Measuring the Effects of Education on Health and Civic Engagement

Proceedings of the Copenhagen Symposium

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Richard Desjardins and Tom Schuller

Editors

Abbreviations

Cedefop	European Centre for the Development of Vocational Training
CERI	Centre for Educational Research and Innovation
CivEd	Civic Education Study
CSE	Civic and social engagement
DESECO	Definition and selection of competencies
ESS	European Social Survey
EVS	European Values Study
IALS	International Adult Literacy Survey
IEA	International Association for the Evaluation of Educational Achievement
ISSP	International Social Survey Programme
OECD	Organisation for Economic Co-operation and Development
PIAAC	Programme for International Assessment of Adult Competencies
PISA	Programme for International Student Assessment
SOL	Social Outcomes of Leaning
WVS	World Values Survey

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1. Introduction
Understanding the social outcomes of learning

By Richard Desjardins and Tom Schuller*

The educational systems of OECD economies continue to grow and with this the total amount of resources dedicated to the total learning effort is reaching unprecedented levels. Are the resources organised and used in a way that fulfills what society intends educational systems to achieve? Do the educational systems provide the right forms and types of learning opportunities? Are the learning opportunities offered at the right time and distributed over the lifespan in the best possible way? Answers are necessary for both public and private officials to effectively guide and manage education and training systems, including the design and implementation of effective and well-informed educational policies.

The effects of education extend beyond the economic sphere. Most agree that the total benefits to society from education are greater than the sum of what individuals earn as a result of their educational attainment. Besides providing the knowledge and skills necessary for economic participation, the schooling system is the primary agent of socialisation in modern societies. Education at all ages plays an equally important role in sustaining economic, social and personal well-being. Accordingly there is now a growing consensus that the links between personal, social and economic well-being and education need to be understood better and communicated to policy makers and the wider public (OECD, 2001).

Policy concerns such as mental and physical health, active citizenship and social cohesion have assumed greater prominence on the political agenda, including as potential benefits of education. But this interest precedes theoretical development and a good information base to make sound policy decisions. While human capital theory links education to economic outcomes and offers a robust framework for scientific investigation and policy analysis, there is to date no widely accepted theory linking education to social outcomes. We need coherent models for understanding better these relationships; for gathering and synthesising what we know and what we want to know; and for drawing out their implications for policy (Behrman and Stacey, 1997; McMahon, 1998, 2000; Schuller *et al.*, 2004).

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The Social Outcomes of Learning (SOL) project

In 2005 the OECD's Centre for Educational Research and Innovation (CERI) in cooperation with the OECD INES Network B (responsible for devising indicators on the outcomes of education) launched a project entitled "Measuring the Social Outcomes of Learning" (SOL). The SOL project is designed to inform economic and social policy that relates to education and lifelong learning. It involves in depth investigations into the nature of the link between learning and well-being, and how such linkages, if warranted, could be used as policy levers to improve well-being through education, and to achieve greater equity in the distribution of well-being. Thirteen countries have so far taken active part in the SOL project.[1]

The project seeks to:

- Develop a framework to investigate these various links.
- Improve the knowledge base for policy decisions on private and public benefits.
- Contribute to more integrated policies across education and other policy domains.
- Foster the gathering and application of evidence on SOL.
- Enable thinking about interactions between economic and social outcomes.

The project is initially focusing on two domain areas: **Health (physical and mental) outcomes of learning**; and **civic and social engagement outcomes of learning**. Two cross-cutting themes are also considered: intergenerational effects of learning via the family and home environment; and distributional effects of learning: how different social groups benefit from education.

The work to date (summer 2006) has achieved a number of things:

- It has been a substantial ground-clearing exercise, ranging over a wide array of existing quantitative studies at national and international level.
- It has explored the issues involved in developing an understanding of the causal relationships in this field; in other words, how to go beyond simple associations between education and social outcomes in order to understand how education directly or indirectly affects them.
- It has developed models for understanding the data better.
- It has begun the work of developing robust indicators which will help us lay the basis for better empirical data and understanding.
- It has begun to sketch out policy implications.

There are a number of general issues which remain to be addressed:

- The material gathered to date does not include qualitative studies which may give important insights into the causal processes. An equally rigorous overview of this material is important.

[1] These countries include: Austria, Belgium (Flemish), Canada, Japan, Luxembourg, the Netherlands, New Zealand, Norway, South Korea, Sweden, Switzerland, the United Kingdom (England and Scotland) and the United States.

- The analyses to date have concentrated on schooling, primarily because this is where data are most readily available. Serious attention needs to be paid to learning later in life, and to informal and non-formal modes of learning.
- We need to build on the current work by differentiating more between types and modes of learning, so as to understand the range of educational effects (including where there is no impact).
- These steps will enable a more developed set of policy implications to be drawn out.

This volume

This volume, which includes major papers on the two principal social domains and a series of responses to them, is the first published output from the SOL project. It will be followed in early 2007 by the publication of a synthesis report which will draw together the different strands of evidence and arguments, and develop policy implications, and include some country papers which will analyse the position in different countries in specific detail.

Two major papers, one for each domain mentioned above, were commissioned directly:

- *Health outcomes and learning experiences*, by Leon Feinstein *et al.*, Director of the Centre for Research on the Wider Benefits of Learning, Institute of Education, London University.
- *Civic and social engagement outcomes and learning experiences*, by David Campbell, Department of Political Science at University of Notre Dame, United States.

The purpose of the two papers was to review concepts, theories, and empirical evidence within the two broad domains. An important aim was to draw out some of the most salient implications for policy and further research, as well as for indicator development. Specifically, the papers aimed to:

- Improve our understanding of the web of relationships that link learning experiences and social outcomes.
- Gather and summarise empirical evidence on the impact of learning experiences.
- Provide a basis for developing strategies that can empirically assess the impact of learning experiences on social outcomes and the channels by which this impact is realised.
- Identify policy levers, and the basis for policy intervention (if any).
- Provide a basis for developing cross-nationally comparative indicators which can inform policy priorities.

Another paper was commissioned by the Social Policy Division of OECD and partly in coordination with the SOL project: *Social disadvantage and education experiences*, by Steve Machin, Professor of Economics, London School of Economics. The paper relates closely to the cross-cutting themes of the SOL project, namely the distributional and

intergenerational effects of learning. It is published separately as an OECD working paper (Machin, 2006).

To review these and other expert papers and consider their policy implications, CERI and INES Network B convened an international symposium on "Measuring the Social Outcomes of Learning" in Copenhagen, on March 23 and 24, 2006, which was hosted by the Danish University of Education. The symposium brought together both individual experts and country representatives.

This volume brings together the two major overviews of the key domains of health and civic and social engagement (CSE), and a number of responses which were commissioned as inputs to the symposium. All these papers were revised for publication following the symposium. The Symposium also discussed papers by Jon Lauglo and Tormod Øia, *Education and Civic Engagement: The Case of Norway*, and Florian Walter, *Political Participation and Education: the Case of Austria*. These are currently being prepared for publication separately.

CSE outcomes of learning

Policy context

The domain of civic and social engagement (CSE) is a broad one. In our definition, it covers both behavioural aspects, for example to do with voting, and attitudinal issues, for example levels of tolerance. The paradox is that education levels have been rising; education is generally positively associated with CSE; and yet most countries share a concern about declining levels of voter participation, and about the state of civic participation generally. The effects of education on CSE are not easily untangled, and unlike health it barely makes sense to put a monetary value on them. However if the rhetoric about education supporting vibrant democratic systems is to be substantiated, we need to understand the patterns more clearly.

Overview of contributions

The overview by **David Campbell** draws together much of the evidence, focussing especially on schooling. It confirms the strong association between education and CSE, and begins to unpack the multiple relationships by means of a framework which distinguishes between absolute, relative and cumulative effects (see below). Campbell's analysis shows how different aspects of the education-CSE relationship are explained by one or other of these models. This framework, applied here to CSE, could be a powerful one for analysing the effects of education in general. For example the education-earnings relationship is subject to the very same alternative mechanisms encompassed within this framework.

As with all the responses, the paper by **Tom Healy** considers some of the gaps and further questions that arise from Campbell's work. Among other points, he elaborates on why we should be interested in CSE outcomes of learning, summarises what we know so far and considers what it is policy makers could do with such information. A major point that he draws our attention toward is that many CSE outcomes of learning are not easily observed or quantified.

John Andersen and **Jørgen Elm Larsen** make a link between Campbell's paper and the social capital literature. They point out the importance of taking into account the wider socio-political context of a nation because this can imply important differences in the quality and purpose of social capital in different national contexts and hence the CSE outcomes that societies are interested in. They also offer a series of reflections regarding a possible multi- and mixed-method approach to further research, including possible ways of measuring school ethos.

Christine Mainguet and **Ariane Baye** elaborate on some of the key elements that are necessary to take into account for developing a framework of indicators relating to CSE. This work is now being carried forward by the OECD INES Network B (see overview by Hudson and Andersson).

Pascaline Descy contributes a small paper that presents select research results on the macro social outcomes of education and training. The results derive from work commissioned by the European Centre for the Development of Vocational Training (CEDEFOP). It illustrates relationships at the macro-social level between educational and income inequality and social outcomes such as general trust, crime and feeling of community safety.

Some key messages

- In general, other things equal, higher levels of schooling contribute to higher and better levels of civic and social engagement.
- A discussion of the social outcomes of learning is useful in recognising the multiple roles that formal education plays from economic to social, cultural and personal.
- Schooling interacts with factors such as social class, gender, ethnic status – understanding of these inter-relationships is still very limited.
- Even so, as David Campbell shows, socioeconomic status is not the only determinant of civic outcomes – looking at civic engagement within and across various social groups shows that some generic lessons and applications are possible.
- Some forms of learning seem to work better than others in fostering CSE – learning environments that stress responsibility, open dialogue, respect and application of theory and ideas in practical and group-orientated work seem to work better than just "civics education" on its own.
- Many other factors impact on CSE as well as schooling – schooling is not a panacea.
- Not all forms of CSE are socially desirable.

Health outcomes of learning

The policy context

As with CSE, research suggests that the relationship between learning experiences and health outcomes is pervasive but the policy context is somewhat different. Spending

on health and healthcare in most OECD countries has risen dramatically over the past five years. All OECD governments are under continuous pressure to reconcile economic and health concerns because the public purse funds the bulk of health spending in most countries. Accordingly, it is increasingly important for government spending departments to understand better the potential savings resulting from policy interventions that relate to investments in learning.

The association between education and health is typically interpreted as a marker of socioeconomic status, because differences in health by levels of education and income often mirror each other. However, the evidence shows that sizable differences in health are partly due to the effects of education and not solely to differences that precede or explain education, such as socioeconomic status. This potential effect raises two important issues that relate to education and health policy:

- A need for a better understanding of the return to investments in learning, and in particular the impact of education on health costs, including public health expenditures.
- A need for a better understanding of the determinants of equity in access and use of health care, and in particular the channels by which education can have an impact on health.

Separately, understanding equity in access and use of health care is a key health policy issue. Income-related inequalities in the use of health care are documented and given due attention. But education has an important impact on economic factors such as income and employment, which in turn affect health outcomes. Moreover, the empirical literature suggests that the role of education is more pervasive than this. It identifies two other possible channels that link education and health outcomes, namely the impact of education on health-related behaviours and psycho-social factors such as self-esteem and empowerment. Additionally, intergenerational factors link parental levels of education and their children's health, independent of income-related effects. Accordingly, it is important to gain a deeper understanding of the nature and extent of the impact of education on health and the channels by which health is affected by learning experiences.

Overview of contributions

The paper by **Leon Feinstein** and colleagues surveys a wealth of evidence, and links it to different types of illness or health domain. This opens up the way to a more detailed understanding of the specific kinds of benefit which education might produce; but also to a potentially powerful set of cost-benefit results, where investment in education can be seen to pay off for society as well as for individuals. The main conclusion is that there exists a stable and statistically significant association between education and health, and that further it is highly plausible to assume that at least part of this association reflects a genuine *causal* effect of education on health. The paper also contributes substantially by considering in detail the possible causal mechanisms behind these effects.

The response paper by **Wim Groot** and **Henriette Maassen van den Brink** considers the size and hence the potential importance of the effects of education on health. They introduce key concepts relating to the measurement of health benefits, such as QALYs (Quality Adjusted Life Years), and make some calculations of the effects. The estimates are tentative at best since a number of assumptions are required, but they nevertheless indicate that the potential health returns to education are substantial and that

this warrants a more comprehensive and integrated policy approach to education and health.

David Hay critiques the omission by Feinstein *et al.* of the many models in the social epidemiological and public health literatures that outline the determinants of health. In those models, education is one among many other determinants. Hay reminds us that reliably sorting out the relative importance of determinants is a key task. He also reminds us that the single best predictor of current health status is prior health status and thus highlights the importance of including the temporal dimension in the investigation of these relationships.

Laura Salganik also mentions the importance of grounding the relationships of interest into a broader framework, since this in her opinion would make transparent the competing hypotheses for how correlations between health outcomes with other factors are generated. She also makes an important link between this work and the OECD work on the Definition and Selection of Competencies (DeSeCo). The material compiled for the DeSeCo project provides a theoretical and conceptual foundation that makes the link between individual behaviour and health outcomes more explicit. In particular, the concept of competence offers a potentially promising way forward in trying to understand further the potential role of education in producing health outcomes.

Some key messages

- Overall, international evidence shows very strong links between education and determinants of health such as health behaviours and preventative service use. Many of these links are causal, *i.e.*, even with rigorous controls the effects go beyond the associational.
- The benefits of education to health go beyond that of schooling. Learning in later life can have substantial effects on health. One study estimates that for every 100 000 women enrolled in adult learning we might expect 116-134 cancers to be prevented.
- Education affects mortality. One US study shows that an additional year of study reduces the probability of dying in the next 10 years by 3.6 years; another Swedish study shows that an additional year reduces the risk of bad health by 18.5%.
- Although precise calculations have to be very tentative, some of these benefits can be costed. A UK study estimates that taking women without qualifications to a Level 2 qualification would lead to a reduction of 15% in their risk of adult depression; with an estimated cost of depression of £9 billion a year, this would lead to a saving of GBP 200 million.
- The health productivity of learning requires considerably more attention from policy makers. Measurement of education depends too heavily on quantity and qualifications. More emphasis should be placed on qualitative evidence which can illuminate how education benefits health, so that policy conclusions can be drawn in relation to curricula and pedagogy at different ages and stages.
- Not all learning is good for health! At a collective level education can increase inequalities, with negative health consequences; and can raise stress levels.

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2. Measuring the social outcomes of learning: OECD Network B's role and perspective

By Lisa Hudson and Dan Andersson*

The Social Outcomes of Learning project is jointly sponsored by two groups within the OECD: CERI and Network B. These groups joined forces because they had a common interest in investigating whether education has positive benefits for individuals and society beyond the economic and labour market benefits that have traditionally been the focus of research. For example, does education help foster civic engagement, does it help individuals lead healthier lives, does it increase social tolerance and cohesion? In short, does education have effects on social outcomes, as well as on economic and labour market outcomes? Both groups are interested in understanding these relationships in order to better inform educational policy-making, either directly through policy analysis, or indirectly through indicator development. This paper outlines in more detail Network B's indicator perspective on the social outcomes of learning.

The indicator perspective

Network B is part of the OECD's Indicators of Education Systems (INES) programme. The INES programme implements procedures for the development of statistically comparable data on education systems across countries, data that are used to develop international indicators of education systems. These indicators are published annually in the OECD report *Education at a Glance – OECD Indicators*.

Before examining Network B's role in the SOL project, it helps to understand exactly what an indicator is and the purpose it serves. Simply stated, an indicator is a statistic (or set of statistics) that provides a succinct description of the condition or performance of a system (*e.g.*, institution, service, economy, society). Indicators can describe inputs, processes, or outcomes. They can be used to provide evidence of how conditions or performance vary over time (by comparing indicators at different points in time) or across a system (by comparing indicators for different entities, such as schools, within a system). Indicators used to monitor national economic and labour market conditions tend to be fairly well-known, and include indicators such as the consumer price index and inflation rate (for economic conditions) and the unemployment rate and job-growth rate (for labour market conditions). Within education, schools or countries may use indicators such as

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pass rates on standardised tests, secondary-school graduation rates, or school drop-out rates to monitor students' progress.

Finally, good indicators have a number of characteristics (as also noted in Section 3.C in this volume):

- Relevance: The condition or performance measured by the indicator should be important to policy makers. That is, the indicator should address an important policy question or issue.
- Validity/accuracy: An indicator should measure the condition or performance of interest in a meaningful way; it should measure what people believe it measures.
- Reliability/consistency: An indicator should be measured consistently and with little error.
- Clarity/interpretability: An indicator should be easy to understand and interpret.
- Accessibility/feasibility: The data for an indicator should be readily available and affordable to collect.
- Timeliness: The information provided by the indicator should be timely, so that it provides information relevant for current policy action.
- Coherence: Sets of indicators should be logically connected and mutually consistent.

Network B indicators

Within the INES programme, Network B was originally responsible for the development of indicators of "student destinations"; that is, indicators that show what happens to people (with varying amounts of educational attainment) after they leave the education system. Historically, the Network has focused on the development of indicators of individual's economic and labour market outcomes. For example, one indicator shows, within each country, the relationship between individuals' educational attainment level and their earnings. Other indicators focus on equity issues, comparing earnings within education levels for males and females, and the distribution of earnings within each country. Additional indicators show the relationship between individuals' educational attainment level and (a) employment rates and (b) unemployment rates. Indicators of the outcomes of adult learning are also under development.

All of these indicators are used to demonstrate the role of education (often mediated by other policies, such as income redistribution policies) in fostering individual's economic success. Although there are competing hypotheses, this interpretation is supported by human capital theory, which is in turn supported by a fairly robust evidence base. Specifically, human capital theory postulates that education provides the skills and knowledge (human capital) needed in the workplace; the more human capital one obtains, the more valuable one is within the labour force, leading to a higher rate of labour force participation and higher earnings. Thus, the Networks' core indicators can confidently be interpreted to at least in part show *the effects of* education on labour market outcomes. Given this interpretation, these indicators are relevant to policy makers who want evidence on 1) the success of their education system in improving labour market outcomes, and 2) the economic value of their education system for individuals and

society. In other words, the indicators meet the first criterion above of being policy-relevant.

Much of the evidence for the relevance of human capital for economic well-being was reviewed in the 2001 OECD publication *The Well-Being of Nations*. More importantly, however, that report advocated for a broader perspective on well-being that moves beyond economics to include other important aspects of individual and social life, such as health, social cohesion, social trust, and civic participation. In the wake of *The Well-Being of Nations*, interest has grown within the OECD in understanding the broader effects that education may have beyond labour market effects. Within this broader perspective, Network B is interested in expanding its indicator development work to include indicators that demonstrate education's effects on non-economic aspects of well-being.

However, the requisite policy and measurement frameworks needed to support indicator development do not yet exist for social outcomes indicators. It is unclear, for example, whether one can assume that an indicator showing a positive relationship between education attainment level and voting rates indicates an effect of education on voting behaviour. Perhaps people who stay in school are also more likely to vote, not because of some benefit of education, but because these individuals are more "socially compliant" or have a greater sense of control over their lives, either of which could motivate participation in both education and voting. In this case, indicators of the relationship between education and voting would have less relevance for education policy makers, as they could not be interpreted as showing a beneficial effect of education on individual or social life. Thus, before proceeding with the development of indicators of the social outcomes of education, we need to understand better the nature and causes of the relationship between education and social outcomes. In particular, three key issues need to be addressed before proceeding with indicator development:

- Theoretical issue: What would the indicators mean – what would they tell us? More specifically, to what extent does learning contribute to social outcomes, and through what mechanisms? What other factors may mediate this relationship? If learning cannot be shown to contribute to social outcomes, what interpretation or purpose would such indicators have; what would their relevance be to policy?
- Measurement issue: Would the indicators provide information we can believe? Specifically, how reliable and valid are various measures of social outcomes, particularly across countries? Which outcomes are more amenable to international measurement, and which less so? What proxy measures are acceptable?
- Data issue: How would we get the information for indicators? What international data sources currently exist, and what is the quality of the data from these sources? How could existing data sources be improved for this purpose? What future data collections might provide useful information? In particular, how could the OECD's planned Programme for International Assessment of Adult Competencies (PIAAC) contribute to this effort?

The SOL work thus far, summarised in this volume, has focused on the first of these three issues. The second two issues will be addressed in two expert papers that were recently commissioned subsequent to the Copenhagen symposium. These papers will focus on the same two social domains targeted in the first part of the project (civic/social engagement and health). The paper authors are, for civic and social engagement, Christine Mainguet and Ariane Baye (from Belgium) and for health, San Keller and Dan

Sherman (from the United States). These papers will determine, first, for which specific aspects of health and civic/social engagement indicators should be developed, and second, for each specific social outcome, how to best develop indicators that demonstrate the relationship between education and the social outcome. This evaluation will include a review and discussion of measurement issues related to the outcome (*e.g.*, can it be measured validly and reliably across countries?); rationales for different levels of measurement; the potential of available data sources for indicator development, with proposals for revisions to existing data collection instruments and additions to future surveys in order to provide data for indicators; and the development of prototype indicators (based on existing data) and hypothetical indicators (based on data proposals).

At the end of the SOL project, Network B hopes to have answers to the key questions listed above, summarised in three key project outputs:

- A research-based rationale for indicator development, including the policy relevance of social outcomes indicators.
- Recommendations to OECD for the most reliable and valid measurement strategies.
- Recommendations to OECD for data collection strategies and sources, including proposals for the use of PIAAC.

The symposium papers

The papers included in this volume provided Network B with a rationale and direction for the indicator development work described above. A key decision resulting from these papers was that this development work should proceed, but with a different rationale from that originally proposed by the Network. As discussed above, the original goal was to develop indicators showing the relationship between education and, for example, health status, in order to demonstrate *the effect* of education on health status. However, although the papers in this volume present fairly strong evidence for such a causal relationship, questions remain about the relative size of this effect and the mechanism through which it operates. As virtually every author noted, we need better data to answer these questions. Thus, the current argument for indicator development rests on indicators' utility as signals to provide attention to and stimulate discussion of the role of education in society, including the broader social goals that education systems (and learning in general) should have. For example, should individuals' likelihood of voting be related to their education level, or should voting rates be equivalent across education levels? What differences in education systems, political systems, and cultures exist across countries that could account for differences in the relationship between voting and education level? How does the prevalence of tobacco smoking vary across countries when examining individuals at the same education level? What do these differences suggest about the specific roles and challenges faced by education systems within each country?

Listed below are some additional points relevant to indicator development made by the authors of the two major commissioned papers (Feinstein *et al.* and Campbell) and the authors of the two response papers that focused on indicator issues (Mainguet and Baye, and Salganik). The other papers also include issues relevant to indicator development.

Feinstein *et al.* conclude that the evidence for the effects of education on health is sufficient to support indicator development to "compare internationally the harnessing of education productivity in the service of health outcomes". They also recommend,

however, for improved data collection and analysis, including longitudinal studies to support causal analysis; natural experiments to test causal models; qualitative data to shed light on the mechanisms through which education and social outcomes are related, particularly on the qualitative aspects of education (as opposed to the quantitative educational attainment measure); and more extensive use of existing international datasets to explore alternatives for indicator development.

Campbell also argues for indicator development to summarise the relationship between education and civic engagement, at both the individual level and the classroom level. His paper tests different models of causality that have implications for how indicators should be developed. For example, outcomes that are related to education under the "absolute model" should be assessed with indicators that relate each individual's social outcome to their own education level, while under the "cumulative model", indicators are best developed that relate each outcome to the overall education level in the individual's environment. This paper underscores the need to more fully understand education and social outcome relationships in order to develop indicators that are appropriate to demonstrate these relationships.

Mainguet and Baye detail a number of conceptual and methodological issues that must be considered prior to indicator development. They first point out the need for a clear underlying framework and definition of terms. For example, does "civic engagement" include attitudes, values, and knowledge as well as behaviours? And how are these different aspects of civic engagement related to each other? These authors also note the need to consider appropriate levels of measurement (micro/individual, meso/community, macro/national), the importance of the distribution of (equity of) outcomes, the possibility of threshold effects (*i.e.*, education may not have an effect until some minimal level is attained), and the comparability of concepts and measures across countries. Each of these issues has important implications for what should be measured in an indicator and how the indicator should be constructed.

Salganik picks up on the framework issue raised by Mainguet and Baye. She points out the need to place the relationship between education and a given social outcome within a broader framework that includes all (major) influences on the outcome. As Salganik notes, a broad framework helps make explicit the nature of the relationship between education and a given social outcome, as well as the size of education's effect relative to other influences. Salganik also emphasises the need for a rationale for how education affects each social outcome. Salganik suggests the OECD Definition and Selection of Competencies (DeSeCo) project as a useful tool for this purpose. For example, what competencies (or components of competencies) does education provide that make individuals better able to maintain a healthy life? Finally, she notes the importance of including a broad range of stakeholders in the framework and indicator development process, and the use of indicator measures that are widely recognised and understood.

3. What is education's impact on civic and social engagement?

By David E. Campbell*

Introduction

While policy makers widely recognise the fact that education serves as an engine for economic growth through the accumulation of *human* capital, education is also strongly associated with boosting levels of *social* capital. Indeed, an important justification for the large expenditures on education within many democratic nations is its social, and not just economic, impact – the benefits an educated electorate brings to civil society. At a time when many civic indicators show a decline across OECD nations, it is thus imperative that we better understand the connections between education and civic and social engagement (hereafter, CSE). This report thus has the narrow objective of taking a step toward sorting through the possible mechanisms linking education and CSE, both through a review of the extant literature and original data analysis. Its broader objective is to consider whether it is worthwhile for the OECD to pursue the development of indicators pertaining to education's impact on CSE.

Anyone with even a cursory familiarity with the literature on civic and social engagement may assume that linking education and CSE is an easy task, and can be summarised tidily: education has a universally positive effect on all forms of engagement. The research literature on civic and social engagement, both old and new, is replete with references to the impact of education. Writing over thirty years ago, Converse (1972) memorably phrased his description of the tight link between education and engagement:

> *"Whether one is dealing with cognitive matters such as level of factual information about politics or conceptual sophistication in its assessment; or such motivational matters as degree of attention paid to politics and emotional involvement in political affairs; or questions of actual behavior, such as engagement in any of a variety of political activities from party work to vote turnout itself: education is everywhere the universal solvent, and the relationship is always in the same direction. The higher the education, the greater the 'good' values of the variable. The educated citizen is attentive, knowledgeable, and participatory and the uneducated citizen is not." (p. 324)*

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This paper was prepared for presentation at the Symposium on Social Outcomes of Learning, held at the Danish University of Education (Copenhagen) on 23-24 March 2006. I am grateful for the helpful suggestions made by the participants in the symposium, as well as the detailed reviews provided by John Andersen and Tom Healy. Richard Desjardins and Tom Schuller have also provided invaluable feedback. Their input has greatly improved this report but, of course, all errors remain mine.

While Converse's description of the "universal solvent" is oft-quoted, he was hardly the first to note the breadth of education's empirical relationship to myriad forms of engagement. He was simply articulating the conventional wisdom among social scientists of his time. In their seminal book *The Civic Culture*, published a decade prior to Converse's words, Almond and Verba (1989 [1963]) wrote very similar words:

> *"As in most other studies of political attitudes, our data show that educational attainment appears to have the most important demographic effect on political attitudes. Among the demographic variables usually investigated – sex, place of residence, occupation, income, age, and so on – none compares with the educational variable in the extent to which it seems to determine political attitudes. The uneducated man or the man with the limited education is a different political actor from the man who has achieved a higher level of education." (pp. 315-316)*

Writing in the 1970s, Marsh and Kaase (1979) again noted the striking empirical regularity linking education and engagement. And, again, the same conclusion is echoed in contemporary scholarship; the conventional wisdom of the past remains so in the present. For example, in his exhaustive analysis of trends in social capital within the United States, *Bowling Alone*, Putnam (2000) reiterates the tight link between education and almost any imaginable type of CES.

> *"Education is one of the most important predictors – usually, in fact,* the *most important predictor – of many forms of social participation – from voting to associational membership, to chairing a local committee to hosting a dinner party to giving blood. The same basic pattern applies to both men and women and to all races and generations. Education, in short, is an extremely powerful predictor of civic engagement." (p. 186)*

In light of the fact that education has for so long been recognised as so significant a predictor of CSE, it is ironic that the precise nature of that link remains largely in the proverbial black box. We know that people attend school, and then they experience a boost in their level of engagement. What precisely happens to them while in school (if anything) to lead to an increase in engagement is not well understood. In spite of – or perhaps because of – the widespread consensus on the universal, strong, and positive relationship between education and CSE, the causal mechanism(s) underlying that relationship have been subjected to relatively scant scrutiny. Indeed, one school of thought holds that, for at least some types of engagement, the content of education does not matter at all. Education only serves to enhance an individual's socioeconomic status, which in turn increases engagement.

As a reflection of how much has yet to be learned about the connection between education and engagement, it is not difficult to identify puzzling trends that would seem to fly in the face of the claim that "education is the universal solvent". Perhaps the best known puzzle is that the individual-level relationship does not appear to hold up when we examine trends in the aggregate. Across much of the industrialised world, education levels have been rising while political engagement of all sorts has been falling. Voter turnout provides an illuminating case in point. Wattenberg (2002, p. 28) compares voter turnout rates for 16 OECD member nations from the 1960s to the present and finds that, on average, turnout has fallen by 13.2%. This ranges from Switzerland, which has seen turnout fall by 34 percentage points, to Germany (12 points) to Sweden (1.5 points).

The apparent contradiction between a positive individual-level relationship and one that, over time and in the aggregate, is apparently negative has long been noted in the United States, which was the first of the industrialised democracies to experience a decline in voter turnout – a trend that is now widely observed across many nations (Franklin, 2004). Almost thirty years ago, Brody (1978) labelled the phenomenon of falling political engagement in the face of rising education, the "paradox of participation". Even more puzzling is the fact that the decline in voter turnout, and other civic indicators, is concentrated among the youngest age cohort of the population – who generally also have the highest average level of education.

I mention the paradox of participation not because I can offer a simple explanation for it, but simply to make the point that there is much to be learned about the intricacies of the links between education and CSE. (We will, however, see evidence that does speak to the paradox of participation.) While virtually every empirical model designed to predict CSE includes a measure of education, few analysts stop to consider just what that variable is capturing. Is it cognitive sophistication? Social status? Adherence to democratic norms? Civic skills? Or, as is most likely, is it some combination of these, and still other, factors? Furthermore, which aspects of education shape which forms of civic and social engagement? Even more elementally, can we speak of education having an effect, in a causal sense, on engagement? Could it not be that the relationship between education and at least some forms of CSE is spurious? That is, perhaps the impact attributed to education is really owing to other characteristics that are themselves correlated with education.

In short, this report scratches below the surface of the well-known positive relationship between education and CES, in an effort to determine whether there is reasonable evidence to characterise that relationship as causal and, if so, the specific nature of those causal links.

Executive summary

Section 3.1

Education is widely recognised as having a strong correlation with multiple forms of civic and social engagement (CSE). In spite of – or perhaps because of – the widespread consensus on the universal, strong, and positive relationship between education and CSE, the causal mechanism(s) underlying that relationship have been subjected to relatively scant scrutiny.

Understanding the relationship between education and civic and social engagement requires delineating multiple dimensions of engagement, namely: political engagement, civic engagement, voting, trust, tolerance, and political knowledge.

Section 3.2

Two independent studies have shown that the introduction of compulsory education laws in the United States and the United Kingdom provides evidence that education has a causal relationship to multiple forms of engagement, including voter turnout, group memberships, tolerance, and the acquisition of political knowledge (newspaper reading). Similarly, using a young person's proximity to a community college as an instrument for

college attendance reveals that a post-secondary education has a positive impact on voter turnout.

Section 3.3

Previous research has proposed three different models whereby education could have an impact on each of the dimensions of engagement. One is the *absolute education model*, which states that an individual's own level of education is the driving mechanism. Another is the *sorting model*, which is premised on the assumption that education serves as a marker of social status. According to the sorting model, it is individuals' level of education relative to their social environment that facilitates engagement. Finally, there is the *cumulative model*, under which engagement rises in accordance with the average education level of one's compatriots. Using data from the European Social Survey (supplemented by the European Values Survey), the absolute education model is found to best explain expressive political activity, voting, membership in voluntary associations, and institutional trust. The sorting model applies to conflict-centered political engagement, while the cumulative model explains interpersonal trust.

Section 3.4

The extant literature has proposed multiple aspects of formal education that could conceivably have an impact on civic and social engagement. These include: development of bureaucratic competence, civic skills, cognitive capacity, curriculum (including the opportunity to discuss social and political issues in the classroom, or what is labeled classroom climate), student government, habits of associational involvement, and volunteering in the community (service learning).

The 1999 IEA Civic Education Study is the most comprehensive source of data on the civic education received by adolescents. Comprising data collected in twenty-eight nations, it measures many (although not all) aspects of education that have been hypothesised to affect civic and social engagement. One in particular that stands out is the openness of the classroom climate, or the degree to which students are able to discuss political and social issues in class. Classroom climate has a positive impact on every dimension of engagement included in the analysis: knowledge, skills, intention of being an informed voter, intention of being civically engaged, intention of being politically engaged, institutional trust, and tolerance.

Section 3.5

While much about the links between education and engagement has yet to be learned, the preponderance of the existing evidence recommends moving forward with more analysis, including the development of indicators pertaining to the links between education and engagement. Such indicators might include individual-level measures of young people's civic and social engagement and extra-curricular involvement, as well as aggregated measures of the "ethos" or culture within a school. School ethos can incorporate the openness of the classroom climate, the degree to which students' opinions are respected by teachers and administrators, and the overall sense of community within the school.

3.1. Dimensions of engagement

This chapter outlines the seven dimensions of engagement that will be discussed throughout this report: political engagement, civic engagement, voting, trust, tolerance, and political knowledge. It then turns to a brief discussion of lifelong learning – education undertaken in the adult years – an undoubtedly important but understudied type of education shaping civic and social engagement. Future research on engagement should prioritise the study of adult learning.

Before proceeding, it is necessary to pause for a definitional note in order to clarify just what is under investigation. The term "civic and social engagement" is broad – deliberately so – and thus requires further precision. Unfortunately, the literature on CSE is complicated by the lack of consensus on just what it entails and how it should be measured. Sometimes, the same concepts are described using different terms by various authors. Other times, different concepts are given the same labels across studies.

Some analysts group many different forms of engagement together into a composite measure (Putnam, 1993), while some draw careful distinctions between various types (Nie, Junn and Stehlik-Berry, 1996; Zukin *et al.*, 2006). The precise distinctions vary from study to study, even those that employ the very same sources of data.

Within this report, reference will be made to seven different types of engagement, all of which find support within the existing literature. I do not claim that this list is exhaustive, but it does cover the most commonly-discussed forms of engagement. The reader is reminded that other authors may use different terms to refer to these same concepts, or similar terms to refer to different forms of engagement.

I begin by distinguishing between two terms that are, regrettably, often used interchangeably. An important distinction can be drawn between engagement that is **political** and that which is **civic**. Loosely speaking, the difference is that the former involves efforts to influence public policy, while the latter does not. The best evidence for the civic/political divide among types of participation comes from a classic study by Verba and Nie (1972), and an equally ambitious new one by Zukin *et al.* (2006). Verba and Nie draw a distinction between activity that is conflictual and non-conflictual, contrasting activities like political campaigning with intrinsically cooperative activities like membership in (most) voluntary associations. Using data collected over thirty years later, Zukin *et al.* similarly differentiate between cooperative and conflictual activity. In the terminology to be used here, cooperative/non-conflictual activity is equated with civic engagement, while conflictual acts are characterised as political in nature.

Based on this body of research, the operational definition of political participation is borrowed directly from Verba and Nie, and has been repeated in its essentials by Verba, Schlozman, and Brady (1995):

> *"Political participation refers to those activities by private citizens that are more or less directly aimed at influencing the selection of governmental personnel and/or the actions they take." [This includes working on political campaigns, contacting public officials, etc.]*

The key to the definition is the *end* to which the activity is directed – actions taken or policies enacted by public officials. Similarly, then, *civic participation* is also defined by its end:

> *"Civic participation refers to non-remunerative, publicly spirited collective action that is not motivated by the desire to affect public policy." [Belonging to voluntary associations, volunteering in the community, etc.]*

There is an interesting ambiguity in one of the most frequently studied forms of engagement, namely **voter turnout**. It is treated as unique form of engagement, owing to a long line of research that has demonstrated that for analytical purposes, voting should be analysed on its own. It is not properly grouped with either civic or political engagement, as it shares the motivations of both (Blais, 2000; Butler and Stokes, 1974; Campbell *et al.*, 1960; Campbell, Gurin and Miller, 1954; Campbell, 2006; Downs, 1957; Fiorina, 1976; Riker and Ordeshook, 1968; Schlozman, Verba and Brady, 1995; Shachar and Nalebuff, 1999). In the words of Verba, Schlozman, and Brady (1995):

> *"[V]oting is fundamentally different from other acts… [T]he origins of voting are different. Compared with those who engage in various other political acts, voters report a different mix of gratifications and a different bundle of issue concerns as being behind their activity. Finally, the configuration of participatory factors – that is, the mix of resources and motivations – required for voting is unique. To repeat, on every dimension along which we consider participatory acts, voting is* sui generis*. For this reason, it is a mistake to generalise from our extensive knowledge about voting to all forms of participation." (pp. 23-24)*

The fourth and fifth types of engagement relate to **trust**, which is the subject of a voluminous literature (Fukuyama, 1995; Hardin, 2002; Inglehart, 1990, 1997; Putnam, 1993, 2000; Uslaner, 2002). Trust in other people, termed interpersonal trust is central to the concept of social capital, as it serves as the "lubricant" for reciprocity, both generalised and specific. Furthermore, a healthy democracy is presumed to require at least a modicum of trust in the institutions of government, termed institutional trust. The optimal degree of such trust remains a matter of debate, as too much trust is antithetical to the concept of a responsive citizenry keeping its elected leaders in check. Inglehart wisely notes that while we cannot be sure of the precise causal connection, the preponderance of the evidence shows that "trust and stable democracy [are] closely linked" (1997, p. 174).

Sixth, this report will refer to **tolerance**. As with trust, there is a long-standing literature on the significance of tolerance to a healthy democracy. Perhaps no one has articulated its significance better than Sullivan, Piereson and Marcus (1982):

> *"Though liberal societies may be divided by intense conflicts, they can remain stable if there is a general adherence to the rules of democratic or constitutional procedure. Tolerance in this sense implies a commitment to the 'rules of the game' and a willingness to apply them equally." (p. 2)*

Because the term tolerance is widely used in the discourse of the general public, it is important that its definition in this context be made clear. As the term is used here, it specifically refers to whether someone is willing to extend free speech rights and similar

civil liberties to minorities that are generally unpopular and/or viewed with widespread suspicion.

The seventh form of engagement is the one that perhaps – *prima facie* – has the strongest association with education, namely **political knowledge**. A growing literature makes the case that, independent of other related factors, more knowledge about politics improves both the quality and the quantity of participation in a democratic system (Delli Carpini and Keeter, 1996; Milner, 2002). While people with more education usually have more political knowledge, education and knowledge are not merely substitutes for one another, as there are empirically-tractable differences between one's level of educational attainment and what is sometimes called political sophistication (Luskin, 1987, 1990; Zaller, 1992).

To recap, then, for the purposes of this report, the term civic and social engagement (CSE) consists of a general rubric under which seven specific types of engagement are found: political engagement, civic engagement, voting, interpersonal and institutional trust, tolerance, and political knowledge. Table 3.1.1 provides a synopsis.

Table 3.1.1. Seven dimensions of engagement

Political engagement Activity aimed at influencing public policy
Civic engagement Publicly-spirited activity that is not primarily motivated by a desire to influence public policy
Voter turnout Voting in public elections
Interpersonal trust Trust in other people
Institutional trust Trust in public institutions, such as the government and political parties
Tolerance A willingness to extend civil liberties to unpopular groups
Political knowledge Knowledge about democratic institutions and processes

Notwithstanding the subdivision of CSE into these seven dimensions, for the sake of parsimony there will be points in the general discussion when all forms of CSE will be grouped together, as the extant literature has observed a positive relationship between education and virtually all forms of engagement. As the discussion proceeds, however, distinctions will be drawn among different types of CSE, as we will see that there are both theoretical and empirical reasons to conclude that education does not have a single, universal impact on all forms of CSE.

Lifelong learning

This report focuses on primary, secondary, and post-secondary education – the three levels of education commonly meant by *schooling*. However, education needs not end upon the completion of a secondary or post-secondary degree. Many people continue their education by taking adult education courses, the motivations for which vary. Some people engage in adult education sponsored by their employer, receiving training relevant to their job. Others pursue academic coursework on their own, perhaps to receive accreditation or to acquire skills and knowledge to better their employment options. Still others take classes purely out of interest in the subject matter.

Unfortunately, little is known about the consequences of adult, or lifelong, learning for civic and social engagement. Survey data collected to measure CSE outcomes always include a measure of formal educational attainment, but rarely do such surveys inquire about lifelong learning. Yet there are good reasons to think that adult education would have effects on CSE; most, perhaps all, of the factors thought to link secondary and post-secondary education and higher levels of CSE also apply to adult learning.

Milner (2002) laments the absence of systematic research on the civic implications of adult learning, but points to suggestive evidence that this form of education contributes to what he labels "civic literacy". In particular, he highlights the well-known study circles of Sweden as an especially effective method of adult education. Given the high level of participation in study circles among Swedish adults, and the emphasis placed on public affairs in this type of education it seems highly likely that they do serve to enhance political knowledge and interest, which in turn are precursors to greater political engagement. Given the unique nature of the Swedish emphasis on adult education, though, one probably can not generalise the study-circle experience to other nations, which have other forms of adult education.

A notable exception to the lacuna of research on adult learning is a recent study conducted by Feinstein, Hammond, and their associates at the Centre for Research on the Wider Benefits of Learning (Feinstein and Hammond, 2004; Feinstein *et al.*, 2003). They have analysed data from the British National Child Development Study, a panel survey that began in 1958, in order to test the impact of adult learning between the ages of 33 and 42. While the Feinstein *et al.* research is limited to Britain, the nature of the adult education under investigation is not idiosyncratic to the British experience. Their study included both health and social capital outcomes, but here our attention is on CSE. In general, they find that adult learning leads to increases in voter turnout, membership in voluntary associations, and racial tolerance, while participation in such courses leads to decreases in authoritarianism and political cynicism. The one exception is vocational accredited courses, which do not have an observable impact on either civic or political engagement. Among the types of courses that do have an effect, academic accredited courses have the biggest effect on attitudes, tolerance in particular. Leisure courses (those with no accreditation component and which are not sponsored by one's employer) also lead to an increase in racial tolerance, as well as membership in civic organisations.

The research by Feinstein *et al.* is an important contribution to our understanding of adult learning. While the observed effects are modest in magnitude, the fact that any change can be found in civic-related measures during this period of the life course is remarkable, as this is the stretch of life in which such attitudes and behavior are most stable. The authors are careful to account for both reverse causality and selection bias and, while the data do not meet the "gold standard" of randomised experimentation, the analysis is nonetheless rigorous and convincing.

The rigor of the Feinstein *et al.* research suggests strongly that, as Milner suggests, adult education has substantial consequences for CSE. But for all its virtues, it is still only a single study in a single nation. Clearly, much more can be learned about the effect of adult learning on many different outcomes, including civic and social engagement. In addition to indicators tied to secondary education, as described above, fruitful research could be conducted if data were collected on adults' participation in educational programmes. The US National Child Development Study provides a useful template, as it demonstrates the utility of differentiating among the many different types of adult

learning: accredited academic courses, accredited vocational courses, work-related courses, and leisure courses.

Because there is so little research on civic and social effects of lifelong learning, this report will forgo a more detailed discussion of the subject. Hopefully, this gap in our knowledge about the consequences of this under-appreciated form of education will be filled by future research. Until that time, I simply note that there is more work to be done.

3.2. Evidence for causation

In the absence of large-scale randomised experiments, it is difficult to determine whether the observed relationship between education and CSE is causal in nature. Two recent studies have tackled the causation question by exploiting natural experiments, namely the introduction of compulsory education laws in the United States and the United Kingdom. Both find evidence that education and multiple forms of engagement are in fact causally related. Likewise, using a young person's proximity to a community college as an instrument for college attendance reveals that a post-secondary education has a positive impact on voter turnout.

Untangling causation

Before plunging into the question of how education might affect CSE or any of its constituent dimensions, it is important to consider the evidence for whether the positive relationship between education and CSE can be considered *causal* in nature. The paradox of participation – increasing education levels in the face of decreasing political engagement – gives some grounds to think that perhaps the relationship is not causal. Dee (2004) notes that the link could be spurious:

> *"since both schooling and civic outcomes are simultaneously influenced by a wide variety of inherently observable traits specific to individuals and the families and communities in which they were reared. For example, individuals who grew up in cohesive families and communities that stressed civic responsibility may also be more likely to remain in school. The plausible existence of such unobservables implies that conventionally estimated correlations may spuriously overstate the true civic returns to education." (p. 1698)*

In other words, it might not be education per se that increases civic and social engagement, but rather a common motivation that spurs both CSE *and* educational attainment. Obviously, if this were the case it would call into question whether changes in a nation's education system would actually lead to widespread civic and social benefits. Put bluntly, if there is no reason to think that education is causally related to engagement, there is no reason to take this discussion any further.

Determining causation, however, is not an easy proposition, as the most convincing evidence for any causal relationship is derived from controlled experiments. At the risk of vast understatement, it is difficult to conceive of a randomised experiment that would permit the definitive determination of whether there is truly a causal relationship between education and CSE. In the absence of controlled experiments, therefore, analysts interested in probing causation have turned their attention to natural experiments.

Specifically, two recent studies have exploited similar analytical strategies to test whether education and CSE share a causal connection.

Proximity to college and compulsory education laws

One such study is by the aforementioned Dee (2004), who employs two different instrumental variables to predict educational attainment, both in the American context. First, he uses respondents' geographic proximity to junior and community colleges[1] while they were adolescents as an instrument to predict entrance into college, on the assumption that distance to a junior and community college is not related to civic engagement as an adult. (Note that for this analysis, civic engagement is operationalised as voting and community volunteering.) Using a two-stage regression model, he finds that college entrance has a significant, substantial, and positive effect on voter turnout. College entrance increases the probability of both registering to vote (roughly 22 percentage points) and actually turning out at the polls (17 points). It does not, however, enhance the probability of community volunteering, as that relationship is negative but statistically insignificant.

Dee's second analysis exploits variation in the adoption of child-labor laws across American states, which other research has shown to be a viable instrument for predicting educational attainment (Acemoglu and Angrist, 2000; Angrist and Krueger, 1991; Lleras-Muney, 2002). Using the US General Social Survey, Dee concludes that graduating from high school has a positive but weak effect on newspaper reading (which is related to political knowledge) and group memberships (a form of civic engagement as defined here). The evidence is more conclusive for both voter turnout and support for the free speech rights of anti-religionists, communists, and homosexuals. In sum, more schooling increases both turnout and tolerance.[2]

Dee's analysis parallels a similar one by Milligan, Moretti, and Oreopoulus (2003), although the two studies were apparently done independently of one another. Within the United States, Milligan and his colleagues use both compulsory education and child labor laws as instruments for educational attainment, and find that both have an almost identical impact on voter turnout. Strengthening the generalised application of their findings, Milligan, Morettie and Oreopoulus also turn to data from Britain. Within the United Kingdom, comparisons can be made across age cohorts, as compulsory education laws changed twice in Britain between 1920 and 1995. As well, Milligan *et al.* gain analytical leverage from comparing differences between people who spent their adolescence in Northern Ireland and other Britons, since the compulsory schooling law changed at a different time in Northern Ireland than in the remainder of the nation. As in the United States, they find that more years of schooling boost voter turnout, although the effect is not as strong as in the United States.[3] Milligan *et al.* also present evidence that

[1] These are post-secondary institutions with non-competitive admission practices and low tuition, which generally offer two-year degrees. They are often the first step toward attending a four-year college, especially for students who are the first in their family to attend any college.

[2] One more year of secondary school boosts turnout by about 7 percentage points, and increases support for the free speech of anti-religionists, communists, and homosexuals from 8 to 12.5 percentage points. The effects on tolerance for people who believe blacks are inferior and those who advocate a military-led government are also positive, but fall short of statistical significance.

[3] They further allude to an analysis of Canadian data, which is consistent with what they find in the United States and the United Kingdom, but do not present their results.

the "education effect" in the United States is largely owing to the fact that more education increases the probability of voter registration, rather than turnout itself among the registered.[4]

Milligan *et al.* do not stop with voter turnout, as they extend their analysis to other measures of engagement that straddle the political engagement and knowledge dimensions described above, such as following political campaigns in the news, attending political meetings (both in the United States) and various measures of political attentiveness and discussion (United Kingdom). Education is shown to have a positive effect on each form of engagement.

Education and voter registration

The conclusions of Dee and Milligan *et al.* speak to a disagreement within the research literature on whether the peculiar system of voter registration within the United States, in which the responsibility for registration falls on the individual and not the state, is an especially strong deterrent for people with less education. Beginning at least with Wolfinger and Rosenstone's seminal *Who Votes?* (1980) (about which we will learn more below), many scholars have thought that registration barriers unduly affect people with less education (Piven and Cloward, 1988). Nagler (1991), however, has argued that this conclusion is merely a statistical artifact. Dee finds college entrance to have an especially large impact on voter registration, which when coupled with Milligan *et al.*'s conclusion, suggests that Wolfinger and Rosenstone were correct in the first place. It is easy to dismiss this debate as applying only within the United States, but it has the potential for a broader application. Contrary to conventional wisdom in the literature on cross-national trends in voter turnout, the United States is not alone in imposing barriers to voter registration. Pierce (1995), for example, estimates that almost 20% of the voter-eligible population in France does not appear on the voter rolls, roughly the same as in the United States. Similarly, Wattenberg (2002) details how Canada, New Zealand, and Britain have also recently experienced declines in the percentage of the population on the electoral list. The Canadian example is particularly telling, as the Canadian government introduced a new voter registration system that mirrors what is used in the United States, and voter registration rates have fallen accordingly (to only 85%). It seems likely that the observed declines in voter registration rates are concentrated among people with limited education, although, admittedly, at this point such a claim remains only an hypothesis.

Conclusions about causation

Because they employ innovative strategies to "crack the causation nut", both the Dee and Milligan *et al.* papers make a significant contribution to the literature on CSE. Employing similar methodology, but using different sources of data, these two complementary studies present a strong case that the long-observed relationship between education and CSE *cannot* simply be dismissed as spurious.

These plaudits aside, both studies still leave many questions unanswered. As with any models employing two-stage regression models, the plausibility of the instrument is

[4] In the United States, voter registration is defined as the responsibility of the individual, as there is no automatic registration for the voter rolls. The registration process varies from state to state, although reforms of the last decade have generally made it easier to register.

critical. Do these particular instruments stand up to close scrutiny? In this case, there is other evidence to suggest that proximity to junior and community colleges is a reasonably reliable predictor of college entrance, and compulsory attendance/child labor laws are robust predictors of educational attainment (but only up to the point of high school graduation and thus not college attendance). In both cases, though, the use of the instrument requires a trade-off. Proximity to junior and community colleges can only be used to predict attendance at institutions of this particular type. Furthermore, Dee's study is limited to predicting whether someone attends, not graduates from, such a school. What about earning a four-year degree or completing graduate school? Similarly, the use of compulsory attendance/child labor laws imposes strict limitations on any inferences to be drawn. In this case, we only know the impact of time spent in secondary education, and not in higher education. When our attention is on the United States and the United Kingdom, where compulsory education laws are unlikely to change dramatically, this analytical strategy will likely have limited utility in future research, as it is only viable when analysing data from people who are old enough to have come of age before the law changed. These studies do underscore, though, that analysts should be aware of the research possibilities that arise from a change in a nation's compulsory education laws. Should such changes be enacted, it opens up the potential for a study of education's effects on numerous outcomes, including civic and social engagement.

The rigor of their methodology notwithstanding, the conclusions of these two studies – that, in general, more education enhances multiple dimensions of CSE – still leave many issues unresolved. Whether the focus is on secondary or post-secondary education, it remains unclear *why* education has the effect it does. Is it simply owing to a "credential effect" – more education boosts one's earnings and/or social status, providing a lift to civic involvement? Or does education have an effect on CSE because of the *content* of what one learns in school? The distinction has huge policy implications. For reasons that will be elaborated upon below, if education is simply an indicator of socioeconomic stratification, then more education in the aggregate is not likely to result in higher levels of CSE (or at least those forms of CSE driven by relative socioeconomic status). Policy makers would not need to be concerned with the *civic* education provided within their nation's schools. On the other hand, if educational content does shape CSE, it behooves policy makers to pay careful attention to the civic implications of the design and implementation of their nation's education system.

3.3. Relative vs. absolute education

This chapter details and then tests three different models whereby education could have an impact on each of the dimensions of engagement. One is the absolute education model, which states that an individual's own level of education is what boosts engagement. Another is the sorting model, which is premised on the assumption that education serves as a marker of social status. According to the sorting model, it is individuals' level of education relative to their social environment that facilitates engagement. Finally, there is the cumulative model, under which engagement rises in accordance with the average education level of one's compatriots. Using data from the European Social Survey, the absolute education model is found to best explain expressive political activity, voting, membership in voluntary associations, and institutional trust. The sorting model applies to political, or conflict-centered, engagement, while the cumulative model explains interpersonal trust.

Is education merely an indicator of socioeconomic status?

There are many possible explanations for the impact of education on civic and social engagement. Perhaps it is because education shapes what you know – that the content of education provides knowledge and experience that facilitate civic and social engagement. In addition, education can also help one apply knowledge by developing skills and competencies, which might also foster CSE. Education might also cultivate attitudes, motivations, and values which encourage engagement.

The above explanations need not be viewed as competitors, as they might all be true. Indeed, they all share a common assumption, namely that education has a direct impact on engagement. However, there is a contrarian point of view which argues that education's impact is entirely indirect, mediated wholly through the increase in social status that accompanies a higher level of education. If this claim is correct, our understanding of education's impact on CSE needs go no further than understanding the link between SES and engagement (Verba, Nie and Kim, 1978). Any further analysis of educational content would be rendered moot. Consequently, this chapter tackles the question with original data analysis, in order to sort out whether education has an impact on education beyond its positive correlation with social status.

Nie, Junn and Stehlik-Berry

The most thorough discussion of the link between education and different dimensions of CSE can be found in *Education and Democratic Citizenship in America*, by Nie, Junn

and Stehlik-Berry, hereafter NJS-B (1996).[1] Despite the fact that the title of their book centers specifically on the United States, NJS-B's theoretical framework is more generally applicable and the book itself ventures into cross-national comparisons. NJS-B address the paradox of participation, and offer a compelling explanation for why rising levels of education have not led to rising levels of political engagement. At its core, their argument is that political engagement is driven by social status. The higher your placement in a social hierarchy, the more likely you are to be engaged in political activity. And your place in the social hierarchy is largely a function of education.

At first blush, NJS-B's statement that political engagement is a function of socioeconomic status may simply seem to be a *re*statement of at least fifty years of conventional wisdom. However, there is more there than might first meet the eye, as three important assumptions underlie the NJS-B analysis. When taken together, these three assumptions lead to concrete, observable implications.

First, they assume that political activity is inherently conflictual. Because this point is critical for understanding the logic of their argument, I quote them verbatim:

> *"We argue that certain aspects of democratic citizenship are in fact bounded, or limited, by their essentially competitive nature. The instrumental behaviors and cognitions of political engagement can be seen as a more of a zero-sum game, bounded by finite resources and conflict, where one's gain will necessarily be another's loss. Elected representatives can vote only one way on a proposed piece of legislation, and bureaucrats cannot regulate to everyone's satisfaction." (p. 101)*

Second, because political engagement is unavoidably competitive and thus zero-sum in nature, it is spurred by one's social status. Even as the potential contact points between government and the electorate expand, and the repertoire of potential participatory activities enlarges, the number of government officials is finite. NJS-B invoke the image of a crowded beach to underscore the point – the more sunbathers on the beach, the less desirable sunbathing becomes. The more voices speaking to government, the less sway each individual voice carries.

These two assumptions lead to the question of how it is that some voices come to have more sway. The answer, according to NJS-B, is that those people with greater standing, or higher status, are more likely to get involved in socially competitive, zero-sum activities simply because they are more likely to "win" the competition. It is the voices of high-status individuals that get heard. And, as the linchpin of NJS-B's theoretical framework, they premise their analysis on the assumption that education is an especially significant indicator of social status, apart from income. The higher your level of formal education – *relative to others within your social environment* – the higher your social status. The higher your social status, the more likely you are to conclude that your voice will be heard above the din. The costs – in time and treasure – you incur in political engagement are outweighed by the likelihood of your receiving benefits from the effort expended.

Let me underscore that, according to NJS-B, it is your level of education in comparison to others around you that determines your social status. For example, in an environment where graduation from secondary school is rare, a secondary diploma would

[1] I am not alone in my positive assessment of this book, as it received the Woodrow Wilson Foundation Book Award from the American Political Science Association for the best book published in political science in 1996.

be expected to confer considerable social status and thus spur political engagement. But should secondary diplomas become common, it would take a post-secondary (university) degree to achieve the same relative social position. Empirically, then, it is not your *absolute* level of education that predicts whether you are politically engaged, but your *relative* level of education. For now, we will forgo a precise statement of "relative to whom", as it turns out this is a matter of some controversy and is thus taken up in some detail below. Regardless of the precise comparison group, the essential idea behind the theory is that relative education levels serve to sort people by social status. This will be referred to as the *sorting model*.

NJS-B do not argue that *all* forms of engagement are a function of relative education. Rather, they see relative education as explaining "democratic engagement", which is largely consistent with what here has been defined as political engagement. In contrast, what they label "democratic enlightenment" is driven by an entirely different causal mechanism. By enlightenment, they mean what most analysts label political tolerance, or the willingness to grant freedom of speech to unpopular minorities. Enlightenment, unlike engagement, is not zero-sum. My being more tolerant does not make you less so, and so tolerance is not a function of a person's social status and, thus, relative education level. Instead, tolerance (respect for civil liberties) is shaped by one's absolute level of education. NJS-B further argue, convincingly, that formal education directly fosters enlightenment because it leads people to see the connections between their own fate and that of others, especially those from different social strata, within their society (Nie, Junn and Stehlik-Berry, 1996, p. 18). Education also deepens citizens' ability to harness their own self-interest in the service of the greater good, which in turn serves as the underpinning for a healthy democracy.

Using cross-sectional and longitudinal data from within the United States, NJS-B find evidence for both of their main hypotheses: democratic engagement is driven by relative levels of education (sorting model) while enlightenment is a function of an individual's own educational attainment and is not affected by the educational environment (absolute education model).

NJS-B's sorting model offers at least a partial solution to the paradox of participation. Political engagement would not be expected to climb in a period of increasing education levels, because a "rising tide lifts all boats". An across-the-board increase in education attainment leaves intact the stratification by education level. Moving to data from other nations, they also find tentative evidence in favor of the absolute education model as an explanation for levels of political tolerance. Across seven nations,[2] they find that younger generational cohorts have higher levels of tolerance, which they attribute to increasing educational attainment among the young. They are unable, though, to test whether the sorting model applies to political engagement in nations beyond the United States. To my knowledge, this report contains the first such analysis.

Critiques of Nie, Junn, and Stehlik-Berry

NJS-B have written the most complete treatment of how and why education shapes CSE, provocatively digging deeper than the frequent, and often facile, observation that education positively affects engagement. They deserve much credit for building an extensive theoretical apparatus, buttressed by a sophisticated empirical analysis. Yet

[2] Australia, Britain, Norway, United States, West Germany, Ireland, Israel.

while there is much to admire in their work, aspects of their argument are fodder for debate. The following criticisms serve to refine rather than refute their conclusions.

The first criticism of NJS-B is strictly on empirical grounds. Recall that central to their analysis is the concept of relative education level. In practice, calculating such a measure means answering the critical question: "relative to whom?" The answer is far from arcane, as different comparison groups apparently lead to very different empirical conclusions. The measure of relative education employed by NJS-B is to compare a respondent's level of education to the mean level of education within the national population of 25- to 50-year-olds when the respondent was 25. Tenn (2005) mildly criticises this definition as too imprecise, and offers an alternative measure: educational attainment relative to one's birth cohort – that is, in comparison to people born in the same year. The specificity with which he measures relative education, however, comes at the expense of his dependent variable, which is limited to the single measure of voter turnout. This is because the only source of data available which permits such a fine-grained measure of education levels within a birth cohort is the United States Current Population Survey, which only measures voter turnout. Tenn's refined measure of relative education produces results that are consistent with those of NJS-B, as he finds evidence for the sorting model.

Helliwell and Putnam (1999) offer a more critical assessment of NJS-B, critiquing their measure of relative education as an unnecessarily "static, backward-looking metric of educational externalities" (p. 2). In their words:

> *"[T]his operational measure of relative education means that the participation rate of a 55-year-old is influenced not at all by the educational credentials of her/his 54-year-old neighbors, but is influenced instead by the educational credentials of people long dead. In other words, in NSJ-B's oddly asymmetric world of civic competition, no one ever competes against anyone younger, but everyone always competes against everyone older (including the dead)." (pp. 2-3)*

In light of their criticism, Helliwell and Putnam employ a different measure of relative educational attainment. They compare respondents' own level of education to the mean education level within the same US census region.[3] They then employ their measure in models of interpersonal trust, tolerance, and civic and social engagement. Using their measure of relative education Helliwell and Putman arrive at conclusions that contrast sharply with those of NJS-B: according to them, the sorting model does not apply to most measures of civic and social engagement, although they do find that the absolute education model applies to tolerance. Helliwell and Putnam are careful to note that they do not assume the census region is the ideal geographic unit for their analysis, but mean

[3] There are four census regions, each comprising a large swath of the United States:

West: Arizona, Colorado, Idaho, New Mexico, Montana, Utah, Nevada, Wyoming, Alaska, California, Hawaii, Oregon, Washington.

South: Delaware, District of Columbia, Florida, Georgia, Maryland, North Carolina, South Carolina, Virginia, West Virginia, Alabama, Kentucky, Mississippi, Tennessee, Arkansas, Louisiana, Oklahoma, Texas.

Midwest: Indiana, Illinois, Michigan, Ohio, Wisconsin, Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, South Dakota.

Northeast: Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont, New Jersey, New York, Pennsylvania.

only to emphasise that shifting the parameters of NJS-B's definition even a little produces different results.

Helliwell and Putnam can be read as offering a critique of NJS-B's empirics. Underpinning their empirically-oriented criticism, however, is a broader theoretical point. While they do not object to characterising purely political engagement (as defined here) as conflictual, competitive, and thus zero-sum in nature, they do suggest that NJS-B have over-reached by mischaracterising civic engagement in the same terms. Helliwell and Putnam go so far as to suggest that theory could plausibly lead us to conclude that education has a *cumulative* effect on at least some forms of engagement. For example, we might expect that the higher the level of education within one's environment, the greater the degree of trust. "If individuals know that higher education levels make others more likely to be trusting (and perhaps also more trustworthy), then they are in turn more likely to trust others. Hence the returns to trusting behavior are increased where there are increases in average levels of education, so that it should be expected that people of any level of education are in fact more trusting of others in an environment marked by higher average education levels." (p. 5).

I would add that NJS-B also seem to go too far in extending their view of engagement as competitive and zero-sum beyond the political realm – where it is compelling – to the civic sphere, where it is far less convincing. Consider why they hypothesise that the sorting model applies to membership in voluntary associations, a quintessentially civic form of engagement:

> *"[M]embership in voluntary associations is, we expect, the result of relative, rather than absolute, educational attainment. Members of associations obtain substantial psychic and social rewards for their organisational involvements. Moreover, voluntary membership requires time, energy, and often money, and those who are relatively near the center of the social network can better afford to pay the costs and are more likely to reap the benefits." (p. 162)*

NJS-B thus assert that civic engagement is driven by the same conflict over rewards as political engagement, a puzzling claim. While membership in voluntary associations does require time and energy, it is not clear that money is necessary at all (a point essentially conceded by NJS-B by their qualification that money is "often" – and thus not "always"– required). Social status does not necessarily give people more free time (Verba, Schlozman and Brady 1995) and it is not clear why one income group would have more "energy" to devote to civic activity than another. Note also that NJS-B make the point that the rewards for civic participation are "psychic" and "social" and not material. While it is clear that material rewards are scarce resources, why should psychic and social rewards be considered zero-sum? These objections underscore why it is difficult to see the reasoning behind the claim that civic, as opposed to political, engagement should be considered inherently competitive in nature, and thus driven by the sorting model.

While NJS-B draw a bright line between enlightenment (tolerance) and engagement, there are theoretical reasons, backed by extant empirical evidence, to think that engagement should be further subdivided – that absolute and relative education affect various forms of engagement in different ways. Furthermore, the debate over NJS-B's argument has centered largely on data from the United States only, raising the question of whether the same relationships can be generalised beyond the American context. (Recall that NJS-B include some cross-national analysis, but it is limited in scope to only seven nations and deals only with tolerance.) The following analysis, therefore, expands upon

the NJS-B framework by incorporating Helliwell and Putnam's objections, and including nations other than the United States.

Testing the causal mechanisms

From the literature on how CSE is affected by one's educational environment, we can distill three potential causal mechanisms (Table 3.3.1):

- **Absolute education model**: This has been the standard view of how education affects the many dimensions of CSE: individuals with more education are more engaged, without regard for their educational environment.
- **Sorting model**: Engagement is a function of one's educational environment. In this model, engagement is driven by an individual's level of formal education relative to her social environment – more education drives engagement only to the extent that educational attainment results in a higher position within the social hierarchy.
- **Cumulative**: Again, educational environment matters, but in the opposite way than predicted by the sorting model. Living in an environment with a higher average level of education increases an individual's level of engagement.

Table 3.3.1. Three causal mechanisms linking education and engagement

	What leads to more engagement?
Absolute education model	The more education you have
Sorting model	The more education you have vs. the average education your peers have
Cumulative model	The more education your peers have

The dataset employed to test these three models must meet two criteria. First, it must include a wide range of nations, to ensure sufficient variation in educational environments. Second, it must include measures of multiple dimensions of CSE. Fortunately, the European Social Survey (ESS) meets both requirements. The ESS was conducted in multiple European nations, from all parts of the continent.[4] Also, its questionnaire includes numerous items pertaining to a wide array of civic and social engagement. While it does not cover every dimension discussed earlier, it does include most of them. No other publicly-available source of cross-national data includes as many.

The sheer variety of nations within the ESS is a double-edged sword for the analyst. On the one hand, the array of countries included in the sample makes it possible to test hypotheses in widely varying environments – to look for consistency amidst the variety. But on the other hand, that same variety only raises questions about the idiosyncrasies of the individual nations. Regrettably, space constraints mean that for the purposes at hand the analysis will be limited to cross-national analysis only and not a detailed discussion of results for each country. Therefore, this analysis should be considered preliminary at best, as there is much more to be learned about the nation-specific results.

[4] This analysis includes the seventeen nations in the first release of the ESS data. The nations are: Austria, Belgium, Switzerland, the Czech Republic, Germany, Denmark, Estonia, Spain, Finland, the United Kingdom, Greece, Luxembourg, Norway, Poland, Portugal, Sweden, Slovenia.

As we have seen, the critical issue in determining the impact of education is the measurement of the educational environment. Far from an abstruse question to be relegated to technical appendices, the question of who is being compared to whom is central to the debate over the claims made by NJS-B. Helliwell and Putnam criticise NJS-B for relying on a measure of the educational environment that was (a) too large in scope; (b) backward-looking (individuals' educational attainment compared to the mean education level of people who were 25-50, at the time the respondent was 25). In response to these criticisms, this analysis uses a measure of the educational environment that varies by both nation and cohort. In each nation, the mean educational level was calculated for the following four cohorts: 25 to 39 years of age; 40 to 54; 55 to 69; 70 and up. Thus, in addition to her/his own level of education, each respondent has a corresponding variable reflecting the mean level of education for people of the same birth cohort (both older and younger) within the same nation. Note that respondents under the age of 25 have been omitted from the model, since the early twenties is generally the period of life when young people are most likely to be in the process of acquiring a post-secondary educational education.

Owing to the varying educational systems across the nations included in the ESS, there is no uniform measure of educational attainment by, say, degree or diploma earned. Instead, the most comparable measure of educational attainment is simply the number of years of formal schooling the respondent has completed. Each model thus includes two measures of education: the number of years of education completed by the individual respondent (*education level*), and the mean level of education completed by members of the same age cohort within that nation (*education environment*).

Understanding the relationship between educational attainment, educational environment, and the various dimensions of CSE requires not only attention to how education is operationalised, but also the measurement of civic and social engagement.

We thus turn next to the dimensions of CSE that can be tested using the ESS: competitive political activity, expressive political activity, voluntary associations, voting, institutional trust, and interpersonal trust. Below is a description of each dimension, how it is operationalised, and the a priori hypothesis of whether it is better explained by the absolute education, sorting, or cumulative models.

Note that while the ESS includes most dimensions of CSE in which we are interested, there are two notable omissions: tolerance and knowledge. While it would be preferred to have measures of these dimensions in addition to those that are included, this is a case where the best (or ideal) ought not to be the enemy of the good. The positive relationship between absolute educational attainment and both tolerance and political knowledge is well established, although future research could profitably examine the precise nature of education's relationship to both.

Dimensions of engagement measured in the European Social Survey[5]

Political engagement: competitive and expressive

The sorting model rests on conceptualising political engagement as inherently zero-sum, with winners and losers. The more likely that a form of engagement is constrained

[5] For more details on these measures, consult the annex.

by its competitive, finite nature, the more likely it is to be explained by the sorting model. A good test of the sorting model, therefore, is to compare two types of engagement that are both political, namely with the objective of influencing public policy, but do and do not involve activities that are inherently zero-sum in their nature:

> *"The ESS is ideal for this purpose, as it includes questions about a wide array of activities. Accordingly, the myriad forms of political engagement included in the ESS have been divided into those activities that are most likely to be zero-sum in nature, namely contacting political leaders and working for a political party or 'action group'".* (Competitive Political Activity).

These two activities are examples of where, at least according to NJS-B, the zero-sum logic applies best. The more people who contact a political leader, the less the impact made by each individual contact; the more people who volunteer for a party, the less the relative value of each individual volunteer. This is the sort of activity where we should have the strongest expectation for the sorting model.

In contrast to the set of competitive political activity, the same battery also includes a set of expressive activities, where participation is more likely to be cooperative than competitive. In contrast to contacting political leaders and working for a political party, these activities do not have an obviously instrumental motivation. Such activities include boycotting consumer products, marching in demonstrations, and signing petitions (*Expressive Political Activity*). Rather than inherently zero-sum activities, with multiple participants scrambling to have their individual influence felt or voice heard, these are activities whose effectiveness rests on mass involvement. I gain more from a boycott, petition, or demonstration when others join me – the more, the better. In this case, the hypothesis is clearly that the sorting model does not apply, since these are not inherently competitive activities, but that the absolute education model does. These are activities identified with social movement-oriented politics, which in turn are often spurred by post-materialist motivations – and post-materialism is largely the province of the highly-educated (Abramson and Inglehart, 1995).

It is also possible that participation in these expressive activities becomes more likely as the average level of education within the environment increases, or what Helliwell and Putnam have labeled the cumulative model. Because their effectiveness requires a cascade of participation, we might expect a "contagion effect", whereby living amongst people with a higher level of education legitimises such activity. Since the cumulative model has not been discussed as thoroughly as the sorting and absolute education models in the extant literature, it is more difficult to generate expectations for it. Therefore, it is mentioned here as a plausible, though tenuous, possibility only.

Voluntary associations

Above, I argued that it is not clear why we should expect participation in voluntary associations – to many, the quintessential example of a civically-oriented activity – to have a zero-sum, inherently competitive nature. Unlike political engagement, people do not generally get involved in voluntary organisations in order to advance or protect their interests. Instead, they presumably have an intrinsic interest in the activities of the group, and enjoy the camaraderie of their fellow group-members. If this is an accurate characterisation of what we might call associationalism, then there is no reason to expect the sorting model to explain why people get involved in groups, clubs, and associations. Instead, we should hypothesise that the absolute education model pertains, simply on the

grounds of the almost universal relationship between educational attainment and CSE generally.

Notwithstanding my objections to NJS-B's reasoning, their belief that the sorting model applies to participation in voluntary associations is not totally unwarranted. It is a reasonable possibility that relative social status is a factor explaining engagement in membership organisations, in which case relative education would be relevant. Supporting this perspective, NJS-B do, in fact, find empirical evidence that the sorting model – at least as they operationalise it – explains organisational involvement (recall, however, that Helliwell and Putnam find by shifting the measure of educational environment, it does not).

In the ESS, involvement in a voluntary association is measured with an item that asks whether respondents have worked for an organisation or association. Unfortunately, the placement of this item may prime the respondent to think of political organisations, rather than a wider array of groups, since it immediately follows the competitive political activities, and immediately precedes the expressive activities. As a robustness check, therefore, a parallel analysis has been conducted with the European Values Survey.

Voting

As discussed above, voting has been placed into a category all its own. Just as light has properties of both a wave and a particle, voting has the properties of both civic and political engagement. Therefore, it is difficult to predict a priori whether the sorting model applies to voting or not. We might expect that, just as contacting political leaders is a zero-sum activity, so is voting. Conversely, however, voting is clearly not driven entirely by the advancement of one's self-interested political objectives, but instead has an expressive component to it. People vote, at least in part, because they receive civic gratification from doing so.

In the ESS, voter turnout is measured in reference to the most recent national election, with a lead-in to the question designed to minimise the social desirability bias associated with the measurement of voter turnout (whereby more people claim to vote in surveys than indicated by the actual turnout rate as tabulated by election officials).

To the extent that voting has a political motivation, the sorting model is hypothesised to apply as an explanation for voter turnout; to the degree that it is grounded in civically-oriented sensibilities, the absolute education model gets the nod. Indeed, it is even conceivable that the cumulative model applies, as the expressive aspect of voting may be greater in environments where people have a higher level of education and thus a stronger sense that voting is a civic obligation or duty.

Trust: interpersonal and institutional

To this point, the forms of engagement under consideration consist of activities, things one *does*. Trust, however, consists of an attitude or a mindset – what one *thinks* – albeit with likely behavioral consequences. For interpersonal trust, these consequences are comparable to what we observe for educational attainment. If education is the "universal solvent", interpersonal trust's universality ranks a strong second, as trusting people are more engaged in a whole host of activities than their less-trusting counterparts. While the behavioral implications of trust in government institutions are not as clear-cut,

this form of trust has long been theorised to be an important ingredient for political stability (Easton, 1965; Hetherington, 2005).

The ESS measures interpersonal trust with three related questions: whether most people can be trusted, whether most people would try to take advantage of you, and whether most of the time people try to be helpful. The index of institutional trust includes seven institutions: your country's Parliament, the legal system, the police, politicians, political parties, the European Parliament, and the United Nations. For both interpersonal and institutional trust, an index has been constructed by simply adding the individual responses together.[6]

There are competing expectations regarding the relationship of education to trust, both interpersonal and institutional. One perspective is that trust has largely social origins, and is thus driven by socioeconomic status. If so, the sorting model would apply. The nearer you are to the top of the social hierarchy, the more reason you have to be trusting. Conversely, if trust is primarily a psychological predisposition immune to one's position on the social ladder, then an individual's absolute level of education is most likely to matter.

A third perspective, which seems most compelling, is that trust is driven by both individual attainment and the educational environment (and, by implication, has both a sociological and a psychological flavor). Rather than the sorting model, though, the environment affects trust through a cumulative mechanism – trust begets trust. Under this scenario, a higher educational level within the environment triggers a positive feedback process, leading to a higher level of both interpersonal and institutional trust.

Findings of data analysis

Correctly testing the impact of education not only requires attention to the measurement of educational environment, but also the method of estimation. Because these data are cross-national, a standard regression model would be flawed. A key assumption of linear regression is that the units of analysis are independent of one another – information about one does not provide information about another. Data that are clustered by nation, however, clearly violate this assumption, as intra-national variation is going to be smaller than the variation between nations. In more intuitive terms, this means that two respondents from, say, Spain are likely to have more in common with one another than a respondent from Spain and one from Sweden. This problem is likely to be especially acute in a study of a nation's educational environment, where we would expect wide variation in the relationships between education, educational environment, and CSE.

There are a number of econometric strategies of handling such a violation of this fundamental assumption underpinning linear regression. One is to run separate models for each nation, but with 17 nations (32 in the European Values Survey, discussed below) this can quickly become cumbersome, and makes generalisations across nations difficult. Instead, an alternative estimator is employed, namely a random coefficient (mixed-effects model) in which the slopes for the relationships in which we are interested are allowed to

[6] For both interpersonal and institutional trust, the items correlate highly and load cleanly on a single factor. Nonetheless, the correlations are not perfect, especially for institutional trust, suggesting the possibility of separate analyses for trust in different institutions. This is likely to be a fruitful avenue for future research, but is beyond the scope of the present analysis.

vary for each nation. Specifically, the relationships between the dependent variable and both education level and educational environment are permitted to vary cross-nationally.[7]

In order to keep the focus on the education variables, the models only include a small number of controls. Since education is often taken to be a proxy for socioeconomic status, the model includes household income. By including both, we can be sure that we are not conflating the impact of education and income. The model also controls for gender, given that there are gender-related differences in civic and social engagement (Burns, Schlozman and Verba, 2001; Christy, 1987; Norris, Lovenduski and Campbell, 2004). And, because educational environment is measured in relation to a respondent's age cohort, the models also account for a respondent's age (specifically, generational cohort.).To facilitate comparisons across the different forms of engagement, each continuous dependent variable has been standardised to have both a mean and standard deviation of 1.0. Since voting and voluntary association are both dichotomous measures, they have not been standardised in this way.

In interpreting the models, it is important to keep in mind that education can have multiple effects. Thus, rather than declaring an hypothesis supported or not, I instead characterise the evidence favoring an hypothesis as strong or weak. More specifically, the interpretation of the models is as follows:

- A positive, significant coefficient for education level and a non-significant coefficient for educational environment is strong evidence for the absolute education model.
- A negative coefficient for educational environment is evidence for the sorting model. If it is greater in magnitude than education level, that is strong evidence favoring the sorting model. If it is smaller in magnitude, then the evidence can only be characterised as weak, and the absolute education model can also be said to have received support.
- A positive coefficient for educational environment is evidence for the cumulative model. As with the evaluation of the sorting model, a coefficient greater than education level is strong evidence, and one smaller than education level is weak evidence.

Tables 3.3.2 and 3.3.3 present the numerical results of all seven models, while Figure 3.3.1 shows the overall conclusions to be drawn from across all the models; the results are summarised verbally below.

[7] These are estimated using the "xtmixed" command in STATA 9.0 (Rabe-Hesketh and Skrondal, 2005).

Table 3.3.2. Testing the absolute education, sorting, and cumulative models
Results from mixed-effects maximum likelihood regression

	Competitive political activity	Expressive political activity	Voting	Voluntary associations	Interpersonal trust	Institutional trust
Education level	0.038 ***	0.052 ***	0.013 ***	0.013 ***	0.031 ***	0.026 ***
	(0.004)	(0.006)	(0.002)	(0.002)	(0.003)	(0.004)
Educational environment	-0.043 ***	-0.040 **	-0.020	-0.011 **	0.042 **	0.010
	(0.015)	(0.020)	(0.013)	(0.006)	(0.021)	(0.017)
Cohort	0.002	-0.077 ***	0.056 ***	0.009 **	0.109 ***	0.056 ***
	(0.013)	(0.013)	(0.006)	(0.005)	(0.014)	(0.014)
Gender	-0.148 ***	0.081 ***	-0.008	-0.043 ***	0.074 ***	-0.009
	(0.014)	(0.012)	(0.005)	(0.005)	(0.012)	(0.013)
Household income	0.028 ***	0.018 ***	0.021***	0.012 ***	0.038 ***	0.031 ***
	(0.004)	(0.003)	(0.001)	(0.001)	(0.003)	(0.004)
Constant	1.166 ***	0.801 ***	0.622 ***	0.123 *	-0.413	0.275
	(0.204)	(0.249)	(0.137)	(0.076)	(0.301)	(0.237)
Nations	17	17	17	17	17	17
Observations	22,428	22,294	21,562	22,432	22,241	18,701
prob > chi²	0.000	0.000	0.000	0.000	0.000	0.000

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$

Source: European Social Survey.

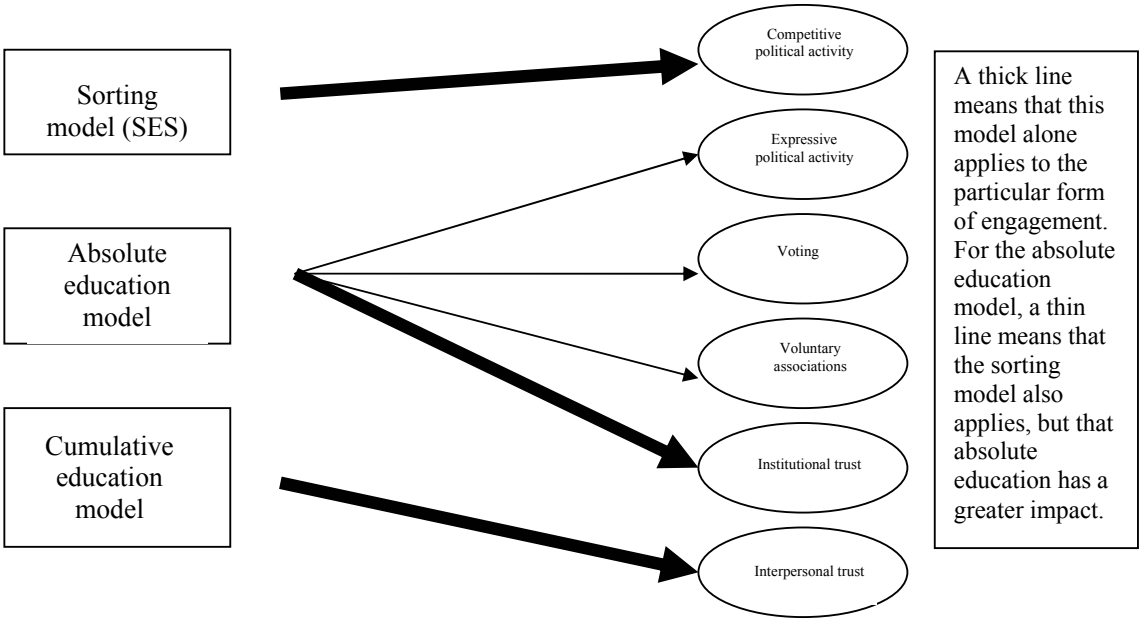
Table 3.3.3. The absolute education, sorting, and cumulative models as applied to voluntary organisations
Results from mixed-effects maximum likelihood regression

	Organisational memberships	Voluntary activity
Education level	0.079 ***	0.062 ***
	(0.009)	(0.007)
Educational environment	-0.056 **	-0.037 *
	(0.028)	(0.022)
Cohort	0.002	0.018
	(0.011)	(0.011)
Gender	-0.017*	-0.036 ***
	(0.010)	(0.011)
Household income	0.032 ***	0.020 ***
	(0.002)	(0.003)
Constant	0.808 ***	0.834 ***
	(0.179)	(0.125)
Nations	32	31
Observations	29,698	29, 136
prob > chi²	0.000	0.000

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$

Source: European Values Survey.

Figure 3.3.1. Is education simply a measure of relative social status?
Summary of three models for education's impact on engagement



***Competitive political activity**: strong evidence for sorting*

As expected, the competitive political activity index is best explained by the sorting model. This constitutes evidence that education is a mechanism by which individuals' place in the social hierarchy is established, and that the model proposed by NJS-B applies beyond the United States.

***Expressive political activity**: weak evidence for sorting, strong evidence for absolute education*

The fact that there is only weak evidence for the sorting mechanism when applied to expressive forms of political engagement suggests that relative education as an indicator of social status is most suitable as an explanation for those forms of engagement that best approximate a zero-sum competition.

***Voting**: weak evidence for sorting, strong evidence for absolute education*

Interpreting the evidence regarding voting is a little tricky. The coefficient for educational environment is negative and greater in magnitude than the positive coefficient for education level, which would suggest strong evidence for the sorting model (as with the political index). However, the coefficient for education level falls just short of statistical significance at a conventional level (p=0.11). Because the coefficient misses the usual cut-off for significance (in a dataset with 22 000 cases, where achieving significance is not difficult) I have classified the evidence as weak in favor of the sorting model. Perhaps a more accurate characterisation would be that it straddles the line between weak and strong which, given the Janus-faced nature of the motivations underpinning voting, is perhaps not surprising.

Voluntary associations: *weak evidence for sorting, strong evidence for absolute education*

There is weak evidence that involvement in a voluntary association is driven by the sorting model, suggesting that social status may play a role in spurring involvement in such organisations. Note, however, that this measure of organisational involvement is less than ideal for teasing out any differences between civically- and politically-oriented engagement, since it is included in a battery that likely primes the respondent to think of organisations that have a political side to them. Recall that the question about involvement in a group is embedded amidst other items that ask whether the respondent has worked for a political party, marched in a demonstration, participated in a boycott, etc.

Further evidence regarding organisational involvement and membership is provided by the European Values Survey (EVS), which includes a wider array of nations (31 instead of 17) and a more extensive set of questions about the respondent's involvement in voluntary associations.[8] The models using data from the EVS use an identical method of estimation, including a random coefficient model, and educational environment is again coded in relation to each respondent's age cohort. In this case, however, educational environment must be calculated using educational level rather than the number of years spent in formal education. The two dependent variables are organisational memberships and volunteering. Respondents were first asked whether they belong to any in a long list of association types, including everything from social welfare groups to religious organisations to sports groups. Then they were asked whether they do any unpaid volunteer work for each type of association.

The EVS results are comparable to those derived from the ESS.[9] For both organisational memberships and volunteering, the coefficient for education level is positive (and significant), while the coefficient for educational environment is negative. However, in both cases the magnitude of educational environment is less than education level, leading again to the conclusion that there is only weak evidence for the sorting model when applied to organisational involvement. It is remarkable that these two sources of data produce consistent results, notwithstanding that they cover different nations and use different measures of organisational involvement.

Interpersonal trust: *strong evidence for cumulative*

As hypothesised, interpersonal trust is driven by the cumulative model. The higher the average level of education in one's environment, the higher is that individual's trust in others. The evidence in favor of the cumulative model can be characterised as strong, as the magnitude for educational environment exceeds that for education level.

[8] Thirty-three nations are actually included in the EVS, but two do not have all the necessary variables (Portugal and Britain). The nations in the analysis include the following: Austria, Belgium, Bulgaria, Belarus, Croatia, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Poland, Romania, the Russian Federation, the Slovak Republic, Slovenia, Spain, Sweden, Turkey, Ukraine, and Northern Ireland.

[9] Complete details are found in the annex.

Institutional trust: *strong evidence for absolute education*

Institutional trust is driven only by absolute education, as the educational environment has neither a negative nor a positive effect.

Conclusions and policy implications

We entered into this comparison of absolute education versus the educational environment in response to NJS-B's provocative claim that educational attainment is correlated with numerous dimensions of CSE simply because education serves as a marker of social status. If this is true, then any efforts to increase civic and social engagement through encouraging more education would be futile. Higher levels of education for everyone would not change the underlying distribution of engagement, as those with more education *relative to their environment* would still be expected to be more engaged.

By testing the impact of the educational environment on multiple forms of engagement across European nations, we see that the sorting model proposed by NJS-B does hold up for the most clearly instrumental forms of political engagement. Therefore, these data suggest that efforts to boost political engagement (narrowly defined) by simply increasing the education level of the population would likely not succeed.

This evidence for the sorting model also sheds partial light on the paradox of participation, as it explains why rising levels of education do not automatically translate into rising levels of political engagement. Indeed, if rising education levels produce an inequitable distribution of the opportunities for educational advancement – thus boosting education levels for some groups within a population but not others – it could actually produce a growing engagement gap. These results offer only partial illumination on the paradox of participation, however, because the sorting model cannot explain why political engagement has fallen in the wake of a more educated populace. A drop in engagement must be explained by factors other than education.

Ceteris paribus, what forms of engagement would be expected to increase as education levels rise? NJS-B have already argued, persuasively, that political tolerance increases across the board in the wake of increased educational attainment. The above analysis also indicates that interpersonal trust increases as education levels climb. In fact, trust accelerates as the overall level of education within one's environment rises – rather than sorting, the cumulative model applies. Institutional trust also increases along with an individual's level of educational attainment, although without the educational environment as an accelerator.

Expressive activities, voting, and involvement in a voluntary association are all forms of engagement that have been shown to rise with increasing individual-level education, but with the educational environment serving as a decelerator. That is, a higher average level of education within one's age cohort pulls engagement down, but not enough to outweigh the impact of an individual's own level of educational attainment. Perhaps a concrete example clarifies. Imagine two people, each with a college degree. Both will have a higher level of engagement than someone with a high school diploma. But the "engagement gap" between a college and high school education will be greater for the person whose age cohort has a lower average level of college education.

Caveats

It is important to note that the forgoing analysis cannot be said to have uncovered causal relationships between education and engagement. Our confidence that the links are not merely spurious should be bolstered, however, by the earlier discussion of the work by Dee (2004) and Milligan *et al.* (2003). Their work suggests that education does have a causal effect on various forms of engagement, while the analysis done here begins to specify *how* education shapes different forms of engagement.

There has admittedly been a glaring omission in the discussion thus far, as virtually nothing has been said about the content of education – *what people actually learn*. To speak of education strictly by referring to the attainment level or years in school is to remain at a level of abstraction that conceals much, presumably most, of what is important about the educational process. This level of abstraction is largely due to the nature of the existing data, which invariably asks respondents to report only the level of education they have received, or the number of years they have spent pursuing a formal education. Far more informative would be detailed measures of their education, like their civically-relevant experiences, the type of educational institution(s) they have attended, their courses of study, etc. The problem is that the existing literature gives us little guidance on what these measures ought to be. The next section of this report, therefore, takes up the question of what we know (and do not know) about the civic consequences of different educational experiences.

3.4. Content of education

There are a variety of educational factors – that is, what happens in school – which the literature suggests might have an impact on civic and social engagement. This chapter reviews those factors and then puts a number of them to the empirical test using the 1999 IEA Civic Education Study. One in particular that stands out is the openness of the classroom climate, or the degree to which students are able to discuss political and social issues in class. When viewed cross-nationally, classroom climate has a positive impact on every dimension of engagement included in the analysis: knowledge, skills, intention of being an informed voter, intention of being civically engaged, intention of being politically engaged, institutional trust, and tolerance. Nation-by-nation results, however, show that classroom climate does not have a consistent effect in every country.

Research on schools and civic education

The subject of how it is that schools might increase engagement opens up a wide field of inquiry – one that is largely untilled. The study of civic education[1] within schools has long suffered from neglect and has only recently attracted the attention of scholars, which means that there are large gaps in our knowledge regarding the processes by young people become engaged, or not, in politics and the role that schools play within that process. Perhaps one reason that democratic education has not enjoyed sustained scholarly attention is that determining if and how schools affect CSE is complex, all the more so when the analysis involves cross-national comparisons. The wide variety in both political cultures and educational systems across nations has made international comparisons difficult and, thus, rare. In the words of Hochschild: "As Mark Twain reportedly observed about the weather, everyone complains about the lack of comparative educational research but no one does much about it" (Wolf and Macedo, 2004). What is true for educational research generally is even more so for the study of democratic education specifically.

Someone familiar only with the political science literature from thirty to forty years ago would likely be surprised to find that attitudes and opinions of young people faded away as a primary topic of research. In the 1960s and 1970s, the study of young people was a thriving area of research among political scientists, especially those with a behavioralist bent (Easton and Dennis, 1969; Greenstein, 1965; Hess and Torney, 1967;

[1] Within the literature on young people's engagement, different labels are applied to the process of learning about political life. It is often referred to as civic education, which is the term I will use most often, even though it refers to engagement beyond the purely civic as the term has been employed above. For variety's sake, I sometimes opt for the term democratic education, by which is meant all means of preparation for active citizenship. The term is synonymous with civic education as it is generally used.

Jennings and Niemi, 1968, 1974). During this period, many political scientists were interested in exploring, and perhaps explaining, a nation's democratic character, and the inter-generational transmission of democratic values was seen as a critical component of that character. While much of this literature was focused on the United States, there were nonetheless efforts to study political socialisation cross-nationally. And while the study of democratic education within the schools was not the only objective of this early literature on political socialisation, schools did figure prominently as a primary "agent" of socialisation. Almond and Verba, for example, devoted considerable attention to cross-national variation in socialisation, including people's educational experiences, in *The Civic Culture*. Notably, in 1971 the International Association for the Evaluation of Educational Achievement (IEA) conducted a cross-national, school-based study of democratic education among young people, a dataset more rigorous than anything that had been done before (Torney, Oppenheim and Farnen, 1975).

After this strong start, for a variety of reasons the study of political socialisation, including research on democratic education within schools, lost its momentum and the study of young people largely disappeared from empirical political science by roughly the mid-to-late 1970s. One reason was a paucity of theory to guide researchers (Cook, 1985) but another was the sheer empirical challenge inherent in trying to study the complex processes by which young people learn to be engaged in a democratic society.

Following a period of desuetude, however, political socialisation – and thus the study of democratic education in schools – has reappeared on the research agenda of political science and related disciplines (Campbell, 2002; Conover and Searing, 2000; Plutzer, 2002; Rahn and Transue, 1998; Sears and Valentino, 1997). This resurgence has been driven, at least in part, by the declining rates of political engagement (notably voter turnout) in many industrialised nations, and the fact that these declines are concentrated mainly among young people. It is ironic that as engagement levels among young people have dropped in many industrialised nations, there is relatively little contemporary scholarship to explain why.

The return of socialisation as a subject of serious study has been helped by the emergence of the social capital literature, which has given impetus to the study of how norms are transmitted across generations. In *Making Democracy Work*, Putnam (1993) argues that the degree of civic involvement in Italian regions today is largely owing to their civic character in the past. While childhood socialisation is not an explicit theme in his study, socialisation is certainly the implied process by which a region's "civic-ness" endures over centuries. More recently, Putnam (2000) has highlighted the variation in social capital among generational cohorts within the United States; a leading explanation for that variation is their different collective socialisation experiences.

Given the intellectual heritage of social capital as a concept, it is appropriately invoked in discussions of young people's socialisation. While the term apparently has multiple progenitors (Portes, 1998), it first gained prominence when Coleman (Coleman and Hoffer, 1987; Coleman, 1988, 1990) developed it in his work on schools and, thus, young people. While schools are by no means the only organisations in which social capital accrues, they are certainly an important source of the norms and networks that constitute social capital.

Even if, as is likely, there are numerous factors responsible for downward trends in engagement, schools are a promising lever to reverse the decline and spur greater engagement among young people. While there are undoubtedly other influences on the democratic education of young people, like families and mass media, they are farther

removed from public policy. Policy makers have a direct hand in the design and implementation of a nation's system of education, and so it is logical to look to schools as a means to enhance the political and civic engagement of young people.

The fact that research on democratic education withered for a spell has meant that empirical social scientists are returning to many of the same questions that occupied the earlier generation of scholarship on education and engagement. Saying that schools matter as a provider of democratic education, or at least that this is a worthy subject of study, is not the same as saying that we have strong theoretical expectations regarding what it is about schools that matters. Because this body of research has not undergone a continuous process of intellectual evolution, the current generation of researchers interested in the democratic education of young people has the challenge of building a new theoretical framework. As mentioned above and detailed below the social capital literature provides a start, but more needs to be done.

How schools might matter

My comments about the relative lack of theoretical development in the study of democratic education should not be taken to mean that there has been an absolute dearth on the subject. To the contrary, reading through the disparate literature on democratic education reveals a number of possible theoretical explanations for how schools can serve as a source of democratic education, some of which are more amenable to empirical testing than others. Many, perhaps all, of them are complementary. In other words, there is no reason to think that there is only a single reason why schools affect engagement. Education is a complex process, influenced by many factors. The next section distills a series of explanations for why the content of education – what actually happens in school – might affect engagement. I will refer to these as educational factors, by which is meant the potential mechanisms through which formal education might affect levels of engagement. This discussion is prefatory to the empirical analysis that follows, which incorporates many, although regrettably not all, of these factors.

Bureaucratic competence

One intriguing explanation for how education enhances engagement comes from Wolfinger and Rosenstone's (1980) succinct yet seminal book *Who Votes?* They were among the first to develop a full-fledged model of voter turnout. Drawing on data from the Current Population Survey, a large-N survey conducted jointly by the US Census Bureau and the Bureau of Labor Statistics, they highlighted the heavy burden of voter registration requirements across the United States, and identified barriers to registration as a leading reason that voter turnout in the United States is so low by international standards. They found that a higher level of education facilitates voter registration, and offer many of the usual explanations for the impact of education: it increases cognitive capacity, interest in politics, and even a sense of civic duty. Amidst these more standard explanations, however, is one more novel and, therefore, intriguing. "Schooling also imparts experience with bureaucratic relationships and such simple information-seeking skills as looking up necessary items in a book." (p. 79). In other words, learning to function in a school environment provides experience in dealing with government bureaucracies, or what we might call bureaucratic competence. Such competence facilitates interaction with government, whether voter registration or other, more intensive ways of expressing preferences to political leaders.

As mentioned above, it is a misnomer that barriers to voter registration are only relevant in the United States. And so while this was a study focused on the United States, it likely has application more generally. After all, governments and bureaucracy go hand-in-hand everywhere.

I do not mean to suggest, and neither do Wolfinger and Rosenstone, that acquiring bureaucratic competence is the primary reason that schooling facilitates engagement, even when we focus narrowly on voter turnout. Indeed, it is hard to see how it could apply at all to some dimensions of engagement such as, say, tolerance. Nonetheless, it is one among many ways that formal education can increase individuals' comfort level with public engagement of different types. Indeed, bureaucratic competence is only acquired as a byproduct of one's experience in school. I mention it as a reminder that education can facilitate engagement in subtle ways.

Summary: One subtle way formal education enhances engagement is through the development of competence in dealing with bureaucratic procedures.

Civic skills

While lists of precursors to civic and political engagement often include abstract notions like efficacy, an easy-to-overlook facilitator is simply the ability to handle the quotidian tasks that many types of engagement require, like running meetings, giving speeches, and writing letters. In their book *Voice and Equality*, Verba, Schlozman and Brady (1995) underscore the significance of these abilities, which they label civic skills. For many people with high-status, white-collar occupations, skills such as these may seem mundane. But for someone for whom these are not regular activities, they can be intimidating. If you have never had the experience of running a meeting, imagine trying to organise a gathering of people to, say, plan a protest. Verba and his colleagues find that civic skills acquired through non-political channels, including on the job and in voluntary associations, are an important predictor of whether someone is politically engaged. Civic skills are of particular interest precisely because they are acquired through activities that have no political content, and thus are not simply the *effect* of a predisposition toward political engagement. With their innovative measures of civic skills, Verba, Schlozman and Brady demonstrate that one reason people of high SES engage in politics is simply that they know how, and that when people with low SES become engaged it is often because they have acquired the necessary skills to do so.

Verba, Schlozman and Brady trace the acquisition of these skills through the workplace and participation in voluntary associations, but another important path is through formal education. School can be an ideal setting to acquire civic skills. Sometimes this experience can come through a curriculum centered on democratic education specifically, as when students are given opportunities to engage in debates over political issues with their classmates. Sometimes this experience can come as a byproduct of instruction in other subjects, as when students give an oral report in a literature class. And sometimes this experience does not come through formal classroom activities at all, but rather through extra-curricular activities. Many student organisations provide opportunities for young people to develop skills that are well suited for civic and political engagement. Intriguingly, Verba, Schlozman and Brady find that people who report having been involved in organisations during high school are more likely to have acquired civic skills in adulthood. The cross-sectional nature of their data preclude inferring that the relationship is causal – as it could be that those who are joiners in high

school continue in the same path through adulthood – but is nonetheless suggestive that experiences gained through formal education have a bearing later in life.

The ability to perform tasks like those described by Verba, Schlozman and Brady is only one definition of civic skills, as the term has other, related meanings. A recent report on the measurement of democratic education, for example, includes two types of skills that are quite different than those discussed by Verba, Schlozman and Brady, "collective decision-making skills, and critical thinking skills" (de Weerd, Gemmeke, Rigter and van Rij, 2005, p. 25). These are more difficult to measure than the skills discussed by Verba and his colleagues, since they require data on outcomes rather than just inputs. Verba, Schlozman and Brady measure skills by asking respondents whether they have ever used any of the skills in question – given a speech, or attended, planned, or run a meeting, – on the assumption that these are things best learned by doing. Measurement is also simplified by the fact that respondents can be straightforwardly asked about their use, and thus acquisition, of the skills in question. On the other hand, determining whether people have decision-making and/or critical-thinking skills is far more difficult. It makes little sense to ask people whether they can think critically or make decisions democratically. Measuring outcome-based skills is difficult and, thus, rare, although one example is the IEA Civic Education Study, to be described in greater detail below.

Summary: Schools are an important institution in which to learn civic skills: the ability to communicate and carry out organisational tasks.

Cognitive capacity

To this point the focus has been on the implications for what we might describe as second-order effects, or even by-products, of formal education. At the core of the educative process, however, is the development of mental acuity, or cognitive capacity. More colloquially, education is designed to make people "smarter".

Formal education has a dramatic impact on the ability of individuals to gather information on a variety of subjects, organise facts meaningfully, and efficiently process additional and related knowledge. In short, education enhances cognitive proficiency and analytic ability. This argument is, in fact, one of the main justifications for general education. Becker and economic theorists studying human capital have argued that education is a capital investment essential to increasing earnings and productivity, for example (Nie, Junn and Stehlik-Berry 1996, p. 41).

Economic theorists point to how education increases earnings and productivity, while political theorists see education as enhancing democracy. An educated population is more likely to produce an informed electorate, as voters are able to obtain, process, and act upon information pertaining to the performance of their elected leaders. As public policies address increasingly complex topics, the information required to evaluate those policies becomes increasingly sophisticated – only underscoring the importance of education.

As discussed above, theory explicitly links cognitive capacity and tolerance. Nie, Junn and Stehlik-Berry see absolute education as enhancing cognitive capacity and, therefore, boosting democratic enlightenment (tolerance). Tolerance, especially when operationalised as respect for the civil liberties of unpopular groups, requires a relatively high level of abstract thinking, precisely what is ideally learned through formal education.

Cognitive capacity also has an indirect impact on other, perhaps all, dimensions of engagement. For example, psychological engagement with politics is likely facilitated by a greater capacity for absorbing and organising political information – which often requires a mixture of knowledge about government, history, geography, the law, economics and even science. More education expands a person's ability to acquire such information, and thus presumably strengthens one's self-perceived sense of personal political efficacy. A strong sense of internal efficacy, in turn, is an enabling condition for other forms of engagement, especially political activity meant to influence public policy.

Note that this discussion of cognitive capacity has not focused solely on what is learned through formal education about the political world. Instead, the expansion of cognitive capacity is far more general in nature, and refers to the totality of one's educational experience. In this context, the capacity referred to is not simply the sheer amount of information a student absorbs, but experience in synthesising information – the process of learning. Thus, while efforts at democratic education are certainly relevant to enhancing a student's cognitive capacity for CSE, engagement is also boosted by spill-over from other aspects of education.

Summary: Formal education enhances mental acuity, which in turn has an impact on all dimensions of engagement.

Curriculum

The immediately preceding section referred to how formal education *in general* can expand cognitive capacities, which then facilitates at least some dimensions of civic and social engagement. Equally important, however, is the content of the democratic education that schools provide – that is, classroom instruction with the specific objective of preparing students for active citizenship. To the casual observer, it may seem that this is the primary means through which schools prepare young people for engagement in the public sphere. After all, if we wanted to determine how schools teach a subject like chemistry, we would presumably look at what is taught in chemistry classrooms.

Perhaps ironically, then, for roughly a generation the consensus was that high school courses in civics[2] had little or no effect on political knowledge, a conclusion based largely on research done by Langton and Jennings (1968) on American high school students in the mid-1960s. Drawing on an array of measures, they concluded that civics courses were an imperceptible signal amidst the noise of the myriad influences on adolescents' political development. Because it was based on a nationwide study and published in the *American Political Science Review*, the flagship journal of the American Political Science Association, the Langton-Jennings conclusions remained the conventional wisdom among political scientists, or at least those studying the United States, until recently.

The conclusion that classroom instruction in democratic education, or civics, had virtually no impact on political and civic outcomes (see below for an exception) was especially ironic within the United States. This is because the *raison d'être* of America's public schools has historically been to provide a common democratic education within a heterogeneous, immigrant nation. How could it be that the schools' civic purposes were not being fulfilled? There are different possible explanations, which are not necessarily contradictory.

[2] Such courses often go by different names (government, social studies, etc.); the single label "civics" is meant to cover all such courses.

The first explanation is that civics is pointedly unlike other academic subjects, in that it is not confined to a single course of study, or to school at all. Unlike politics, you are not going to learn much chemistry from reading the newspaper or watching television. Students, however, can absorb a lot of political information from the "ether" around them, making classroom instruction redundant. In particular, young people are likely to absorb a lot of political information at home.

Another explanation for the absence of a "civics effect" is simply that democratic education is largely uniform. If every student receives essentially the same instruction in civics, then civics instruction is logically unable to predict differences in engagement. A constant cannot explain a variable. This explanation, it should be noted, leaves open the possibility that education is actually of an equally high caliber across the board.

The second proffered explanation for the absence of a "civics effect", however, is that civic education is of low quality. Langton and Jennings, and many others since, have suggested that civics classes have little impact on engagement not only because they are uniform, but because they are uniformly bad. Many observers of American education have been critical of the methods used to teach civics, which often constitute rote learning, as well as the teachers' lack of expertise in the subject matter.

Even though the Langton and Jennings study led to the widespread opinion that civics courses had little independent impact on the engagement of young people, this is actually a mischaracterisation of their conclusions. Langton and Jennings did not conclude that civics classes had no impact whatsoever. They noted one exception to their generalisation, which turns out to be very revealing. Based on their 1965 data, they suggested that while *white* students of the time did not benefit from civics instruction, *black* students did. Recall that in the mid-1960s, racial segregation was still common in the United States. Specifically, in the Southern states African Americans were largely denied the right to vote and otherwise closed off from the political process. Langton and Jennings suggested that for many black students in what was then an overtly segregated nation, exposure to civics at school did not simply repeat what they were learning at home, as was the case for white students (p. 866).

There are two ways to interpret the finding that civics courses had an impact on civic outcomes for black students. On the one hand, this *is* evidence that civics courses matter after all. But on the other hand, the evidence suggests that civics courses only matter for those people within the population who have been totally shut out from the political process – that is, civics instruction only matters in the most extreme case.

In the years following publication of the Langton and Jennings study other evidence beyond the United States began to accumulate, suggesting that the positive impact of civics courses is not limited to black adolescents in the American South. An experimental study in Argentina found that a programme designed to have adolescents read newspapers and discuss current events within their classrooms led to small but statistically significant increases in political knowledge and tolerance (Morduchowicz *et al.*, 1996). The theoretical explanation for this positive impact is similar in kind to the hypothesised reason for the impact of civics on African Americans – the civics courses compensate for the absence of democratic education at home or through other channels in Argentine society. Even in more established democracies, though, civics courses have been shown to affect civic outcomes. In Sweden, obviously a nation with deep democratic roots, social studies courses have been found to have an impact on adolescents' political knowledge (Westholm, Lindquist and Niemi, 1990). The Swedish study is especially compelling because it draws on longitudinal data (the same individuals interviewed at

multiple points in time), a research design which is rare. Similarly, a study in the United Kingdom in 1986-1987 (Denver and Hands, 1990) concluded that A-level courses in British politics have a positive effect on multiple dimensions of engagement: knowledge, media consumption, political discussion, participation, and efficacy. While the study was not experimental, the authors still get some purchase on causation by noting that students in their second year of a politics course have higher levels of engagement than students in their first year, suggesting that students learn more the longer they take the course. In contrast to the study in Argentina, civics instruction in Britain did not have an effect on tolerance, nor on political cynicism. The fact that civics instruction appears to affect tolerance in Argentina but not Britain could, of course, simply be due to differences in the instruction that was offered. Alternatively, it could be that tolerance is such a widely-held value in a longstanding democracy like the United Kingdom that a civics course can do little to boost it higher.

More recently, other evidence from the United Kingdom supports the conclusion that civics instruction can have a positive impact on engagement. Unlike the earlier study by Denver and Hands, John and Morris (2004) have conducted a panel study of 15- to 17-year-olds in 24 schools in which they administered two surveys one year apart. They find that civic education, measured as the students' reports of what they have studied, predicts volunteering in the community, an example of civic engagement

Even in the United States, where there had been the greatest skepticism about the impact of civics courses, more recent research has concluded that classroom instruction can indeed increase at least one dimension of CSE, namely political knowledge. Based on their analysis of the civics exam included in the 1988 National Assessment of Educational Progress (US NAEP), a far more thorough evaluation than the broad but shallow set of civic measures used by Langton and Jennings a generation prior, Niemi and Junn (1998) concluded that students who have taken civics courses perform better on the exam.

The studies that find a positive impact on engagement for civics courses are obviously important, as they demonstrate that what happens in the classroom does have an impact on young people's preparation for active citizenship. However, their results really only demonstrate how much more we need to learn about civic education, as we have essentially missed a generation of research on the subject. Take, for example, the study by Niemi and Junn (1998). Their main finding is that taking a civics course leads, on average, to an increase on the US NAEP Civics Evaluation of roughly four percentage points. But in a re-analysis of their data, Greene (2000) demonstrates that the effect is limited to students currently enrolled in a civics course, and is really only a gain of two percentage points. In other words, from the research of Niemi and Junn we know that taking a civics course matters – at least a little and for at least a little while. But the small size of the effect raises the question of how much is really learned through formal instruction. If the subject in question were anything but civics, we would almost certainly be inclined to ask why the effect is so minimal. Nor is the concern about small effect sizes unique to the Niemi and Junn study. None of the studies across this body of research shows effects that are large in magnitude.

Summary: Until recently, the conventional wisdom was that civics classes had little effect. New evidence indicates that they do, but that the effect is nonetheless small in magnitude.

Pedagogical method

Based on these studies, it is difficult to generalise for the purpose of designing an effective civics curriculum. The specifics of what is taught varies widely across nations, and appropriately so, as a civics curriculum should presumably include instruction regarding the political system of a student's own country and culture. Given this unavoidable variation across nations, is it possible to develop some general guidelines for effective civics instruction? Fortunately, the answer is yes. Rather than focus on curriculum – what is taught – the best available evidence indicates that civic educators should worry more about *how* the content is taught. Woven throughout the research literature on civic curriculum is one consistent conclusion: the most effective civics instruction involves the free and open discussion of current political events within the classroom, or what is often called an *open classroom climate*.

The conclusion that an open classroom climate fosters civic and political engagement is not new, as it dates back to Almond and Verba's *Civic Culture*. Similarly, the 1971 IEA study of civic education also found that a classroom climate which fosters debate and discussion leads to better performance on a civics evaluation (Torney, Oppenheim and Farnen, 1975). Upon a close reading, in fact, many of the existing studies on civic courses support the claim that an open classroom climate is the causal mechanism behind any observed effect for a civics curriculum. The Argentine experiment described above, for instance, used newspapers as a way to introduce the *discussion* of current events within the classroom. Similarly, Niemi and Junn also find that adolescents' performance on a test of objective civics knowledge is related to the discussion of political issues within their classrooms. More recently, cross-national analysis drawing on the IEA Civic Education Study (described in greater detail below), has also found that an open classroom climate enhances political knowledge (Torney-Purta, 2001-2002, 2002; Torney-Purta and Richardson, 2005).

Empiricists are not alone in highlighting the virtues of political discussion as an educative process, as normative political theorists have also advocated discourse and debate. In describing what she considers to be the basis of a democratic education, Gutmann (1999, p. 51) stresses the need for young people to develop "the capacity for rational deliberation". In other words, young people need to experience the open discussion of political issues to prepare them for engagement in a pluralistic, participatory democracy. Gutmann makes an explicitly normative case for deliberation, but embedded in her argument is an implicit empirical claim. While she centers her argument on the democratic virtues cultivated by rational discussion of political issues in the classroom, underpinning her reasoning is the assumption that as a pedagogical technique, students who experience open classroom discourse learn more about politics than their peers in classrooms without the same level of discussion, and are thus better primed for engagement in the public sphere.

Interestingly, even critics of deliberative theory accept the empirically-grounded premise that exposure to the discussion of public issues best equips people, especially adolescents, for political engagement. Notably, two of the deliberative school's harshest detractors, namely Hibbing and Theiss-Morse (1996, 2002), advocate an educational system in which young people come face-to-face with the difficulties of resolving conflict-ridden political issues, including exposure to the discussion of contentious subjects. Like Gutmann, Hibbing and Theiss-Morse are making an explicitly normative claim that stems from the implicitly empirical proposition that adolescents' exposure to,

and participation in, the discussion of public issues trains them for the cognitive demands of active engagement in a pluralistic, participatory democracy.

Why might we expect discussion of political and social issues in a school setting to enhance civic education? The answer lies in the virtues of such discussion as an educative process. In classrooms where students are exposed to the real world of political issues, they are introduced to the lifeblood of participatory democracy – discourse and debate. Rather than dry, abstract lessons on the institutional mechanisms of the political system, students are provided with opportunities to wrestle with political and social issues. From such discussions, they glean knowledge about the political process. Furthermore, in classrooms where they feel welcome to venture their views, they gain experience in reasoning through positions on public policy issues, essential preparation for informed participation in the democratic process. Thus, it is not just that discussion is more *interesting* for students – although it almost certainly is – but also that it is more *effective* as a means to equip young people for informed political engagement (Carnegie Corporation and CIRCLE, 2003).

While the evidence that an open classroom climate spurs students' engagement is widespread and certainly plausible, the causal claims in the extant research on classroom effects are tainted by the high likelihood of endogeneity, because each of these studies relies on respondents to report on the degree to which social and political issues are discussed in their classes. Perhaps it is being politically engaged or having greater political knowledge that leads adolescents to perceive a greater degree of political discussion in their schools, rather than the other way around. Even if the relationship is not causal per se, it could simply be that politically-engaged students project their own interest into their recall of political discussions in the classroom. In a recent paper, Campbell (2006b) works around the problems of endogeneity and/or projection by not relying solely on an individual's self-report regarding the level of openness within the classroom. Instead, the analysis relies on a sample of a student's classmates, and estimates the degree of classroom openness by averaging the perceptions of multiple respondents in the same school. Using this measure of classroom climate, Campbell finds that, in the United States, an open classroom climate leads to a notable increase in "civic proficiency" – an objective evaluation of how much a person understands about the fundamental workings of democracy. And, in a finding that echoes – but does not fully replicate – the original Langton and Jennings study, exposure to an open classroom climate at school compensates for an absence of political discussion in the home. That is, those students who experience the least political discussion in the home get the biggest boost from discussion in the classroom. Unlike in the Langton-Jennings (1968) study, this effect is not defined by race – students of all races who experience little political discussion at home benefit equally from an open climate in their schools. Campbell also finds that an open classroom climate has a positive impact on whether American adolescents report that they anticipate being informed voters, as well as on their anticipated level of civic and political engagement. Furthermore, it has a negative impact on whether they envision themselves participating in illegal protest activities like spray-painting slogans, blocking traffic, and occupying buildings in protest. One possible explanation for this negative relationship is that political discussion teaches young people that conflicts can be resolved in ways other than protest activities.

In short, the best available evidence suggests that the most promising avenue for an effective democratic education is not to focus on a specific curriculum, but rather to encourage educators to engage in open discussion with their students about real-world events. In many nations, this is easier said than done, owing to teachers' reasonable fears

that they will face criticism from parents and school administrators for injecting controversy into their classrooms. Democracy, however, is about managing controversy; experience with lively discussion of topical issues is a critically important feature of preparation for engaged citizenship in a pluralistic democracy.

The significance of an open classroom climate for the civic and social engagement of young people leads naturally to the question of what conditions facilitate the free and open exchange of views within a classroom. In a follow-up paper, Campbell (2006c) examines the conditions under which one finds an open classroom climate. Specifically, the paper tests whether racial diversity in a classroom ignites or extinguishes political discussion. Support for both hypotheses can be found in the burgeoning literature on the civic consequences of social diversity. Some research has concluded that a diverse environment dampens engagement (Costa and Kahn, 2003; Uslaner and Brown, 2005) while other studies have found that diversity, at least along a few dimensions, stimulates political interest, involvement, and efficacy (Oliver, 2001). Significantly, Gimpel, Lay and Schuknecht (2003) have found that, among adolescents (in the United States), living in a racially diverse community corresponds to greater political efficacy. Based on the existing studies that show a positive link between diversity and conflictually-oriented political engagement, we might expect that political discussion abounds in racially diverse classrooms. Call this the conflict hypothesis: in heterogeneous environments students have a lot to talk about because their political opinions differ. Although race is certainly not a perfect proxy for political opinions – even when it comes to racial issues – in contemporary America blacks and whites often have sharply divergent political attitudes (Kinder and Sanders, 1996). So while it is an oversimplification to suggest that members of different racial groups have systematically varying opinions on every issue, race nonetheless shapes opinions on many issues. Racial diversity in the classroom, therefore, almost certainly means opinion diversity, which might be expected to spark discussion among members of a high school social studies class.

However, there is another line of reasoning that might lead us to expect exactly the opposite relationship between diversity and classroom political discussion. Within social networks on a small scale, diversity dampens political engagement (Mutz, 2002). It could be, then, that political discussion is dampened in heterogeneous classrooms because students, teachers, or both wish to avoid conflict and embrace consensus, which is more likely when everyone is of the same race. This can be referred to as the consensus hypothesis: homogeneity fosters commonality, which creates an environment in which both teachers and students feel comfortable talking about social and political issues. Strengthening the plausibility of the consensus hypothesis is the fact that classrooms are not rudderless vessels. They are led by a teacher who has considerable (although presumably not total) control over the nature of discussion in the class. Teachers in a racially diverse class may wish to avoid addressing contentious issues that could trigger conflict among students and perhaps raise the ire of administrators and/or parents.

The evidence supports the consensus hypothesis: political discussion is most common in racially homogeneous classrooms. Unfortunately, the limitations of the available data mean that we do not know whether it is students or teachers who limit discussion in racially diverse classrooms, or where the balance lies between them. Nor is it possible to determine whether the race of the teacher matters. Are teachers who are themselves members of racial minority groups more likely to foster political discussion among minority students? In a similar vein, the existing data do not permit us to examine the *content* of the political discussion within these classrooms. Perhaps the discussion in diverse classrooms is lower in quantity but nonetheless higher in quality. Further analysis

does provide a clue, however, regarding what it is about diversity that inhibits discussion of social and political issues, and young people's anticipation of being an informed voter. Racial diversity drives down trust in one's school, suggesting that a more trusting environment would smooth the way for classroom discussions of potentially controversial topics.

This research in the United States clearly leads to the question of whether diversity dampens discussion in other nations, or whether it is due to the unique racial environment within the United States. Campbell's work draws on the multi-nation IEA Civic Education Study (described in more detail below) which, regrettably, does not allow for a cross-national analysis of diversity's effects on classroom discussion, as ethnic and racial measures were not included in the general questionnaire administered in all countries (they were added to the items asked in the United States). This is a ripe area for more research, as current events repeatedly remind us all of the civic challenges that accompany rising ethnic, racial, linguistic, and racial diversity within a nation. Beyond diversity, fruitful research can, and should, also be conducted on other factors which foster an open classroom climate: teachers' attitudes and training, class size, externally-imposed examinations, etc.

It is important to stress that the research on formal instruction in civics is only in its beginning stages. With only rare exceptions, the existing data are cross-sectional, making it impossible to trace the impact of civic education over time. For example, Campbell finds that an open classroom climate correlates with whether adolescents say they anticipate being an informed voter and becoming civically engaged as adults. But do these intentions actually translate into behavior? Without longitudinal data, we do not know. Even the John and Morris (2004) study cited above, which has a panel component, only tracked adolescents for a single year, and the Westholm, Lindquist and Niemi (1990) study only did so for a year and a half. Far more informative would be panels that extend for much longer periods of time. Because the existing data provide solid hypotheses to test with panel data, any such exercise could be guided by strong theoretical expectations.

Summary: The openness with which political issues are discussed is an especially important factor in civic education.

Student parliament

The conclusion that an open classroom climate is an especially potent form of civic education leads to the question of whether student governments also enhance engagement among young people by providing experience in governance. Does the existence of a student government or parliament within a school foster a student's sense of political efficacy, or ignite an interest in being politically engaged within the wider community? Similarly, does participating in student government have a positive impact on young people?

Analysis of the 1999 IEA Civic Education Study suggests that student voice in the governance of a school can have an impact on adolescents' political engagement. In roughly half of the European nations within the study, young people who are involved in a student government or parliament display higher levels of political knowledge (Torney-Purta and Richardson, 2003). The fact that this relationship does not hold in all nations, however, suggests that other factors condition whether student governments have an impact on engagement. Future research should be directed at understanding the differences in how student governments are run, both within and across nations. One

especially promising avenue to pursue is not whether the individual has participated in a student government – which is subject to the usual concerns about self-selection – but whether a school fosters a democratic climate, in which students feel that their opinions are heard. Just as a classroom climate that encourages debate and discussion fosters civic and political engagement among young people, so apparently does a school's openness to the opinions of its students. However, there is admittedly reluctance on the part of some teachers and administrators to cede too much control over school policies to the students. Discipline and order are necessary for a sound learning environment. Nevertheless, there is an equilibrium between permitting voice and maintaining order.

Using data in which respondents recalled their own participation in student government, Verba, Schlozman and Brady (1995) find that having participated in student government while a high school student predicts political engagement in adulthood. Admittedly, retrospective reports of this sort are always potentially subject to backward projection, where respondents' memories inadvertently calibrate their current level of involvement with their remembered experiences in adolescence. Verba, Schlozman and Brady suggest that this finding is not totally tainted by misremembering, though, as they do not find that participation in all high school activities predicts political engagement in adulthood. In apparent contrast to the cross-sectional IEA data, Verba and his colleagues also find that having attended a high school which "encouraged students to debate current events or permitted them to complain" (p. 425) has no relationship to political engagement as an adult. Can we conclude, therefore, that "voice in school" has no long-term effect on engagement? Given that these are retrospective reports, I would say not. Longitudinal data would provide far more convincing evidence.

Summary: Participation in student parliaments appears to have a positive impact on political engagement.

Extracurricular activities

The preceding discussion of formal instruction in democratic education began by noting the conventional wisdom that civics courses actually have little impact on civic outcomes, and concluded by lamenting the dearth of longitudinal data on the subject. The literature on participation in school-based groups stands in sharp contrast. Based on longitudinal data, many studies have consistently concluded that people who belong to groups and clubs as adolescents are more civically and politically engaged as adults.

The most convincing evidence showing this relationship comes from the US Youth-Parent Socialisation Study (US YPSS). In its first wave, the US YPSS included interviews with secondary-school students near graduation and their parents. The next two waves, in 1971 and 1982, included follow-up interviews with those same parent-child pairs. In the 1997 wave, a third generation was added to the study, as the original "students" in the panel (who by this time were in their late 40s) were paired with their own children. Based on the first three waves of the US YPSS, Beck and Jennings memorably wrote that group involvement in adolescence is a "pathway to participation", by which they meant political participation, in adulthood (1982).

Other longitudinal studies support the general conclusions drawn from the US YPSS. For example, Smith (1999) has used more recent data from the US National Education Longitudinal Study (US NELS) to demonstrate that extracurricular activities in the eighth, tenth, and twelfth grades correlate with political participation two years after high school. She also finds that high school involvement in community service correlates with subsequent political engagement.

Smith's analysis echoes a similar study based on data from the US National Longitudinal Study (Hanks, 1981), which also found that participation in voluntary associations during adolescence correlates with civic activity in the years immediately following high school.

Youniss, McLellan and Yates (1997) review three disparate studies, each based on longitudinal data of varying quality, and from them conclude that adolescent participation in groups "differentiates civic engagement in adults several years later" (p. 621). These include a longitudinal study of the impact of adolescent participation in a planning study for their town government thirty years later (with a small sample size of 82), a study that followed up on the high school graduating class of 1957 in 1972 (with a medium sample size of 327), and a study of high school students that stretched from 1955 to 1970 (with a large sample size of 1 827). In each case, participation as a youth predicts participation as an adult. While none of these studies is particularly convincing on its own, their consistency with one another and more rigorous research suggest that there is something to their common conclusions. Youniss, McLellan and Yates cite another study based on adults' recall of involvement in youth organisations, the results of which concur with the longitudinal studies. Similarly, Campbell (2000) finds that in the United States retrospective measures of volunteering in one's youth predict voluntarism in adulthood, while Reed and Selbee (2000) show the same in Canada.

Underscoring the value of longitudinal research, the fourth and most recent wave of the US YPSS has demonstrated that high school activities can have a long reach into the future. Jennings and Stoker (2004) report that the correlation between engagement in high school activities and civic engagement grows significantly over time. When they were in their mid-twenties, the organisational involvement of participants in the panel survey bore little relationship to their associationalism in high school:

> *"However, the connection grew stronger as the generation aged through their thirties and forties. By the time they had reached mid-life, their involvement levels were strongly linked to their high school profiles… Significantly, this holds true after controlling for personal characteristics that influence civic engagement and after taking into account the initial socialisation boost (or lack thereof) in engagement provided by the parent's level of organisational involvement… Those involved in high school organisations show higher rates of voluntary activity by 1997 as well." (Jennings and Stoker, 2004, p. 363)*

Jennings and Stoker refer to this delayed emergence of participatory orientations as a "sleeper effect."

There are a variety of mutually reinforcing explanations for the empirically robust connection between involvement in high school activities and engagement later in life. Social capital theory would suggest that adolescents have a norm of associational involvement inculcated within them. Beck and Jennings suggest that high school activities lead to political engagement because youth groups may have a "role in implanting activist orientations toward one's environment" (1982, p. 101). Similarly, participation in high school groups might also instill a "habit" of associational involvement, which is imprinted during adolescence and manifests itself over a lifetime. A counter-explanation, however, calls into question whether there is a causal relationship at all. It is plausible that people who, for whatever reason, are inclined to be joiners in high school retain that "joinerism" in adulthood. That is, participation in activities in both adolescence and adulthood could be driven by the same underlying predisposition, which remains unobserved and thus unexplained.

Summary: Extracurricular involvement in high school corresponds with greater associational involvement in adulthood.

Community voluntarism/service learning

While extracurricular high school groups have long had the attention of researchers, another form of civic activity has more recently attracted considerable scholarly and public attention: community voluntarism, or what is often called "community service" in the United States and "solidarity" or "social cause" in Europe. In this context, the voluntarism in question refers to charitable activities, and is thus distinct from group membership. Not all young people who serve as volunteers do so under the auspices of a group to which they belong, and not all group members serve as volunteers.

There is an important distinction to be made between voluntarism that is part of a curriculum – often called "service learning" – and that which is not:

> *"[S]ervice learning typically refers to activities incorporated into a course or the formal curriculum where the volunteer experience is typically preceded with conceptually oriented information about politics or social problems and followed by classroom discussions and written reflections." (Torney-Purta, Amadeo and Richardson, forthcoming, p. 3)*

Indeed, the term "voluntarism" does not accurately describe service learning, since it is often mandatory. Whatever the normative implications of mandatory voluntarism might be, from a methodological perspective compulsory service learning provides potential insight into the causal effects of participation in charitable activities. Its mandatory status lessens the self-selection bias that otherwise plagues the study of volunteering (or other forms of engagement). Even mandatory programmes do not entirely eliminate the prospects for self-selection, however, as parents and students may choose to attend or avoid schools that require community service. Similarly, if within a school service learning is required by some instructors and not others, the students who opt to enroll in classes with a service requirement likely have a predisposition toward voluntarism, calling into question any causal claims.

There is a large and growing literature on community voluntarism, although the quality of the research varies widely. And for all the research that has been done, there has yet to be a definitive study that combines the two critical features to gauge causality. First, the research design must involve randomisation, such that a group of students selected by chance engage in community voluntarism while a control group does not. The current literature is rife with studies of programmes in which young people themselves decide whether to participate in community service, which share the same inability to tease out causal effects as studies of other extra-curricular activities.

Second, the ideal research design would test whether involvement in community service has long-term consequences, and not merely fleeting effects for a few months after participation in the community service. Recall that Jennings and Stoker found a "sleeper effect" for participation in high school groups; perhaps the same is true for community service. It is unfortunate that service learning has never been subjected to a full-blown randomised field trial since, as part of the curriculum, it would lend itself to this type of study in a way that extra-curricular activities would not.

The findings of the existing literature on community voluntarism, both classroom-based and not, are mixed, but generally find positive, if modest, impacts on various dimensions of engagement. For example, drawing on the US National Household Education Study, a large and nationally representative survey of American adolescents, Niemi, Hepburn and Chapman (2000) find that *sustained* participation in community service correlates with "greater political knowledge, more political discussions with

parents, enhanced participation skills, and higher political efficacy, but not more tolerance of diversity" (p. 45). While they do not employ a randomised experiment, they do take advantage of the fact that some students in their national sample were required to participate in community service, while others were not. Again, the assumption is that selection bias among students who are compelled to participate in community service is less acute than among who do so entirely of their own accord. Significantly, Niemi, Hepburn and Chapman find no differences between students who were required to participate in community service and those who were not. Drawing on the IEA Civic Education Study, Torney-Purta, Amadeo and Richardson also find that community voluntarism among adolescents in Chile, Denmark, England, and the United States leads them to "have higher levels of trust in government, efficacy, political identity, pro-social attitudes, and tolerance" (forthcoming, p. 2).

Perhaps the most comprehensive discussion of research on youth voluntarism is Perry and Katula's (2001) review of 37 different studies of community service and service-learning.[3] The collection of studies is broad and methodologically diverse, examining different types of service programmes and different outcomes. Generalising from this disparate set of studies is difficult, but they nonetheless conclude that service learning – that is, community service incorporated into a curriculum – fosters what they call "cognitive understanding of society", which is similar to political knowledge as it has been defined here. Recall that Niemi, Hepburn and Chapman also found that community service correlates with a higher level of political knowledge. "The relationship between community service and knowledge was also comparable to the difference made by moving up two grades in school" (2000, p. 60). They further note that the knowledge items in question were not directly related to the particular service activities in which the students engaged, making the finding all the more notable.

Perry and Katula also conclude that there is a relationship between engaging in community service as a youth, and giving and volunteering as an adult. While they caution that the precise causal relationship remains obscure, Campbell (2006a) offers a possible explanation. Using the panel component of a nationally representative survey in the United States, he finds that high school students who participate in community service are more likely to be both volunteers and voters ten years following high school. Importantly, however, they are not more likely to participate in forms of expressly *political* engagement, whether it be electoral[4] or expressive in nature. The explanation is that, as time passes, volunteering fosters a sense of civic obligation, which manifests itself in civically-oriented behavior but not political activity.

Campbell's distinction between civic and political engagement, and the antecedents for each, speaks directly to a controversy within the literature on service learning. While

[3] The studies they reference include Aguirre International, 1999; Astin and Sax, 1998; Astin, Sax and Avalos, 1999; Batchelder and Root, 1994; Berger, 1991; Blyth, Saito and Berkas, 1997; Brehm and Rahn, 1997; Chavis and Wandersman, 1990; Eyler, Giles and Braxton, 1997; Eyler et al., 1997; Fenzel and Leary, 1997; Ferguson, 1993; Flanagan et al., 1998; Flanagan et al., 1999; Ford, 1994, 1995; Giles and Eyler, 1994; Gray et al., 1996; Hajdo, 1998; Hettman and Jenkins, 1990; Jastrzab et al., 1996; Kaplan, 1997; Koliba, 1998; Marks, 1994; Markus, Howard and King, 1993; Melchior, 1998; Morgan and Streb, 2001; Ridgell, 1994; Rosenthal, Feiring and Lewis, 1998; Sandler and Vandergrift, 1994; Smith, 1994; Thomson and Perry, 1998; Williams, 1993; Yates and Youniss, 1996, 1998.

[4] Electoral activism is measured as having worked as a volunteer for a political campaign or given money to a political candidate or party, while the expressive activities include participating in a lawful demonstration, writing to public officials, and boycotting certain products or stores.

Perry and Katula note that political engagement "has largely been neglected in studies of service" (p. 360), other observers have suggested that community service fosters a withdrawal from political activity (Niemi, Hepburn and Chapman, 2000; Raskoff and Sundeen, 1998; Rutter and Newman, 1989). The reasoning for the "withdrawal from politics hypothesis" is that community service teaches young people to avoid collective, public policy solutions to social problems, and instead focus on individualistic action only. Community service is thus thought to be an alternative to what Galston calls "official politics" (2001). Aggregate trends certainly suggest a negative link between voluntarism and political activity, as at least within the United States the former has risen among young people during precisely the same period that the latter has fallen. At the individual level, though, we see a different story, as there is a relatively strong correlation between voluntarism and political activity (Macedo *et al.*, 2005). Furthermore, the studies of Niemi, Hepburn and Chapman and Torney-Purta *et al.* both provide evidence that community voluntarism correlates with greater political efficacy. Similarly, by employing a pre/post-test design, Riedel (2002) finds that service-learning programmes in four Minneapolis high schools lead to an increase in sense of civic obligation. Morgan and Streb (2001) use an analogous design to study the impact of participating in service learning, finding modest but statistically significant increases in political efficacy, attentiveness, and a desire to become more politically active. In a finding that dovetails with the literature on classroom climate, they also note that the more involved students were involved in the design and implementation of their service projects, the greater the increase in their politically-oriented engagement.

While not all studies of community service and/or service learning find a positive correlation with engagement (measured in many different ways), those that do generally conclude that service learning is most effective when incorporated into classroom instruction, and specifically when accompanied by reflection on the service that has been performed. In the words of Battistoni:

> *"Beyond the good intentions of school administrators and national commissions, a growing body of evidence – from political scientists practicing community-based learning – strongly suggests that when accompanied by proper preparation and adequate reflection, service learning can be a potent civic educator." (2000, p. 31)*

Torney-Purta *et al.* concur. Their cross-national study of voluntarism finds that it is not merely participation in community-based volunteering that results in positive civic outcomes. Rather, that participation must be coupled with the discussion of community problems within the classroom. Similarly, in surveying the literature on community voluntarism, Hepburn (2000) notes that successfully incorporating reflection into the curriculum can take the form of discussion or writing.

Summarising the literature on community voluntarism is difficult. For one thing, its multi-disciplinary nature means that the studies have different research objectives, use different terminology, employ different theoretical frameworks, and include different measures. Furthermore, the bulk of the existing research has been conducted within the United States, where service learning has become increasingly common, and where rates of volunteering are generally high. I am aware of only one rigorous cross-national study of service learning, namely the Torney-Purta *et al.* piece cited above (see the analysis below for another, using the same data but a wider range of nations). Nonetheless, even with its limitations, it is noteworthy that the current literature suggests participation in community voluntarism, especially as a curriculum-based initiative, correlates with

numerous dimensions of engagement. But whether that relationship is causal remains unclear.

Summary: Community service, whether done through a school setting or not, appears to foster civic engagement. Service learning appears to be most effective when it is accompanied by reflection in the classroom on the service that students have performed.

Norms

As noted above, the return of political socialisation and democratic education to prominence as topics of research is due in part to the interest in social capital. This is fitting because Coleman originally wrote of social capital in the context of explaining the behavior of young people and, specifically, their experience in schools. In Coleman's original formulation, social capital consisted of behavioral norms reinforced through social networks. As used here, the term "norm" is defined as "a regularity such that members of [a population] expect that nonconformity will (with positive probability) be punished with (negative) sanctions" (Voss, 2001, p. 109). In a memorable turn of phrase, some authors refer to a norm's "oughtness" – it is something members of a community feel they ought to do, even if they do not always do it (Hechter and Opp, 2001). Essentially, Coleman sought to explain the conditions under which people, and especially young people, come to act in accordance with social norms. The key facilitating condition for norm-induced behavior is the social networks in which people are enmeshed. Coleman suggested that norms are "enforced" within social networks through the use of social sanctions. In other words, conformity to a social norm is shaped by individuals' desire to avoid the opprobrium, even if only expressed subtly, of their friends, neighbors, and acquaintances. Putnam then exported the concept of social capital to, first, explain regional governmental performance in Italy and then a larger array of social indicators within the United States, spawning a much larger body of research on social capital. While Putnam himself was careful to retain Coleman's insight that social capital consists of both norms and networks (the latter reinforcing the former), the bulk of the social capital literature has largely ignored the importance of norms and focused instead on networks. Most measures of social capital revolve around organisations and activities through which networks are built and strengthened, perhaps because these are thought to be more easily measured than norms.

The fact that norms have not received much attention in the scholarly literature is unfortunate, as they are central to understanding individuals' motivations for civic and social engagement. According to a strict cost-benefit analysis, no one should ever engage in any form of behavioral engagement. Voting illustrates the dilemma well. Why incur the costs – time and energy – to vote, when the probability of casting the deciding vote is infinitesimal? The fact that so many people apparently defy irrationality and turn out to vote has long puzzled economists and economically-oriented political scientists alike (Aldrich, 1993; Downs, 1957; Ferejohn and Fiorina, 1974; Fiorina, 1976; Green and Shapiro, 1994; Riker and Ordeshook, 1968). The answer to the puzzle is simply that most people do not employ a narrow view of rationality when deciding whether to turn out, or participate in many forms of civic and social engagement. Instead, many vote and/or participate in other ways because they feel it is their civic duty. For example, Verba, Schlozman and Brady find that civic gratifications are a leading reason for both voter turnout and other forms of engagement (Schlozman, Verba and Brady, 1995; Verba, Schlozman and Brady 1995). Andre Blais (2000) finds the same in Canada. These recent findings, in turn, are consistent with the observations of some of the earliest empirical

investigations of why people vote (Almond and Verba, 1989 [1963]; Campbell *et al.*, 1960).

Saying that people have a strong sense of civic duty, in turn, is really another way of saying that they adhere to a norm which encourages voting. The problem with such an explanation for any form of CSE is its circularity: people vote (or engage in other activities) because they feel they ought to. A social science skeptic might point to this as an example of confirming the obvious. Would people admit to engaging in activity that they feel is wrong? Similarly, upon having engaged in an activity, are people not more likely to say it is something they ought to do? However, upon closer analysis, relying on norms to explain why people are civically, politically, and socially engaged is not unavoidably tautological, if only for the reason that not everyone endorses the same norms, nor to the same degree. The challenge is explaining why some people are more likely to follow a norm – whether it be one encouraging engagement or anything else – than others. The social capital literature emphasises the *social* nature of norms. They are learned and enforced through inter-personal connections. Putnam (1993) uses the somewhat whimsical example of leaf-raking in his neighborhood to illustrate the point:

> *"The norm of keeping lawns leaf-free is powerful in my neighborhood… and it constrains my decision as to whether to spend Saturday afternoon watching TV. This norm is not actually taught in local schools, but neighbors mention it when newcomers move in, and they reinforce it in frequent autumnal chats, as well as by obsessive raking of their own yards. Non-rakers risk being shunned at neighborhood events, and non-raking is rare." (p. 171)*

Knack (1992) applies and extends the same logic to voter turnout, stressing the collective aspect of social capital as a mechanism for norm-enforcement. Because of the subtle social sanctions which guide behavior, even people with a low sense of duty have a higher likelihood of voting in a place populated with duty-bound compatriots. "Social sanctions… permit a certain amount of 'substitutability' of feelings of duty, as someone with a low sense of civic obligation may nonetheless vote to avoid displeasing a friend or relative with a stronger sense of duty" (pp. 137-138).

Explaining norm-driven behavior narrowly in terms of social sanctions, using a crude "stimulus-response" model, is too simple however. People often behave in accordance with norms even when they need not be concerned about immediate social sanctions, or anyone finding out about their behavior at all. Many norms are internalised, through habituation. The internalisation of a norm means "that an individual comes to have an internal sanctioning system which provides punishment when he carries out an action proscribed by the norm or fails to carry out an action prescribed by the norm" (Coleman, 1990, p. 293). We might say that a norm has been internalised when you act in accordance with it even when no one else is looking. The term "socialisation" aptly refers to the process by which a norm is internalised – one learns what is socially desirable. As young people undergo socialisation, they are imprinted with norms that have the potential to guide their behavior throughout their lives.

It is the link between socialisation and norms that makes schools – and thus formal education – relevant to this discussion of education and CSE. Coleman, in fact, originally developed his conceptualisation of social capital while studying schools within the United States. Coleman found that, in the American context, Catholic schools were rich in social capital – social networks of students, parents, teachers, and members of the community surrounding the school overlapped. Norms were widely shared and broadly enforced,

specifically norms pertaining to academic achievement. As private[5] religious institutions, Catholic schools foster group solidarity, or what the social capital literature has come to call bonding social capital. A later study by Bryk, Lee and Holland (1993) elaborated on the argument that this particular type of school fosters a strong sense of community, using a series of quantitative and qualitative indicators to confirm Coleman's basic insight. They also show that this bonding social capital (a term that had not been coined when they were writing) does not come at the expense of a commitment to the good of the wider community. Still further studies have specifically linked the social capital found in these schools to higher levels of civic and social engagement among their students (Campbell, 2001; Dee, 2005).

If the literature on how schools foster civic norms left us only with the conclusion that Catholic schools in the United States are rich in social capital, the policy implications would admittedly be rather limited, especially in a cross-national context. From this body of literature, however, comes a more fundamental insight: the ethos of a school, or its normative climate, plays an important role in shaping the civic and social engagement of its students – both in adolescence and, looking forward, in adulthood. Schools are communities, in which norms are taught and enforced. Since they involve regular face-to-face interaction and a need for cooperation, they are a prime environment for the development of social capital. Campbell (2005; 2006a) presents evidence that a school's level of social capital – specifically, the norms shared within the school's population – has civic as well as academic implications. Using panel data, whereby high school students interviewed in 1965 were reinterviewed in 1973 and 1982, Campbell shows that the normative climate of a school has a long-term impact on voter turnout and volunteering, but not on political engagement. "Normative climate" is operationalised as the percentage of students within one's high school who indicate that to be a "good citizen", one must vote. Even when controlling for individual students' own adherence to this norm, the normative climate predicts – *ceteris paribus* – that they will be more likely to vote and volunteer 15 years after high school. And, in a finding that parallels what Jennings and Stoker found for extra-curricular involvement, a school's normative climate exhibits a sleeper effect, increasing in magnitude over time. This same effect, it should be emphasised, was not found for other norms regarding good citizenship. It is also significant that the normative climate only appears to foster civically-oriented engagement: volunteering and voting. Volunteering, you will recall, is the prototypical form of civic engagement, while voting has both a civic as well as a political component. Politically-oriented activity, like working on electoral campaigns, is not related to the civic norms of one's high school, suggesting that civic norms only foster civic engagement, and do not spill over to more conflictual, interest-driven activity.

In sum, the existing evidence suggests that any discussion of education and engagement would be remiss to omit the norms that are learned in the course of one's education, specifically within the environment of a school. Far from being hopelessly circular, the study of norms is a fruitful avenue for explaining engagement and schools are a significant venue in which norms are learned. The literature on norms, and specifically norms in schools, also underscores the significance of data that are:

- Contextual, and thus include interviews with clusters of students.
- Longitudinal, and thus include follow-up interviews years later.

Summary: Much civic and social engagement is the product of social norms encouraging collective action. Schools are an important institution where such norms are inculcated.

[5] Private refers to the fact that these schools do not receive financial support from the state.

Description of the 1999 IEA Civic Education Study

The discussion thus far has covered a lot of ground, highlighting a number of ways in which the existing literature suggests formal education, particularly within secondary schools, affects civic and social engagement. The following section subjects most of these potential explanatory factors to empirical testing, to determine which educational factors affect which dimensions of engagement among adolescents (Table 3.4.1).

Table 3.4.1. Educational factors affecting civic and social engagement

Bureaucratic competence
Civic skills
Cognitive capacity
Curriculum
Pedagogical method
Student parliament
Extracurricular activities
Service learning
Norms

Much of the existing literature has unavoidably been limited to individual nations, primarily the United States, if only because of the limited data available to study civic education across nations. The 1971 IEA data are dated, and only include ten nations. More recently, Hahn (1998) published a book comparing civic education across five nations, but she did not have randomly-selected and thus representative samples of adolescents in each country. To fill this lacuna in our understanding of civic education across nations, in 1999 the IEA completed a second civics evaluation, the Civic Education Study (CivEd). With representative samples in 28 nations, it is far and away the single most significant source of data on civic education. The analysis to follow, therefore, relies on CivEd.

Under the direction of Judith Torney-Purta, CivEd took considerable time to develop and implement. Evaluating civic education presents far different challenges than developing tests in areas like mathematics and science, since agreeing on the "right answers" to a civics exam is fraught with more ambiguity than in many other subjects. Indeed, it is not hard to think of civics questions for which the right answer in one nation would be wrong in another. The evaluation, therefore, could not be tied to the political system or culture of any given nation. Furthermore, it had to be valid across a wide array of nations, and not simply long-standing industrialised democracies. In addition, early on in the process, the architects of CivEd decided that it should include a series of attitudinal and behavioral questions in addition to the scored examination (Schulz and Sibberns, 2004; Torney-Purta *et al.*, 2001).

The first phase of the project consisted of qualitative case studies of 24 nations, mostly written by the national research coordinator appointed within each nation by the IEA. Phase two was the quantitative component of the study, and involved the administration of the common exam and survey instrument to a representative sample of roughly 3 000 14-year-olds in 28 nations. A second evaluation involved older (ages 16-18) students in 16 nations, who were given the same instrument as the 14-year-olds. Because these data involve a smaller number of nations and greater inconsistency in the ages of the students surveyed, I focus here on the sample of 14-year-olds.

Within each nation, schools were selected randomly, using a two-stage stratified sampling design. Within each school, one whole class was selected. Wherever possible, it was a class in what the CivEd documentation describes as "a civic-related subject" (Schulz and Sibberns, 2004, p. 33). The class was also not to have students who were selected on the basis of academic ability, to ensure that the data included the widest possible cross-section of adolescents within each nation.

The 28 nations are an interesting combination of industrialised and newly-emerging democracies. While most are in Europe, North and Latin America are also represented, as are Hong Kong and Australia. The full list of nations includes: Australia, Belgium (French), Bulgaria, Chile, Colombia, Cyprus, the Czech Republic, Denmark, England, Estonia, Finland, Germany, Greece, Hong Kong (Special Administrative Region of China), Hungary, Italy, Latvia, Lithuania, Norway, Poland, Portugal, Romania, the Russian Federation, the Slovak Republic, Slovenia, Sweden, Switzerland, and the United States.[6] Not all of these nations were represented among the 24 in Phase 1 (case studies); likewise, not all of the case-study nations participated in Phase 2 (exam/survey). While we would always prefer to have more nations represented in this and any other cross-national study, CivEd's particular combination of countries is an analytically useful mixture. For example, although few of the nations are abjectly poor, neither are they homogeneously wealthy. Their educational systems also differ substantially, as do their experiences with democracy.

The CivEd instrument was designed to be as broadly applicable as possible. The attitudinal and behavioral questions – that is, those items that were not scored as right or wrong – thus went through a lengthy development process. Many of the items resemble questions asked of adults in such cross-national surveys as the Eurobarometer, World Values Survey, and European Social Survey. Similarly, the exam portion of the instrument had to be equally valid across multiple nations. Consequently, the exam does not comprise "top of the head" factual questions of the sort often found in public opinion surveys. It does include items meant to tap into the test-taker's knowledge, but these deal with how democracies function, and not the specific institutions, practices, or personalities of any given nation or political system.

Recalling the above discussion of civic skills, the CivEd instrument also included right-or-wrong questions that gauge one's skill in interpreting political information. It should be noted that with such an exam it is difficult, perhaps impossible, to sort out the differences between students' general academic proficiency and their civic proficiency – if, indeed, there is actually a difference. That is, it could simply be that young people with high levels of literacy proficiency also do well on questions such as those asked on the CivEd instrument, not because they pertain to the way democracies function but simply owing to the interpretive nature of the items. Any conclusions drawn about adolescents' civic proficiency must be tempered by the fact that CivEd contains no interpretive questions on a subject other than civics, which would permit the analyst to control for a general level of academic prowess.

Like all omnibus datasets, CivEd cannot please every analyst equally – some researchers will undoubtedly disagree with the decision to include some measures and exclude others. Nonetheless, the sheer breadth of the instrument combined with the wide

[6] The analysis below does not include data from Belgium, as the item about television viewing (used as a control variable, as explained below) is not available for Belgian respondents. Belgium is thus also omitted from the presentation of national-level descriptive data.

array of nations in which it was administered made it an extremely rich source of information on civic education around the world. Already, analysis of CivEd has produced a number of notable findings, as evidenced by the citations to work using CivEd in the literature review above. As more and more scholars continue to use these data, they will undoubtedly prove to be even more valuable, especially since the principal investigator has worked to establish an infrastructure for scholars interested in analysing the data. To that end, the University of Maryland hosts the Civic Education Data and Research Services (CEDARS), which serves to make the CivEd data, documentation, as well as research employing CivEd, widely available. Similarly, the 2005 general meeting of the European Consortium for Political Research featured an entire section on civic education, comprised largely of papers drawing upon CivEd data in one form or another.

CivEd permits analysis of how numerous educational factors affect multiple dimensions of engagement, across an array of nations. This is not the first analysis of CivEd, nor will it be the last. It differs from most of the existing CivEd research in that it examines commonalities across all the nations in the data, which means that it sacrifices depth for the sake of breadth. Other analysis can profitably go deeper by examining whether the general relationships reported here hold up in individual nations. In addition, further analysis should more deeply analyse the predictors of the particular dimensions of engagement measured in CivEd.

For the sake of consistency across the engagement dimensions, the models all follow the same analytic strategy. Each one contains a series of independent variables measuring the array of educational factors discussed above, all standardised on the same scale as to be comparable. In this way, the reader can make two types of comparisons, both within and between models. Within each model, one can compare both the magnitude and direction of each educational factor on the dimension of engagement in question. Between models, the common specifications and standardisation of variables mean that the reader can compare the relative impact of an educational factor on one form of engagement versus another. Owing to the large number of models and variables, the discussion below does not highlight every variable in every model. However, all of the results are presented herein, in both tabular and graphical format, so that readers can look up any relationships – which factors predict which dimensions of engagement – of interest to them. I first describe the variables and how they have been coded, next move to a discussion of the model itself, and then conclude this section with the results themselves. The results, in turn, are divided into two parts: the cross-national analysis (in which all nations are combined in a single model) and the nation-by-nation models (which break out results for each country individually).

Description of independent variables in CivEd

School ethos variables

The design of the CivEd study – students sampled within schools – enables the analyst to measure the *ethos* of the school. We need not rely solely on an individual's own report of what the school environment is like, which opens up many analytical possibilities.

Classroom climate

Previous analysis of both the recent (1999) and previous (1971) IEA studies of civic education, in addition to growing evidence from other sources, indicates that the critical factor in classroom instruction is what was described above as the openness of the classroom climate. The analysis therefore includes a measure of classroom climate, specifically an index that asks students to evaluate the discussion of social and political issues within their classroom.[7]

The classroom climate scale is a valid indicator of a young person's own perception of the classroom environment, and whether political discussion is encouraged. However, our understanding of whether the classroom really has an effect is clouded by the high likelihood that students who report more discussion are themselves more civically and politically engaged. Perhaps it is being politically engaged or having greater political knowledge that leads adolescents to perceive a greater degree of political discussion in their schools, rather than the other way around. Similarly, it could simply be that politically-engaged students project their own interest into their recall of political discussions in the classroom. Needed, therefore, is a means to gauge the general environment within the classroom, rather than just an individual's own perception of that environment. To guard against confounding the impact of a student's own proclivity toward politics with the general perception of the classroom environment, I calculate the mean value of the classroom climate index for *all* of the respondent students within a given classroom. In this way, we are not relying on students' own perceptions, but the aggregated perceptions of all the students in the same classroom. Measuring collective perceptions in this way smoothes out any unusually high or low individual scores on the classroom climate index. This variable is labeled *Classroom Climate: Aggregate.*

While the aggregate measure of classroom environment is of central interest, an individual student's own perception of the openness of a school is nonetheless relevant also. Some students are going to perceive a different level of openness than others, which could plausibly affect their preparation for political engagement. However, interpreting the impact of an individual's own perception is difficult, given that it naturally has a strong correlation with the aggregate mean. To separate an individual's own perception from the aggregate value, I have "purged" the two of any correlation. This has been done by regressing the individual's own classroom climate score on the class mean, and saving the residuals. Since the residuals reflect the degree to which an individual's own score deviates from the aggregate value, the two are by definition uncorrelated. In the models that follow, therefore, the individual-level classroom environment score represents the impact of individuals' perceptions *over and above* what their fellow students indicate the classroom environment is like. Comparable variables have been calculated for all of the school ethos measures. This variable is labeled *Classroom Climate: Individual* to distinguish it from the classroom mean. All pairs of ethos measures (individual and aggregate) use the same nomenclature.

Confidence in school participation

In addition to the openness of the classroom, students were also asked to indicate the extent to which students' voices are heard in the governance of the school. The key difference between this index and the one measuring classroom climate is that these

[7] For details regarding this and all other CivEd measures, see the annex.

questions deal with whether the students have a say in the policies that directly affect their school. A representative item asks whether "students acting together can have more influence on what happens in this school than students acting alone"? The classroom climate index, in contrast, only deals with discussion – not action – and emphasises the public nature of the issues in question ("political and social issues").

Good citizenship norms

Owing to Campbell's (2006a) finding that the collective norms within a school shape the engagement of young people, even as they move into adulthood, the analysis also includes two measures of "engagement norms". Students were asked about the activities of a "good citizen", which permits the construction of two indices. One index centers on conventional citizenship, and includes voting and similar forms of forms of political engagement. The other is labeled the social movement index, and contains activities that characterise the "elite-challenging" style of political activity that has become increasingly common in industrialised democracies (Barnes and Kaase, 1979; Inglehart, 1990, 1997).

School experiences

CivEd includes many measures of the experiences students have within their schools. While the self-selected nature of these activities makes discerning a strictly causal effect tenuous, the correlations with the various dimensions of engagement are nonetheless informative. At the least, they point to avenues for future research that can more successfully untangle causal relationships.

Student parliament

Participation in student government is measured as whether the student has ever been a part of a student government or parliament.

Service learning

I follow the example of Torney-Purta, Amadeo and Richardson (forthcoming) and measure service learning not simply as whether the student participated in volunteer activity, but also whether the student reports discussing community problems in class. The resulting measure is dichotomous. A 1 indicates that a student has "participated in a group conducting voluntary activities to help the community", (the phrasing of the questionnaire) and either agrees or strongly agrees that "in school I have learned to contribute to solving problems in the community". Everyone else is coded 0. Note that this is an extremely limited test of service learning. Of all the school experiences under investigation, this one is most tentative.

Extracurricular activities

In addition to student government and charitable organisations, students were asked whether they have ever participated in a host of extra-curricular activities, including a school newspaper, environmental organisation, sports organisation, and many others. The

number of organisations in which each student reports participating have been added together to create the variable *Group Participation*.[8]

The phrasing of the question about group participation leaves ambiguous the level of involvement in each organisation; reporting that one has participated in an organisation may not mean that the involvement is sustained. In order to measure the degree of activity, the models also include the frequency of these organisations' meetings and activities, labeled *Meetings.*

Home experiences

While the primary interest of the analysis is on the impact of school variables, experiences at home are obviously also important in explaining the engagement levels of adolescents. The models thus include a series of indicators that measure the political exposure a young person receives at home, as well as some general measures of the home environment.

Political conversations and news index

Students were asked to report the frequency which they hold conversations on political topics with members of their family. Two questions were asked, one about domestic politics and another about international affairs. Both have been combined into the Political Conversations Index. In addition to conversations with family members, students can also be exposed to politics through their consumption of news media that cover politics and current affairs. The News Index tallies the extent to which the CivEd respondents read the newspaper, listen to news on television, and listen to news on the radio.

Left unclear in the measures of both political conversations and the news index is the degree to which either one reflects political exposure independent of the young person's own intrinsic interest in public affairs. For many young people, these are simply measures of psychological engagement in politics. So while they are not so good for determining whether political exposure at home has a causal effect on engagement, they are excellent control variables for an intrinsic motivation to learn about politics, and thus help to isolate the impact of the experiences at school.

TV watching

Television viewing has been fingered as a uniquely strong deflator of engagement, as it "privatises" leisure time and thus prevents the development of social ties (Putnam, 1995). It also has a negative impact on academic performance, presumably because it steals time from academic pursuits. Consequently, the models include the amount of time young people spend viewing television: *TV Time*.

[8] I opted to include both student government and community voluntarism in this index, even though these particular student activities are also reflected in other variables (and thus correlate with this index). There is no substantive difference in the results if student government and community voluntarism are left out of the group membership index.

Books in home

The final item regarding the home is a standard measure of general intellectual stimulation provided by the home environment, which also serves as a partial proxy for socioeconomic states, namely the number of books in the home. The number of books has been found to correlate with opportunities for learning provided within the home, and is a measure that can be used across cultures. Note that this item does not pertain specifically to politics or public affairs, as it simply asks about books in general.

Demographics

The models control for two standard demographic measures, gender and socioeconomic status, both of which have a long pedigree in the study of civic and social engagement, and are standard controls.

Gender

Measuring gender is straightforward, as students are simply asked to identify themselves as male or female (with female coded as 1).

Expected education

Measuring socioeconomic status is complicated, as indicators of high SES vary across nations and, at any rate, 14-year-olds are not necessarily the best judge of their own family's relative social status. As a proxy for SES, I include the student's expected education level – how many more years he or she expects to complete. This is not a "pure" measure of SES as it also gauges the student's own level of ambition, but it also reflects the emphasis placed on education within the home, which is highly correlated with class.

Description of dependent variables in CivEd

The above measures will be entered into a series of models, each of which will have a different measure of engagement as a dependent variable. While not all the dimensions of engagement introduced in Section 3.1 are available in CivEd, most of them are. Those dimensions for which CivEd includes measures are as follows. Note that a scale has been created for each one.[9]

Knowledge and skills

Recall that the primary rationale for the CivEd study is to do for civics what similar cross-national evaluations have done for other subjects like math and science, namely provide an objective measure of what adolescents in each nation know. As described above, CivEd contains a civics exam that was scored. The results of that exam have been divided into two parts, knowledge and skills. The following is an example of a knowledge question (the correct answer is in bold):

[9] An explanation of all the scales available in the Civic Education Study can be found in a recent working paper from the Civic Education Data and Researcher Services (CEDARS) at the University of Maryland-College Park (Husfeldt, Barber and Torney-Purta, 2005).

Which of the following is most likely to cause a government to be called non-democratic?

- ***People are prevented from criticising the government***
- *The political parties criticise each other often*
- *People must pay very high taxes*
- *Every citizen has the right to a job*

Of the 38 total questions on the civics exam, 25 are knowledge items, while the remaining 13 pertain to "skills."

In this context, "skills" has a very specific meaning, referring to the interpretation of politically-relevant information. (And therefore does not incorporate other definitions of skills, such as experience in running meetings, writing letters, giving speeches, etc.)

One such example is:

We citizens have had enough!

A vote for the Silver Party means a vote for higher taxes.

It means an end to economic growth and a waste of our nation's resources.

Vote instead for economic growth and free enterprise.

Vote for more money left in everyone's wallet!

Let's not waste another 4 years!

VOTE FOR THE GOLD PARTY.

This is an election leaflet which has probably been issued by

- *the Silver Party*
- ***a party or group in opposition to the Silver Party***
- *a group which tries to be sure elections are fair*
- *the Silver Party and the Gold Party together*

The knowledge and skills items have been combined into two scales.[10]

Voting, civic engagement, political engagement

In surveys administered to adults, these dimensions of engagement are measured by asking about their current or recent behavior. For adolescents, such questions do not always apply, at least to some forms of engagement which given their age are either impossible (voting, running for office) or extremely unlikely (writing letters to a newspaper). Instead, respondents are asked whether, as an adult, they expect to do any number of activities. Voting is measured with an index of two items: whether respondents will vote upon becoming an adult, and whether they will get information about the candidates before voting. The Political Engagement Index consists of questions about joining a political party, writing letters to newspapers, and running for office, while the Civic Engagement Index asks about volunteering in the community, collecting money for

[10] These are scales developed using Item Response Theory.

charitable causes, and collecting signatures for a petition. Since these questions ask adolescents to project into the future, their responses should not be taken as iron-clad predictors of future behavior. Rather, they are windows into how they currently perceive the desirability of each form of engagement. That said, it should be noted that longitudinal data from other sources do indicate that stated intentions in adolescence correlate highly with engagement in adulthood (Campbell, 2006a).

Institutional trust

Regrettably, CivEd does not include the standard items about interpersonal trust regularly asked in such studies as the World Values Survey. Nor does it have any clear measures of trust in other people. However, it does include a battery of items about the respondent's level of trust in government institutions, namely the national government, the local government, the courts, the police, political parties, and the national parliament.

Tolerance

As discussed above, the literature has typically defined tolerance as respect for the civil liberties, particularly free speech rights, of unpopular groups. CivEd includes a series of questions along these lines. Note, however, that these questions entail an especially stringent test of political tolerance because they focus specifically on *anti-democratic* groups. Respondents are asked whether "members of groups that are against democracy" should be allowed host television shows, hold demonstrations, run for office, or making public speeches.

Findings of data analysis

The method of model estimation parallels the above models of absolute vs. relative education, in that it employs a "mixed model" to account for cross-national variation. More technically, again the intercept is allowed to vary randomly for each nation.

With such a large number of cases in the dataset, statistical significance is a low hurdle to clear. The evaluation of variables' relative impacts, therefore, rests on weighing their substantive significance. That is, it is not enough to know whether a coefficient's magnitude is significantly different than zero, as the more meaningful test is whether the impact is of an appreciable magnitude. To facilitate the comparison of relative impacts, all of the non-dichotomous variables (on both the right and left-hand sides of the equation) have been coded to have a standard deviation of 1.0. A coefficient of 1.0, therefore, is interpreted to mean that a one standard deviation increase in that independent variable leads to a one standard deviation increase in the dependent variable. A dichotomous variable has no standard deviation per se, and so its coefficient is simply interpreted as the impact on the dependent variable of moving from 0 to 1.

Results are presented in two formats, both tabular and graphically. Both contain essentially the same information, but facilitate different types of comparisons. Table 3.4.2 presents the full statistical results, which makes it easy to compare coefficients *across* models – the relative magnitude and direction of impacts on different forms of engagement – while Figures 3.4.1-3.4.7 are more intuitive, and simplify the comparison of impacts *within* a model. The ensuing discussion has been organised around the independent variables, the educational factors hypothesised to have an impact on the various dimensions of engagement.

Table 3.4.2. Testing the impact of education factors on dimensions of engagement
Results from mixed-effects maximum likelihood regression

	Knowledge	Skills	Voting (anticipated)	Civic engagement (anticipated)	Political engagement (anticipated)	Institutional trust	Tolerance
School ethos							
Classroom climate: aggregate	0.068 *** (0.004)	0.060 *** (0.004)	0.051 *** (0.004)	0.030*** (0.004)	0.018 *** (0.004)	0.043 *** (0.004)	0.008 * (0.004)
Classroom climate: individual	0.070 *** (0.004)	0.063 *** (0.004)	0.089 *** (0.004)	0.079 *** (0.004)	0.042 *** (0.004)	0.108 *** (0.004)	0.010 ** (0.004)
Confidence in school participation: aggregate	0.028 *** (0.005)	0.041 *** (0.005)	0.010 ** (0.005)	-0.012 *** (0.005)	-0.019 *** (0.005)	-0.006 (0.005)	0.023 *** (0.006)
Confidence in school participation: individual	0.063 *** (0.004)	0.062 *** (0.004)	0.119 *** (0.004)	0.085 *** (0.004)	-0.023 *** (0.004)	0.069 *** (0.006)	0.012 *** (0.004)
Conventional citizenship norms: aggregate	-0.029 *** (0.005)	-0.042 *** (0.005)	0.047 *** (0.005)	0.024 *** (0.005)	0.070 *** (0.006)	0.068 *** (0.006)	-0.051 *** (0.006)
Conventional citizenship norms: individual	-0.082 *** (0.004)	-0.080 *** (0.004)	0.131 *** (0.004)	0.048 *** (0.004)	0.167 *** (0.004)	0.211 *** (0.004)	-0.106 *** (0.005)
Social movement norms: aggregate	0.007 (0.004)	0.012 *** (0.005)	0.016 *** (0.005)	0.047 *** (0.005)	0.005 (0.005)	-0.0001 (0.005)	0.005 (0.006)
Social movement norms: individual	0.053 *** (0.004)	0.037 *** (0.004)	0.030 *** (0.004)	0.143 *** (0.004)	-0.003 (0.004)	-0.018 *** (0.004)	0.031 *** (0.005)
School experiences							
Student parliament	0.172 *** (0.009)	0.145 *** (0.009)	0.035 *** (0.009)	-0.050 *** (0.009)	0.024 *** (0.009)	-0.017 * (0.009)	0.024 * (0.010)

	Knowledge	Skills	Voting (anticipated)	Civic engagement (anticipated)	Political engagement (anticipated)	Institutional trust	Tolerance
Service learning	-0.036 ***	-0.030 ***	0.026 ***	0.147 ***	0.046 ***	0.039 ***	-0.024 *
	(0.011)	(0.011)	(0.011)	(0.011)	(0.012)	(0.012)	(0.013)
Group memberships	-0.079 ***	-0.059 ***	-0.007	0.108 ***	0.079 ***	0.005	-0.001
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.006)
Meetings	0.042 ***	0.047 ***	0.029 ***	0.010 ***	0.012 ***	0.025 ***	0.006
	(0.005)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Home experiences							
Political conversations	0.088 ***	0.064 ***	0.135 ***	0.073 ***	0.188 ***	0.025 ***	0.024 ***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.005)
Political news index	0.062 ***	0.042 ***	0.122 ***	0.118 ***	0.106 ***	0.057 ***	0.004
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.005)
TV watching	-0.006	-0.008 **	-0.012 ***	-0.024 ***	-0.018 ***	-0.016 ***	0.003
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Books in home	0.142 ***	0.145 ***	0.065 ***	-0.041 ***	-0.002	-0.030 ***	0.038 ***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.005)
Other control variables							
Expected education	0.267 ***	0.239 ***	0.114 ***	-0.031 ***	0.016 ***	-0.006	0.037 ***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.005)

	Knowledge	Skills	Voting (anticipated)	Civic engagement (anticipated)	Political engagement (anticipated)	Institutional trust	Tolerance
Gender (female)	-0.134 *** (0.007)	-0.014 ** (0.007)	-0.013* (0.007)	0.254 *** (0.007)	-0.104 *** (0.007)	-0.057 *** (0.007)	0.129 *** (0.008)
Intercept	0.120** (0.051)	0.072 (0.061)	0.008 (0.049)	-0.194 *** (0.045)	0.007 *** (0.032)	0.040 (0.052)	0.056 (0.028)
Nations	27	27	27	27	27	27	27
Observations	62 589	62 589	61 625	61 176	61 051	62 320	59 641
prob > chi²	0.000	0.000	0.000	0.000	0.000	0.000	0.000

*** p < 0.01, ** p <0.05, * p < 0.10

Source: IEA Civic Education Study.

Figure 3.4.1. Knowledge

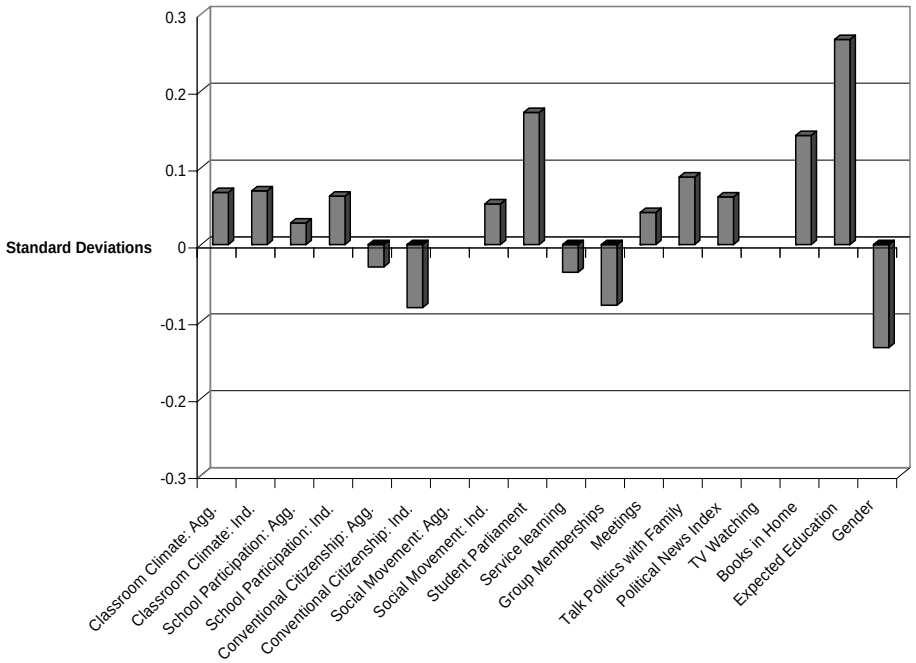


Figure 3.4.2. Skills

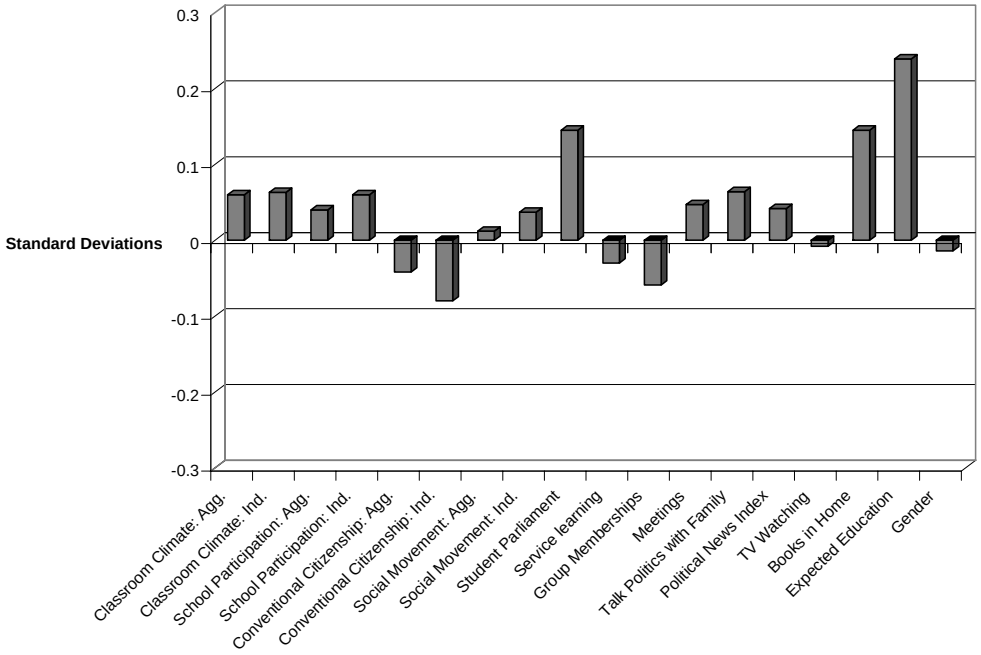


Figure 3.4.3. Voting

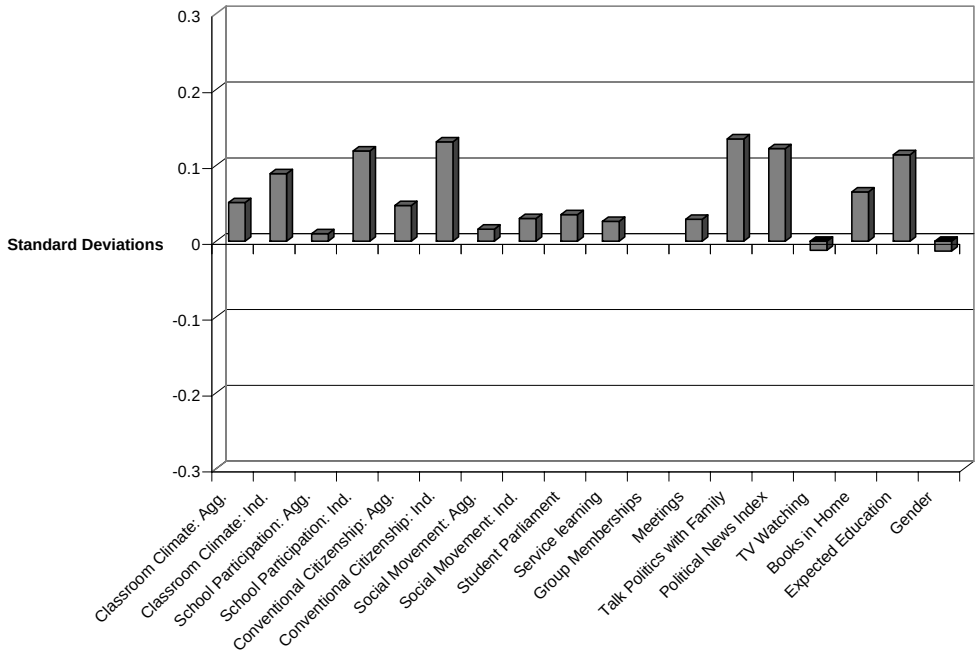


Figure 3.4.4. Civic engagement

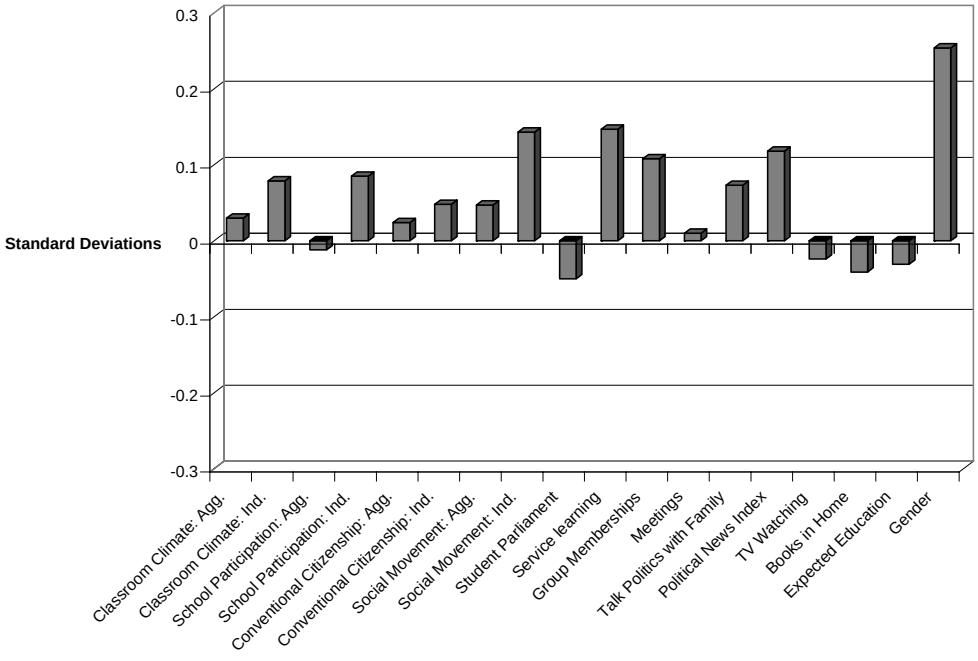


Figure 3.4.5. Political engagement

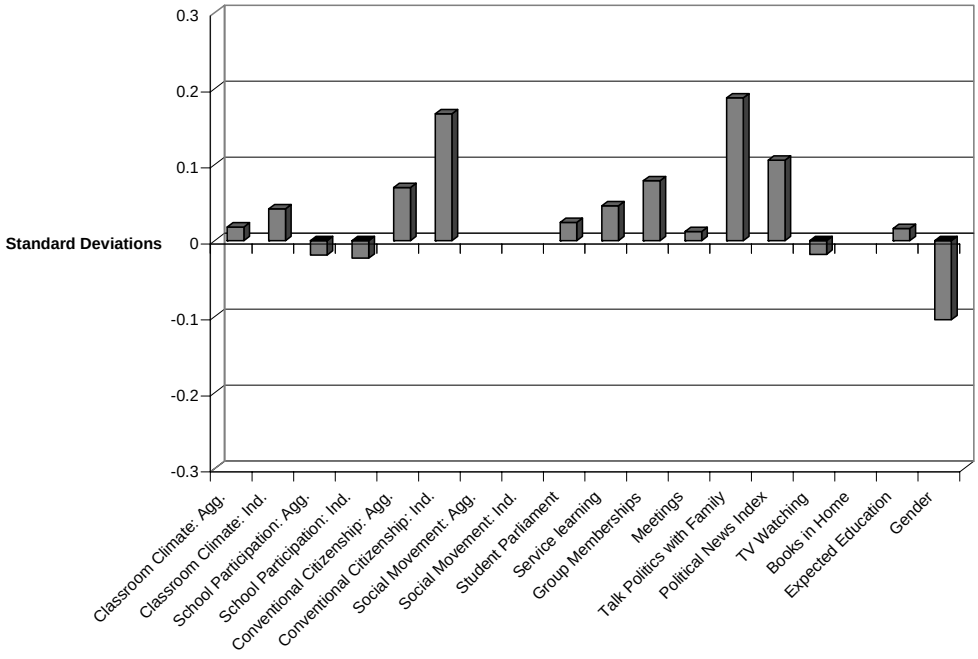


Figure 3.4.6. Institutional trust

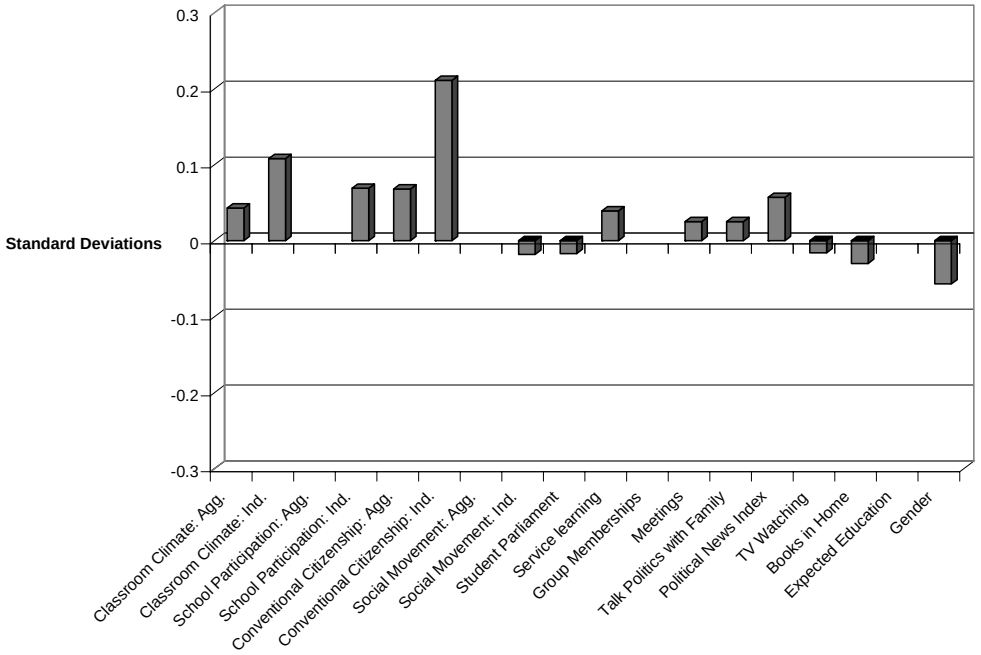
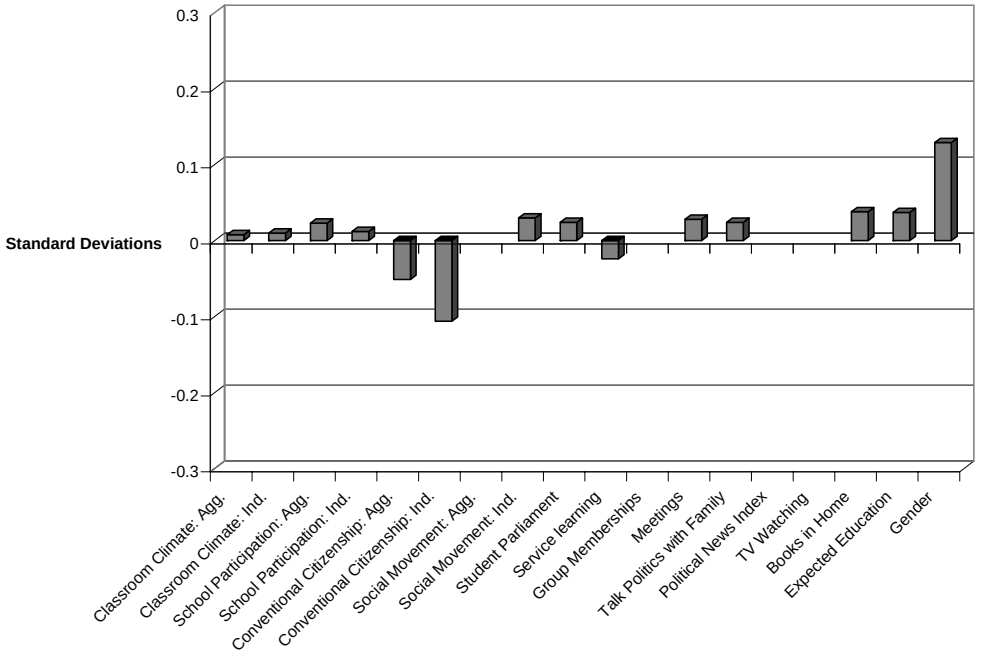


Figure 3.4.7. Tolerance



School ethos

Classroom climate

The aggregate measure of classroom climate – the one, that is, least tainted by concerns over endogeneity – has a consistently positive relationship with all forms of engagement. In terms of magnitude, it ranges from 0.068 for knowledge (with skills right behind at 0.06) to 0.018 for political engagement. This is the most consistent impact across all the engagement dimensions, and confirms the growing consensus that an open classroom climate is a promising pedagogical strategy for civic education. Indeed, the consistency of its impact across the myriad types of engagement is remarkable.

The individual-level measure of classroom climate also has a positive impact across all the forms of engagement, although recall that the interpretation of this variable is clouded by the likely possibility that students who perceive an open classroom (over and above the mean) have an unusually high level of civic and political engagement. Nonetheless, it is noteworthy that both ways of measuring classroom climate reveal a strong relationship between the openness of the climate and numerous indicators of civic and political engagement.

Confidence in school participation

The classroom mean of the Confidence in School Participation Index has a positive and relatively large impact on knowledge, skills, voting, and tolerance, while it has a negative impact on both anticipated civic and political engagement (and is not significantly related to trust). It ranks among the larger impacts and is fairly consistent in size across the models. The potential causal connections are perhaps clearest for the indices that ask about future engagement, specifically voting. It seems plausible that attending a school in which students' voices are perceived to play a meaningful role in school governance would lead adolescents to envision themselves as voters upon becoming adults. The negative relationship with both civic and political engagement is, admittedly, puzzling. A democratic ethos within the school – which is distinct from the openness of the classroom climate – appears to constitute a trade-off. Knowledge, skills, tolerance and the intention to vote are all positively related to a school culture that fosters student voice and cooperation in the affairs of the school. However, student voice and a cooperative ethos have a negative relationship to political and civic engagement.

The individual-level measure of Confidence in School Participation is often greater in magnitude than the classroom mean. It also differs from the aggregate score in that it is positively related to anticipated civic engagement (although it, like the classroom mean, is negatively related to political engagement).

Conventional citizenship norms

The classroom mean of the Conventional Citizenship Index is a positive predictor of voting, civic engagement, political engagement, and institutional trust. In those models in which it is statistically significant, it is among the largest impacts, even running ahead of classroom climate in two cases (political engagement and trust). In other words, young people who are immersed in a normative culture that encourages conventional citizenship are likely to indicate a high level of engagement in the four measures that most clearly tap

into behaviour. (While trust is an attitude and not a behavior, it is a precursor to behaviour.)

There are a few negative relationships observed as well. One of these is not surprising; conventional citizenship norms drive down tolerance for anti-democratic groups. Schools where conventional expressions of active citizenship are widely endorsed are also where anti-democratic ideas are viewed with suspicion. The other two negative relationships, however, are puzzling, as conventional citizenship norms deflate scores on both the knowledge and skills portions of the civics evaluation. It is not clear why this would be the case, although it is worth noting that the common thread across all three is academic proficiency (remember Nie, Junn and Stehlik-Berry's argument that tolerance is a function of such aptitude). Does this mean that a normative environment approving of political activity *causes* a lower level of academic achievement? That seems unlikely, but the precise causal link remains unknown and thus a ripe subject for future research.

The individual-level measure of the conventional citizenship index contains few surprises (again remembering that this is over and above the classroom mean). In particular, we are reminded of the utility of using the classroom mean when we observe the extremely large impact Conventional Citizenship: Individual has on voting, political engagement and institutional trust (0.131, 0.167, and 0.211 respectively). It is not surprising that young people who say a good citizen should do things like join a political party and engage in political discussions also report that they expect to join a political party or write letters to newspapers as an adult, or report a high level of trust in political institutions.

Social movement norms

The classroom mean of the Social Movement Index has a far more variable impact than does the Conventional Citizenship Index. It has a positive and moderately large relationship to civic engagement (0.047) and a smaller effect on voting (0.016), which suggests some commonality between elite-challenging activity and more conventional forms of engagement. Its only other impact is a relatively modest one on the skills evaluation, perhaps suggesting that in school environments where students are more amenable to social movement activity, they are also better able to interpret political information. Perhaps their interpretive skill is either a cause or an effect of skepticism regarding government authority.

At the individual-level, the Social Movement Index shows some intriguing relationships. First, it has a relatively large and positive impact on both knowledge and skills – students who subscribe to social movement-oriented political objectives perform better on the civics evaluation, which is probably a reflection of their psychological engagement with politics. Interestingly, the index is not related to political engagement, suggesting that a social movement orientation does not move hand-in-hand with conventional political engagement (neither are they negatively related, however). Not surprisingly, it is negatively related to institutional trust, again a reflection that a social movement works outside of conventional political institutions. It also correlates positively with tolerance for anti-democratic groups, suggesting an appreciation for an expansive conception of civil liberties.

School experiences

Student parliament

Students who report that they have participated in a student parliament have a much higher score on both the knowledge and skills dimensions of the exam (0.172 and 0.145 respectively), but a much smaller impact on voting, political engagement, tolerance, and civic engagement (the first three are positive, while civic engagement is negative). Surprisingly, participation in student government corresponds to a *lower* level of institutional trust (although only at p=0.06). Could this mean that student governments lead young people to become disenchanted with political institutions? The thought is provocative but, at this point, only speculative.

Service learning

Community voluntarism (service learning) has a variegated relationship to the various forms of engagement. For knowledge, skills, and tolerance the relationship is negative. For civic engagement, the one dimension that seems most closely tied to service learning, there is a strong and positive relationship (0.147). It also has a positive, if weaker, impact on voting, political engagement, and trust.

These conclusions are tentative, however, owing to the limitations of the analysis. First and most obviously, there is no experimental component to the measure – students likely have selected themselves to be involved in community service. To the degree that this selection is correlated with other factors in the model, the impact of service learning is attenuated. Second, the measure of service learning is rather loose, as it does not actually determine whether students are involved in a curriculum-based service learning programme; remember that the measure is a post-hoc combination of whether the respondent has participated in charitable service and whether community problems are discussed in the classroom. There is no way of knowing whether these two activities are linked together, or fall under a formal service learning initiative. Third, classroom-based service learning is far more common in some nations than others, suggesting that the observed effect is really a proxy for a student's nationality. In other words, better evidence is needed to render a verdict on the efficacy of service learning.

Organisational involvement

The story for organisational involvement is interesting. The total number of organisations in which a young person has participated has a negative impact on both knowledge and skills (-0.079 and -0.059), suggesting that the relationships observed for service learning are indicative of a general relationship between extra-curricular activity and civic proficiency. Perhaps this measure is picking up a general level of sociability that draws a student away from academics. As expected from the literature on extra-curricular activities, organisational involvement has a positive relationship with both civic and political engagement –cross-nationally, we again see evidence that involvement in groups is a "pathway to participation". It has no relationship to voting, tolerance, or trust.

Meetings

In contrast to the number of group memberships, the frequency of attending meetings has a largely consistent positive, if modest, impact on engagement (although it does not

reach statistical significance for civic engagement or tolerance). The largest impacts are on knowledge and skills (0.042 and 0.047), while it has a small impact on voting, civic and political engagement, as well as institutional trust. It is not clear why attendance at meetings would have a relationship to knowledge and skills that is the reverse of the number of organisations in which a young person is involved. A possible explanation comes from the literature on civic skills, as meetings are an important venue for developing organisational skills as defined by Verba, Schlozman and Brady. Perhaps participation in meetings builds skill capacity, which in turn facilitates other dimensions of engagement, in a way that other forms of organisational involvement do not.

Political conversations and TV watching

The control variables all behave more or less as expected, and many serve as a useful benchmark for comparing magnitudes with the school factors. For example, Political Conversations (at home) has a strong, positive impact on every form of engagement, similar to the findings for classroom climate. Note that TV watching generally has a negative, but small, impact (tolerance being the sole exception, as TV watching and tolerance are not related to one another).

Expected education

The one control variable of note is the measure of expected education, which combines the student's ambition, academic ability, and socioeconomic status, in the same manner that educational attainment does for adults. As would probably be expected, expected education has a sizable, positive impact on knowledge and skills; it also has a positive impact on voting, political engagement, and tolerance. Interestingly, it is negatively related to civic engagement and has no bearing on institutional trust.

I highlight expected education to underscore that the relationships observed are not simply a function of an individual's socioeconomic status. If they were, we would anticipate expected education to soak up a large portion of the observed variance, leaving the other factors with minimal impacts at best.

Synthesis of results

The volume of results generated from the above analysis of the IEA Civic Education Study admittedly risk losing sight of the forest for the trees. As a guide through the forest, Table 3.4.3 provides a graphical summary of the most significant conclusions to be drawn from the analysis of the IEA CivEd data.

Table 3.4.3. Highlights from analysis of IEA CivEd

	Knowledge	Skills	Voting (anticipated)	Civic engagement (anticipated)	Political engagement (anticipated)	Institutional trust	Tolerance
Classroom climate: aggregate	↑	↑	↑	↑	↑	↑	↑
Confidence in school participation: aggregate	↑	↑	↑	↓	↓	--	↑
Conventional citizenship norms: aggregate	↓	↓	↑	↑	↑	↑	↓
Number of group memberships	↓	↓	--	↑	↑	--	--
Frequency of meetings	↑	↑	↑	↑	↑	↑	--

↑ Statistically significant, positive relationship.

↓ Statistically significant, negative relationship.

-- No statistically significant relationship.

When the specific findings are taken together, some common patterns emerge from which general conclusions can be drawn. One is that, of all the dimensions of engagement, tolerance is the most difficult to predict. When compared to the other dimensions, a smaller number of factors have a statistically discernable impact on tolerance, and none of those impacts are comparatively large in magnitude. This is surprising in light of Nie, Junn and Stehlik-Berry's argument that the clearest effect for education is on political tolerance. One possible explanation for the apparent inconsistency is that the IEA data do not gauge the school-based factors that best explain the development of tolerance (although what those other factors might be is not clear). Another is that the CivEd tolerance measures constitute an especially stringent test of tolerance, namely questions revolving around granting free speech rights to anti-democratic groups. Typically, tolerance items reference such groups as racists, atheists, and homosexuals, or even allow respondents to select their own unpopular group. Some might argue that pro-democratic attitudes need not include tolerance for avowedly anti-democratic organisations, since tolerance for the intolerant may prove to be self-defeating. That is, the spread of anti-democratic values would destroy the foundations of a political system which preserves minority rights. This is obviously not the place to settle the normative question of the nature of tolerance, but only to raise the possibility that the particular tolerance questions employed in the IEA data do not necessarily coincide with

the tolerance items employed in other studies. Perhaps school-based factors would explain more variance of other, more conventional measures of tolerance.

One of the most significant conclusions to arise from the IEA analysis is the simple fact that the civic and social engagement of young people is not simply a function of their socioeconomic status. Indicators of social status certainly have an impact on many – although significantly not all – dimensions of engagement, but they do not crowd out the impact of indicators that measure civic education. Another, related, general conclusion is that civic education does not take place entirely at home. While the home is an important environment for democratic education, what happens at home also complements what happens at school. Students who report more political conversations at home score more highly on all measures of engagement, but for only two does home-based discussion vastly exceed the impact of the classroom climate. The two exceptions are voting and political engagement, where the home has an impact that is roughly three and ten times, respectively, that of the classroom. Why might these be the forms of engagement most affected by political stimulation at home? Recall that in the above discussion of the absolute, sorting, and cumulative models of education and engagement, the one dimension of engagement for which the sorting model received the strongest evidence is political engagement. In other words, political engagement – defined as conflictually-oriented, zero-sum, interest-driven activity – is activity for which there is the weakest evidence that schooling matters. If high-status parents are themselves politically engaged, they are modeling that behavior for their children, and in the process likely spurring conversation about politics within the home.[11] Voting is partially motivated by political motivations and so its results resemble those for political engagement, although the impact of political discussion at home is muted.

Having established that school-based civic education does have a measurable impact on engagement, what is it about a school that appears to matter most? The answer depends on the dimension of engagement under scrutiny. For example, the evidence supports the longstanding conclusion that involvement in extra-curricular organisations is a "pathway to participation". But it does not appear to affect other forms of engagement. In other words, associational involvement, at least as measured by participation in groups, has a positive impact on two behavioral measures – the anticipation of civic and political engagement – but either a non-existent or negligible impact on trust and tolerance, and a negative relationship to both knowledge and skills. Frequent attendance at these organisations' meetings has a positive and statistically significant correlation, albeit of a modest magnitude, with every dimension of engagement but tolerance. While the reasons for the different impacts for the number of groups versus the frequency of meetings remain speculative, it may be that meetings are the one form of group involvement that build organisational civic skills, which in turn have other attendant consequences on engagement.

What of the ethos measures, those that gauge the students' conception of "good citizenship"? Here the results are equivocal. On the one hand, wide endorsement of conventional citizenship norms has a positive impact on intended voting, civic engagement, political engagement, and institutional trust. In other words, in schools where activities associated with conventional citizenship are broadly embraced, young

[11] Both of these conclusions about the impact of family status and experiences in the home must carry with them the caveat that they are based only on the reports of adolescent respondents. Superior data would be derived from their parents.

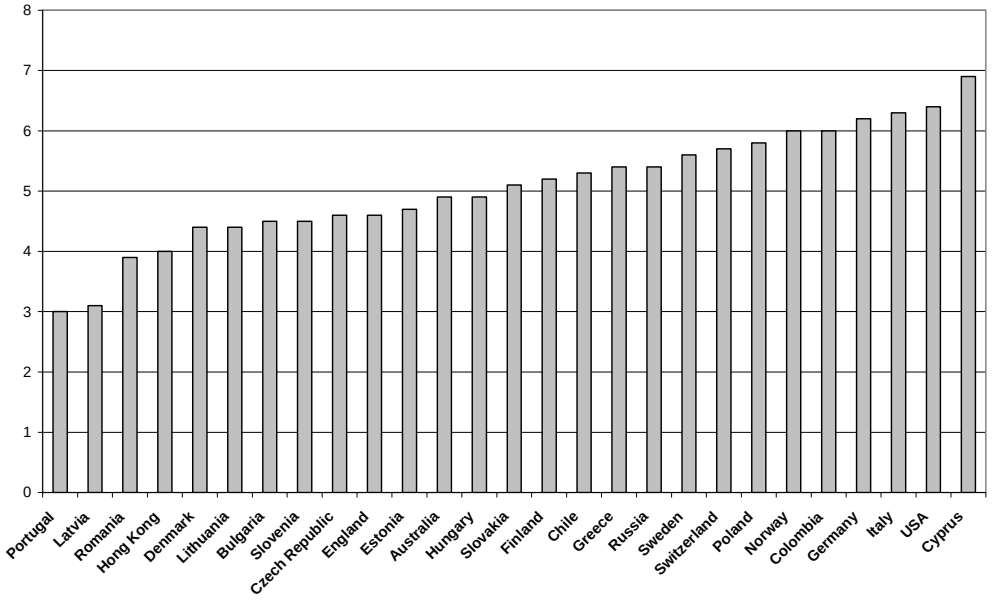
people are likely to envision themselves as both civically and politically engaged. This is broadly consistent with Campbell's (2006a) earlier finding that the normative climate of a school has a long-term impact on civic engagement. The fact that conventional citizenship norms correlate negatively with tolerance, as well as both knowledge and skills, suggests that there may be trade-offs between strong norms and other civic outcomes, although with only cross-sectional data such a conclusion must remain speculative. Furthermore, it is difficult to arrive at a concrete policy recommendation regarding the encouragement of these norms, as we know little about how they might be fostered. Campbell finds that school populations with broadly shared identities have stronger civic norms, but just how a school can build a sense of commonality remains an open question – although a question well worth asking.

The one aspect of civic education in the school that receives the strongest endorsement is the openness of the classroom climate. An open classroom climate has the most consistent positive impact across all dimensions of engagement, even more consistent than socioeconomic status. Further adding to the evidence in its favor is that the measure of classroom climate does not rely solely on the individual students' personal perceptions of the discussion within their classrooms, but instead incorporates information from the entire class.

Nation-by-nation models

Because of its consistent impact across multiple forms of engagement, classroom climate warrants a closer look. Figure 3.4.8 thus displays the average openness of the classroom climate for each nation (averaged by class, not individual, in order to account for the fact that class sizes vary widely). The classroom climate measure has been coded to have a standard deviation of 1.0 (and a mean of 5.0). In comparing classroom climate across nations, note that there is not an obvious pattern to the levels of openness. There is a modest correlation with the affluence of a nation, as per capita GDP has a correlation of 0.43 ($p > 0.05$) with classroom climate. Visual inspection of Figure 3.4.8 reveals the many counter-examples, however. Denmark, for example, has a relatively low level of openness, even though it has one of the highest levels of per capita GDP, while Colombia (with a low per capita GDP) ranks near the top for openness. Neither is there a clear geographic pattern, as neither the Scandinavian countries nor the former Soviet states clustered together. In short, explaining the factors that lead to classroom openness is a matter for further exploration.

Figure 3.4.8. Classroom climate by nation
Standard deviation of 1.0



To further explore the impact of an open classroom climate, Figures 3.4.9-3.4.15 display the coefficients for the aggregated measure of classroom climate broken out by each individual nation in the CES sample.[12] These models include precisely the same set of independent variables as in the cross-national models, with the standard errors clustered by classroom. Both the independent and dependent variables are coded so that they have a standard deviation of 1.0. The figures display all coefficients that achieve a significance level of 0.10 or less.

The results reveal that even though an open classroom climate has a consistently positive and statistically significant effect across each form of engagement when all nations are combined into one model, that relationship is far more variable when we examine nations individually. For no form of engagement does classroom climate have a significantly positive impact in all nations. Classroom climate displays the most consistent effect for skills and voting, and even in these two cases the relationship only appears for 14 nations. Classroom climate has an especially weak impact on civic engagement (five nations). It is similarly weak for political engagement (seven nations), with a negative relationship registered in one nation (Greece). For tolerance, there is only a positive relationship in four nations, and a negative one in three more. Once again, we see the difficulty in matching school experiences to tolerance (although also recall, once again, that the measure of tolerance is non-standard and thus difficult to compare with other such measures in other sources of data).

Volumes could be written explaining the idiosyncrasies of each nation. Some of the non-effects could be explained by a relative lack of variation within a particular country's educational system, but in other cases the curriculum may limit the impact of the

[12] The sheer number of nations and variables precludes doing this for every independent variable. This presentation is meant to be suggestive of all that is yet to be learned from the in-depth analysis of the IEA data.

classroom climate. This is not the place to delve deeply into these national differences. The point here is simply that there is much yet to be explained regarding an open classroom climate.

Figure 3.4.9. Knowledge

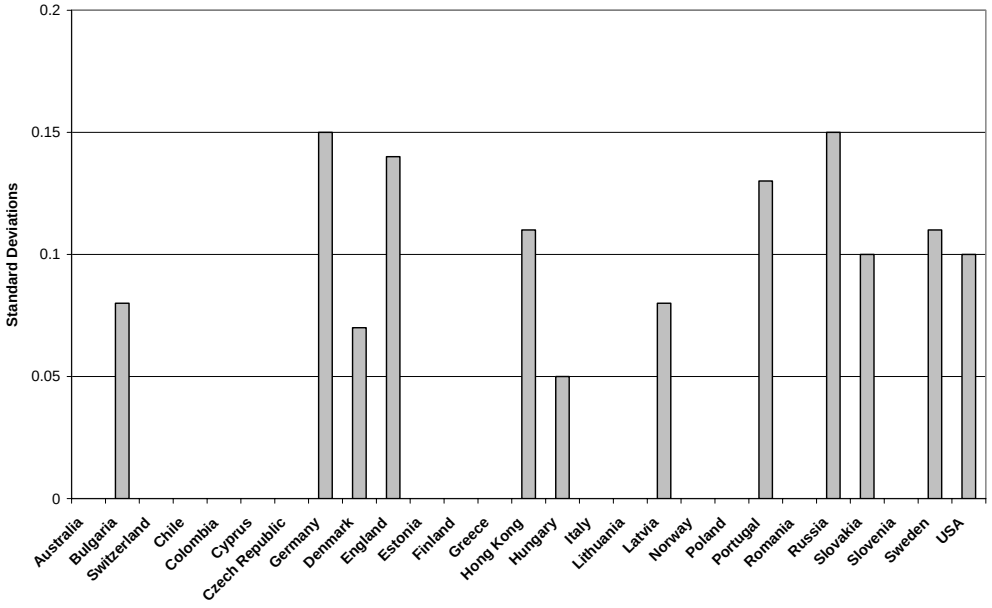


Figure 3.4.10. Skills

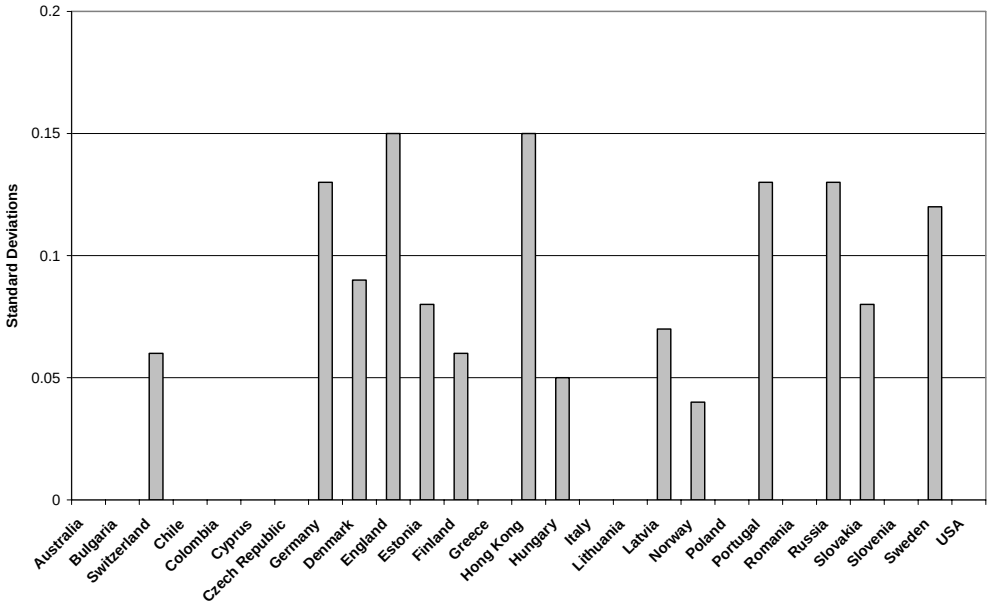


Figure 3.4.11. Voting

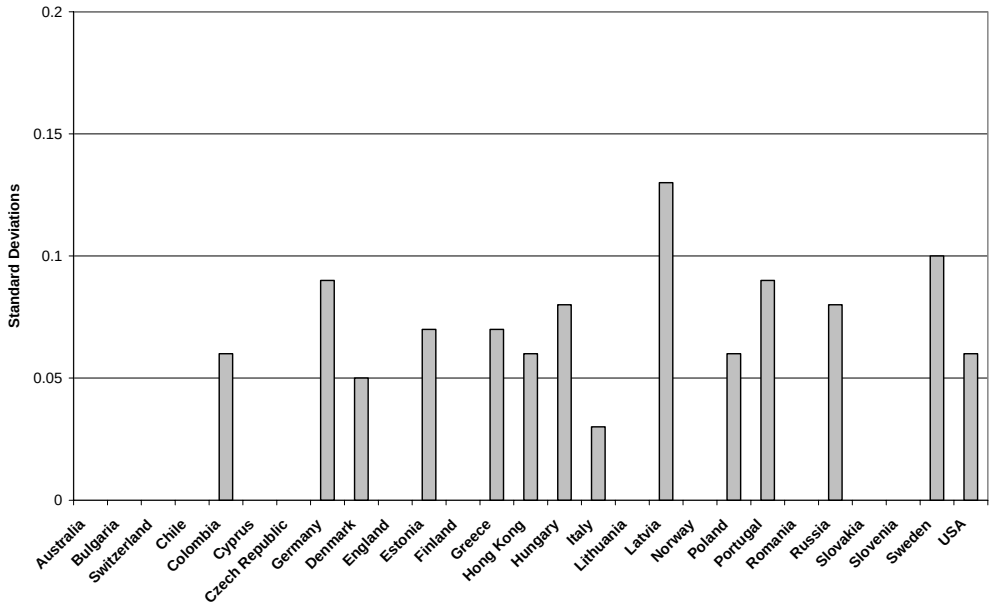


Figure 3.4.12. Civic engagement

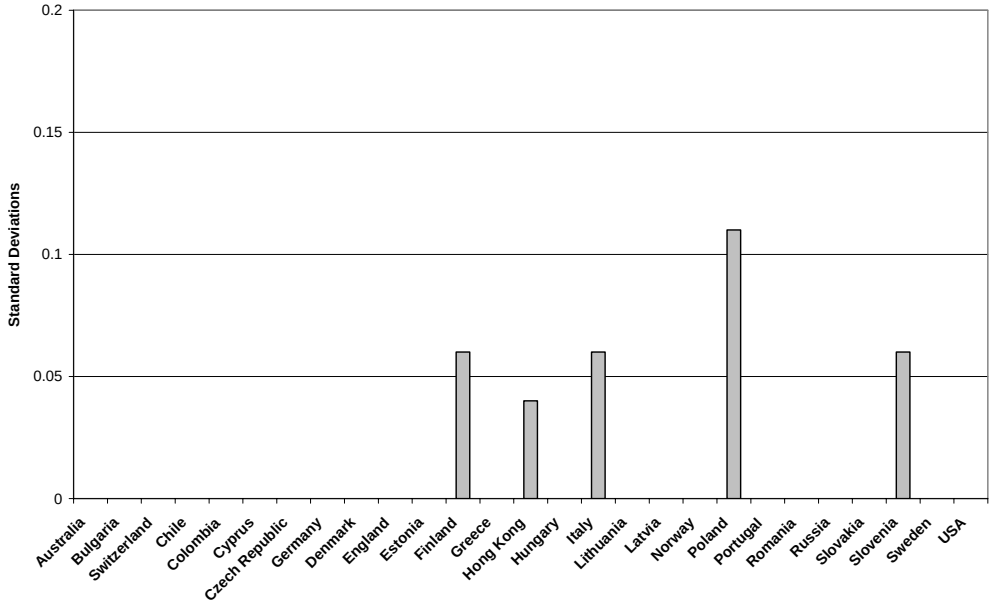


Figure 3.4.13. Political engagement

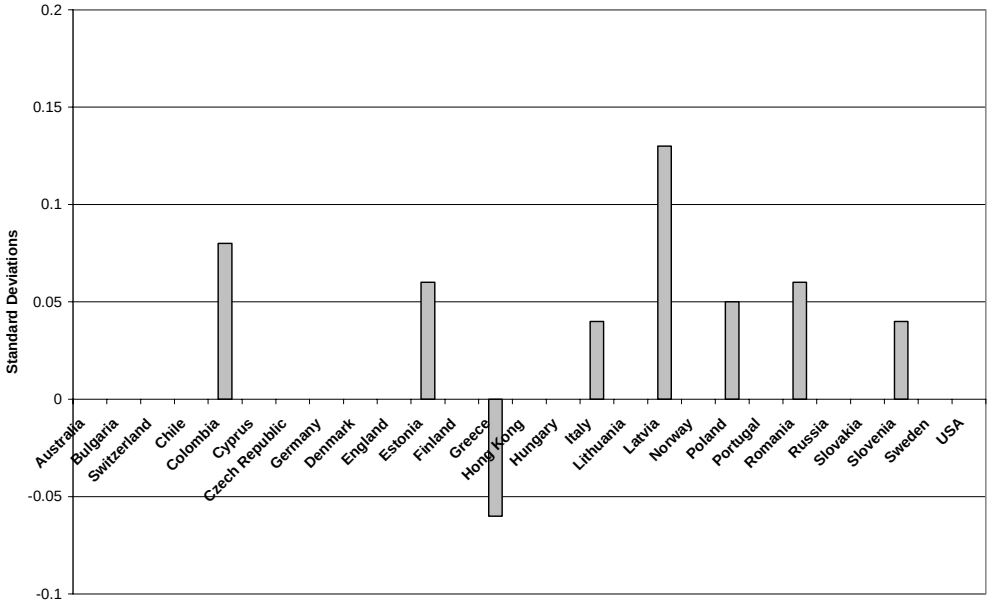


Figure 3.4.14. Institutional trust

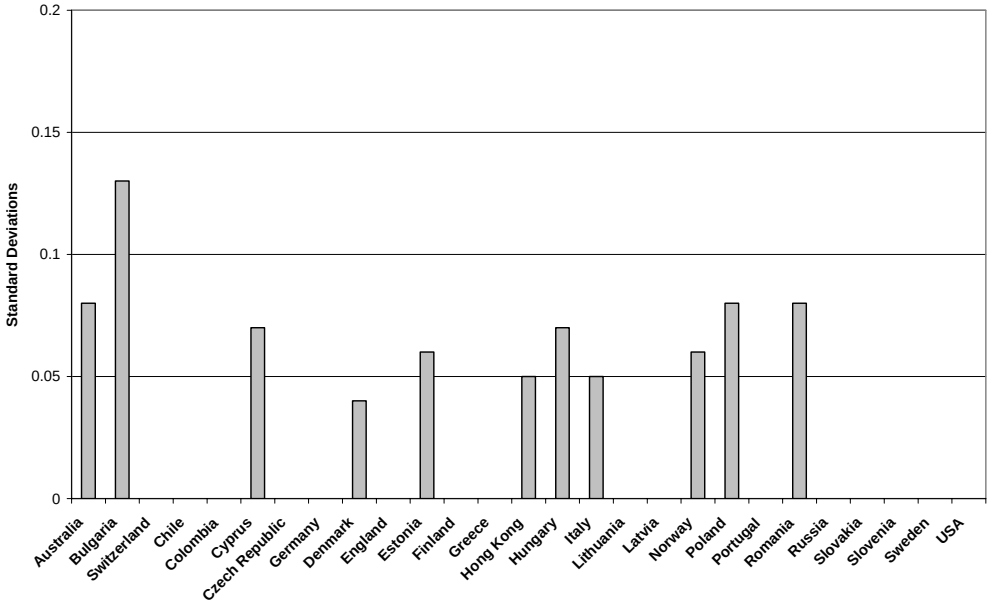
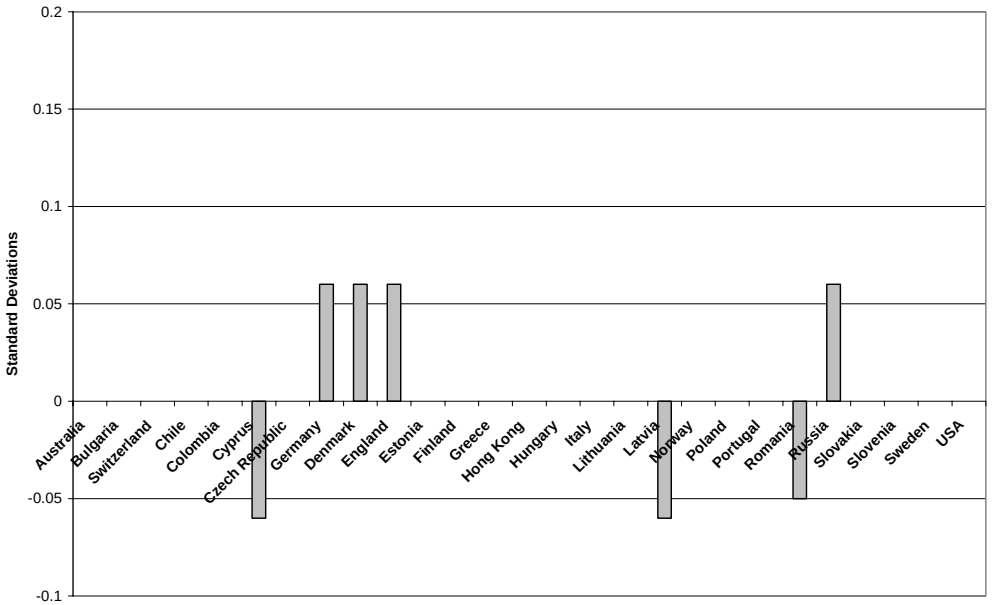


Figure 3.4.15. Tolerance



Conclusion

While the bulk of the evidence suggests that promoting an open classroom climate is a propitious means to foster engagement among young people, we do not quite have the evidence to cinch the case. For one, it is still possible that the link between classroom climate and engagement is endogenous. Perhaps classrooms where students are more likely to be engaged – for reasons out of the school's control – are also classrooms where teachers feel that they can promote discussion of political issues. If this is the case, though, whatever leads the students to be more engaged and thus engage in classroom discussion would have to be something other than what is gauged with the many measures already in the model.

How could we determine whether classroom climate has a truly causal effect on engagement? The cleanest causal inference could be accomplished with a randomised experiment, whereby chance determines that some adolescents are randomly assigned to classrooms with open discussion while others are not. Barring that, analysts would need to find an instrumental variable to predict classroom climate that is not itself correlated with individuals' level of engagement.

Even if it could be shown that an open classroom climate does have a causal effect, it would leave open the critical question of whether it has a sustained impact on engagement as adolescents age into adulthood. While there is good reason to suspect that predilections toward participation developed in adolescence continue to manifest themselves over the lifespan, whether classroom climate in particular has such a long-term impact remains unknowable without the appropriate longitudinal data.

3.5. Conclusion

This concluding chapter first summarises the preceding chapters. Converse's "universal solvent" of education has been the subject of a burgeoning literature which, while still developing, nonetheless illuminates the education-engagement link. Gaps in the research remain, but there are reasonable grounds to proceed with further study, including the development of indicators pertaining to education and engagement.

Summary of report

This report has unfolded as follows. First we saw that there is overwhelming empirical evidence linking education and engagement. The empirics, however, have raced far ahead of theory. We know that education is a potent predictor of virtually every type of civic and social engagement; we do not necessarily know why. Most scholars of civic and political participation have been content to control for education without examining in depth why education has the apparent effects it does.

The link between education and engagement has been well known for so long that few scholars have ever bothered to consider whether the relationship is actually causal in nature. Perhaps education only appears to have an effect, when the real causal mechanism lies elsewhere. If this were the case, then there would be no point in pursuing the study of education and engagement. Accordingly, Section 3.2 considers the evidence in favor of a causal relationship. Two independent studies have examined natural experiments, namely the introduction of compulsory education laws, and found that formal education does appear to have a truly causal relationship on civic and social engagement, particularly voter turnout, political tolerance, and political attentiveness (which is closely related to political knowledge).

The blunt conclusion that obtaining more education causes an increase in engagement is a valuable first step to understanding the theoretical connection between the two, as it justifies further exploration of the subject. Yet it is only a first step, as it leaves the precise nature of that causal relationship inside the proverbial black box. Section 3.3 thus scratches below the surface to explore that causal relationship. In particular, it takes up the question of whether education is simply a proxy for social status. One compelling explanation for the link between education and political engagement is that education sorts people according to their relative social status. More education – relative to others in the same social environment – means more status, which leads to more political involvement (the sorting model). However, more education means a higher level of political tolerance, regardless of one's educational environment, because education increases "democratic enlightenment"– better known as political tolerance (the absolute education model). That is the theory, the evidence for which has largely been amassed in the United States, although even there doubts have been raised. Section 3.3 subjects the

sorting and absolute models to their first full-blown cross-national test. The results reveal evidence favoring the sorting model, but only for one particular type of engagement – conflictual, competitive political engagement that is most likely to be zero-sum in nature. Expressive political engagement (boycotting and the like), voting, membership in voluntary associations are all a function more of one's absolute education level than the educational environment, although in all these cases the educational environment matters too (just not as much as absolute education). For institutional trust, though, only absolute education has an impact. Furthermore, still a different mechanism predicts interpersonal trust, namely the cumulative model of education. Not only does more absolute education foster greater interpersonal trust, but so does a higher level of education in one's social environment.

Based on the results of Section 3.3, the policy implications of increasing education levels within a nation, holding everything else constant, would appear to be the following:

- An increase in voter turnout. As has been noted, voter turnout has not risen in the wake of increasing education and, in fact, has decreased in most industrialised democracies. What these results suggest is that turnout would be even lower if education levels had not increased. That is, in the face of other factors which have been driving turnout down, rising education has served to prop it up.
- An increase in civic engagement, expressive political engagement and, especially, institutional trust.
- A multiplicative increase in interpersonal trust, owing to the positive impact of both individual and environmental increases in education.
- No increase in political engagement, as rising levels of education would preserve the social hierarchy that leads people at or near the top to participate in zero-sum activities. It would merely take more education to climb to the top of the social ladder.

Obviously, such conclusions about the social consequences of rising education levels are tentative at best. They could only be expected to the extent that everything else in the political, social, and cultural milieu is held constant.

Based on their analysis, including cross-national models, Nie, Junn and Stehlik-Berry also conclude that political tolerance increases across the board as education levels rise. While the data used in Section 3.3 were unable to attempt a replication of that claim, the robustness of the connection between education and tolerance suggests that it continues to hold.

Section 3.4 then took up the question of how it is that schools, the primary vehicle of formal education, have the impact that they do. If schools catalyse civic and social engagement through a mechanism other than their impact on an individual's socioeconomic status, this implies that the content of education actually matters. The discussion covers a number of possible *educational factors* – that is, the specifics of what is learned in school – that have been discussed in the extant research literature. These include:

- ***Bureaucratic competence*:** familiarity with administrative procedures.
- ***Civic skills*:** development of the capacity to perform the tasks necessary for organisational involvement. It also refers to the ability to interpret political information.

- ***General cognitive capacity:*** the expansion of general abilities like assimilating and articulating information eases one's way into civic and political engagement, which often has a high information threshold.
- ***Curriculum:*** apart from the general cognitive capacity developed through formal education, the civic orientation of a curriculum could spur CSE.
- ***Pedagogical method:*** research into the methods of civic education suggests that an especially effective classroom technique is the open discussion of social and political issues.
- ***Student government:*** perhaps participation in the governance of the school prepares young people for participation in the governance of their community and nation.
- ***Habits:*** youth groups, also known as extra-curricular activities, can inculcate habits of associational involvement and engagement.
- ***Service-learning*:** programmes whereby young people perform charitable volunteering connected to their classroom work, have arisen as a possible strategy for deepening their commitment to civic and, in some cases, political engagement.
- ***Norms:*** schools are communities with the potential to inculcate social norms, such as the norm of engagement in collective action like civic and political activity.

Fortunately, the 1999 IEA Civic Education Study (CivEd) makes it possible to test whether any of these factors are, indeed, related to the various dimensions of engagement. Section 3.4 thus contains a new analysis of the CivEd data examining those empirical relationships. While there are many findings detailed in Section 3.4, the most consistent pertains to the openness of the classroom climate, which is shown to have a positive impact on all forms of engagement included in CivEd: knowledge, interpretive skills, intention to be an informed voter, intention to be civically engaged, intention to be politically engaged, institutional trust, and tolerance for anti-democratic groups. These findings are the more notable in light of the fact that the measure is not only an individual's personal perception of the discussion within the classroom, but the mean perceptions of an entire class.

The openness of the classroom measure is one measure of the ethos within a school. While it has the strongest and most consistent impact, it nonetheless is not alone among measures of school culture. The perception of the school's openness to students' involvement in governance also has a positive impact on some dimensions of engagement (knowledge, skills, civic engagement, and tolerance), although a negative impact on the intention to be involved in political engagement. This negative relationship may be because a school that fosters student involvement has a cooperative culture, which is anathema to the conflictual orientation of political engagement.

Some educators may be wary that the widespread adoption of an open classroom climate and student participation in school governance would, at best, divert schools from their core educational mission and, at worst, invite disorder by subverting the authority of teachers and school administrators. A closer look, however, suggests that educators need not worry. An open classroom climate simply refers to a style of instruction. Instead of rote learning, students are given the opportunity to discuss and debate compelling issues with a teacher's guidance. Similarly, the confidence in school participation index makes

reference to students' opinions being treated respectfully by teachers and administrators, hardly a recipe for anarchy.

Results from CivEd also suggest, consistent with previous research, that participation in extracurricular activities has a positive impact on every dimension of engagement but the intention to be engaged in explicitly civic activities, at least when participation is measured as attending organisational meetings. The breadth of a student's involvement in extra-curriculars only has a substantively meaningful positive impact on intended civic and political engagement, and a negative relationship to knowledge and skills. Too many extracurricular activities may distract young people from more academic pursuits.

Possible indicators

A judicious reading of all the evidence presented here suggests that it is reasonable to conclude that education affects engagement in measurable ways, and that we have some purchase on the mechanisms underpinning that relationship. Clearly, however, questions remain, as there is much we do not yet know about the links between education and engagement. The bottom line is that we know enough to conclude that further study, particularly with richer data, would teach us much more.

One weakness in the state of current research on education and engagement is simply the absence of cross-national descriptive data on the subject. Unfortunately, as of this writing, there is no single comprehensive source of data on democratic education requirements within school systems around the world, let alone the manner in which those requirements are fulfilled. Currently, there are a few volumes that discuss school-based democratic education in a selected number of nations, but none that approach comprehensiveness. Two notable examples of such volumes include *Civic Education Across Countries: Twenty-Four National Case Studies from the IEA Civic Education Project* (Torney-Purta, Schwille and Amadeo, 1999), which was written in preparation for the 1999 Civic Education Study. It consists of case studies from many of the nations that participated in the second, quantitative, phase of the IEA study. These case studies provide rich detail regarding the practices of democratic education within this wide range of nations. A second example of a cross-national study of democratic education is a recent book published by the Brookings Institution, *Educating Citizens: International Perspectives on Civic Values and School Choice* (Wolf and Macedo, 2004). This book is the product of a conference sponsored by the Bill and Melinda Gates Foundation and Brookings Institution which brought together scholars from many different nations (all of which, incidentally, are OECD members) to compare and contrast the approaches to democratic education taken in the United Kingdom (England and Wales), Canada, Germany, France, Belgium, and Italy.

Such volumes are informative and vital for understanding the nuances of individual nations' systems of education. However, as case studies they do not provide comparative data that can be incorporated into a systematic and/or quantitative cross-national study. They thus draw our attention to a gaping hole in the research community's ability to delve deeply into the cross-national study of democratic education, namely the absence of a single, comprehensive source of data on the democratic education provided in different nations. Admittedly, collecting such data is not a simple task. In some nations, democratic education is an explicit component of the nationally-mandated curriculum, while in others the curriculum does not mention it at all. In still others, the education system is so decentralised that the appropriate unit of study is not the national curriculum, but the

requirements imposed by individual states, regions, or provinces. Notwithstanding the complexities – which are presumably no greater than collecting data on any other aspect of education across nations – there is a need for the creation of a database that systematically records how (or if) democratic education figures into a nation's curriculum. Such a database should also take into account that the very institutional design of a nation's education system can have civic consequences. In addition to whether or not there is a nationally-mandated curriculum, other relevant features of the education system likely include the prevalence of religious vs. secular schools, whether the nation has a private (non-state supported) educational sector, and whether the education system facilitates the mixing of students from different ethnic, racial, religious, and linguistic groups. At this point, it is largely unknown whether these, or any other, features of an educational system actually do have measurable implications for democratic education, but the research literature suggests that it is at least plausible that they do.[1]

Even the compilation of such a database, however, is only a first step to understanding cross-national variation in democratic education, as it would only indicate what the curriculum technically requires. Equally important is understanding what actually happens in classrooms, and measuring educational outcomes. While unquestionably valuable, CivEd is the beginning, not the end, of what can be learned about education and engagement. Virtually nothing is known about cross-national comparisons of post-secondary education and how it affects civic and social engagement. Even in secondary schools, the focus of CivEd, there is still much to be learned. In particular, the constraints on the IEA mean that its studies of civic education have only been done sporadically. Twenty-eight years passed between the two IEA studies of civic education, and it has already been seven years since the last one.

The best possible data would come from a longitudinal, individual-level study – information collected from the same individuals in repeated interviews over time. Ideally, it would include interviews with both young people and their parents. Panel data of this sort can provide greater analytical leverage on causal relationships than is possible with cross-sectional data. Yet even barring the collection of panel data, there is much to be gained from repeated collection of cross-sectional data. As demonstrated with the CivEd study, an especially informative research design consists of data gathered from students clustered in schools, so that it is possible to compare the individual against others within the same school environment. If such indicators were developed, the existing evidence recommends the following, roughly in order of priority.

Dimensions of engagement

Essential to any analysis of education and engagement is rigorous measurement of CSE's many dimensions. These could include items about young people's anticipated levels of engagement in adulthood, as well as questions about their current engagement. Conceivably, all the dimensions of engagement could be included. Good engagement measures of this type already exist, in the CivEd study and elsewhere, and thus would not need to be developed. Indeed, there are analytical advantages to using measures that

[1] Recognising the need for just such a comprehensive accounting, at a recent meeting held in conjunction with the general conference of the European Consortium for Political Research, the International Institute for Democracy and Electoral Assistance (IDEA) explored the feasibility of compiling the necessary data, as a first step toward making it publicly available. Under the direction of Henry Milner, an exploratory project to collect these data has begun (but, as of this writing, is only in its infancy).

appear elsewhere, to compare both levels and trends, as well as to serve as a validity check.

School ethos

There are at least three aspects of a school's ethos that are promising analytical avenues.

Classroom climate

An index asking about the free and open discussion of social and political issues. The index used in the IEA CivEd is a good measure, although it could probably be abridged into fewer items, as determined by pilot testing.

Confidence in school participation

Again, the CivEd index is a starting point, although a shorter version could almost certainly be developed.

Sense of community in school

In addition to asking young people about whether their opinions are valued in their schools, it would likely be fruitful to ask about the general sense of community within the school. In other contexts, researchers have tapped into this concept with questions about whether respondents feel a missing wallet would be returned, or whether other members of the community would be willing to sacrifice for the good of the whole (*e.g.* would they be willing to ration water in the case of a shortage?). My point is not that these are the specific questions that should be asked but rather only to make the suggestion that comparable items could easily be developed. For example, while a missing wallet question could be adapted to apply to adolescents, one about the willingness of other community members to sacrifice for the good of the whole would need further refinement.

Extra-curricular involvement

An item that asks about the specific groups in which a young person is involved, as well as the frequency of meetings – both of which are found in CivEd. In addition, adolescents could be asked whether they hold a leadership position, and the responsibilities that entails. Such items about extra-curricular involvement could include measures of community voluntarism and/or service-learning, as well as participation in student government.

Concluding thoughts

In closing, the study of education and engagement is caught in a catch-22. We are far from a complete understanding of how education and engagement are linked, owing to the lack of systematic data. We lack more thorough data, however, at least partly because there has been a lack of knowledge about the ways in which education and engagement are connected. Hopefully, this report has demonstrated that the existing data justify developing cross-national indicators that pertain to those aspects of education which have

a connection to civic and social engagement. The precise nature of those indicators is yet to be determined, but simply the recognition of their value is an important step forward.

Finally, little is known about the consequences of adult learning for civic and social engagement. Survey data collected to measure CSE outcomes always include a measure of formal educational attainment, but rarely do such surveys inquire about adult learning. Yet there are good reasons to think that adult education would have effects on CSE; most, perhaps all, of the factors thought to link secondary and post-secondary education and higher levels of CSE also apply to adult learning. Among the dearth of studies which explore the adult learning-CSE relationship, a few rigorous findings stand out which suggest that adult education does have substantial consequences for CSE. But much more needs to be learned about these relationships.

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Annex
Question wordings

European Social Survey

Competitive Political Activity, Expressive Political Activity, and Voluntary Associations

There are different ways of trying to improve things in [country] or help prevent things from going wrong. During the last 12 months, have you done any of the following?

Have you:

[Competitive Political Activity]

Contacted a politician, government, or local government official?

Worked in a political party or action group?

[Voluntary Associations]

Worked in another organisation or association?

[Expressive Political Activity]

Signed a petition?

Taken part in a lawful demonstration?

Boycotted certain products?

Voting

Some people don't vote nowadays for one reason or another. Did you vote in the last [country] national election in [month/year]?

Interpersonal Trust

Using this card, generally speaking, would you say that most people can be trusted, or that you can't be too careful in dealing with people? Please tell me on a score of 0 to 10, where 0 means you can't be too careful and 10 means that most people can be trusted.

Do you think most people would try to take advantage of you if they got the chance, or would they try to be fair?

Would you say that most of the time people try to be helpful or that they are mostly looking out for themselves?

Institutional Trust

Using this card, please tell me on a score of 0-10 how much you personally trust each of the institutions I read out. 0 means you do not trust an institution at all, and 10 means you have complete trust.

[country's] Parliament

The legal system

The police

Politicians

Political Parties

The European Parliament

The United Nations

European Values Survey

Education Level

The specific form of the question gauging education level varies from nation to nation but is transformed into this common measure:

Inadequately completed elementary education

Completed (compulsory) elementary education

(Compulsory) elementary education and basic vocational qualification

Secondary, intermediate vocational qualification

Secondary, intermediate general qualification

Full secondary, maturity level certificate

Higher education – lower-level tertiary certificate

Higher education – upper-level tertiary certificate

Organisational Memberships and Voluntary Activity

Please look carefully at the following list of voluntary organisations and activities and say which, if any, do you belong to?[1]

And for which, if any, are you currently doing unpaid voluntary work?

Social welfare services for elderly, handicapped, or deprived people

Religious or church organisations

Education, arts, music, or cultural activities

Labor unions

Local community action on issues like poverty, employment, housing, racial equality

Third world development or human rights

Conservation, environmental, animal rights groups

Professional associations

Youth work (scouts, guides, youth clubs, etc.)

Sports or recreation

Women's groups

Peace movement

Voluntary organisations concerned with health

IEA Civic Education Study

Classroom Climate Index

The next part of the questionnaire includes some statements about things that happen in your school. When answering these questions think especially about classes in history, civics/citizenship, or social studies.

Students feel free to disagree openly with their teachers about political and social issues during class

Students are encouraged to make up their own minds about issues

Teachers respect our opinions and encourage us to express them during class

[1] In the interview, respondents were also asked about their membership and involvement in political parties, which has been omitted so as not to conflate civic and political engagement as they have been defined. Since relatively few people belong to or volunteer for a political party, results are substantively unchanged whether this form of engagement is included in the index or not.

Students feel free to express opinions in class even when their opinions are different from most of the other students

Teachers encourage us to discuss political or social issues about which people have different opinions

Teachers present several sides of an issue when explaining it in class

Never, Rarely, Sometimes, Often

Confidence in School Participation Index

Listed below you will find some statements on students' participation in school life.

Electing student representatives to suggest changes in how the school is run makes schools better

Lots of positive changes happen in this school when students work together

Organising groups of students to state their opinions could help solve problems in this school

Students acting together can have more influence on what happens in this school than students acting alone

Strongly disagree, Disagree, Agree, Strongly agree

Conventional Citizenship and Social Movement Indices

In this section, there are some statements that could be used to describe what a good adult citizen is or what a good adult citizen does. There are no right and wrong answers to these questions.

An adult who is a good citizen . . .

[Conventional Citizenship Index]

Votes in every election

Joins a political party

Knows about the country's history

Follows political issues in the newspaper, on the radio, or on TV

Shows respect for government representatives

Engages in political discussions

[Social Movement Index]

Would participate in a peaceful protest against a law believed to be unjust

Participates in activities to benefit people in the community

Takes part in activities promoting human rights

Takes part in activities to protect the environment

Not Important, Somewhat Unimportant, Somewhat Important, Very Important

Group Memberships and Meetings

Have you participated in the following organisations?

A youth organisation affiliated with a political party or union

A group which prepares a school newspaper

An environmental organisation

A United Nations or UNESCO Club

A student exchange or school partnership programme

A human rights organisation

A charity collecting money for a social cause

Boy or Girl Scouts

A cultural organisation based on ethnicity

A computer club

An art, music or drama organisation

A sports organisation or team

An organisation sponsored by a religious group

Think about all the organisations listed above. How often do you attend meetings or activities for any or all of these organisations?

Almost every day (4 or more days a week)

Several days (1 to 3 days a week)

A few times each month

Never or almost never

Political Conversations Index

How often do you have discussions of what is happening in the [name of country] government with parents or other adult family members?

How often do you have discussions of what is happening in international politics with parents or other adult family members?

Never, Rarely, Sometimes, Often

News Index

How often do you:

Read articles in the newspaper about what is happening in this country?

Read articles in the newspaper about what is happening in other countries?

Listen to news broadcasts on television?

Listen to news broadcasts on the radio?

Never, Rarely, Sometimes, Often

TV Watching

How much time do you spend watching television or videos on school days?

No Time

Less than 1 hour

1-2 hours

3-5 hours

More than 5 hours

Books in Home

About how many books are there in your home?

None

1-10

11-50

51-100

101-200

More than 200

Expected Education

How many years of further education do you expect to complete after this year?

Please include vocational education and/or higher education.

0 years

1 or 2 years

3 or 4 years

5 or 6 years

7 or 8 years

9 or 10 years

More than 10 years

Voting, Political Engagement, and Civic Engagement

When you are an adult, what do you expect you will do

[Voting Index]

Vote in national elections

Get information about candidates before voting in an election

[Political Engagement Index]

Join a political party

Write letters to a newspaper about social or political concerns

Be a candidate for a local or city office

[Civic Engagement Index]

What do you expect you will do over the next few years?

Volunteer time to help people in the community

Collect money for a cause

Collect signatures for a petition

Certainly Not Do This, Probably Not Do This, Probably Do This, Certainly Do This

Institutional Trust

How much of the time do you trust:

The national government

The local council or government of your town or city

Courts

The police

Political parties

Congress

Never, Only Some of the Time, Most of the Time, Always

Interpersonal Trust

In this section there are some statements about the opportunities which members of certain groups should have in [name of country]. Please read each statement and select the box in the column which corresponds to the way you feel about the statement.

Members of groups that are against democracy should be prohibited from hosting a television show talking about their ideas

Members of groups that are against democracy should be prohibited from organising peaceful demonstrations or rallies

Members of groups that are against democracy should be prohibited from running in an election for political office

Members of groups that are against democracy should be prohibited from making public speeches about their ideas

Strongly Disagree, Disagree, Agree, Strongly Agree

3.A. What can policy makers do with this information?

By Tom Healy*

Introduction

David Campbell's review is a timely and comprehensive account of a vast and complex area – the impact of formal education on some measurable aspects of civic and social engagement (CSE). It is about formal education because it focuses, as was required, on that part of learning which takes place within institutions of teaching and learning – especially at secondary level. It addresses some measurable aspects of civic and social engagement because not every form of political, civic and societal involvement is directly measurable, observable or readily distinguished from other phenomena. But, we have to start somewhere and this paper allows us to review what is known, what is not known and how we might proceed to establish better sources of information and knowledge about the impact of formal education on CSE.

As project of OECD/CERI, the Social Outcomes of Learning (SOL) focuses mainly on the international comparative evidence through empirical research as a guide to informative and useful pointers to educational policy makers. There is, already, a large amount of research and data-gathering on the "economic" returns to investment in human capital: relatively less has been gathered together in relation to the "social" returns (see OECD, 1998 and 2001 for previous reviews of evidence).

My concerns centre on four overlapping questions:

- Why should we be interested in the CSE outcomes of formal education?
- Does formal education increase CSE and, if so, which types of formal education for which kinds of measurable CSE outcomes?
- How much does formal education increase CSE compared to other factors?
- And what can policy makers do with this information to improve (i) the quantity and quality of CSE, and (ii) the quality of education's impact on CSE?

A key issue emerging in any consideration of the CSE impacts of formal education is how specific and generic skills (or attributes) relevant to CSE can be fostered inside and outside formal education. Skills such as working with others toward some shared set of goals, listening to other viewpoints, negotiating and adapting to social change, asserting one's own rights and those of others, knowing about the history, institutions and political arrangements of a society are all critical to sustained democratic action and behaviour. None of these skills or attributes can be taken for granted. Neither is formal education a

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guarantee of effective and morally defensible civic and social engagement. History knows too many examples where high levels of education in the population as a whole did not correlate with desirable forms of social engagement. Recent examples of how high levels of skill, human capital and completed educational attainment were associated with extremely evil outcomes confirm the obvious point that human capital and schooling can be used for good or ill. It is worth stating the obvious if only to recall that social capital can be used for good and ill and this fact, alone, does not render it any less problematic than human capital.

Why should we be interested in the CSE outcomes of formal education?

Politics, power struggles and competition (*to strive with*) are natural and necessary aspects of human discourse and relationships. The challenge, I would argue, is to moderate competition with compassion (*to suffer with*) and other values. This is where a civic learning culture – going beyond "civics education" has a vital role to play. May I suggest that to dis*passion*ately study the empirical evidence on the "social outcomes" of formal education is necessary but insufficient. To use learning and formal education to enable people to realise their full potential to work and live co-operatively with others is, surely, the goal of our joint endeavours.

Living in a fractured world – economically, culturally and politically – is a tough challenge. A recent OECD project (DESECO) on the definition and selection of key competencies, Rychen and Salganik (2001) has defined three generic or core skills for living: acting and thinking for oneself; using various tools including language and symbols; and learning to live and work with others.[1] The latter competence – learning to live and work with others in a diverse and complex society – is learned in many settings such as school, community, family and workplace as well as voluntary and other organisations. Formal education from pre-primary through to adult or continuing education provides an important social context in which skills are developed, relationships developed, norms of behaviour adapted and changed. Increasingly, participation in formal education and training is seen as a lifelong process in which people are learning as much about change and how to change as about a fixed set of facts or known procedures to accomplishing particular tasks.

Hence, CSE has a context – OECD societies facing the challenge of rapid change and risk. And "education" has a purpose – to equip individuals, groups and whole societies to fulfil many and complex roles. In the first place, knowing something about the social outcomes of learning in a formal education setting helps policy makers and educationalists to influence the impact of learning on broader social aims and objectives. In the second place, it enables a wider audience to appreciate the specific social outcomes of learning and formal education that are typically sidelined in mainstream analysis of the labour market and economic development outcomes of investment in "human capital". Human capital has a social and economic rate of return and any analysis that enables us to

[1] The skills were summarised as capacities to:

- function autonomously (including critical thinking, judgement);

- use tools interactively (including language and symbols); and

- join in socially heterogeneous groups (including acceptance of diversity and democratic values).

quantify this in monetary or non-monetary terms should be welcome news to education ministries as they contend for scarce public resources.

Third, many commentators (*e.g.* Whiteley, 2005) have noted worrying trends in levels of political engagement, voting and trust (with respect to institutions) in many OECD countries. If formal education has a positive impact on civic and political engagement, how do we explain long-term declines in *some* of these forms of engagement (particularly voting)? What others things are going on that explain these trends? And can formal education moderate these trends?

Finally, all of this has a strong political and policy context. For example, the European Union (EU, 2005) has committed to upskilling as it struggles to move toward Lisbon 2010 goals. Among eight "core competencies" it has identified "interpersonal, intercultural and social competencies, civic competence". This competence (note the use of the singular instead of the plural) is defined as covering "all forms of behaviour that equip individuals to participate in an effective and constructive way in social and working life, and particularly in increasingly diverse societies, and to resolve conflict where necessary". Civic competence "equips individuals to fully participate in civic life, based on knowledge of social and political concepts and structures and a commitment to active and democratic participation". Schools and schooling still have a vital role to play. I would argue that we need to pay more attention to the "social capital" outcome of schooling and not just its "human capital" function in sustaining growth in economic output or personal income (important as these are in terms of realising social inclusion and meeting various personal needs).

Formal education impacts on CSE – what and for whom?

That formal education emerges as a strong correlate of CSE is not surprising. From analysis of European data in the 1950s, Almond and Verba (1963, p. 276) reported a strong link between various types of political engagement (discussion of politics, voting, sense of competence to influence government) and levels of completed (formal) education. Verba, Schlozman and Brady (1995) found that education, other things constant, increased political participation. Moreover, literacy skills among adults have shown a positive relationship with participation in voluntary community activities for several OECD countries (OECD and Statistics Canada, 2000).

A survey of the adult population in Ireland in 2002 showed that higher education graduates, other things equal, were 7 times more likely to volunteer in the community than those with lower or upper secondary attainment only (Healy, 2005). Higher education graduates were more than twice as likely to volunteer as those who have not completed second level schooling. These results are similar to those found by Schuller *et al.* (2001) in the United Kingdom. They report that higher education graduates were three times more likely to be a current or active member of a voluntary organisation than those without upper secondary completion (below A-Levels) and about twice as likely as upper secondary completers.

The power of generalisation is in numbers – international cross-country and cross-situational. They enable us to identify relationships, impacts, and even in special circumstances, causality. The drawback is that they are generalisations – not amenable to local or national circumstances where the "rules of the game" and the particular set of institutional and cultural norms mediate general relationships and impacts. Formal education, CSE and their complex inter-relationships are *not* the same everywhere.

A drawback with European Social Survey (ESS) or the Civic Education Study (CivEd) of the International Association for the Evaluation of Educational Achievement (IEA) is that they refer to patterns of CSE that are readily observed and quantified. What about areas of CSE that are more implicit, influential, subjective in nature? Much effective civic and political engagement may be indirect, informal and based on mutual favours, acquaintances and implicit "contracts". Hence, particular groups may enjoy favoured status on account of who they know and how their status in society is respected. They may not need to attend meetings, volunteer, engage in boycotts, contact local parliamentarians, etc. Their civic and social engagement could be of a different quality and nature to that of other groups. The relevance of their initial level of education is that it gave them both access to powerful socioeconomic positions of knowledge, status and respect. In this sense, education – understood as formal schooling – can have a strong "sorting" element and no amount of data from ESS or other similar type surveys could reveal the extent of such engagement and position of influence.

Hence, examining correlations between educational attainment, on the one hand, and types of CSE from sources such as ESS does not allow us to examine the differential impact of formal schooling on a broader concept of civic and social engagement. We may be back to the "drunk and the lamppost"[2] problem. Moreover, the absence of longitudinal analysis means that we cannot convincingly disentangle cohort from lifecycle and period effects. Even if we could approximate these on the basis of longitudinal data, we are unable to identify causative influences as distinct from correlation ones.

Nevertheless, in the space of 150 pages, Campbell has undertaken an unenviable task of summarising a very complex and often confusing area. He had to contend with a number of significant short-falls in the availability of evidence and the limitations of existing research methodology. He pays particular attention to the available empirical evidence – as in other areas of social research – often but not exclusively North American.[3] His sources refer to generalised impact on CSE in the case of primary, and especially secondary, levels of education. Relatively little is known, and therefore reported, about impacts in the case of tertiary, adult and other areas including non-formal or informal learning. Whiteley (2005, p. 19) reports on the emergence of a literature on the impact of adult civic education programmes on civic and political engagement.[4] In a revised draft, it would be valuable to draw on some empirical work in the area of adult education. For example, using UK panel data, Feinstein and Hammond (2004) have found that adult learning plays an important role in contributing, in mid-adulthood, to observable shifts in political and social attitudes as well as in civic behaviour as measured by group membership. Given the dearth of evidence in the field of social outcomes of *adult learning* it would be worth exploring and describing some available studies further.

Also of interest is work commissioned by CEDEFOP (Green, Preston and Malmberg, 2004) in which relationships between various civic outcomes and educational attainment and inequality in adult literacy skills are explored. They suggest that increases in levels of average educational attainment across the population may not impact *directly* on civic

[2] The story is told of a drunk who searched for a lost key under the public lamppost even though it was pointed out to him that it likely to be in the park – presently covered in darkness.

[3] A useful weblink to US research and data that complements the review is *www.civicyouth.org/*

[4] Whiteley's paper examines the impact of education on participation among young people and not adults. However, he cites a number of studies on the impact of adult civic education without elaborating on these (Whiteley, 2005, p. 19).

tolerance, crime and social cohesion. However, to the extent that higher educational attainment can reduce poverty, unemployment and income inequality, it can have an *indirect* impact on social cohesion.[5]

As Campbell acknowledges, what we have are suggestive correlations rather than firm causative relationships. He concedes that such correlations could be spurious "since both schooling and civic outcomes are simultaneously influenced by a wide variety of inherently observable traits specific to individuals and the families and communities in which they were reared" (taken from Dee, 2004, p. 1698). Even if we were to access more longitudinal surveys the enduring problem posed by selection bias or endogeneity leaves us wondering: but does this apparent relationship and correlation reveal the influence of other (unmeasurable) factors, or does it tell us something about the way particular groups select themselves for formal education and CSE?

Campbell begins with a consideration of results from the European Social Survey (ESS) covering a large number of European countries. This particular source has furnished a new set of measures of civic and social engagement not readily available from previous waves of the European Values Survey (EVS). He gives considerable attention to the international empirical evidence for "relative", "absolute" and "cumulative" hypotheses. The discussion of the sorting or "relative education hypothesis" in Section 3.3 would benefit from an inclusion of the work of Pierre Bourdieu. Bourdieu saw educational credentials as a form of capital that gives strategic (sorting) advantage to particular social groups by virtue of its access to power, knowledge and cultural symbols. Those with greater *economic capital* are best positioned to acquire *cultural capital* such as formal education but also adult education or social capital, such as valuable social networks, a fact that further reinforces their dominance (Bourdieu and Passeron, 1990). Through combining social and cultural capital those with greater economic capital are also best positioned to exercise *political power and influence* (Phillips, 1999). As Campbell correctly observes the sorting or competitive model described in Nie, Junn and Stehlik-Berry (1996) does hold for some CSE outcomes – viz. political activity expressed in accessing politicians.

Citing Nie *et al.*, Campbell writes:

> *"At its core, their argument is that political engagement is driven by social status. The higher your placement in a social hierarchy, the more likely you are to be engaged in political activity. And your place in the social hierarchy is largely a function of education."*

and

> *"There are competing expectations regarding the relationship of trust – both interpersonal and institutional – to education. One perspective is that trust has largely social origins, and is thus driven by socioeconomic status. If so, the sorting model would apply. The nearer you are to the top of the social hierarchy, the more reason you have to be trusting. Conversely, if trust is primarily a psychological predisposition immune to one's position on the social ladder, then one's absolute level of education is most likely to matter."*

[5] Using aggregate cross-country data for 15 countries, Green, Preston and Malmberg (2004) found that income inequality – when controlling for GNP per capita – was significantly associated with lower levels of trust and higher levels of crime.

The inter-relationships between social status or power, trust (as one component of CSE) and formal education is complex and, probably highly context-specific. In other words, particular types and levels of formal education could be highly useful to advance the access of some social groups to political influence. In this perspective, CSE could indeed be a very competitive private good – private to particular groups and collectivities. In other cases, CSE could be like a public good – its possession by one group does not crowd out or exclude access by others. To address some of these issues would require a detailed analysis of social power as it plays out in specific societies and hierarchical and multi-tiered educational systems.

By way of illustration, Galland (1999) has found (using EVS) that whereas trust and civic engagement are indeed correlated at the cross-country level, there are important differences between different social groups in the way in which individuals exercise their choice of social networks and relations. Hence, high levels of trust in one area can co-exist with a restricted radius of engagement or trust in another area. Galland questions whether general measures of trust or civic engagement can offer a reliable guide to the quality of social relations or to their interaction at a macro-level.

Campbell makes an important distinction between different types of CSE. He differentiates between a "political index" (= contacting officials/politicians, working in a political party/group) and an "expressive index" (= signing petitions, boycotting, demonstrating) and "political interest". However, each of these indices captures a very partial set of information. The expressive index which comprises signing of a petition, taking part in a lawful demonstration and boycotting certain products, is a very limited measure of how people exercise their civic engagement.

Campbell suggests that "civic" engagement tends to be consensual while "political" engagement tends to be rooted in conflict. I would question this typology. While it may be true in practice – this would required empirical verification – it is not necessarily true in the way these forms of engagement are defined. In any case, "politics" and "civil society" do not have clear-cut boundaries. In practice they overlap. Much "politics" is local and at the local level "civic engagement" frequently has a political dimension both in the implicit sense that people contend for influence, ideas and power and also in the explicit sense that political parties and ideologies still exert a strong influence in various social networks and manifestations of community engagement. Which student society, charitable organisation, sports club, organisation and Church group is not characterised by some degree of implicit power struggles and "politics"? Voluntary activity and community engagement may represent forms of civic and political engagement to the extent that even if they are not politically motivated or aimed they can influence political decisions. As Whiteley (2005, p. 8) puts it: "Voluntary activity helps to sustain civil society and hence supports the government and state". Hence, even if the distinction of "civic" and "political" engagement is conceptually and empirically useful, we should not draw too rigid a boundary line around these concepts.

In the statistical analysis, two factors emerge as significant – apart from education impacts: gender and, secondly, household income. By implication, social class (proxied in this case by household income) and gender are likely to have strong and statistically significant impacts on some dimensions of CSE independently of the level of formal education. If this is so, we need to ask what is the impact of education relative to other factors including social class? Can education contribute positively or negatively to the strong (positive) relationship between social class and CSE – in other words is education serving to shore up and accentuate social inequality in access to politicians and the

political system or does it play an equalising role? In a cross-sectional and cross-national study of these relationships it is difficult to draw conclusive results.

Formal education impacts on CSE – how and why?

Campbell writes: "the fact that norms have not received much attention in the scholarly literature is unfortunate, as they are central to understanding why people engage in CSE". At this point, his review would benefit from additional insights of a theoretical nature. For example, Whitelely (2005) describes five theoretical models in explaining political participation and engagement:

- *cognitive engagement* – people who are better educated can process more information and make informed decisions on the basis of which they selectively engage in forms of engagement they identify as productive;
- *rational choice* – people chose political involvement on the basis of a rational evaluation of costs and benefits to them (such an evaluation may be aided by education in political knowledge and skills);
- *civic voluntarism* – people get involved if they have resources (money, time and education) as well as motivation (contingent on social conditioning and norms of civic behaviour);
- *equity fairness* – people participate in response to a perceived unfairness or gap between expectations and treatment; and
- *social capital* – people are more generally more likely to participate politically in communities where voluntary and community networks and associated trust are higher (education tends to be strongly related to many measures of social capital both as an outcome as well as an input).

The latter three models place emphasis on social and structural factors including social norms and networks. At the risk of over-simplifying the above models, it could be claimed that cognitive engagement and rational choice are fully compatible with the classic human capital model of human behaviour: people, rationally, invest their time and effort in various activities (including schooling) with a view to some net gain over alternative uses of time and effort. Education improves the decision-making and information-transforming process. In the social-structural accounts, education is acting as a socialising agent as well as a form of capital working in association with other forms of capital (financial, cultural and social). One suspects that each of the above five models casts some incomplete light on the reasons why people engage and how education facilitates this. If we were to find more evidence for the cognitive and rational choice models of explanation then the policy implications might suggest more targeted educational provision including education in civic knowledge. If we were to find more evidence on the social-structural side then the education policy implications are broader and may refer to a much wider range of issues that cross the curriculum, pedagogy, assessment and governance of schools.

The analysis of UK longitudinal data (Whiteley, 2005) suggests that cognitive engagement models of active social participation are significantly shaped by political knowledge and interest as well as exposure to citizenship education. Civic voluntarism models are shaped by political interest and educational attainment of parents. By merging both models together, Whiteley claims that "citizenship education appears to have a direct

impact on these rather different forms of participation, even when many other factors are taken into account" (Whiteley, 2005, p. 51). Consequently, Whiteley is optimistic about the future prospects for civics education in Britain and its impact on civil society.

Lurking behind the generic competencies in the DESECO framework, mentioned above, are those norms of "good" and "bad" behaviour inculcated through socialisation. Presumably schools are an important part of this "social conditioning" through learned example and lived ethos as much as in formal instruction in right behaviour. Hence, the way schools are run, who gets to make which decisions, how curriculum is interpreted and applied and how various people relate to each other sets an important conditioning context for young people as they learn about society, democracy and social relationships on their own doorsteps. Campbell comments that: "Schools are communities, in which norms are taught and enforced. Since they involve regular face-to-face interaction and a need for cooperation, they are a prime environment for the development of social capital". It could be postulated that the ethos of a particular school or learning community is likely to be a more telling factor in shaping actual or potential civic behaviour than simply taught civics. Civic norms of behaviour are probably more *caught* than *taught* in such an environment. These findings have profound implications for public policy on schooling that go beyond programme design and curricular content. Hence, the implications for public policy to promote CSE may be as much about hidden curricula at the local level, as well as system-design effects at a more macro-level, than in any specific measures, curriculum or assessments to instruct students about civics and civic engagement.

At this point, we move from looking purely at various aspects of CSE as they are claimed to result from schooling to how social networks in school communities reinforce CSE (as well as academic achievement). Campbell cites previous work by Coleman (1990) and Bryk, Lee and Holland (1993) to refer to the example of Roman Catholic schools in the United States. The claim made is that segregated schooling with strong reserves of "bonding" social capital (a term not used by Coleman or Bryk, Lee and Holland) correlate with higher levels of CSE among students. Assuming that this effect is representative of an independent causative effect of denominational schooling we can ask two questions: Are these outcomes peculiar to the US school system and social context? And are there other impacts – some of which could be negative – on CSE not captured on the outcome side. Transplanting the question to Northern Ireland, for example, we might question about the specific effects of denominational and segregated schooling on (i) intra-community bonding and civic engagement and (ii) cross-community bridging and civic engagement.[6] There are no clear answers to these questions in the many research studies undertaken.

In the discussion of civics education and the empirical findings of the CivEd data source, Campbell reiterates the importance of an open classroom climate in fostering debate and critical thinking about civic and political issues – a finding also echoed in many previous studies (*e.g.* see literature review in Whiteley, 2005, p. 20). Earlier – mainly US-based – research had indicated a limited impact of civics education. However, analysis of longitudinal data in the United Kingdom (Whiteley, 2005) and the cross-country analysis of IEA data indicate strong impacts from education – including

[6] And possibly, also, engagement by whole communities in Northern Ireland with hierarchical institutions such as the State or local public authorities.

citizenship education in the case of the UK data[7]. Presumably these impacts complement (or compensate for) given climates in the families and communities from which students are drawn. At this point, one has to ask if such a finding suggests a wider set of cultural issues and traits embedded in the societies in which schools are located. In other words, the capacity to question, explore, debate and to find a generally welcoming environment to do that is not the same everywhere. Cultures of deference to authority in society and the classroom as well as a shared sense that some topics, issues and debating styles are "off limits" can pervade. What is the appropriate scope for debate, autonomy and exploration; at which stage of formal education; and relative to what set of societal and school norms? There are no clear-cut answers to these questions.

The importance of peer and "community-level" effects is brought out very well in Campbell's review of the CivEd data. There, through use of classroom-level means he is able to report the impact of classroom-level factors such as openness to dialogue, participation in school affairs and shared ideas of what constitutes "good citizenship". The impact of these latter three classroom-level variables is significant. New social movement norms (although vaguely defined in CivEd) provide an interesting case of where young people, who engage in various types of protest or advocacy-type activities (around human rights, environment, etc), are not "politically" engaged as defined in CivEd and, not surprisingly, tend not to trust various institutions. Reference is made to "service learning". However, as Campbell points out, "service learning" is not really captured in the CivEd data. Hence, the finding that community voluntarism, in my view incorrectly coupled with "service learning", has no impact on anticipated civic engagement should be treated with caution. I understand "service learning" to involve some direct linkage of curriculum and service in the community and not just a coincidence of engagement outside the school and education within the school.

Use of longitudinal data from the United States to explore the long-term impact of extra-curricular and out-of-school involvement by young people in various types of clubs and associations is valuable. Campbell reports positive impacts for such involvement. This is an important finding in so far as it underlines the potential of schools to facilitate and complement other forms of social engagement and learning parallel to formal education at a crucial stage of young peoples' development and transition to adulthood. Yet, the absence, in the CivEd data, of any positive relationship between extra-curricular group membership and a range of civic outcomes such as civic knowledge, skills, anticipated inclination to vote and tolerance suggests that the classic *Tocquevillian* hypothesis might not hold across the board – the more people are engaged in civic associations the more they trust others and the healthier is the state of democracy. However, at least Campbell does report statistically significant impacts of group membership on anticipated civic and political engagement (Table 3.4.2).

A received wisdom is that home trumps school across a range of student outcomes from academic achievement to various social skills. However, Campbell suggests that the CivEd findings indicate that classroom climate (open dialogue) has a stronger impact on most of the measures of civic engagement and trust than "political conversations" at home. However, political conversations at home do have a consistently strong and positive relationship with all of the measurable civic outcomes and this factor outweighs classroom climate in the case of political engagement outcomes.

[7] However, these impacts are difficult to differentiate in terms of education programme. Some of the impact could be cross-curricular as well as specific to civics classes.

Some gaps and some questions

Campbell suggests, or hints at, a number of very fruitful lines of approach in future research on the CSE outcomes of schooling:

- contextual studies (and by implication more qualitative approaches to complement large-scale empirical studies);
- greater consistency in survey approach and question coverage internationally (to enable analysts to compare similar phenomena across countries, time and situations);
- longitudinal surveys including parents as well as students that trace behaviour over time for a given cohort;
- adaptation of survey questions on engagement, school climate, etc. from previous surveys such as CivEd;
- randomised experiments to uncover, over time, the benefits and impacts of different policy interventions and educational practices on the ground. It is worth repeating the fundamental assertion also made by Campbell that correlations do not prove causality and a significant and strong positive relationship between two variables may be seriously contaminated by "selection" effects – people who are more engaged are also more prone to interest themselves in, and avail of, "civic education" experiences. As a second-best alternative to randomised experiments, Campbell suggest an Instrumental Variable (IV) to isolate out the impact of a given variable;[8] and
- system-level information that captures possible relationships between macro-level features of national or sub-national school systems and civic outcomes of schooling.

Care is needed in generalising from just one international survey (albeit one that contains many countries and a large overall number of student respondents) at one point in time. One suspects that, qualitatively, some of the findings and correlations might be reversed in another study.[9]

An issue that has not been explored by Campbell is the extent to which active learning can contribute to civic and social outcomes. In addition to open classroom climate, learning that is associated with application, experimentation, experience and project-work could be very effective. One recalls the saying ascribed to Confucius: "Tell me and I forget; Show me and I remember; Let me do and I understand". Active learning involves: investigation, discovery, application and communication:

- learners *want* to change themselves or their environment;

[8] So, for example, a variable correlated with classroom climate as an independent variable but not correlated with civic engagement as a dependent variable could be introduced into the explanatory model. This approach is common, for example, in many micro-level studies of schooling impacts on income. In practice it is very difficult to identify and use some available instrumental variable.

[9] Moreover, a generally positive relationship at international level may not hold up at national level. In one study of civic behaviour in the adult population in Ireland it emerged that contrary to findings elsewhere, there appears to be no correlation between highest level of educational attainment on the one hand and voting or trust, on the other (Healy, 2005).

- they *want* to engage with others;
- they *discover* through a variety of means;
- their *appropriated* knowledge is applied in practice;
- they continue to *reflect* on this knowledge; and
- this knowledge is *communicated*.

At times, the review assesses the state of the literature; at other points it develops new analysis and evidence (from the ESS). The review might benefit from

- a shorter overview of key findings, insights and policy implications followed by a longer and more technical appendix for those interested;
- discussion of results on student engagement[10] and participation[11] from the OECD Progamme for International Student Assessment (PISA) (Willms, 2003); and
- more coverage of some very significant European reviews (I am thinking, for example, of the EUYOUPART survey[12] and the Political Participation of Young People in Europe indicator project, the Wider Benefits of Learning project in the United Kingdom,[13] the UK Citizenship Education Longitudinal Study which began in 2001 (Whiteley, 2005, Baudelot *et al.*, 2004, Green, Preston and Malmberg, 2004).

And so what?

Campbell makes a vitally important observation – and this is worth situating in a larger contemporary debate about the goals, priorities and purpose of formal education. He writes:

> *"Some educators may be wary that the widespread adoption of an open classroom climate and student participation in school governance would, at best, divert schools from their core educational mission and, at worst, invite disorder by subverting the authority of teachers and school administrators."*

These are very reasonable concerns – especially the latter one about mission drift. I have heard it argued, more than once, that too much of a public school (or adult learning) focus on active citizenship and social skills as core competencies, along with others such as literacy and numeracy, risks diluting the claimed absolute and over-riding priority of targeting low levels of literacy and numeracy especially among socially disadvantaged groups. However, I wonder if this is necessarily a zero-sum game. I tend to agree with Campbell when he goes on to say:

[10] PISA is an international study of student achievement at age 15 in over 40 countries. Engagement was measured according to the extent to which students felt that they belonged to a school, were included and could make friends, etc.

[11] Participation was measured by the extent to which students were in attendance and punctual.

[12] See *www.sora.at/de/start.asp?b=236*. Some 8 countries have participated to date: Austria, Estonia, Finland, France, Germany, Italy, Slovakia and the United Kingdom. The survey covers questions on political interest and participation among young people aged 15-25.

[13] Refer to: *www.learningbenefits.net/Index.htm*

"A closer look, however, suggests that educators need not worry. An open classroom climate simply refers to a style of instruction; instead of rote learning, students are given the opportunity to discuss and debate compelling issues with a teacher's guidance. Similarly, the confidence in school participation index makes reference to students' opinions being treated respectfully by teachers and administrators, hardly a recipe for anarchy."

In other words, open and learner-centred education can cut across all subject or learning domains and leave a generally positive impact in terms of both civic attitude and behaviour and – at the same time – standard academic achievement and basic skills in listening, writing and reading.

Some over-arching conclusions can be guessed:

- in general, other things equal, higher levels of schooling contribute to higher and better levels of civic and social engagement;
- a discussion of the social outcomes of learning is useful in recognising the multiple roles that formal education plays from economic to social, cultural and personal;
- schooling interacts with factors such as social class, gender, ethnic status – understanding these inter-relationships is still very limited;
- even still, as Campbell shows, socioeconomic status is not the only determinant of civic outcomes – looking at civic engagement within and across various social groups shows that some generic lessons and applications are possible;
- some forms of learning seem to work better than others in fostering CSE – learning environments that stress responsibility, open dialogue, respect and application of theory and ideas in practical and group-orientated work seem to work better than just "civics education" on its own;
- many other factors impact on CSE as well as schooling – schooling is not a panacea; and
- not all forms of CSE are socially desirable.

An important insight that emerges from the review (as indeed other empirical analyses) is that CSE is not a unitary good. Activities such as joining various associations, voting, engaging in different types of political action (meeting politicians, signing petitions, writing to the newspapers, etc) may have very different relationships to the underlying demographic, socioeconomic and educational profiles of survey respondents. One of the intriguing issues posed by a study of the social outcomes of learning is whether particular institutional arrangements at the schooling level facilitate, or not, effective democracies and social engagement. For example, in a highly polarised and sectarian society, does segregated schooling reinforce social and inter-group divisions? What is the policy leverage for bringing about greater social integration and mutual understanding through the schooling process? The same question could be asked in relation to increasingly diverse (ethnically and otherwise) European societies. Can schooling be an effective public policy to promote social cohesion and what tradeoffs exist between this and other considerations such as school choice and local autonomy?

Epilogue

If we were to find ourselves in an elevator/lift for 40 seconds with the Minister for Schools what useful things might we say on foot of this stage of the SOL project's deliberation on CSE? I would suggest the following:

- education is good for civic and social engagement – lots of data show this and that reputable body, OECD, says so;
- encouraging young people to be involved in their own learning – applying it inside and outside the classroom, school and local community is well worth pursuing;
- some, but not all, of this learning can be in civics programmes, "service learning", student councils at secondary and tertiary levels and project-based learning involving teamwork, inter-personal skills and problem-solving together;
- but, above all, having an open classroom climate in which students are encouraged to debate, question and explore is a winner whether in terms of civic knowledge, skills, anticipated voting, political and civic engagement and trust and tolerance toward other;
- however, there is a lot we don't know in terms of "what works" and "why" and at which "level of education" – hence we need more and better data, research and interaction between researchers and policy makers.
- so, please Minister support the OECD SOL project.

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3.B. A broader social capital perspective

By John Andersen and Joergen Elm Larsen*

Introduction

The paper is in general a very skilled piece of work with a comprehensive evaluation of existing research on the topic.

From a European point of view the objective of the study is highly relevant. In the scientific and political debate about the future of Europe, the European Commission (EC) has put forward the model of the knowledge-based economy and society as the scaffold to support the rebuilding of the inclusive European socioeconomic model. There are concerns that globalisation threatens the European social model, which has so far been relative successful in combining social inclusion and economic growth (Atkinson, 2004). In the renewed Lisbon strategy it is stated that a high quality education system is the best way of guaranteeing the long-term competitiveness of the Union. Knowledge and innovation, the role of science technology and lifelong learning (Alheit *et al.*, 2004) are considered to be the "beating heart of Europe" (EC, 2005a).

In the ongoing European debate about the Lisbon strategy some scholars (Moulaert *et al.*, 2005) have introduced the notion of "Creative Social Europe". They argue in line with the renewed Lisbon Strategy and the social agendas objective (EC, 2005b) that the knowledge based economy approach must be combined with concerns about how to strengthen the collective capacity of societies to ensure social inclusion and cohesion. They introduce the notion of "social innovation" and argue that European citizens have an "untapped potential to create prosperity and offer opportunity and justice for all its citizens… European citizens in fact store a wealth of local knowledge, social capital, diversity, solidarity and creativity" (Katarsis, 2005).

Following this line of thought it is obvious that the objective and message of the Campbell report is extremely important in today's ongoing discourse about the road forward in the age of globalisation. Civic and social engagement seems to be condition for coping with not only the economic challenges, but also social and political challenges – not least multiculturalism, which has caused turbulence in political life in most European countries and in life and identity politics of post-industrial societies.

With regard to the *policy relevance* of the study – from a democratic and social exclusion point of view – we suggest emphasising more strongly that CSE investment seems to be one of the answers to the present and future challenges for democracy in a

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more and more complex globalised, multicultural and post traditional world, and research has its own role to play as agenda setting around these issues.

Note that even in a relatively well functioning democracy like in Denmark (where the general trends of falling voter turnout is not the case) a recent study of inclusion and exclusion (Larsen, 2005) shows that 15% of the Danish population do not, or only to a very limited degree, participate in politics.

The outcome of education with regard to CSE needs systematic attention – not least by international organisations like OECD. Education which effectively stimulates CSE must be regarded as a necessary investment in the social cohesion and the collective socioeconomic and democratic inclusion capacity of future societies. Alone the fact that voter turn out on average has fallen by 13.2% in 16 OECD countries since the 1960s should in itself give rise to serious political concern. As Campbell notes, a lot of complex factors are in play in the determination of levels and changing character of CSE, but education is – unlike *e.g.* mass media influence – one important field for public intervention, where policy makers have a direct hand in the design and implementation of the system of education. In the following we will comment on the general analytical framework.

Social capital, education and CSE

Campbell states that "The return of socialisation as a subject of serious study has been helped by the emergence of the social capital literature schools" and referring to Coleman he continues: "While schools are by no means the only organisations in which social capital occurs they are certainly an important source of the norms and networks that constitute social capital… it is logical to look at schools as means to enhance the political and civic engagement of young people".

Research inspired by the concept of social capital has a strong position in the academic field – among other things because it has opened for creative interdisciplinary dialogue between economic, sociological and political perspectives on the role of education. The conditions for social capital formation also attract huge interest in the political field – not least because international organisations, such as World Bank and OECD have put it on their agendas. The challenge of the SOL project is to expand this existing agenda. Therefore, the link to the social capital discourse in Campbell paper is very fruitful both in relation to the policy agenda and the research agenda.

In the review of the social capital literature he stresses among other things the importance of norms as vital in social capital formation, and later in the paper he links this to "school ethos": "The ethos of a school matters… schools are communities in which norms are taught and enforced. Schools level of social capital – especially the norm shared – has civic as well as academic implications".

We will return to the question about how to measure aspects of schools ethos, but first we will suggest a broader perspective on social capital in order to define a framework for analysing the relation between different social capital approaches and their perspectives on education and CSE. This could also be a way to transform the tendency to a US bias in the paper and to open up for discussion about the role of education in *different welfare regime contexts* in order to grasp the differences between the American and European contexts – and different welfare regimes within Europe. The term welfare regime is here used in the same way as Esping-Andersen (1990), who distinguishes between liberal, social democratic and conservative regimes.

In this context, social capital can roughly be approached from three perspectives; neo-liberalism/rational choice, communitarianism and welfare statism (Oinonen, 2006). These approaches emphasise either the role of the market, civil society or welfare state and social capital scholars, such as Coleman, Putnam or Rothstein, each advocates for and can be situated in one of these approaches. These approaches can also be found in the political discourse even if they do not always fit simply into the left (welfare statism) wing and right (neo-liberalism) wing dichotomy. It should be underlined that the suggested distinction serves a heuristic purpose – as a framework for discussion of the complicated relations between education and social capital – including the complicated linkages between micro and macro levels of analysis (Woolcock, 1998).

Paradigm	**Neo-liberalism**	**Communitarianism**	**Welfare society**
Emphasis	Market	Civil society	State-society relations
Social capital scholars	James Coleman	Robert Putnam	Bo Rothstein and Dietlind Stolle
Other scholars	James Buchanan, Peter North	Amitai Etzioni	Pierre Bourdieu, Emile Durkheim
Economical approach	Neo-classical economics, rational choice theory, public choice theory, monetarism	Neo-Keynesianism, new institutional economics, Schumpeterianism	Keynesianism, corrections of the market mechanism
	Under-socialised concept of a man		Over-socialised concept of a man
Emphasises	Weak bridges	Strong bonds	Both
Approach to education	Market relations Education as a private good and investment in individuals economic performance	Community relations Education as community good and mechanism for strong civic norms	State-society relations (negotiated economy). Education as a common good linked to social citizenship
Important norms for the learning environment	Competitive meritocratism	Commitment to shared norms	"Soft" egalitarian meritocratism
Sources of social capital	Individual level:	Individual level:	Individual level:
	Rational exploitation of network relationships, social exchange	Belonging in a community, participation in associations, civic engagement	Socialisation processes in schools and education, experienced fairness and impartiality, internalised norms, social structure
	Collective level:	Collective level:	Collective level:
	Cost effective public sector management	Civil society, citizens participation (Putnam), informal institutions, religion	Public sector institutions, including free education, collective social security/social citizenship
Outcomes of high social capital	Individual level:	Individual level:	Individual level:
	Higher social position, returns on the labour market (incomes, career)	Civicness (Putnam), family support, trust in other people	Happiness, individual welfare and social security
	Collective level:	Collective level:	Collective level:
	Reduced transaction costs, economic growth	Active civil society, generalised trust (Putnam). High level of CSE	Trust in public and political institutions. High level of CSE

Starting with the first column of the table above, the neoclassical economic theories take methodological individualism as their starting point and argue that maximisation of utility is the universal engine of action in both economic and non-economic action (Coleman, 1988). Social exchange theory has got its economic variant: rational choice theory and when applied in public institutions, public choice theory. In this paradigm education is primarily seen as a *private good* and investment in human capital and skills to build rational social exchange and network relations for individuals. The implication of this is also that the dominant principles and norms for learning in the schools are competitive meritocratism. The school and the teachers should facilitate norms of just and fair competition in the classroom based on *meritocratic* principles: *rewards* (including student's marks) should constantly be directly linked to the achievement of individuals from an early age. Schools should also (in line with new public management principles) be ranked after their scores according to (national and/or international) prefined measurable standards for students outcomes.

Communitarian approaches are not unitary, but basically they oppose the assumption of utilitarian individualism. The influence of the home contexts, social ties within the community, and the socialisation processes form the basis of human behavior (Etzioni, 1988). This also presents a shift away from utilitarian view of ethics and norms and emphasises the altruistic motivation of public officials like teachers, who according to their professional ethos should act as facilitators of the common good. Note here, that Brewer (2003, p. 20) in his interesting empirical study of public servants found that they are more civic minded than other citizens and motivated by a strong desire to perform public and community service.

With regard to education and norms in the school and class room the communitarian perspective emphasises education as a community good and as a mechanism for promotion of strong civicness and commitment to shared norms.

The welfare statist – or rather welfare society approach often associated with the Scandinavian countries – situates social capital in the realm of the welfare society and its public institutions: government policies and institutions create, channel and influence the amount of social capital (Rothstein and Stolle, 2002). In this paradigm education is seen as a *common good*: free education is part of social citizenship. Important norms for the learning environment are some sort of egalitarianism. Meritocratism and hence sorting of students after individual skills and achievements is a universal feature of any school system, but sorting and reward systems can be balanced by other more egalitarian and pedagogical principles, which could be labeled "soft meritocratism". For example individual marks can be introduced at a later stage in the school career and parts of the mark and reward system in the schools can take form of collective marks and rewards for good participation in group work and project work. In Denmark, instruments like project group work have been very influential (but also constantly disputed) since the 1970s.

Civic and social participation in Denmark

In the European Union the Danish population shows the highest degree of interest in politics (van der Aarts and Wessels, 2002) and this interest has been growing during the last 30 years (Goul Andersen, 2003a). The Danish "Power Investigation" (*Magtudredningen*) explained this by a long Danish tradition of collective mobilisation and by the fact that poverty is low – similar to the other Nordic countries. One important lesson to be learned is that the high level of CSE – irrespective of differences in formal

education – is highly dependent on other economic, social and cultural factors embedded in a nation's history. The strong labour and peasant movement dating back more than 100 years has been crucial for mobilising and "educating" low skilled people for CSE. Since trade unions have played an important role in both mobilising and educating people in CSE (especially in the Scandinavian countries) we think that trade union membership should explicitly be included in the "Social Movement Index".

Class differences in CSE therefore were and still are relatively small, and during most of the 20th century, the political parties had an overrepresentation of members from the classes with low education. The historical tradition and culture for CSE among all classes in Denmark has a clear impact on how Danes perceive their abilities to influence decision-making at all levels. Due to a combination of institutionalised channels in different associations and an anti-authoritarian culture which is encouraged through socialisation and education in schools social and political trust among Danes is among the highest in Europe and it has been increasing since 1971. Furthermore, the political culture is not dominated by a narrow self-interest. For example, it is among the 40- to 59-year-olds who relatively have the heaviest tax burdens, that the most positive attitudes toward public expenditures and the most negative attitudes toward tax cuts are found.

However, there has also been a change in CSE in Denmark. Fewer people are members of political parties today than 20 years ago (8.0% in 1979 and 5.0% in 2000), but this has not influenced participation in elections, which is comparatively high and stable (85.6% in 1979 and 87.1% in 2000). The Danish "Power Investigation" concludes that overall CSE has not declined. On the contrary, both CSE and the ability to engage ("political competence") have grown. This is not least due to civic and social learning in schools and in different types of associations (Togeby, 2003). On average, Danes are members of 3.2 associations, and in 1998 63% of the Danes were active in at least one association (Goul Andersen, 2003b). However, the "Power Investigation" also points out that there has been a change in CSE: 1) from formal political channels (parties and organisations) to informal and context related issues, 2) from the input side (actions that are directed against political decisions) to actions that are concerned with the practical implementation of political decisions, 3) from collective actions to more individualised political engagement (for example buying or boycotting certain goods of political reasons) and 4) from issues concerning the common good (or collectives or larger groups of people) to issues that concerns one self or one's family. However, it has also been shown that most people are engaged in issues related to both the big democracy (for example elections) and in the small democracy (for example engaged in activities in the children's school) (Larsen, 2003). To learn more about the school ethos and school democracy some indicators on parents' participation in schools are needed. A Danish study has shown that more than 50% of parents within a single year are trying to influence different conditions in day care institutions and schools (Goul Andersen and Rossteutscher, 2003).

The Danish case, however, is not just a positive example. A study of inclusion and exclusion (Larsen, 2005) shows that 15% of the Danish population do not or to a very limited degree participate in politics. Exclusion in relation to CSE is especially high among lone mothers, ethnic minority groups and unemployed people. The educational level clearly plays a role for CSE, but it seems that the concentration of multidimensional exclusion is more important than education itself, since the CSE rate is high among unskilled and low educated people in the Danish society compared with other European countries. On the other hand, among those groups with a low degree of CSE, some specific types of CSE are found. Members of ethnic groups are for example more

engaged in political and religious youth organisations than ethnic Danes, and lone mothers have the highest degree of participation in public demonstrations (Larsen, 2003). Therefore, one needs to be aware of the specific economic, cultural and social context that encourage or hinder CSE among different groups in the population. Furthermore, some types of CSE or more broadly social capital are difficult to measure because they are of a more invisible character. More invisible types of network are for example found among immigrant women, who in general have a low visible participation rate irrespective of educational level (Lindstrom, 2005), but some of these women nonetheless form strong networks (Guldager, 2006).

One way of capturing these informal types of communication is to develop some indicators on the use of information technology in relation to CSE, for example using the Internet to gather information on civic and social issues.

The importance of pre-school learning/education

The most important factor for attainment in the formal educational system is pre-school socialisation, learning and education. Much of this takes place in the family. Several studies conclude that social origins still seem to play a major role for inequality in educational attainment and in other societal areas, for example in cultural participation in adolescence and adulthood (Nagel and Ganzeboom, 2002). Research on intergenerational mobility seems to suggest that a good part of intergenerational transmission in earnings, education and occupational outcomes are mediated via parent's impact on children's cognitive development (for example Esping-Andersen, 2002; Danziger and Waldfogel, 2000; Solon, 1999). Research from the United States shows that the return from investment in children is highest in early childhood. Investments that prepare children to enter school ready and motivated to learn have greater effect than additional investment in school resources such as reduction in class size (Heckman and Lochner 2000). However the learning and socialising environment in the family is not the only important factor preparing and motivating children to enter school. Esping-Andersen (2002) has pointed out that the day care institution system in the Scandinavian countries is a crucial precondition, on the one hand to avoid poverty among lone parents (access to labour market participation), and on the other hand to maximise children's possibilities for learning. Children's learning and socialisation in high quality day care institutions are the most effective way to combat negative social heritage from the family. At the same time, public day care institutions are a major investment in society's social capital. Children and parents formslocal political and social communities around the day care institutions.

A related issue of concern is segregation of the school system. From a social inclusion point of view it is important whether the schools are highly segregated in relation to different socioeconomic and ethnic groups or if the schools to a higher degree mix children with different socioeconomic and ethnic backgrounds. Segregation is not only related to a divide between public and private schools but also due to segregation in housing areas, especially in the major cities.

These considerations lead us to conclude that indicators are needed about the impact of pre-school learning environment on later CSE. In the CivEd there are some indicators on "Home Experiences", but these need to be developed further, and it seems useful to have some indicators on the cognitive learning environment in the family as well. Additionally indicators are needed in relation to how day care institutions may have an impact on children's later CSE.

Recommendations: methodology and reflections over a revised research design

In methodological terms cross-national research, which has an ambition of identifying causal relations, is complicated. We suggest a more complex multilevel research design in order to grasp the complexity of the links between welfare regimes, educational and learning regimes and CSE in different OECD member states and in order to grasp the impact of different outcomes for different social strata *within* nations (the social exclusion perspective discussed in the introduction).

A revised research design could try to combine different levels, units of analysis and different types of quantitative and qualitative data (documents analysis of legislation, discourse, data from development programmes, field work, qualitative interviews in a creative, holistic way) (for general methodological inspiration see for example Allardt, 1990; de Vaus, 2001; Yin, 2003).

The *optimal* methodological approach would be a double strategy: explorative qualitative studies could give input to the construction of the cross national questionnaire, and the questionnaire could be followed up by additional case/qualitative studies in order to explore in a deeper way the findings from the quantitative analysis.

The purpose is to open up the research agenda, and we suggest a variety of combined approaches in order to improve the quality of the quantitative indicators and to make possible reflections about causality on a "deeper" level, where the impact of the different contexts among and within nations can be taken better into account.

Grasping the diversity of national contexts

By using nations as the analytical unit the study could contextualise and identify important similarities and differences (configurations) between different nations in order to identify different educational and "CSE regimes".

Suggestion for focal points and research questions:

In which ways are the educational systems linked to the core characteristics of the welfare regime?

Are there spill-over effects from the welfare regimes: is education regarded as mainly a private or public good? Does the educational system in reality equalise or reproduce life chances along class, race and gender lines?

Questions like these may lead to some kind of analytical useful "cluster of educational regimes" with regard to their objectives and effects on social stratification – parallel to the welfare regime modelling business. The "primitive" hypothesis which might be tested in the quantitative study would be that the educational systems in strong welfare states are less sorting and less individualistic in their ethos and that this might explain a higher level and comparatively less unevenly distributed CSE. But so far we do not know. However it would be extremely interesting to test the correlation between the degree of socioeconomic inequality and CSE and determine the impact of the educational system.

To what extent and how are elements of CSE defined as objectives of the primary and secondary school curriculum in national school policy, and how is this eventually rooted in distinct political cultures and citizenship traditions?

The Campbell study correctly documents that there are huge differences between nations. In some countries, CSE skills are part of the national curriculum – in other cases more or less absent. In some countries, distinct citizenship and political traditions, for example republicanism in France, social democracy in Scandinavian countries or more liberal traditions would be manifest and have strong spill-over effects on the education policy tradition. In other countries, for example post-communist societies such a path dependency would be very different. In other words: an important part of the national context for education policy and CSE is the nature of the *"democratic ethos"*, which in some way must be taken into account.

A third aspect (closely linked to the former research question about spill-over from citizenship and political culture) is to illuminate whether and how CSE components play a role in the discourse about school policy – since neither welfare regimes nor political cultures are static. What seems to be the dominating and/or competing discourses over the legitimacy and role of CSE outcomes?

In Denmark, for example, the OECD/PISA survey has fuelled an intensified discourse about what should be seen as the most important success parameters for primary and secondary schools. In this debate two main camps or poles can be identified. On the one hand are those (*e.g.* the present government), who identify the dominating challenge as how the school system can be adjusted to improve the scores on the PISA scale as a way to strengthen primarily human capital building. The core argument is that open class rooms and too much CSE emphasis pull down the cognitive level.

On the other hand, are those (*e.g.* represented by the teachers union) who defend the priority of the "participatory and social schools ethos". This discourse is closely linked to a critique of new public management (NMP). Gregory (2002, p. 250) argues that public administration in New Zealand, a country that has been kept as a laboratory of NPM doctrines, is facing legitimacy crisis, because citizens have become increasingly distrusting toward political and public institutions generally. In Denmark, the teachers union refers to New Zealand and argues that too much testing in schools undermines local creativity and social capital building. They argue that professional autonomy and ethics of the teachers guarantees that they serve the common good. Furthermore, they argue that trust in teachers as competent (semi)professionals and student participation is the best way to enhance social capital in schools.

However, in practical policy-making we see an emerging compromise bridging the two poles: national standards and test systems can be used as tools to identify low quality and failures in the school system in order to channel resources to schools facing difficulties, but this should not be at the expense of the priority of "the open class room climate" and further development of the "participatory school ethos". The Danish case suggests that the challenge for the SOL project is to try to document in more detail the conditions under which the relation between CSE outcomes and PISA outcomes can be a plus-sum game. This is also the way Campbell argues: "Educators need not worry" that open class room climate diverts schools from their core educational mission. Hard evidence which can document this will have a very powerful impact on the discourse.

The school level in each country

Does schools governance matter?

Moving down from national education policy to the meso level of schools the next question is: To what extent and how are parental and student involvement in "school governance" institutionalised? In Danish schools, for example, there have been formal students councils in all schools for decades. We need to classify national "school governance regimes" and distinguish between high, medium and low degrees of formal parental and students involvement in the daily management of schools. The guiding question would be: Does schools governance matter?

The sample

One crucial question is the composition of the sample. We suggest that the sample in each country includes schools with different socioeconomic/social status (parental and students socioeconomic neighbourhood environment). Roughly three criteria should be met: (1) middle and upper class dominated, (2) socially mixed schools, (3) segregated schools in relative deprived areas – and "ethno-national" profile (mixed versus etno-national segregated schools). This would make possible cross national comparisons of how social exclusion/social class and ethnicity (intersectionality) interacts with CSE effects and how this is handled in the educational system.

Another supplementary criterion for the composition of the national samples – and/or a small number of supplementary case studies (this would be the preferred solution) – could be a smaller number of strategic chosen case studies of "best and worst" practices with regard to school ethos. Evaluation research and data from pilot programmes could probably provide useful contextual information about "schools ethos", etc.

Grasping the school ethos, class room climate and students opinion

In terms of indicators, we would therefore argue for indicators that could enlighten the relation between different types of learning environment and the rate of school drop-outs, and the relation between school drop-outs and CSE.

A recent Danish study (Jacobsen *et al.*, 2004) sponsored by the Danish "Power Investigation" relates to this issue, because it covers many of the topics in Campbell's report and supports the overall hypothesis of the study that classroom and school ethos matter. The study is based on a survey of 10- to 16-year old Danish students in 250 classes and 90 schools. The survey data are complemented with classroom observations and qualitative interviews with teachers and students. The study examines the correlation between a number of democratic and community experiences in the school and classroom as well as their future expectations (at the age of 30) with regard to democratic participation. The logistic regression analysis showed that:

- The largest positive effect with regard to future voting was found among students who regarded the classroom as functioning well both in terms of community attachment and identification. However, boys were more affected than girls by the quality of the classroom community.

- Experiences with positive handling of disagreements in the classroom and participation in students councils also increased the expectation of future political participation.

These results could partly support the republican (the quest for "positive freedom" through participation in communities) or communitarian thesis where democracy is rooted in the community with shared norms. However, the same survey also shows that aspects of the liberal democracy approach matters: the possibility for expression of own values and interests ("negative freedom" or freedom from binding norms) also increased future expectation in relation to democratic activities.

The overall conclusion was that positive democratic experiences in the school, that is a tolerant and inclusive class community combined with space for individual expression, increase the chances for democratic participation at the age of 30. This suggest that "good school ethos" is about combining space for diversity and individual expression, good social relations in the class room and positive democratic experiences in the school as a whole.

The same study documents that bullying in schools has a negative important impact on both civic and social learning and increases school drop-outs. Therefore, it might be a good idea to think about indicators for negative school ethos such as presence of bullying and school drop-out rates.

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3.C. Defining a framework of indicators to measure the social outcomes of learning

By Christine Mainguet and Ariane Baye*

Defining a framework of indicators in an international perspective

After taking a close look at what the definition of an indicator is in research literature, we can conclude that everything emerges but a clear and consistent definition. Authors are not unanimous with respect to the very nature of the variables termed educational indicators, nor to their inherently normative or goal-oriented nature. However, the existing framework of an international and policy-driven project like the OECD International Indicators of Education Systems (INES), combined with the OECD CERI research objectives for the SOL project, may help to overcome barriers when defining and selecting the characteristics of indicators that measure social outcomes of learning, even if it remains a challenging issue.

A few key points can be deduced from the research literature. Indicators can enable us to assess benchmarks and to monitor education systems (de Landsheere, 1994; de Broucker, Gensbittel and Mainguet, 2000; Demeuse and Baye, 2001). In this respect, indicators must be designed to be relevant for education policies, and also to possibly help in modifying them. Indicators may also provide warning lights which invite social and political actors to action in order to improve the system (de Landsheere, 1994), as the etymology of the term *indicator* suggests. In this respect, indicators may then be defined as tools meant to describe the quality, the effectiveness, the equity or the trends of a particular aspect of the education system. Furthermore, designed in an international context, an indicator needs to reach a certain degree of consensus on the goals, on the usefulness, pertinence and validity for different participating countries, and must also allow for comparisons among countries.

When trying to provide an answer, or at least some enlightenment on certain political issues, researchers almost always conclude that it is difficult to give one single explanation. Reality is more complex than one single dataset or relationship, since issues are interconnected and often embedded in not so easy to handle factors, such as the historical, cultural and economic contexts of particular countries. Those arguments require us to go beyond the monitoring and political facets of indicators. A theoretical framework coupled with a framework of indicators can help us to anticipate and to show the possible relationships between variables, and how the variables work together to

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produce a global effect (Shavelson *et al.*, 2003). A framework of indicators can help us to map the relationships between variables in a broader way, exploring not only one single input compared to one single output, but also the combined effect of several variables, including exogenous factors. From this perspective, indicators can work as signals of how education is related to social outcomes in different countries. Those signals can stimulate discussion across and within countries on the social objectives of education systems.

Building a framework of indicators in a systematic way can help us to show some gaps in the existing information, calling for new data collection. The systematic approach used in the construction of a framework of indicators does not prevent the risk of oversimplification, because among other reasons there is a lack of data. This is another reason for coupling a framework of indicators with theoretical research: the gap between the information provided by indicators and the research hypotheses and/or results need to be documented.

Research and the implementation of a framework of indicators are and should be interrelated. Research can support the interpretation of the framework of indicators. It can also provide useful information to measure or interpret the causes and effects, using for example longitudinal data. Research helps to select, among the possible indicators, the most appropriate and the most informative ones. The development of cross-country and cross-situational surveys provides irreplaceable information to identify relationships and to understand how institutional and cultural norms may mediate them.

If there is a need for a theoretical framework before collecting data, data analysis may also contribute to redesign the theoretical framework, according to the new relations or evidence showed by the data. In this respect, indicators may be viewed as tools emerging from the framework (resulting from evidences from the past) and the data collected (the present), contributing to the development of further research (the future). In this sense, indicators are a compromise between theory and data, reflecting the balance of the issues emerging at the beginning of the data collection and the issues to be addressed in the future.

Main characteristics of a "good" indicator

From both de Landsheere (1994) and our further consideration on the usefulness of indicators for policy and research, we point out some characteristics of a good indicator. In our view, an indicator must be:

- politically relevant: it should address an important policy question or issue, but not necessarily politically driven, since answering only to a particular political agenda may give a very partial picture of a situation under examination;
- robust: in this respect, an indicator has to be related to global and lasting characteristics of the system, to avoid too much sensitivity to accidental fluctuations;
- connected with priorities and significant issues;
- coherent: an indicator should be connected/connectable with other indicators;
- feasible: the data to construct an indicator should be readily available and affordable to collect;
- accessible to a large audience;
- valid, reliable, accurate, which implies a high quality the data sources.

According to Jaeger (1978), a good indicator is not necessarily a quantitative measure, since a narrative form "is often a better aid to comprehension and understanding of phenomena than is a numeric report" (p. 287). In major international systems of indicators such as *Education at a Glance* (OECD, reference year), *Key Data on Education in Europe* (Eurydice, reference year), and the Equity Indicators produced by the European Group for Research on Equity in Educational Systems (EGREES, 2005), as well as in various national publications, indicators combine quantitative information (figures, tables) with interpretative comments – which undoubtedly helps to give interpretation to the sometimes rather complex "signals". Moreover, some of the key issues in education are difficult to measure quantitatively. Thus qualitative information can contribute to significant developments for future work related to indicators (European Commission, 2001).

From research on civic and social engagement to indicator development

Defining civic and social engagement

Researchers have not come to an agreement on the definition of civic and social engagement (CSE). The existence of several approaches does not mean they invalidate each other, but rather leads us to consider the issue of CSE outcomes of education within a framework designed to allow several possibilities, each depending on the exact definition or the political perspective chosen. This perspective was adopted by EGREES (2005) in order to accommodate different principles of justice when building equity indicators. In an international perspective, this kind of framework can help to anticipate conflicting approaches to the issue of social outcomes of education. For instance, the distinct categorisation by David Campbell of political and civic engagement may be perceived as counterproductive: the conflicting or competing nature of politics may be less pregnant outside North America (or at least in Western Europe) where personal support and engagement are often actualised in the voting act itself, and not so much via public meetings, financial support, etc.

However, to build indicators, a consensus is needed on what should be measured and showed. The criteria of political relevance can help to focus the definition that participating countries are interested in (de Weerd *et al.*, 2005). At the moment, no agreement on a common definition for OECD countries has been reached, even if two major social domains of interest have been selected (*i.e.*, CSE outcomes of learning and health outcomes of learning). In the area of CSE, the conceptual papers presented in Copenhagen suggested that one of the most important social issues faced by public authorities is the falling level of political engagement, voting, and trust in institutions, particularly in some countries. A question then is can education systems: moderate or reverse this trend? Analysing the objectives of the educational systems with regard to CSE would help to find a common denominator among OECD countries (see Table 3.C.1).

Definitions included in the papers presented at the Copenhagen symposium help us to go further, even if some refinement is still needed. In this respect, what the papers by Campbell and Lauglo and Øia (2006) consider CSE to be, is particularly interesting to focus on, because it is relevant, both for education policies and also from a more general political perspective, since education systems may be viewed as tools which, among other vehicles, foster social cohesion and social tolerance.

However, the definition of CSE needs to be refined. Firstly, the specificity of the social engagement does not appear clearly in the Campbell paper. Does the word "social" include something else than what is included in civic engagement? Secondly, the concept of engagement used by Campbell includes cognitive dimensions which are not necessarily included in other international surveys (Torney-Purta *et al.*, 2001; Kirsch *et al.*, 2002). An approach grounded in a broader concept of literacy, used for example as in OECD/PISA, is perhaps more appropriate than the concept of engagement, since this broader perspective includes attitudes, values, practices and knowledge. In this respect, the concept of civic literacy could be defined as the set of knowledge, values, attitudes and practices that individuals acquire over the course of their life to become citizens participating in democratic societies.

In 2001, the OECD DESECO project produced definitions of key competencies. As Laura Salganik recalls in her response paper (in this volume), a major category of key competencies is "interacting in socially heterogeneous groups". Key competencies listed within this category would seem to cover some of the key dimensions that are being covered by the approach to CSE in the SOL project, namely the ability to relate well to others, ability to cooperate, ability to manage and resolve conflicts.

Taking into consideration a range of outcomes and their relationships

In most surveys (*e.g.* CivEd, EVS, ESS, ISSP), social outcomes cover a large range of features, including not only behaviour, like participation in given activities or in social networks (structural dimensions), but also knowledge and attitudes including trust (normative dimensions). As described above, it is important to take into account all these dimensions to assess CSE outcomes. We would like to emphasise here the need to document better the relations between knowledge, values, attitudes and practices. For instance, is participation in civic activities (voting is not the only concern) associated with, dissociated from, or mediated by civic knowledge and values? The assumption is that specific civic behaviours can occur if the person has sufficient knowledge and/or trust in the democratic process or in the role of institutions. An alternative hypothesis can be that trust and knowledge are also created by CSE. The causality, if any, will be in most cases bi-directional. If surveys show that a more educated person is more likely to participate in civic and social activities, then, we should also acknowledge that participation in these kinds of activities can also provide new opportunities to learn, which would itself increase the level of civic literacy.

CSE is a key dimension that is taken into account in social capital research (Houard and Jacquemain, 2006), where engagement is seen to also include community engagement and is related to social identities. In this line of thinking, new forms of social movements, maybe more informal, could also be studied (see Lauglo and Øia, 2006).

Many measurement questions remain: is the strength of the relation equivalent for all the components of civic literacy mentioned above, *i.e.* knowledge, values, attitudes and practices? Is it possible to use a single scale including all the components of civic literacy or do we need several sub-scales, corresponding to a subdivision of the main concept?

Taking into account explanatory variables and their relationships

If there is a relation between level of education and CSE, how could we explain it? Which are the determinants? Are they manageable? Is it possible to enhance the level of

civic literacy by developing (initial and continuing) education? What will the relation be if we use literacy skills instead of level of education (see Descy in this volume)?

A positive correlation between education and engagement cannot simply be interpreted as a causal link. The relation could also be indirect. Is education the main determinant to explain civic outcomes or could the relationship be explained by many other factors, including the level of income, the social status, the socioeconomic and political background, the participation in continuing education (informal and non formal)? The Campbell paper reports findings that are based on methods of analysis aimed at controlling multiple factors effects, which is recommended to understand the complex links between variables.

Taking into account different levels of analysis

Outcomes distributed or produced by education systems may be relevant at different levels: for the society, for different communities or for individuals. Even if it is interesting to merge data at the international level to understand global effects of education on CSE outcomes, the data also have to be analysed and presented at a country level, or even at the education system level (region, territory), which are the levels on which policies may be defined and applied.

Adapted from Baye and Mainguet (2006), Table 3.C.1 shows how the objectives assigned to education systems may be broken up into different units of analysis,[1] because some of these are more relevant to either individuals, schools or the society as a whole. This mapping of the objectives allows us to consider the relevance of different levels of analysis, *i.e.* at micro (individuals), meso (schools) or macro (society) levels.

Table 3.C.1. Education systems' objectives related to civic literacy, by level of analysis

Micro **Individuals**	**Meso** **Schools**	**Macro** **Societies**
- knowledge, skills - responsible citizenship - self-confidence - trust in institutions - respect - critical thinking - sense of responsibilities - humanitarian values - social engagement - civic engagement	- integration and participation in the local community - enhanced democracy - pluralism - cultural open-mindedness - trust in the school institutions	- enhanced democracy - pluralism - cultural open-mindedness - social and civic engagement - trust in institutions - social cohesion

Source: adapted from Baye and Mainguet (2006).

[1] To complete this table, legal objectives concerning civic and social engagement defined for compulsory and tertiary education in the French Community of Belgium education system have been reviewed according to the level they were referring to.

Taking into account different ways to look at the data

What does the data mean in different contexts?

The question of the equivalence of the level of the relationship between education and CSE in different contexts is not yet solved. By context, we mean macro-level context, *i.e.* countries, education systems and other general contexts such as the cultural or the historical one (*i.e.* post 2nd World War, post May 68). For example, international comparisons of voting rates, cannot be interpreted the same way in countries where voting is compulsory. The history of a particular country regarding democracy, voting, and specific cultural pattern regarding the importance and the frequency of elections, should be taken into account in order to optimise the interpretation of the data in specific national contexts. Further, Lauglo and Øia (2006) show the importance of studying both generational (cohort) and ageing effects for understanding the evolution of attitudes and practices.

Several surveys on youth (*e.g.* CivEd) have pointed out an important variable to take into account: not all the countries are equivalent in the importance they place on citizenship in the school curriculum (Eurydice European Unit, 2005; Campbell in this volume). This question could also be raised when we use adult surveys: what was the emphasis on citizenship in the curriculum years ago? Could this element explain some of the CSE differences between countries? Is there a time limit after which the initial education does not make the difference? The explicit curriculum has to be compared with the implemented curriculum (including the school climate and practices when the respondent was young).

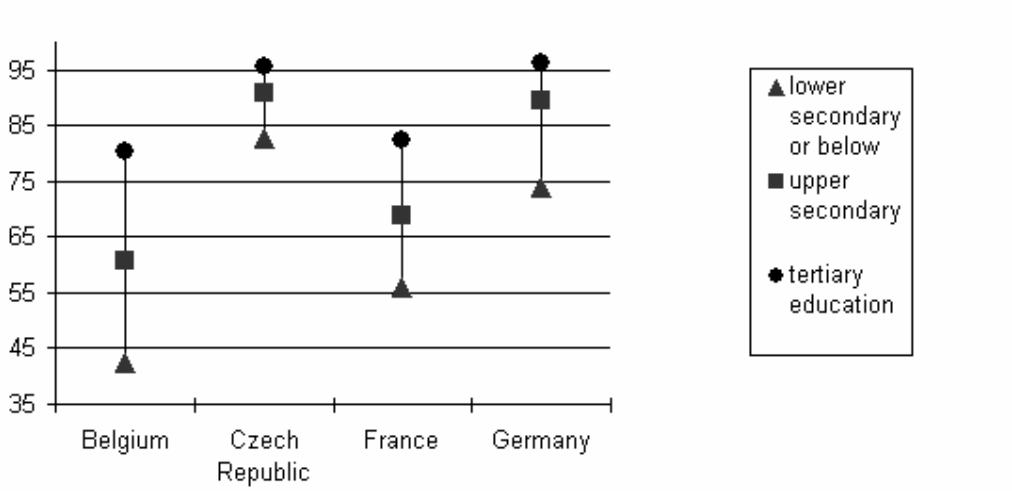
Context may also refer to the group or community in which the person lives. Is it "easier" or more profitable to show CSE in certain circumstances? Within particular groups? In countries where the level of CSE is already high? Is this behaviour sometimes viewed as negative?

How is the education asset distributed?

Anticipating political objectives that are relevant as social outcomes of education, we do not expect that more will always mean better. For example, countries may expect the education system to foster social cohesion. In this perspective, what would be considered as the most important issue for a country: a distribution where only some part of the population shows high level of engagement or a lower level of engagement but equally distributed? Such an example argues for the analysis of the distribution of outcomes within a country or within groups or regions, since the high mean of an outcome for a particular country is not a guarantee of equality in the distributions of outcomes within the country.

International comparisons can show how the distribution of CSE varies according to the level of education among different countries. Figures 3.C.1 and 3.C.2 which are based on results of the European Value Survey, show important differences between countries regarding the relationship between potentially desired outcomes and different levels of education.

Figure 3.C.1. Political discussion and level of education, by country



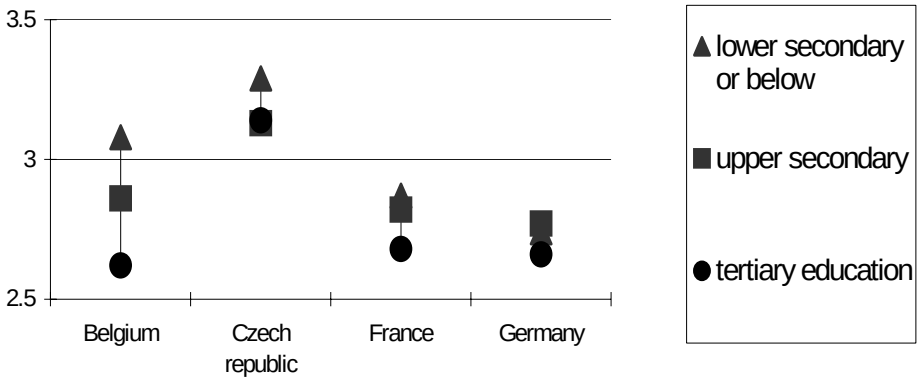
Source: Baye and Mainguet (2006), based on Hudson, 2004 (EVS data).

Figure 3.C.1 displays that the intensity of political discussions between friends is strongly associated with education, and this is the case, for the four countries presented. A rise in average levels of education could thus be accompanied by an intensification of "political culture" or a greater practice of exchanges of views or debates of ideas in this field.

In France and Germany for example, the level of education does not necessarily imply a more or less critical position toward the institutions in place (Figure 3.C.2). No-confidence toward the Parliament is not greater according to the level of education in either France or Germany. In the Czech Republic, the least educated tend to be less trustful; in Belgium, each level of education marks a step toward a higher degree of confidence in Parliament.

Beyond the description of the variations in the scores obtained in the four countries, the interpretation of these data account for the relative differences between levels of education within each country. The interpretation is not likely to be univocal considering the probable social desirability which affects these various dimensions and specificities of the political and cultural contexts. These variations could be interpreted differently, like an index of social homogeneity or social heterogeneity.

Figure 3.C.2. No-confidence toward the Parliament and level of diploma, by country



Source: Baye and Mainguet, 2006, based on Hudson, 2004 (EVS data).

Are some groups or individuals situated below a threshold?

Regarding the distribution of CSE, we also have to question the linearity of the education variable. Is the level of education and civic literacy for example, strictly related to the level or could we point to some threshold effects? For instance, is there a threshold between secondary level and tertiary level? Can continuing education contribute to the level of engagement? Do differences between education levels lead to define thresholds below which the education system seems to fail to fulfil its objectives? In this respect, the assumption that "more education is better" has to be questioned because it may instead indicate a failure of compulsory education. Table 3.C.2 presents a summary of the different levels of analysis and types of data analysis which could be considered when building a systematic framework of indicators that aim to measure social outcomes of learning.

Table 3.C.2. Combining levels of analysis and types of data analysis

	Micro **Individuals**	**Meso** **Communities, groups, work places, …**	**Macro** **Countries, education systems, …**
Mean			
Distribution			
Threshold			

Consequences for indicator development

Recognising that it is not possible, or not feasible, to get data to cover and measure every issue, we propose some "guidelines" for data collection and indicator development.

Indicators must say something relevant about/for countries or education systems

First, indicators must produce valuable information at the country level, in an international perspective. The analysis of the way education and civic literacy for example are interrelated is relevant if it helps to interpret country and education system differences.

Indicators should help to address questions at different levels of analysis

Most often, the results are measured and analysed at the individual level. Meanwhile extrapolation to macro or country level is frequent, although analyses at this level seem more difficult. Previous papers have pointed out that a positive relationship between levels of education and voting at the individual level cannot necessarily be confirmed at macro (country) level (see Hudson, 2004). Green, Preston and Malmberg (2004) showed that macro-social benefits are not simple aggregates of micro social individual benefits. Even if they come from a single data set, different indicators have to be designed for each particular level of analysis. Using different data sets to document different levels of analysis and the different parts of the framework of indicators is a common way to get a more complete picture of the phenomena.

Indicators must try to say something about the way education and outcomes could be interrelated

This condition is linked with the theoretical relevance of the framework of indicators. Measuring the differences between countries in the strength of the relationship (mean level of education and mean level of CSE) is not sufficient. The differences in the distribution of the results between countries should be analysed to understand how the benefits of education are shared in a population.

Campbell's paper gives a thoughtful perspective to capture the very nature of the possible causal mechanisms. The models proposed – absolute, relative and cumulative – are interesting because education may be viewed as an individual characteristic (absolute level) and as a macro variable (cumulative). His idea to consider the relative level of education helps to link both levels (how an individual is situated within a distribution). Another way to envisage the relative nature of the education level would consist in asking the individuals where they think they are in the distribution of the education compared to their peers (relative level, individual perception compared to peers), and compared to their parents (relative level, individual perception compared to parents).

Indicators must point out factors on which government could have an impact

This condition is linked with the political relevance of the framework of indicators. From this point of view, the distinction between direct or mediated effect of education is crucial.

International indicators must be comparable

To produce good indicators, we need internationally comparable data. This requires the need to be aware of the cultural and linguistic equivalence issues, and of the comparability of constructs issue. It concerns both the translation and adaptation process in an international context, but it also raises the issue of the "universality" of the construct we measure, since there is a strong assumption that civics values, behaviours and attitudes may vary substantially from one country to another. Existing international databases should be reviewed to confirm the international comparability of the constructs (consistency), and to document translation and adaptation issues detected in the available international experiences.

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3.D. Macro-social benefits of education, training and skills

By Pascaline Descy*

Introduction

The European Centre for the Development of Vocational Training (Cedefop) has published reports on vocational education and training research since 1998. These reports provide a comprehensive review of current research on vocational education and training and related socioeconomic research in Europe, its results and implications for policy, practice and future research. The third report *The value of Learning: Evaluation and Impact of Education and Training* was published in 2004 and 2005.[1]

This paper presents selected research results on macro social benefits of education and training. More specifically, it discusses indicators of the relationship between selected macro-social variables and educational inequality. It is based on the literature review and empirical analyses prepared by Green, Preston and Malmberg (2004) for Cedefop's third research report. The complete Green *et al.* report which includes an in-depth literature review and some additional empirical evidence of the impact of education on crime, on social cohesion, trust and tolerance and on active citizenship, civic and political participation is published in Descy and Tessaring (2004a).[2]

Cedefop intends to continue supporting and disseminating research and analysis on the social benefits of education and training and is therefore particularly interested in the progress and results achieved by the SOL project.

Characteristics of macro-social benefits

Macro-social benefits comprise all non-material benefits that accrue to society. They can also be considered as externalities of investment in education and training at societal level. Examples of macro-social benefits are: social cohesion, social capital, income equality, trust in institutions or democracy, reduction of crime, of poverty, etc. Of these macro-social benefits some are aggregates of micro individual benefits (*e.g.* reduction of crime, of poverty, improved health), while others are not (*e.g.* social capital, social cohesion). The latter kind of benefits are of a macro-social nature:

- They cannot necessarily be attributed to particular members, agents or communities lower than the national level, e.g. social cohesion may be measured,

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[1] The third report is published in two parts: (a) a set of contributions from researchers across Europe, collected into three volumes (Descy and Tessaring, 2004a; 2004b; 2004c); (b) a synthesis report based upon the first set of contributions as well as additional research (Descy and Tessaring, 2005).

[2] The report can be downloaded from *www.trainingvillage.gr/etv/Projects_Networks/ResearchLab/*

or at least proxied, at macro-level but it is not possible to quantify the social cohesiveness of an individual.

- They are often positional in nature, e.g. improved literacy can be expressed in terms of an individual, education equity – i.e. the distribution of educational outcomes – cannot.
- They are system level benefits, e.g. societal trust is more than the aggregation of expressed individual trust, although the latter can be used as a proxy measure; it includes cultural and historical norms of trust which are particular to a society or a community.

Investigating macro-social benefits

Following a literature review, Green *et al.* carry out an empirical analysis of the relation between education and educational inequality on social cohesion. Their data set uses the World Value Survey, the International Adult Literacy Survey (IALS), Interpol crime statistics and the International crime victimisation survey. It covers the following countries: Australia, Belgium, Denmark, Finland, Germany, Ireland, the Netherlands, Norway, Poland, Portugal, Sweden, the United Kingdom, and the United States.

The macro-social indicators selected were the following: general trust, trust in democracy, civic cooperation (*i.e.* cheating on public transport and on taxes), a civic participation measure, a tolerance indicator, measures of violent crime and perception of risk of assault in the local community.

Correlation between education and social cohesion measures

The education variable used for calculating correlations with the macro-social indicators selected is the mean prose literacy score of upper secondary graduates. Overall, authors found no significant correlations ($p<0.05$) across countries between aggregate skill levels and the various measures of social cohesion (Table 3.D.1). It is likely that national cultural and institutional factors greatly outweigh gross education effects on social cohesion.

Table 3.D.1. Pearson correlation coefficients and levels of significance for mean level of upper secondary attainment and social cohesion aggregates

		General trust	Civic participation	Trust in democracy	Cheating on taxes	Cheating on public transport	Violent crime	Tolerance	Risk of assault
Mean literacy score at upper secondary level	Pearson correlation	.354 [a]	-.120	.244	-.376	-.487	-.055	.491	-.505
	Sig. (2-tailed)	.196 [b]	.670	.381	.167	.066	.845	.063	.078
	N	15	15	15	15	15	15	15	13

a) Correlation is significant at the 0.05 level (2-tailed).

b) Correlation is significant at the 0.01 level (2-tailed).

Source: Green, Preston and Malmberg (2004).

Educational inequality and social cohesion

The scientific literature on social cohesion suggests that it is highly sensitive to distributional effects. To test the effect of educational inequalities, Green *et al.* build a literacy test-score ratio which is the ratio between the mean prose literacy score of those with tertiary education and those with lower secondary education (Table 3.D.2). This ratio indicates that the inequality in skills outcomes are rather higher in Canada, the United Kingdom and the United States compared to some continental and Nordic countries such as Germany and Sweden.

Table 3.D.2. Mean literacy scores and test-score ratio for countries in sample

Country	Lower secondary education	Upper secondary education	Tertiary education	Skill distribution ratio
Australia (AU)	250.60	280.00	310.40	1.24
Belgium (B)	242.50	281.00	312.30	1.29
Canada (CA)	233.40	283.80	314.80	1.35
Switzerland (CH)	228.10	274.10	298.30	1.31
Germany (D)	265.60	283.80	310.10	1.17
Denmark (DK)	252.80	278.10	298.50	1.18
Finland (FIN)	261.60	295.90	316.90	1.21
Ireland (IRL)	238.80	288.20	308.30	1.29
Netherlands (NL)	257.50	297.00	312.10	1.21
Norway (NO)	254.50	284.40	315.10	1.24
Portugal (P)	206.60	291.50	304.80	1.48
Poland (PL)	210.50	252.70	277.30	1.32
Sweden (S)	275.40	302.30	329.10	1.19
United Kingdom (UK)	247.90	281.90	309.50	1.25
United States (US)	207.10	270.70	308.40	1.49

Source: Green, Preston and Malmberg (2004).

Table 3.D.3 presents the correlation between this measure of skill distribution and social cohesion indicators under analysis. There is a significant negative correlation between educational inequality and the level of general trust: the higher the level of educational inequalities, the lower the level of general trust. This is also demonstrated in Figure 3.D.1 which depicts the relation for individual countries. Those countries with low inequality in the skill distribution have high levels of trust and those with high inequality have low levels of trust.

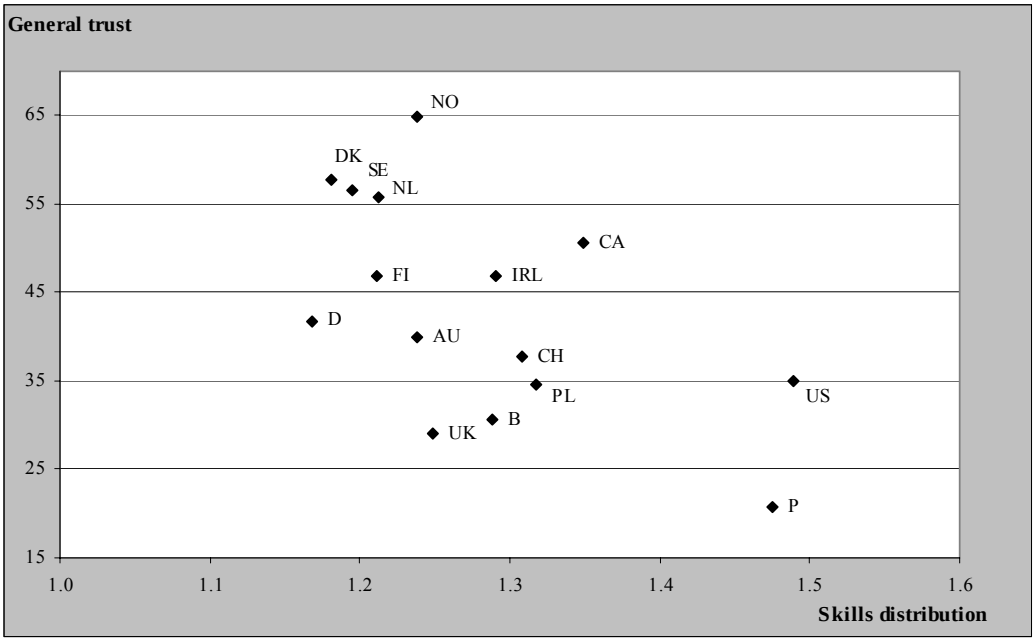
Table 3.D.3. Pearson correlation coefficients and levels of significance for distribution of educational attainments and social cohesion aggregates

		General trust	Civic participation	Trust in democracy	Cheating on taxes	Cheating on public transport	Violent crime	Tolerance	Risk of assault
Skill distribution ratio	Pearson correlation	-.592 [a]	.333	-.283	.265	.171	.398	-.060	.404
	Sig. (2-tailed)	.020	.225	.307	.340	.543	.142	.831	.171
	N	15	15	15	15	15	15	15	13

a) Correlation is significant at the 0.05 level (2-tailed).

Source: Green, Preston and Malmberg (2004).

Figure 3.D.1. Educational equality and general trust



Source: Green *et al.* 2004.

Income inequality and social cohesion

After finding a statistically significant correlation between the skill distribution ratio and a measure of income inequality using GINI coefficients,[3] Green *et al.* test the association between income inequality and macrosocial outcomes (Table 3.D.4). They found significant positive relationship between income inequality and violent crime and the perceived risk of assault in the community and a significant negative relation between income inequality and general trust. These effects of income inequality persist even when controlling for the general level of economic activity, using GNP per capita (Table 3.D.5). In this case, the correlation between income inequality and civic participation also becomes significant.

Table 3.D.4. Pearson correlation coefficients and levels of significance for distribution of income and social cohesion aggregates

		General trust	Civic participation	Trust in democracy	Cheating on taxes	Cheating on public transport	Violent crime	Tolerance	Risk of assault
Income inequality GINI	Pearson correlation	-.547 (a)	.414	-.305	.403	-.009	.640 (a)	.240	.636 (a)
	Sig. (2-tailed)	.035	.125	.269	.136	.975	.010	.389	.020
	N	15	15	15	15	15	15	15	13

a) Correlation is significant at the 0.05 level (2-tailed).

Source: Green, Preston and Malmberg (2004).

[3] Gini coefficients for the countries of the data sets come from the World Bank (2001).

Table 3.D.5. Pearson correlation coefficients and levels of significance for distribution of income and social cohesion aggregates with controls for GNP/capita

		General trust	Civic participation	Trust in democracy	Cheating on taxes	Cheating on public transport	Violent crime	Tolerance	Risk of assault
Income inequality GINI	Pearson correlation	-.562 [a]	.595 [a]	-.032	.430	-.004	.660 [a]	.270	.628 [a]
	Sig. (2-tailed)	.037	.025	.293	.125	.989	.010	.350	.029
	N	15	15	15	15	15	15	15	15

a) Correlation is significant at the 0.05 level (2-tailed).

Source: Green, Preston and Malmberg (2004).

Conclusions

The few results presented here aimed at illustrating the kind of relationship that can be highlighted in combining macro level data and indicators to investigate macro-social benefits of education. They indicate a clear relationship between educational and income inequality and social outcomes such as general trust, crime and feeling of community safety.

The literature review carried out in the framework of the third research report has shown that increases in the general level of education have not had a direct effect on national levels of tolerance, crime or social cohesion. However, education and training are indirectly linked with macro-social benefits, by playing a role in reducing poverty, unemployment and inequality in income distribution. It seems therefore that raising educational level is neither a necessary nor a sufficient condition for promoting macro-social benefits but that improving equity, *i.e.* reducing the distribution of educational outcomes, may be one way in which education and training can make a contribution (Descy and Tessaring, 2005, p. 227).

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4. What are the effects of education on health?

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All remaining errors are our own.

4.1. Executive summary

Objectives

This report reviews the evidence on the hypothesis that education has important social impacts on health. In reviewing the evidence, we highlight those studies that have attempted to identify causal impacts with robust estimation techniques. We have also described evidence that demonstrates the extent of the descriptive correlation of education and health.

As well as reviewing the evidence on the overall effect of education, we have reviewed the evidence on potential mechanisms for this effect, in a wide range of different personal and social contexts.

Overview of the structure of the report

In Section 4.2 of the report we have mapped out a general conceptual framework that sets out the hypothesised mechanisms for the effect of education on health. This framework creates a structure within which evidence and theory from diverse strands of the literature can be linked coherently. It also enables us to include within the review, evidence that does not investigate the direct impact of education on health but rather investigates the relationship between education and a potential mechanism or mediator of impacts on health.

We set out the methodological criteria for our review of the evidence in Section 4.3 and summarise the findings of this review in Section 4.4. The implications of these findings are discussed in Section 4.5 in relation to the development of indicators and in terms of general policy conclusions in Section 4.6.

The remaining sections present a detailed review of the evidence. Section 4.7 summarises the search criteria for evidence. In Sections 4.8 and 4.9 we describe the evidence in relation to the direct effects of education on mental and physical health and health behaviours. In Sections 4.10 and 4.11 we describe the evidence in relation to the indirect mechanisms that have been emphasised in the conceptual review, namely via effects of education on the self and effects of education on contexts.

Main findings

Overall, we find considerable international evidence that education is strongly linked to health and to determinants of health such as health behaviours, risky contexts and preventative service use. Moreover, we find that a substantial element of this effect is causal.

Education does not act on health in isolation from other factors. Income is another very important factor that interacts in many important ways with education as influences on health. This makes it hard to assess their independent effects. However, empirical investigations often find that the effect of education on health is at least as great as the effect of income.

Those with more years of schooling tend to have better health and well-being and healthier behaviours. Education is an important mechanism for enhancing the health and well-being of individuals because it reduces the need for health care, the associated costs of dependence, lost earnings and human suffering. It also helps promote and sustain healthy lifestyles and positive choices, supporting and nurturing human development, human relationships and personal, family and community well-being

For example, one study finds that for individuals born in the United States between 1914 and 1939, an additional year of schooling reduces the probability of dying in the next 10 years by 3.6 percentage points (Lleras-Muney, 2005). Another study finds that for the cohort of Swedish men born between 1945 and 1955, an additional year of schooling reduces the risk of bad health by 18.5% (Spasojevic, 2003).

Breierova and Duflo (2004) use the Indonesian government's implementation of a primary school construction project in the years 1973-79 to identify the causal effect of education. They find that an increase in the average number of years of education in the household reduces child mortality by approximately 10 percentage points from a mean level of 22.5%.

For women in the United States at the margin of college enrolment, being able to enrol in college and stay for a minimum of two years decreases the probability of smoking during pregnancy by 5.8 percentage points. This is a large effect given that on average only 7.8% of the women in the sample smoked during pregnancy (Currie and Moretti, 2002).

Not all of the effects of education on health costs are positive. Education can increase uptake of preventative care which may lead to long-run savings but short-term increases in health care costs. Those with more education are also more likely to take advantage of health care provision. Moreover, the association of education and some forms of illicit drug use and sometimes alcohol use is found to be positive, *i.e.* education is associated with increased use. Finally, although education appears to be protective against depression it has been found to have much less substantial impacts on general happiness or well-being.

It is also important to emphasise that to the extent that education effects on health occur as a result of impacts on features of the self, particularly self-concepts and attitudes, then if the quality of education is not appropriate to the developmental needs of the individual education can have directly injurious effects.

Findings on the mechanisms for education effects

The finding that education affects health is not new. An innovation of this review is the breadth of features of health that have been shown to be impacted on by education, linked to a clear conceptual model to explain that effect in terms of benefits for individuals in multiple contexts at different levels of social aggregation.

Our central hypothesis is that education impacts on health because:

- individuals exist in multiple, multi-layered and interacting contexts,
- each of these contexts is a domain of social relations and environmental health; and
- education impacts on individuals and on each context at each level.

As well as finding direct effects of education on health outcomes and on the health behaviours that lead to health outcomes, we also assess the evidence in relation to the mechanisms for these education effects.

There is substantive evidence to suggest that education has direct impacts on features of the individual that have direct benefits for health as well as supporting individuals in moderating the impacts of the contexts they inhabit.

For example, there is good evidence that beliefs about health and health care, shaped and influenced by socio-demographic factors including education, determine health behaviours. Randomised controlled trials testing the efficacy of interventions has demonstrated that education has the potential to change health beliefs and behaviours if designed and delivered to appropriately address particular notions about health and illness.

Self-concepts are associated with learning across the lifespan, though a causal link has not been determined through rigorous testing. There is also some evidence that self-concept and self-esteem provide protection against some adverse health outcomes through fostering resilience. This finding has not been consistent.

We find that there are important channels for effects of education on health in all of the contexts considered, at every level of social aggregation from the household to the nation.

To some extent these different contexts mediate education effects because of the effects of education on the physical and chemical environments that people come to inhabit and to some extent education effects are channelled through social and economic relations in each of these contexts.

For example in relation to the workplace, education reduces the likelihood that individuals will work in the most hazardous jobs. As well as this direct effect of physical hazards, education impacts on social and economic relations in the workplace to improve the relative health of those with autonomy and authority in the workplace and reduce that of individuals with less autonomy and authority. There may also be an aggregate effect by which increasing average levels of education may improve the overall balance of risk through these channels.

To give another example, there is a great deal of associational evidence that various forms of social support are supportive of a variety of health outcomes. There is evidence of a causal relationship between education and civic participation. Robust evidence from a randomised clinical trial also points to the causal effect of social support on improvements in depression and social functioning.

At the social or national level, one consistent result of studies that investigate the impacts of income inequality is that education is a protective factor. That is, it moderates the relationship between income inequality and health, mitigating the effects of inequality on the health of more educated people. It is clear that education has a central role in the

determination of income inequality, and other aspects of inequality. However, it is not proven whether the effects of income inequality are felt only by the least well off in a society or whether the effects are more universal.

Calculating the pecuniary gains

Only one or two studies have expressed these types of impacts in quantitative, costed terms. For example, Groot and van den Brink (2006) find that the health benefit of education is in costed terms equivalent to roughly 15-60% of the wage effect. This is a substantial additional benefit that may indicate a major under-investment in education.

Chevalier and Feinstein (2006) assess in monetary terms the benefits of education for reduced depression. Simulating the effects of taking women without qualifications to Level 2 in the United Kingdom would lead to a reduction in their risk of adult depression at age 42 from 26% to 22%. It is estimated that this would reduce the total cost of depression for the population of interest by GBP 200 million a year.

Spasojevic (2003) compares the effect on education on health to the effect of income. She obtains a wide range of estimates under different assumptions, finding in one model that a year of schooling is equivalent to an increase in income of nearly USD 1 700 in terms of its health effect. Other estimates suggest that a one-year increase in schooling is equivalent to an increase in income of USD 17 700, in terms of health.

Other studies have estimated the gains in terms of mortality rates, life expectancy or other health outcomes. For example, Lleras-Muney (2005) shows that there is a large causal effect of education on mortality. She calculates that for people in the United States in 1960, one more year of education increased life expectancy at age 35 by as much as 1.7 years.

Currie and Moretti (2002) use coefficients derived from their instrumental variable estimation to estimate the impact of schooling on health outcomes. They estimate that 12% of the decrease in the probability of low birthweight in the period in the United States between the 1940s and the 1980s and 20% of the decrease in the probability of pre-term birth can be attributed to increased maternal education. It is estimated that between birth and age 15, low birthweight children incur an additional USD 5.5 to USD 6 billion more in health, education, and other costs than children of normal birthweight.

Evidence gaps

A weakness of the evidence to date is that much of the assessment of the effects of education has measured education in terms of years of schooling. This has commonly been investigated as a simple linear effect, without distinguishing the relative benefit of educational participation at different stages. Moreover, few studies have investigated lifelong learning effects beyond the stage of higher education during post-adolescent emerging adulthood. Yet, preliminary investigations suggest that the health benefits of learning later in life may be extremely substantial.

The over-dependence on quantity and qualifications-based measures of educational participation neglects the hypothesis that has emerged from qualitative evidence and theoretical perspectives that effects of education depend on the nature and quality of learning provision as much as on the number of hours spent in schooling. We also know considerably less than is required for an informed policy debate about the relative health

impacts of different curricula (vocational, general or academic) or about the impacts of learning at different ages and stages.

A further weakness is that much of the evidence is from researchers based in the United States and Northern Europe, particularly the United Kingdom, Germany and Scandinavia. We have attempted to identify studies from a greater range of nations and where possible have presented this evidence, but it appears to be in short supply.

The evidence does not come to a clear conclusion about the relative importance of positional benefits of education as compared to absolute effects. Thus the precise effects of broadened participation in education are difficult to predict. Improvements to the quality of education, in its appropriateness to the lives of individuals and communities and in its persistence and accessibility through the lifecourse may be as or more important for health outcomes than a simple expansion of the quantity and breadth of participation at a particular stage such as at tertiary level.

Conclusion

We conclude that there are substantial and important causal effects of education on health. We have summarised in Section 4.4 robust evaluation evidence on the quantitative effects of education assessed in terms of mortality probabilities or exchequer costs. These studies indicate the substantial public significance of the potential role of education in improving health.

We conclude that the health productivity of learning requires considerably more attention from policy makers than it has hitherto received. This is not primarily a question of providing more specific health-based learning but of recognising and investing in the wider impact of general learning in education contexts through the lifecourse.

There are clear conceptual frameworks to explain this effect but the evidence on the precise contributions of the mechanisms is weak. This limits our ability to make precise policy recommendations.

The evidence on the mechanisms for effects of education on health does not suggest that there is one single, simple mechanism. Rather we find evidence in support of a range of hypothesised mechanisms that operate at different levels of society, from effects on the individual, through effects on household and work contexts, effects at the community level and also national level effects.

In all of these contexts there is evidence to support the notion that there are important effects that result from physical and chemical features of environments and also from social and economic relations. Education in its many forms impacts on these environments and social relations, changing the nature of the contexts people inhabit and also enhancing the resilience of individuals and other agencies to protect themselves against potential shocks to health.

Indicators could usefully be developed in relation to the relationships between educational level and one or two key indicators of health behaviour such as smoking and or a measure of psycho-social development such as self-esteem. These indicators would provide useful information for national policy makers about the extent to which education and health systems compare internationally in the harnessing of educational productivity in the service of health outcomes and about the genesis of health and well-being disparities.

It would be possible to conduct analysis of existing datasets to test out the usefulness of such indicators in terms of the inferences that could meaningfully be drawn from them and their interest to policy makers.

There is considerable need for more longitudinal (see glossary in Appendix 4.1) evidence across a greater range of countries such that between-country differences can be modelled and tested. This would enable greater assessment of the relative importance of national level and individual level processes in the formation of health outcomes. It would also enable assessment of the importance of specific features of national level educational provision in terms of their effects on health.

Linked to the previous point, it would be useful for future cross-national longitudinal data collection to incorporate more measures of health, personal development and well-being, alongside measures of learners' self-concepts, personal circumstances, wider contexts, wider skills and attributes and personal resilience in order to test the mechanisms for education effects on health while also considering and holding constant the effects of national level contextual and policy differences.

There is considerable need for more evidence that draws on a wider range of measures of educational provision and addresses the more qualitative aspects of education such as pedagogy, learning ethos, teaching style, and the relationship of learning to the self-concepts and personal development of learners.

4.2. A conceptual model of the effects of education on health

Overview

There are many channels for effects of education on health. This section puts forward a conceptual framework for the links between key aspects such as psycho-social development, health behaviours, social context and qualifications.

There are a number of such theoretical frameworks available for the task. Advocates of each tend to work within specific academic disciplines or traditions such as public health, economics, developmental psychology and sociology. There are insights and analyses that are relevant to this review from all of these disciplines. Sometimes there is clear compatibility between the different traditions but it is not always obvious whether these different approaches are competing or complementary. To some extent they exist in isolation, working on the same terrain, sometimes with very different methodologies, axioms and assumptions, sometimes with similar ones but with different terminologies so that the similarities are obscured.

Yet this breadth of perspectives is important. It is worth emphasising that the theory and evidence for the links between education and health is less developed than that linking education to its narrow economic returns. A key reason for this is that the research area is necessarily inter-disciplinary and does not sit comfortably within any single disciplinary foundation. A cornerstone of economic research on the wage benefit of education has been the human capital revolution in economic theory that occurred in the 1960s and subsequently, initiated in the work of Schultz (1961), taken great steps forward by Becker (1975, 1991) in microeconomic terms and Romer (1986), Lucas (1988) and Barro (2001) and others in macroeconomics, and kept moving forwards recently in the work of Heckman (2005) on more sophisticated economic models of human capital formation.

The economic returns to education are relatively easily understood as the result of the human capital formed in the education process. The health effects of education are much broader in scope, reflecting a much wider set of outcomes with an equivalently wider set of mechanisms. Human capital is an important channel but other personal resources are also important. In the models discussed below, authors have highlighted social and/or identity capital as important mechanisms by which health benefits are generated. These capitals are not the same as human capital and not reducible to it. Therefore, conceptual models are necessarily more complex. Our aim in this section is to set out and justify a relatively simple model that we hope is accessible to policy makers and others who recognise that the significance of health as an outcome justifies conceptual work that does not fit entirely within the tradition of the human capital framework.

In this review we attempt to bring the different perspective into a single framework so that the strengths of each can be brought together. We describe a very general framework

that retains the important elements of each while offering a broad perspective that encompasses the full set of conceptual pathways.

Our aim is to be inclusive of all relevant and substantive theory and evidence from diverse literatures. The choice of framework is important in this regard because as well as being the basis for conceptualisation of the effects of education on health, and thereby clarifying key causal pathways, the framework will also be used to structure our collection and presentation of evidence and so it must be quite general.

Education does not act on health in isolation from other factors. This review lays out the mechanisms for the effects of education on health but this is not to suggest that other factors do not have importance independently of education. Education may impact on income and so some of the effect of income may be thought of as the channelling of the effect of education but that is not to subsume the whole income effect under the heading of education. A large component of income is independent of education and even to the extent that income mediates the effect of education, this can still be conceptualised as an income effect. However, *even conditioning on income, empirical investigations tend to find that the effect of education on health is at least as great as the effect of income*. Our aim is not to denigrate the significance of income but to support a more balanced view that recognises that many factors are important in the generation of health and avoidance of ill-health.

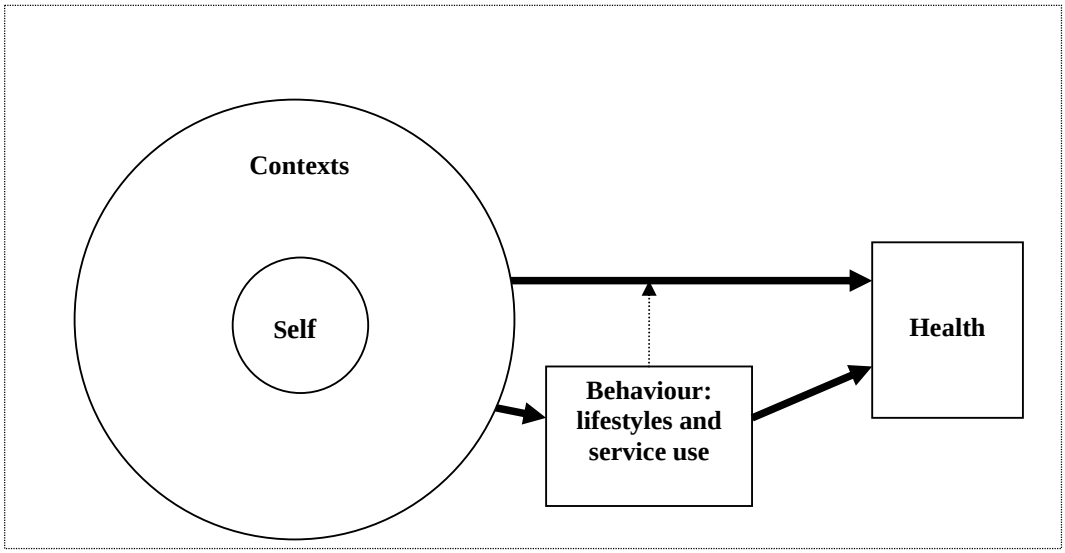
We recognise, too, that there are other important moderating factors. Education changes the way individuals behave and the choices they make but so do ethnicity and gender. Specific historical or social contexts will also moderate the behaviours and the effects of education on health. These moderating effects may apply to all of the elements of the model so that a single model is inadequate to the task of describing the effects of education for all individuals in all social, historical and cultural circumstances.

This model is put forward here as an aid to policy makers in better understanding the mechanisms for the effects of education on health. However, *the focus on education should not be taken for the claim that education is the only important factor or the only factor with such wide-ranging influences*. That is certainly not the claim being made here. The model clarifies the general influences on health, of which education is one and so provides a framework for subsequently clarifying the effects of education on health. The model is not deterministic. It is intended to highlight the essential mechanisms that have been identified and tested in quantitative data.

The basic model

The very general, simple model is set out in Figure 4.2.1.

Figure 4.2.1. Basic conceptual model of influences on health



The foundations of this model are to be found in Bronfenbrenner's ecological perspective (Bronfenbrenner, 1979; 1986). The central notion is that individuals exist in multiple, multi-layered and interacting contexts, each of which is a domain of social relations and environmental health risk and protection. The social relations in each context include elements of structure such that in each context the individual experiences bounded agency that in different ways at each level may be important in the formation of health outcomes.

The model as presented in Figure 4.2.1 is fairly static in that it holds constant many important dynamic and lifecourse processes. This is useful in focusing on the core issue of the effects of the self-in-context on health which will be manifested in part via health behaviours. For many aspects of health these effects may take a very long time to emerge. Health disparities are much more apparent in later life than even in mid-adulthood, particularly for physical health outcomes. There are also important reverse mechanisms, impacts of health and of health behaviours on the self and on contexts.

These and other dynamic, transactional processes are suppressed in Figure 4.2.1, although important. This enables us to foreground the core issue that *individuals have a degree of agency in the determination of their mental and physical health. But that this agency is bounded by structures and contexts and by features of the self that constrain healthy choices that in other terms may seem rational. This "irrationality" lies at the heart of the public health problem.* Central to the hypothesis that education can impact on health is the suggestion that it does so by empowering healthy choice. Below we describe

the basic model in more detail and then discuss the various ways in which education can exert this empowering capacity.

Before we proceed to discuss in detail the conceptual relationships between the features of the model, it may be helpful to discuss a number of terms requiring conceptual definition and clarity. First we define the key features of the model, discussing and clarifying our working definitions of health, self, context, structure and environment in this framework. We then present an extended model that introduces the role of education in this framework, focusing on the mechanisms for effects of education, providing brief descriptions of the conceptual basis that supports the overall framework. In Sections 4.7-4.11 we describe in more detail the evidence on key aspects of the model, focussing particularly on the evidence for education effects.

Defining terms 1: the meaning of health in this framework and review

Changes in the conceptualisation of health over the last century in part reflect the changing profile of health and disease in the developed western world. During the twentieth century, acute contagious diseases gave way to chronic illness and disability (Crossley, 2000).

Traditional understandings of health, which were primarily concerned with curing acute ill-health employed a biomedical model of health that focused on the absence of disease. The biomedical model of health continues to dominate the study of disease and the administration of health care as it has for the bulk of the 19th and 20th centuries. It emphasises the biological and physiological aspects of health, and forms interventions based on the medical model. This model primarily operates by changing the physical state of the body through, for example, the use of surgery or drugs to treat disease, alleviate symptoms and maintain functioning. From this perspective, the body is a machine and the doctor or surgeon is the mechanic who fixes it malfunctions (Crossley, 2000).

However, the 1940s marked a movement from such negative definitions of health to a more positive one. For example, in 1947, the WHO constitution defined health as a, "state of complete physical and social well-being and not merely the absence of disease or infirmity" (WHO, 1946). This international declaration summarised not only new concepts of health emerging from states, but also introduced a more holistic concept of health, encompassing social as well as physical health. It pre-dated the influential academic work of George Engel, a psychiatrist, who critiqued the traditional biomedical model of health and set out an alternative biopsychosocial model (Engel, 1977). This model integrates biological, psychological and social aspects of health into its framework.

The biopsychosocial model of health represents a departure from traditional biomedical thinking. Although it accepts the importance of biological determinants of health, it emphasises the reciprocal and dynamic interactions between different levels of human and social systems, from the biochemical to the sociocultural.

This model was welcomed by psychologists and social scientists because it highlighted the importance of psychological and social factors in the study of health and disease. Beliefs about health, coping strategies, and risky behaviours were identified as important to the promotion of health. These psychological and behavioural factors were influenced by social and demographic factors such as social class, employment status, work environment, social support, urbanisation, age, sex, and ethnicity (Crossley, 2000).

The model was based on "systems theory" (Engel, 1977), which allowed for the modelling of complex relationships between psychological, social and biological factors, health and illness.

This broader definition of health is the basis for the WHO Health for All Strategy, which introduced the aim of maximising economic and social life as a means to improving overall health (Blane, White and Morris, 1996; WHO, 1999). This understanding of health concerns individuals' capacity to fulfil their aspirations within their social environment. This raises two issues. First, individual aspirations for health vary, and so to some extent health becomes a relative rather than an absolute concept. Second, the ability to fulfil these (individual) aspirations and so maximise health is constrained by the social environment and one's ability to navigate it. The social environment is therefore an important determinant of health. Thus, this concepualisation of health sits within a socioecological framework.

This conceptualisation of health renders traditional methods of measuring population health, such as morbidity and mortality, inadequate. Measures for positive health and well-being based on the current definition are available but they could be improved. We tend to rely on psychological measures based on self-report; for example, self-rated health, which are complicated to interpret.

Defining terms 2: the self

The self, or the individual, has a degree of agency and so cognitions, beliefs and psycho-social capabilities feature as crucial elements of the self in this model. Yet, there are a range of different systems for classifying the key features of the self in the determination of health. *Individuals differ in terms of features of the self that are important in the formation of health outcomes, features such as competencies (Rychen and Salganik, 2003), capabilities (Sen, 1992), resources and internal resilience (Masten, 2004; Rutter, 1990), capitals such as human capital (Becker, 1975), social capital (Coleman, 1988; Putnam, 1999) and identity capital (Côté and Levine, 2002).*

Biology is also a particularly crucial factor. Since our concern in this report is with the role of education, we focus on those features of the self that are amenable to intervention through learning or other developmental impacts, rather than on bio-medical features of the self. That suggests a particularly important role for what are discussed below as health behaviours. However, this not to deny the great importance of bio-medical factors that are not within the control or choice of the individual. The model does not suggest that everything need flow through these health behaviours. You can of course not smoke and still get cancer. Health is a property of an individual organism and so any consideration of health must recognise the role of biology.

Nonetheless, the individual does have a considerable degree of potential agency in the formation of health outcomes and so it is important to clarify the role of these features of the self. In the review of the evidence below we focus on three particular features of the self which we present as examples of the characteristics of individuals that have been hypothesised to be important in the formation of health outcomes. These three aspects of the self, each discussed in more detail below, are: beliefs, valuation of the future, and resilience.

There are very complex interactions between these components of the individual, even holding to one side for the moment the importance of structure and context. Behaviours are the result of heterogenous and diverse interactions between individuals' beliefs, skills, capabilities and values and these terms are used in very different ways in different literatures. We do not attempt to construct or reproduce a model of these complex within-person relationships or of the influences on them. Instead we emphasise the importance of psychological and psycho-social factors that are hypothesised to be important mediators of education effects on health.

The agency of the individual is always limited by structure and context, a point at the heart of the person-in-context model. Public health approaches tend to model the influences on health in multi-level terms, covering all domains that impact upon population health: the environment and human ecology, the distribution of social capital, and human interaction with these surroundings (McMichael and Beaglehole, 2003). That is the approach adopted here.

Defining terms 3: context

As with the features of the self, the features of context are theorised differently in different literatures. Particularly relevant here is the distinction between the terms structure, context and environment. We use the term contexts to refer to the domains of interaction for the individual with others. In a multi-level sense, if one defines the individual as a level one unit, then contexts are a very general term for spatial and non-spatial domains of interaction of individuals with higher level units, *i.e* at greater levels of aggregation. Thus the family is an example of an important context, the sphere of important interactions of self and other(s) with potential impacts on development, behaviours and health, particularly, but by no means exclusively, during childhood. Learning institutions also provide important contexts as do neighbourhoods, and, at higher levels of social aggregation, communities and nations. Within each of these contexts, the individual experiences dynamic interaction with others in terms of social relations and with the environment. These have important implications for the health of individuals.

Environment

We use the term environment to refer to the physical/material context within which people live and work, experiencing the impacts on health of the built and physical infrastructure and of other aspects of environmental health. Seen in this way, environments are an aspect of contexts. Thus, for each context we also consider environmental risk as a key potential mediator of education effects on health. Work, household, neighbourhoods and macro-level contexts all include factors with potentially significant and direct environmental risk to health in terms of toxicity, risk of accidents, pollution, physical strain and so on.

Social relations

At each level of this contextual framework the individual experiences and engages in social relations over which the individual has varying but always limited agency. Peers and social networks are very important elements of the contexts within which people live and work. Where these networks of interaction are formed around specific physical locations such as in housing structures or work environments, they can be considered as specific contextual sources of health risk or protection. These social relations include

aspects of authority, power and access to resources, commonly termed structure. As well as the level of hierarchy implicit in social relations, another important aspect for health is the degree of support provided by social relations. Peer groups are another aspect of social relations that may occur in all contexts and that influence the development of cultural values and norms, important as influences on health behaviours and lifestyles.

Social capital

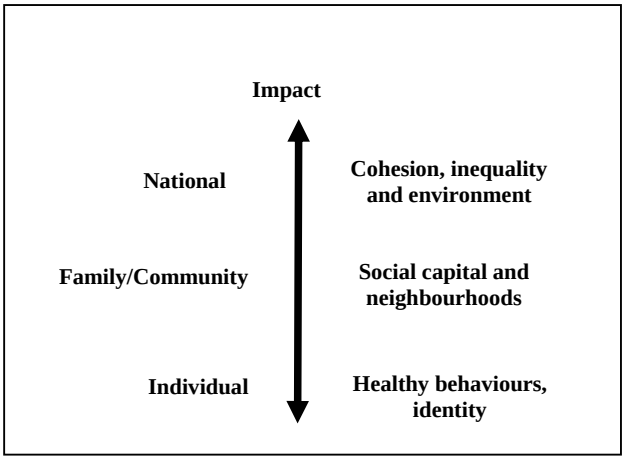
Both of these aspects of social relations have been discussed in terms of the notion of social capital. The most basic form of social capital is bonding social capital, which coalesces around a single, shared identity, and tends to reinforce the confidence and homogeneity of a particular group. Bridging social capital refers to horizontal social networks that extend beyond homogenous entities. This form of social capital involves cross-cutting networks amongst people of various ethnic, cultural, and socio-demographic backgrounds. Linking social capital is characterised by connections with individuals and institutions with power and authority. This is theorised in terms of vertical rather than horizontal networks within the social hierarchy.

While those of lower socioeconomic status tend to have higher levels of bonding social capital, allowing them to use their social networks as a protective factor, they tend to have lower levels of bridging and linking social capital, limiting their access to resources not available in more local environments. The reverse is generally true for higher SES individuals, who have much higher levels of bridging and linking social capital, allowing them to tap into a wide range of productive resources.

There are also important potential effects on health that result from social relationships at a more macro level. These include the potentially very important impacts on health of national levels of disparity in social and economic status that may be defined in terms of income, education or social class.

It is worth highlighting that there may be very important interactions between effects at different levels. Figure 4.2.2 provides examples of this in relation to the impacts of national level factors on individual health and the reverse dynamics.

Figure 4.2.2. Two-way multi-level impacts



National level inequality of income or education has been hypothesised (Wilkinson, 1996) to impact on individual identity and well-being with implications for health and healthy behaviours. This suggests an impact of social level factors on individual health. However social cohesion as a social level outcome is the result in part of the multitude of individual behaviours, attitudes and decisions that comprise social action. These are influenced by individual level factors. Thus individual and social factors are constantly in dynamic interaction, with smaller community-level organisation and agencies also impacted on from above and below by this dynamic flux as well as acting as an additional level of agency and structure in this multi-level system, with implications for health.

Key health behaviours: lifestyles and service use

Although biology plays a role in health determination, it is often the behaviours and choices of individuals that place biological health at risk. These behaviours are a central mechanism for public health and social policy effects on health and are therefore central to the framework of this review. The mediating role of *lifestyles* is indicated by the arrows in Figure 4.2.1. Lifestyles is used here as a term intended to encompass many important elements that are stressed in the public health and social science literature more generally, such as diet and nutrition, smoking, exercise, work-life balance and alcohol use.

Lifestyles

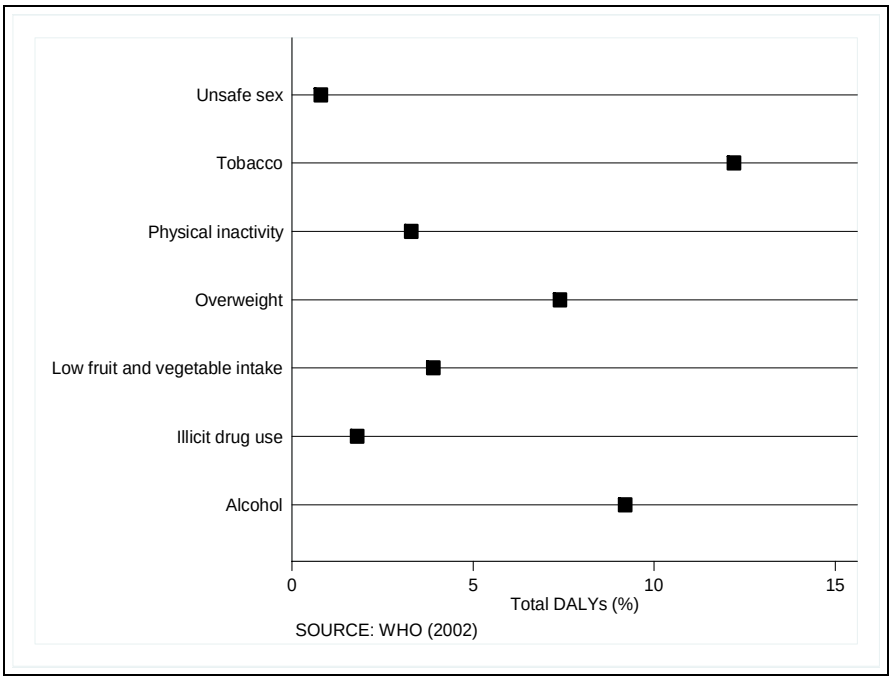
In a report of the major risks to health, the World Health Organisation gathered together nationally representative individual-level data on the leading causes of death and disability for all developed member states. They identified the top ten risk factors in terms of attributable Disability Adjusted Life Years (DALYs) (see glossary in Appendix 4.1). Three of these differ from the other seven in being immediate markers of biological health rather than health behaviours (blood pressure, cholesterol and iron deficiency). These three markers are linked in important ways to health behaviours. For example, high blood pressure is caused by salt intake in diet, low levels of exercise, obesity, and excessive alcohol intake. It results in structural changes in the walls of arteries that can lead to stoke, ischemic heart disease, hypertension and other cardiac diseases. Globally, high blood pressure is responsible for about 13% of deaths and 4.4% of attributable DALYs. However, although education may have important benefits though impacts on the way individuals manage these biological risk factors, we focus here on the seven behavioural risks as key factors which mediate the effects of education on health.

In order of greatest proportion of attributable Disability Adjusted Life Years for health risk behaviours, the top seven risk behaviours are:

- Tobacco.
- Alcohol.
- Overweight.
- Low fruit and vegetable intake.
- Physical activity.
- Illicit drugs.
- Unsafe sex.

The importance of each of these seven factors in terms of their contribution to DALYs is reported in Figure 4.2.3.

Figure 4.2.3. Seven leading selected risk factors in developed countries



Evidence for the impact of education on these seven health behaviours is discussed in Section 4.8. Here we describe briefly the extent of risk associated with these behaviours. This validates our claim that evidence of effects of education on health behaviours also lends support to the hypothesis of effects on health.

Health risk factor No. 1: Tobacco. Smoking has been common in industrialised countries for much of the past century and as a result is responsible for over 90% of lung cancer in men and 70% of lung cancer in women. Globally, tobacco, used for smoking, chewing or snuff, causes 8.8% of deaths and 4.1% of attributable DALYs. In developed countries, tobacco is responsible for 12.2% of DALYs.

Health risk factor No. 2: Alcohol. Alcohol use has direct and indirect impacts upon mortality and morbidity through intoxication, addiction and other metabolic mechanisms. Social drinking patterns vary by context, but remain responsible for more than 60 diseases and injuries. For countries in the developed world, this amounts to 9.2% of DALYs. Worldwide, alcohol use is implicated in 20-30% each of oesophageal cancer, liver cancer, cirrhosis of the liver, homicide, epilepsy, and motor vehicle accidents.

Health risk factor No. 3: Overweight. Increasing BMI is positively correlated with risk of coronary heart disease, ischemic stoke and type 2 diabetes mellitus. It is also implicated in the development of cancers of the breast, colon, prostate, endometrium, kidney and gall bladder. High BMI is associated with 7.4% of DALYs in developed countries.

Health risk factor No. 4: Low fruit and vegetable intake. Worldwide, 19% of gastrointestinal cancer, 31% of ischemic heart disease and 11% of strokes are attributed to low intake of fruits and vegetables. In developed countries, this amounts to 3.9% of DALYs.

Health risk factor No. 5: Physical activity. Exercise protects against the risk of cardiovascular disease, cancers and diabetes. Inactivity is related to 10-16% of cases of breast cancer, colon and rectal cancers, and diabetes mellitus. It is responsible for 1.9 million deaths and 19 million DALYs globally, and 3.3% of DALYs in developed countries.

Health risk factor No. 6: Illicit drugs. The non-medical use of drugs is related to increased overall mortality though HIV/AIDS, overdose, suicide and trauma. Overall illicit drug use is implicated in 0.4% of all deaths worldwide and is most common in the industrialised countries of the Americas, Eastern Mediterranean and Europe. In developed countries, illicit drug use is responsible for 1.8% of DALYs.

Health risk factor No. 7: Unsafe sex. The overwhelming majority of DALYs attributable to unsafe sex result from the global HIV/AIDS epidemic. Although much of this occurs in countries outside of the OECD, of the HIV/AIDS related deaths that occurred outside of Africa in 2001, 25-90% were caused by unsafe sex. In developed countries, 0.8% of DALYs is attributable to unsafe sex.

Service use

Another important health behaviour is health service utilisation. We define service use in a general sense to include not just the uptake of services per se in terms of quantity of resources used but also in terms of the efficiency of service use and more generally in terms of the communication with health professionals, use of preventative treatments, compliance with advice, expert patients and community level access to health provision. Because of the importance for health of appropriate and effective use of services we add this to the list of health behaviours considered as markers of health.

There are three main elements to service use relevant here:

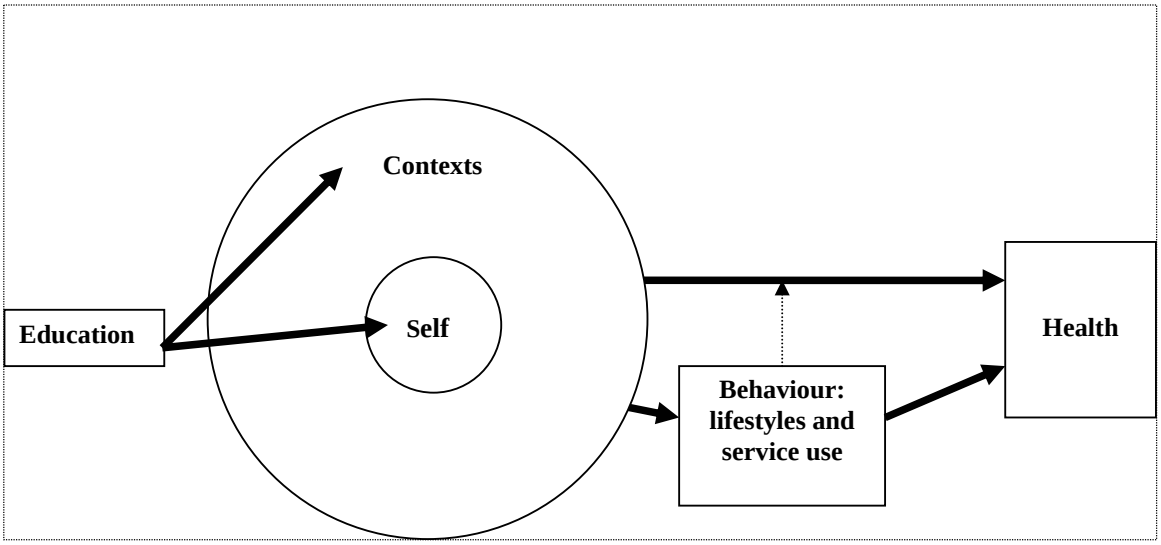
- A *preventative* element which is manifested through the use of health services for preventative reasons (*e.g.* regular check-ups) or to monitor health conditions.
- A *responsive* element, characterised by individuals' use of health facilities in response to diseases, pains, accidents, or in general poor health conditions which usually limit daily activities.
- The *management* of chronic and/or disabling conditions.

The role of education

We introduce education into the model in Figure 4.2.4. At the centre of the framework is the self in context. Education matters to health firstly through direct effects on the people that engage in it and secondly because it impacts on the choices of contexts that people come to inhabit or on their opportunities to choose such contexts. Also, through effects on multiple individuals and on social relations and wider socialisation and civic processes, education has the potential to impact on the nature of the contexts themselves, changing workplaces, homes, communities and wider society. It is important

to remember that we have defined context in a very general way that includes environmental health and social and economic relations. Although education has this potential, little is known in robust quantitative terms about the precise nature, range and magnitude of such effects. Nonetheless, many such effects have been hypothesised and considered in empirical terms and we summarise what is known about these effects in this review.

Figure 4.2.4. Basic conceptual model of the effects of education on health



Specifying the effects on the self as distinct from effects on context as in Figures 4.2.1 and 4.2.4 has the advantage of separating these sets of effects. However, it is also emphasised that *the self and contexts are constantly in interaction. This interaction of people and contexts is basic to the ecological, self-in-context model and is crucial in the generation of health outcomes*. The effect of education is not a one-off impact that leads individuals into given contexts. The benefits of education are more dynamic. Through benefits of education for individual and community agency, education may continue to moderate the effect of contexts on the individual, providing protection against the stresses and health impacts of risky environments. *Features of the self such as autonomy and resilience are of value precisely because they enhance the capability of individuals to manage interactions with the contexts in which they live their lives.* To the extent that education supports these features of the self, it enables and empowers individuals to protect their health and manage ill-health.

To summarise, our central hypothesis is that education impacts on health because:

- *individuals exist in multiple, multi-layered and interacting context;.*
- *each of these contexts is a domain of social relations and environmental health; and*
- *education impacts on each factor in each context at each level.*

However, it is also important to emphasise that this capability of education is not always realised and may also include negative effects, particularly where access to education is unequal and where provision is injurious to self-concepts, learning and development. This is discussed in more detail below.

Defining terms 4: the meaning of education

Education is a very general term used to refer in very different ways to the experience and/or results of learning undertaken primarily in institutional settings such as schools and colleges. The very breadth of this term often conceals a number of important distinctions of meaning that are important for a consideration of the health impacts of education.

Education as context and process

When defined institutionally, education can be thought of as a context. Schools, colleges and other learning institutions are contexts like those of the home or neighbourhood. In educational contexts as in other contexts there are important social relations that impact on the experience and development of the individual. There are interactions with teachers, other adults and peers that may be of vital importance in the formation of cultural and personal identity for individuals, social groups and for society as a whole. These features of the educational context may result from explicit and deliberate learning experiences or from aspects of social interaction that occur outside of the explicit curricula, within or outside the classroom. An experience of being bullied, for example, or of developing a good relationship with another learner can each radically transform the sense of self of a learner and the nature of their engagement in learning.

As well as referring to contexts of learning, development and experience, education can also refer to the explicit experience of curricula-led learning, the experience of being in an interaction with a teacher being taken through stages of educational experience intended to develop key skills, values and capabilities. This process of learning is not only explicit and deliberate but also implicit and non-deterministic. Higher authorities can set curricula and establish the structural boundaries or objectives of institutional learning and in so doing can create challenges and opportunities for learning but the central experience is a complex interaction of learner, teacher and other learners in a specific form of social interaction. This complex interaction includes within-person experiences of cognitive, affective and behavioural development as learners engage in cognitive processes that result from self-regulation and attention to the task of learning as well as from implicit and explicit reflection.

We make this distinction between education as a context and education as a process because the two elements of education have different types of implication for health. Some of the benefits and/or risks of education for health result from the membership or participation in a learning institution, others from the explicit experience of the process of learning. It is also important to emphasise that there are important experiences of learning that do not take place within educational settings, key examples of which are learning in the workplace and home learning as in parent-child interaction, as discussed below in the section on inter-generational processes.

Health literacy

The significance of the global health risk factors has led to a major emphasis in public health policy on education interventions. This role for education has traditionally focused on providing information and skills to help people make choices and/or changes that will promote individual and societal health and well-being. Contemporary health education had three main aims: to reduce morbidity and mortality through changing the behaviour and beliefs of individuals; to foster the appropriate use of health services; and to create general awareness of health issues.

Policy makers have historically designed specific health promotion programmes that, through health education, put the onus on individuals to change behaviours that lead to ill health. However, this approach implies equality of choice among populations, and a direct relationship between the acquisition of information and rational decision making. It also fails to take into account the socio-political context in which individual health resides and the unequal distribution of constraints on behaviour (Katz, Peberdy and Douglas, 1997; Tones and Green, 2004). In the model of Figures 4.2.1 and 4.2.4, these are highlighted as the person-in-context.

Health promotion has shifted toward addressing the contextual and social as well as the behavioural determinants of health. Health policy, thus became concerned with creating supportive contexts that make "the healthy choice the easy choice". As such, pervading all policy is the ultimate goal of reducing inequities, furthering human rights and building social capital – an approach which addresses the social determinants of health (Tones and Green, 2004).

Health education has also moved toward the adoption of a "life-skills" approach through raising consciousness about factors that influence health and increasing the ability for individuals to make informed choices through fostering empowerment. These models of health education aim to encourage personal growth through enhancing awareness, self-esteem and self-assertion. (Katz, Peberdy and Douglas, 1997).

The movement toward life skills encourages health literacy; a shift away from the simple transfer of information, toward the development of self-esteem and confidence that allow individuals to make educated choices about their health and seek out more information if necessary (Renkert and Nutbeam, 2001). It is founded on a deep-seated recognition of the other important elements of the ecological model set out in Figures 4.2.1 and 4.2.4.

The World Health Organisation has defined health literacy as:

> *"…the cognitive and social skills that determine the motivation and ability of individuals to gain access to, understand, and use information in ways that promote and maintain good health. Health literacy means more than being able to read pamphlets and successfully make appointments. By improving people's access to health information and their capacity to use it effectively, health literacy is critical to empowerment." (Renkert and Nutbeam, 2001).*

Developing health literacy is about nurturing the benefits of education and learning that extend beyond the acquisition of information toward overall personal growth.

The measurement of learning 1: quantity and qualifications

The majority of the quantitative studies of the effects of education on health have focused on the effects of measures either of the number of years of schooling or on the educational level reached. There are fundamental distinctions between these constructs that it is important to highlight and it is also important to emphasise that each is distinct from an important, broad third category, namely the quality of learning.

A particular concern in relation to the use of the number of years of schooling as a measure of educational participation is that it takes no account of the quality of that schooling or of the extent to which learning or other important features of development occurred. It is a useful proxy measure of progression within the school system and all else being equal one may assume that if educational experience is a good thing then more of such experience is better than less. However, the quantity proxy conflates individual progression with learning and gives no guide as to the features of the learning experience in educational settings that are important for outcomes such as health.

Thus while qualifications attained can be thought of as an output measure of learning, the quantity measure that is commonly used to proxy for educational outputs is really just a measure of the duration of experience of inputs.

As a measure, qualifications attained tends to be highly correlated with the length of participation in that it is generally necessary to attain entry level qualifications to proceed to the next stage of learning and those with greater quantity of education (years of schooling) will therefore also tend to have higher levels of qualification. Thus it is difficult to tease out the separate effects of participation and qualification, although consideration of effects for those who fail to qualify at the end of a learning experience can give some guide to the difference in effect of duration and qualification.

We emphasise, however, that the distinction is important as some of the benefits may follow from a good experience of learning others from the socioeconomic structural benefits that follow from the signalling effect of qualifications. These are different mechanisms for health effects and have very different policy implications. Whereas the learning process explanation suggests a general mechanism that may bring absolute benefits for health if educational participation were widened, the signalling mechanism indicates that education effects follow from relative positional advantage that would not follow in the same way if there were a widening of participation.

These different explanations can usefully be discussed in terms of partial and general equilibrium (see glossary in Appendix 4.1). Estimates that result from data analysis at the individual level indicate marginal effects, the likely impact, subject to standard statistical assumptions, of a change in the rate of participation at the margins of the current rate. If the likely impact depends on the average rate of participation then the estimated marginal effect is not a good guide to the impact of a large shift to participation. To the extent that the learning process explanation of education effects on health is the right one, one may presume from theory that the general equilibrium need not be greatly disturbed by widened educational participation or that any externalities will be positive such that the partial equilibrium effects estimated in individual-level longitudinal studies remain valid or will in fact be lower bound estimates of the true effects. On the other hand, to the extent that the signalling explanation is the right one, one may presume from theory that a change in the average rate of participation would change the signalling effect of

qualifications such that the ex ante estimated marginal effect is a poor and probably upwardly biased guide to the impact of the policy shift.

Therefore, whether education is conceptualised and measured by qualifications gained or by quantity of participation is an important distinction with strong implications for analysis and inference. However, both measures are at best proxy indicators of education inputs and so conflate a number of related impacts.

The measurement of learning 2: quality

The previous discussion focused on output measures of learning but the nature of the effects are likely to depend heavily on the nature of the learning experience. Key features of this are conceptualised by educationalists in terms of constructs such as learning ethos, pedagogy, curricula and assessment, as well as in terms of the broader social relations experienced in a learning context. In conceptual terms all of these features of learning may have important implications for health either positively or negatively depending on their manifestation and may be in different ways be important mechanisms for effects of education on health. It would be very useful for policy makers to know more about the distribution of these different aspects of quality within and between education systems. It is unfortunate, therefore, that although qualitative and conceptual research indicates that these features of learning are vital, there is very little quantitative research that enables evaluation of the magnitude or external validity of these potential effects.

We also suggest that the emphasis on qualifications gained neglects the potentially vital role of non-accredited learning in the protection and sustenance of health, particularly in later life.

Learning through the lifecourse

Another feature of the focus on the years of schooling or of qualifications as measures of education is that the lifecourse benefits of learning tend to be omitted from consideration. The health benefits of learning in adulthood and in later life may be particularly substantial. Until we know more about the causal mechanisms for education effects it is not possible to hypothesise with conviction about the relative size of health effects of different stages of learning. If the benefits are driven by income then earlier education may be relatively more influential than if the benefits are to do with features of identity and resilience. Little is known about these relative trade-offs.

It is also worth emphasising the importance of complementarities in learning (Heckman, 2005), the notion that learning begets more learning. This tends to be associated with the view that early learning is particularly important but in relation to health (and other benefits) it may be that learning through the lifecourse provides vital complementarities and support for individuals and communities that greatly enhance the benefit of earlier experiences of learning.

Relevant features of the self: beliefs, patience and resilience

Here we discuss the theoretical and conceptual basis for the view that education has important impacts on key features of the self that are themselves important in the formation of health outcomes. As discussed above, there is a great range of important

features of the self that have been classified in different taxonomies, and measured and analysed in different ways. Different literatures and authors have tended to focus on different key features. Here we do not review the theory and evidence in relation to all of the many important features of the self that may impact on health and be channels for effects of education on heath. Moreover, there are important connections and intersections amongst these features of the self. A full discussion of all of these inter-relationships would take us some distance from the purpose of this review which is to describe the theory and evidence in relation to the effect of education on health. The main point here is that there are features of the self that have been theorised to be influenced by education and that also impact on health behaviours and health outcomes. The mediators discussed here are:

- Beliefs about the self.
- Beliefs about health.
- Patience – valuation of the future.
- Resilience.

Beliefs cover a very wide range of potentially important cognitions. We focus here on two particular sets of beliefs that may be particularly important mediators, firstly, general beliefs about the self (self-concepts) such as self-efficacy and self-esteem. These are particularly important as mechanisms for impacts on agency, capability and action in the service of mental and physical health and for health behaviours. Secondly, we consider the more specific set of beliefs concerned with health and health care.

Next, we focus on patience, also known as inter-temporal preference, the valuation by the individual of the future. This is an important element of many economic and psychological models of health determination. Finally, we consider the psycho-social capability of resilience.

Beliefs about the self (self-concepts)

Self-concepts concern individuals' perceptions of their own abilities and worth. They depend on information available to the individual and also the cognitive ability to process this information (Markus and Wurf, 1987). Self-concepts vary across different domains, for example, relating to academic capabilities, social capabilities, or general self-worth (Shavelson, Hubner and Stanton, 1976).

Psychologists have developed self-concept scales, which reflect domains of self-concept. The SDQ-1 scale (Marsh, 1988 and 1990) is designed to measure eight features of the self-concepts of adolescents. These are: physical ability – based on perceptions of skills and interest in sports and games; physical appearance, peer relations – self perceptions of how easily the individual makes friends and their popularity; parent relationships – perceptions of how well the individual gets on with their parents and whether they feel that their parents accept and approve of them; reading, which encompasses interest and enjoyment as well as ability to read; maths; school, which refers to school subjects in general; and esteem. Esteem is the individual's self-perception of his- or herself as an effective, capable individual who has self-confidence and self-respect and is proud and satisfied with the way they are (Marsh, Craven and Debus, 1998).

Self-concept develops in important ways whilst children are at school. Amongst very young children, self-concept is consistently high, but with increasing life experience children learn their relative strengths and weaknesses. In general, their level of self-concept declines, becomes more differentiated with age, and becomes more highly correlated with external indicators of competence, such as skills, accomplishments, and the opinions of significant others (Marsh, 1985 and 1990; Marsh *et al.*, 1984; Shavelson, Hubner and Stanton, 1976). Eccles *et al.* (1993) propose that the declines in mean levels of competence self-ratings reflect an optimistic bias for very young children and increased accuracy as they grow older.

School plays an important role in the development of self-concepts. School provides children with external feedback about their competencies in academic, psychological and social areas. The child develops perceptions of her/himself from her/his academic successes and failures, and also from her/his relationships with peers and teachers. These can be managed in ways that may be supportive or damaging to emotional health and well-being.

Self-concepts impact upon and are affected by each other and by the other factors discussed in this section: resilience and patience. If an individual has a high regard for her/himself generally and of her/his abilities in particular, she/he will be more likely to consider her/himself capable (self-efficacy) and be more inclined to persevere in the face of adversity (resilience). Through channels involving these psychosocial and intra-psychic factors, positive self-concepts promote positive health behaviours, protect mental health and help individuals to manage chronic health conditions (Schuller *et al.*, 2002; Hammond, 2004). Particularly important potential mediators of education effects on health are self-concepts of self-esteem and self-efficacy. Other aspects of self-concept such as body image may also be very important for some health and health behaviour outcomes but have less direct relationships to education and so are not the focus here.

Self-esteem

It has been suggested that people who have very low self-worth tend to treat themselves badly and may invite bad treatment from others, but do not treat others badly (Emler, 2001). The costs of low self-worth amongst young people include unhappiness, symptoms of depression, suicidal thoughts and suicidal attempts, eating disorders, victimisation, teenage pregnancy, and difficulties in forming and sustaining close relationships (Emler, 2001). To the extent that use or abuse of illegal drugs, drinking to excess and smoking are acts of defiance on the part of adolescents, low self-worth may afford protection from these behaviours (Emler, 2001). On the other hand, it is also plausible that teenagers who do not see drug taking as an act of defiance but are aware of the negative consequences will be less likely to use drugs to excess if they have high self-worth and believe that they are worth taking care of (Modrein-Talbott *et al.*, 1998).

Self-efficacy

Bandura (1997) describes self-efficacy as an individual's confidence in her/his ability to organise and execute a given course of action to solve a problem or accomplish a task. It may apply specifically to a particular competence or more generally.

Interest in the relationships between self-efficacy and health follows from a biopsychosocial model of health (Bandura, 1997). As developed by Engel (1977), this

model includes multiple determinants of health function such as lifestyle and environmental conditions, which go beyond the more traditional medical model. It also emphasises enhanced health and well-being as well as disease prevention.

Bandura (1997) discusses the effects of self-efficacy on health through biological mediators and health-promoting behaviours. He argues that the biological effects of self-efficacy beliefs largely arise while coping with acute or chronic stressors in everyday life. Stressors do not result in physiological damage if an individual feels that he or she has control over them. However, stressors over which an individual has no control are associated with various negative physiological impacts including impaired immunological function.

Self-efficacy also contributes to health behaviours. This is because it affects whether people even consider changing their health habits in the first place, whether they can enlist the motivation and perseverance to succeed, their responses to setbacks, and how well they maintain the changes they have achieved. Mirowsky and Ross (2005) also emphasise the importance of exposure to stressors, such as economic insecurity.

Bandura identifies four sources of self-efficacy, and education plays a role in each. The first is enactive mastery, by which he means not only success but also the perception that one has succeeded. Similarly, Eccles, Wigfield and Schiefele (1997) argue that it is the perception and interpretation of success or failure rather than whether one actually succeeds or fails that matters for beliefs about self-efficacy and self-worth. Perceptions of success depend on preconceptions of capabilities and pre-existing self-knowledge structures. Weiner *et al.* (1971) developed a theory of attribution whereby individuals attribute success or failure to ability, effort, task difficulty or luck. Individuals believe that they have more control over some attributes than others. If the individual attributes failure to fixed personal characteristics such as a genetic and pre-determined lack of ability, then the impact on self-efficacy will be much more devastating than if they attribute the same failure to lack of effort. Covington (1992) argues that children at school should be encouraged and helped to protect a sense of academic confidence as this is likely to be critical to their sense of self-worth.

The second source of self-efficacy is vicarious experience, which refers both to learning from the competence of others (*e.g.* teachers and peers) and social comparison (Bandura, 1997). Individuals' evaluations of their own capabilities are influenced not only by their own objective performance, but also by how this compares to the performances of those around them. Eccles, Wigfield and Schiefele (1997) suggest that school competition, evaluation and social comparison can make it difficult for some children to believe that they are competent academically. In addition, a narrow curriculum means that children who are not academically gifted do not get the opportunity to recognise their competence in other areas.

Thirdly, verbal persuasion also contributes to self-efficacy when significant others express faith in one's abilities rather than convey doubts (Bandura, 1997). Bandura suggests that verbal persuasion has more impact when it is within realistic bounds and on people who already believe that they can produce effects through their actions. In addition, people are more inclined to trust the evaluations of individuals who are themselves skilled in the activity and have some way of assessing success. Teachers, therefore, are in a good position to promote efficacy amongst students because they are skilled in the subjects they teach and also in assessing success.

Eccles, Wigfield and Schiefele (1997) review the ways in which teachers and parents contribute to motivation amongst children. Motivation is closely related to efficacy because belief that one can succeed is an important determinant of motivation. Parents' perceptions of their children's competencies and likely success influence children's efficacy beliefs. These perceptions are probably communicated through verbal persuasion and also in more subtle ways, which may not be verbal. In addition, Eccles and her colleagues stress that both at home and at school, what is important for positive self-efficacy is not only parents' or teachers' beliefs about the child's abilities, but a combination of other factors, such as an environment that provides good emotional and cognitive support (Eccles, Wigfield and Schiefele, 1997). Both home and school play important roles in the development of self-efficacy, and they should be understood as parts of an interacting and re-inforcing system of influences.

Bandura's final source of self-efficacy is physiological and affective states. Efficacy beliefs can be altered by reducing stress levels, enhancing physical health and functioning, and correcting misinterpretations of bodily states (Bandura, 1991; Cioffi, 1991). This is particularly relevant for efficacy relating to physical accomplishments, health functioning, and coping with stressors. Bandura (1997) argues that as with the other three sources of self-efficacy, knowledge of physiological states and reactions are not, by themselves, diagnostic of personal efficacy. Such information affects perceived self-efficacy through cognitive processing. Education may contribute to self-efficacy through the channel of this fourth source of self-efficacy. A whole school approach emphasises physical health and psychological resilience, and may therefore impact on self-efficacy through promoting healthy physiological and affective states. Furthermore, adults with higher qualifications tend to enjoy better physical health than their less highly qualified counterparts (*e.g.* Acheson, 1998).

Learned effectiveness is a concept developed by Mirowsky and Ross (2005), which encompasses not only self-perceptions of personal attributes, but also the objective resources to control and shape lives and protect health, which they argue are developed through education. Learned effectiveness emphasises the value of personal resources developed through education. The knowledge, skills, habits and orientations acquired through education constitute economic, social and psychological assets, which contribute to health and well-being through the life course through their impacts on personal efficacy (Mirowsky and Ross, 2005).

There is a good theoretical basis for the view that learned effectiveness is an important construct, related to empowerment and the source of potential, resilience, social inclusion and agency. Issues of structure and context are necessary supplements to the construct for it to be appropriately contextualised within the social processes that constrain or support the development and impacts of self-efficacy.

Beliefs about health and health care

Preceding any action are notions about the significance of that action. These notions or beliefs determine whether or in which form action is taken. In terms of health and health care, beliefs are important because they drive behaviours that have implications for health outcomes. This relationship is illustrated in the Health Belief Model (Rosenstock, 1974; Strecher and Rosenstock, 1997). This model suggests that individuals will take action to protect themselves from disease and injury if a particular set of beliefs is in place about their position with respect to a condition. Components of the model include

perceived personal susceptibility to an illness or ill-health condition, an understanding of the severity of a given illness, a position on the benefits of a course of action and a calculation of the barriers (or costs) versus advantages of any health-related behaviour.

Perceived susceptibility is the subjective measure of risk to contracting a health condition. It is an individual's understanding of a diagnosis or the probability of him/her becoming ill. For example, before attending a screening for breast cancer, a woman must believe that she is vulnerable to the disease. In addition to perception of vulnerability or risk, an individual's opinion of the consequences of becoming ill or leaving an illness untreated also partly determines his/her decision to take action. Using the example of breast cancer screening, a woman's perception of the extent to which developing breast cancer will be physically or socially debilitating will influence whether she will attend screening. Additionally a sense of the benefits of a suggested action is important for health behaviours. A woman's belief in the efficacy of breast cancer screening in reducing susceptibility and severity or perceived threat of breast cancer is implicated in her attendance. An understanding of the negative aspects of any potential action also weighs upon the likelihood of engaging in health behaviour. According to this approach, largely unconscious calculation of the relative cost in time, energy, money, or psychosocial costs, such as embarrassment or distress, precedes any action. A consideration of the benefits of learning about breast health may or may not be seen as advantageous depending upon the potential financial or social implications of attending screening.

It is additionally theorised that cues to action and self-efficacy impact upon decisions to engage in health behaviours. The Health Belief Model suggests that an instigator, such as awareness provoked by learning new information through, for example, a media campaign for breast cancer screening or a bodily event, such as the detection of a lump in the breast, serves as a cue to action. Self-efficacy is more important for a change in lifestyle or behavioural factors than for one-time actions, such as attending screenings, as adjustments in behaviour changes require further confidence in one's ability to change, for example in the cases of smoking behaviour and exercise (Strecher and Rosenstock, 1997).

The Health Belief Model is useful for identifying the beliefs or ideas that come before a change in health behaviours. However, an understanding of the source of beliefs is also necessary to determine locations for intervention. An individual's beliefs or perceptions are shaped and influenced by an assortment of demographic (age, ethnicity, gender), socio-psychological (cognitions, personality and norms), and structural (socioeconomic status, education) variables, some of which can be modified though intervention.

Evidence for the potential for prior beliefs about health to influence decisions about behaviour is found in a qualitative study using focus groups on parent's beliefs about child immunisations. Evans *et al.* (2001) found that parents' lack of confidence in health professionals is in some part due to their knowledge that heath professionals have to reach targets for vaccination in order to be paid. Therefore, the advice of health professionals is not seen as beneficial for the child, but rather as self-interested. Further, lay beliefs about health often compete against attempts to educate populations about the benefits of particular health behaviours. Smith and colleagues (1999) found that, in Australia, despite health promotion activities about preventative health, there was still variable public awareness and confidence in ability to avoid a number of health outcomes, including cancer and heart disease. Beliefs around health and individual level

of control over their health were linked to socio-demographic factors, such as educational attainment, gender and ethnicity that were not sufficiently taken into account in the design and delivery of health promotion activities. Other research with vulnerable populations in the United States discovered an association between stereotypes about physicians and health care satisfaction and behaviour (Bogart *et al.*, 2004). Individuals with negative stereotypes about health care providers were less likely to seek care when sick, to be satisfied with the care received when they did attend and to adhere to doctor's recommendations for treatment. This research is limited by its ability to determine the direction of these relationships, but the association is important for the understanding of the link between beliefs and health behaviours.

Education can act as an initial source of information about health and health care, but is also important in triggering cues to action through the provision of new information in health promotion activities. Targeted and tailored health education that addresses both the beliefs that precede actions and the varied socio-demographic and cultural sources of beliefs can instigate actions around health.

Patience – valuation of the future

Frederick, Lowenstein and O'Donoghue (2002) describe inter-temporal choices as "decisions involving tradeoffs among costs and benefits occurring at different points in time". This concept is also referred to as time preference, patience and future orientation. It has been developed primarily in the disciplines of psychology and economics.

Intertemporal choices are influenced by many factors. These influences include individual, family, social and cultural characteristics. Different individuals make different intertemporal choices but also the same individual may exhibit different intertemporal preferences in relation to different outcomes, *e.g.* someone may smoke but take great care with their retirement programme. They may also make different choices in different situations, and at different stages in their life (Frederick, Lowenstein and O'Donoghue, 2002; Bishai, 2004). Becker and Mulligan (1997) suggest that time preference changes as future prospects and mental capacities develop.

Some analysts have discerned a correlation between education (measured by years of schooling or levels of qualifications achieved) and time preference. Fuchs (1982) suggests that this correlation can be explained in two ways: first, individuals who are inclined to value future events highly are more likely to invest in school, and second, school may promote time preference. This is partly because schooling may increase awareness of the value of investing in the future and awareness of risk. In addition, school promotes thinking that is not simply about the here and now, and the education system values investment in the future. For instance, achievements at school, especially qualifications, are themselves investments for the future.

Intertemporal choices are central to models of health behaviours. For example, choice about whether to smoke, whether to quit, and when to quit are in part determined by an individual's levels of time preference.

We therefore hypothesise that one of the channels through which education affects health is likely to be intertemporal choice.

Resilience

Resilience is a construct describing positive adaptation in the face of adversity (Schoon and Bynner, 2003). It is not a personality attribute, but rather a process of positive adaptation in response to significant adversity or trauma (Luthar, Cicchetti and Becker, 2000).

A major source of adversity for children and throughout adulthood is socioeconomic disadvantage. This is associated with a number of co-factors, such as poor living conditions, overcrowding, and lack of material resources (Duncan and Brooks-Gunn, 1997). The experience of disadvantage early in life may, for less resilient individuals, weaken their ability to adapt to future challenges.

Protective factors fall into three broad categories: attributes of children; characteristics of their families; and aspects of the wider social context (Masten, Best and Garmezy, 1990; Garmezy, 1985; Rutter, 1987). Thus, resilience can be described as the phenomenon that some individuals show positive adjustment despite being exposed to adversity (Luthar, Cicchetti and Becker, 2000). It is associated with personality characteristics like self-worth and efficacy, but it is also influenced by factors external to the child, such as having a supportive family and other sources of external support. Resilience may be a feature of social groups as well as of individuals.

Howard, Dryden and Johnson (1999) reviewed theoretical and empirical literature relating to the development of resilience amongst children. The authors focused on personal attributes, concluding that the following "internal attributes" characterise the resilient child: autonomy, problem solving skills, a sense of purpose and future, and social competence. It is plausible that education – amongst adults as well as children – impacts on each of the "internal attributes".

In addition, the school or other educational setting may be a source of support because it provides distraction, goals, and positive support and role modeling from friends and possibly teachers as well. Education promotes social integration, civic engagement, and widens social networks. Schlossberg, Waters and Goodman (1995) suggest that social networks and the ability to draw upon social resources contribute to resilience, leading to better psychological and physical health outcomes.

Numerous studies of students in community-based education who have a history of mental health difficulties report that participation has positive effects upon mental health (*e.g.* Wertheimer, 1997; McGivney, 1997). Indeed, some general practitioner (GP) practices now prescribe education as treatment for their patients (Wheeler, Smith and Trayhorn, 1999). Such schemes have been piloted and evaluated (James, 2001).

Dealing effectively with adversity and stressful conditions affects physical as well as mental health. Reliance upon nicotine, alcohol and other addictive substances as well as certain patterns of eating are common responses to adversity and stressful conditions (*e.g.*, Allison *et al.*, 1999). Individuals who are more resilient may be inclined to respond in other ways, which are less damaging to their physical health and possibly more effective in reducing levels of experienced stress in the longer term. This is a very plausible explanation for effects of education on health.

Individuals who are more resilient, almost by definition, experience lower levels of chronic stress in response to a given stressor or life event. This not only affects health behaviours. It also affects physical health because chronic stress exacts a cost that can both promote the onset of illness and its progression (see Ogden, 1997, and Wilkinson,

1996 for fuller discussions). Levels of experienced stress and self-efficacy may also affect the perception of certain symptoms such as pain (Turk, Meichenbaum and Genest, 1983).

Contexts

Public health works with a broad definition of health that includes not only the "absence of disease" but also "overall well-being". Health is now considered an ecological characteristic of populations and not simply a personal and family level issue (Griffiths and Hunter, 1999; Katz, Peberdy and Douglas, 1997; Peterson and Lupton, 1996). McMichael and Beaglehole (2003) view contemporary public health as having three main components: the improvement of population health; the reduction of social and health inequalities; and the maintenance of health-sustaining environments.

This highlights the importance of broad-ranging contextual factors in the formation of health outcomes. These different contexts are all the domain of important social relations and interactions of the self and environment. Moreover, as we discuss below, these contexts exist at different levels of social aggregation, from the household to the international arena.

Here we consider the following contexts:

- Context 1: the family and household.
- Context 2: work and occupational health risk.
- Context 3: neighbourhoods and communities.
- Context 4: the macro-level context: inequality and social cohesion.

We make a distinction between the family and household contexts, in part to structure our presentation of evidence in relation to two separate themes. The focus in the section on the family context is the literature from development psychology on the family as the context of important influences of parents on children's outcomes. The section on the household sets out the model from economics on the role of the household as the context for the important decision-making processes that are involved in the household production of health. Both models essentially focus on the same context although in importantly different ways.

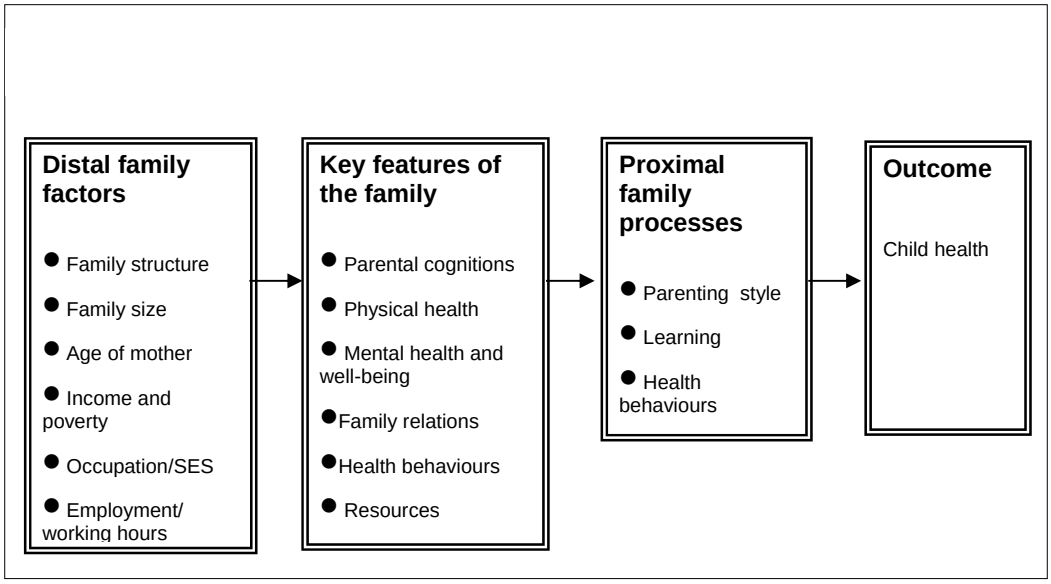
Context 1a: the family and inter-generational processes

Ecological models in the developmental psychology literature have focused on the interactions between parents and children that are important in the formation of health outcomes for children. In these models the family context impacts on the health of children not just because of direct impacts of family health behaviours and family resources on immediate physical health but also because the beliefs and values in the home (cognitions) impact on the child's own developing agency and sense of self with important long-term implications for the child's own future health behaviours and resilience. The education of parents and carers is an important influence on children's health because it impacts on most of the features of this general model.

A useful form of these models distinguishes between three categories of the home context: distal factors, characteristics within the family, and proximal processes within the family. These are shown in Figure 4.2.5.

Distal factors refer to the more global or descriptive aspects that characterise the environment and provide an index of a family's demographic or socioeconomic situation. Examples of distal variables include income or parents' occupation. Characteristics within the family are more closely related to the contextual factors that impact on children. Here important factors include parental attitudes to health and diet, health behaviours in the home and the physical infrastructure of the home. The notion of characteristics of contexts differs from the notion of distal factors in providing a more substantive measure of the child's immediate context.

Figure 4.2.5. Conceptual model for the related family influences on child health



The final category is family process. By the term process we refer to the actual interactions experienced by the child. Process is the most proximal element in the model as it refers to the day-to-day life of the child. Examples of family process variables include the type of nutrition in the home, aspects of parent-child relationships such as warmth and affection – important in the formation of the child's self-concepts and resilience – and the use of discipline, control and punishment strategies.

The ecological model emphasises that the family context interacts with the other contexts in the general model suggested in Figure 4.2.1 and considered elsewhere in this review. Neighbourhoods and other features of the national context have important impacts on children's developing health as indicated throughout this section. The family is not independent of these other contexts. Yet, particularly in early life the family context provides a particularly important context for developmental health and is the context for strong mechanisms of inter-generational effects of education.

Mediation and moderation effects of education

The education of parents may be an important influence on the health of children because of potential direct effects of education on each feature of this model and also because of the protective or moderating capability of education in changing the nature of

the effects of each of these features. This can be described taking the example of income. Family income is influenced by the family's level of education so that to the extent that education influences income and income influences child health, income may be thought of as a mediator of inter-generational education effects. However, the education of parents may also be protective in that it reduces the level of risk to the child's health that results from poverty or low levels of income. In other words, families with low income but relatively higher levels of education may be better able to compensate for and be resilient against the effects of low income on child's health than parents with similarly low income but less education.

In this review we do not assess the evidence for all of the features of the model highlighted in Figure 4.2.5. We present the evidence in Sections 4.8 and 4.9 in relation to the magnitude and causal robustness of the direct effects of parents' education on children's health.

Context 1b: the household, economic structure and resources of time and income

Models of the household production of broad-ranging amenities such as children's academic attainment and family well-being have been a major innovation in economics since the 1960s. These models emphasise the trade-offs between use of resources of time and money in different activities in the production of different outputs for the household. Particularly relevant here is the emphasis on the role of human capital. The application of this general model to the question of health outcomes has been most strongly developed in the work of Grossman (2005).

In terms of the role of education, economists have theorised that education can have a productive efficiency effect and/or an allocative efficiency effect in the production of health outcomes. Broadly speaking, productive efficiency can be thought of as the technological efficiency of household production processes, the capacity to produce a given amount of health for a given amount of inputs of time and money. This is indicated in Figures 4.2.1 and 4.2.4 by the direct arrow from the self in context to health outcomes. The notion of allocative efficiency refers instead to the mix of inputs selected. This more complex decision-making process takes account more explicitly of lifestyle and health behaviour choices in simultaneous decision-making about all of the relationships modelled in Figures 4.2.1 and 4.2.4. Both mechanisms emphasise the importance of human capital in enhancing efficiency in the formation of health.

We describe these channels for effects of education in more detail below, highlighting the decision-making processes of individuals and emphasising the role of education in the production of health.

Productive efficiency

Becker (1965) suggests that education is likely to influence the marginal cost of producing health and so leads to greater levels of health for a given level of inputs. Grossman (1972, 2000) explores the productive efficiency role of education in a model where individuals produce health using health care and time as inputs in the production process. In his model, health is both a consumption and investment good. It is a consumption good since it is valued by consumers, *i.e.* it is a direct source of utility. It is also desired as investment since good health enhances individual's earning capacity.

In a simplified version of the Grossman model, in which health is only an investment good, the time that individuals can devote to the production of market and non-market outcomes is not fixed. It is a function of individuals' health since an increase in health lowers the time lost from production due to illnesses or injuries. Individuals do not purchase health from the market but instead produce it spending time on health improving activities as well as purchasing medical inputs. Medical care serves as an input to produce health. Therefore, health is produced in the household sector with a production function in which the individual's stock of human capital is an element that enhances the efficiency of production of health. In this approach, human capital is traditionally operationalised in terms of measures of years of schooling or educational qualifications.

In this model, the level of investment in health chosen by the individual is theorised to be that level at which the marginal revenue from the labour market (including time in the labour market due to good health) equals the marginal cost of health investments. Using this optimality condition and the health production function introduced earlier it is possible to derive mathematical statements of the expected relationship between education and health. An increase in education is theorised to increase the quantity of health demanded. Education is also theorised to decrease the quantity of medical care demanded. This is because schooling improves the marginal product of health production and health improvement reduces the time lost due to illness and injury. As a consequence, schooling reduces the need for medical care.

Therefore, in the productive efficiency approach, an increase in education can lead to better health through the enhancement of an individual's skill to produce health. For example, individuals with higher levels of education tend to have better understanding of their symptoms and have better communication skills to explain these to the health practitioner than individuals with lower levels of education. Thus, human capital in this literature is directly but implicitly linked to "soft skills" and/or psycho-social capabilities. Other writers (Côté and Levine, 2002) have suggested that these attributes are better conceptualised as identity capital.

Allocative efficiency

Deaton (2002) and Rosenzweig and Schultz (1982) argue that unless education affects the choice of inputs used in the production of commodities, *e.g.* health, it is not clear how education would reduce the marginal cost of producing these commodities. These theorists argue that there will be an education effect because individuals with higher levels of education will select a more efficient mix of inputs to produce a given output than individuals with lower levels of education. This is not a matter of the technology of production as in the notion of productive efficiency but of the mix of inputs selected, *i.e.* choices about how resources of time and money are used in the lives of individuals and families.

Whereas models following the productive efficiency approach utilise a generic input for the production of health, models of allocative efficiency recognise that multiple inputs affect the production of health and that these inputs may also have an impact on individual well-being (utility). For example, smoking can have damaging effects on health but also provides pleasure to individuals. Allocative efficiency models incorporate such issues of choice as joint production processes.

A further aspect of models of allocative efficiency is their use of initial health endowments. This has implications for the conceptualisation of the role of education and

the choice of inputs for the production of health. Healthier individuals are more likely to achieve higher levels of schooling. This reverse causality (see glossary in Appendix 4.1) is of particular relevance for this review in terms of the estimation of education effects on health.

Grossman (2005) points out that models of allocative efficiency typically assume that individuals with higher levels of education have more information about the true nature of the production of health. Education is theorised to raise awareness about the damaging effects of smoking, the importance of periodical health care tests, or the components of a balanced diet. Thus, education may improve health through the choice of individual health inputs. For example, individuals with higher levels of education may be less likely to smoke and binge drink and more likely to eat healthily and increase exercise.

The productive and allocative efficiency models of the effect of education in the production of health need not be viewed as competitors. Aspects of both may be relevant and both predict that an increase in schooling improves health outcomes if a reduced form equation is estimated.

One of the basic insights of the economic model is that health is a stock and that current inputs and chosen health behaviours are investments producing increments to that stock. Education affects current inputs to the stock of health through increases in the productive or allocative efficiency but education is not the only influential factor. The production of health is also influenced by income, prices, and initial health endowments, among other factors that enter into the budget constraint. An important consideration is that the level of resources available to the household in all of its activities is affected by the stock of health. Healthier people can work longer hours in a given week or more weeks in a year leading to higher earnings. Therefore, health enters into the model as an outcome with feedbacks to income.

These trade-offs between education, health and income are important when one comes to ask the key policy questions. There are important interactions between education and income as elements of socioeconomic status. Whereas much of the literature on health effects has conflated education and income into a single construct, we argue that as well as interacting with each other, education and income each have partially separate and distinct effects above and beyond any effect of the other. Although there are important interactions between these features, the policy mechanisms appropriate to each are different and so it is important to recognise the separate contribution of each as well as their interactive effect.

Context 2: work and occupational health risk

The evident link between education and occupation is the increased access to work that does not compromise physical and mental health. In general, higher levels of education lead to non-manual labour occupations where dangers to physical health through exposure to injury or dangerous chemicals are reduced. Additionally, as emerged from the Whitehall studies of British civil servants, the mental and physical health implications of occupations are related to the balance of demand and control. In particular, jobs characterised by low control were associated with increased levels of sickness. The Whitehall II study demonstrated that this relationship was independent of individual characteristics (Ferrie, 2004).

Hazards faced in the work environment have serious implications for health amounting to 1.5% of the global burden in DALYs. The variety of potential hazards is

broad, ranging from exposure to chemicals to adverse ergonomic conditions. These exposures increase the risk of a number of health outcomes, including injuries, cancer, hearing loss, respiratory, musculoskeletal, cardiovascular, reproductive and psychological disorders (WHO, 2002).

Work-related injuries are another important source of occupational hazard. The highest risk is found among industrial and agricultural workers, but office workers and other members of the labour forces are also at risk. Data have demonstrated that overall each year 310 000 employees die as a result of unintentional occupational injury. Examples include injuries among health care workers resulting in the contraction of infection, falls and poisonings. Occupational injuries are responsible for 0.9% or 13.1 million of global DALYs (WHO, 2002).

Nearly one and a half million (1.4) DALYs are attributable to exposure to carcinogens in the work place. Occupational exposure to chemicals such as, asbestos, arsenic, beryllium, cadmium, chromium, diesel exhaust, nickel and silica account for 1.3% of cancer of the lung, trachea and bronchus and 2.4% of leukaemia diagnosed, worldwide. The likelihood of developing a related illness depends upon the dose received, potency, interaction with other present carcinogens, and individual susceptibility. The attributable mortality to exposure to carcinogens amounts to 146 000 (0.3%) of deaths (WHO, 2002).

Stress is the number one cause of lost time at work. Stress experienced in the work place has been linked with coronary heart disease. Key elements of work environments that produce large amounts of stress are high psychological demand combined with low decision making power and control that has become typical of positions management and administration among other roles. A further stressor linked with disease is shift work. Employees working in shifts tend to be exposed to heavier workloads, higher demands, poor psychosocial work environments, reduced physical activity, limited control and are less educated. Also fatigue and disturbances in the circadian rhythm are associated with stress-related coronary heart disease (Ferrie, 2004; WHO, 2002).

Context 3: neighbourhoods and communities

Risks to health posed by the living environment place an additional burden on the morbidity and mortality of populations. The relationships between education and environmental health risks are largely linked to individuals' ability to make choices about where they live and how they deal with their resulting environment. Therefore, the impact of education is limited to effects on those risks that can be individually controlled. In most cases, the increased income afforded by high levels of education predicts increased access to healthier choices, though this is not always so. Other factors, such as social responsibility and resilience to stress, related to education, moderate exposure to environmental risk factors.

Key environmental circumstances at the community-level include pollution, road-traffic injuries and housing. Pollution, particularly through the air, is a macro-level phenomenon. However, there are also important differences between local areas in the degrees of air pollution experienced by their inhabitants. Therefore, there may be effects of education on exposure to pollution. There is also an interesting potential macro-level effect in that to the extent that education may foster a connection between an individual and their surroundings, education has the capacity to impact upon perceptions of

responsibility for the welfare of the environment and consequently behaviours that promote it.

Pollution

A major source of risk from the environment comes from urban air pollution produced as a result of the burning of fossil fuels mainly for the use of transport. Air pollution causes a number of adverse health outcomes. The particles that are released into the air as a result of combustion, when inhaled, lead to serious health consequences, such as lung cancer and other cardiopulmonary diseases. Other elements, including lead and ozone also contribute to the burden of disease related to air pollution. WHO analysis estimates that ambient air pollution accounts for 5% of trachea, bronchus and lung cancer, 2% of cardiorespiratory infections and 1% of respiratory infections, worldwide. This amounts to 0.8 million (1.4%) deaths and 7.9 million (0.8%) DALYs. Polices responding to ambient air pollution have emerged in recent years; however, there remain serious risk to health in the urban areas of North America, Europe and many developing nations (WHO, 2002).

Road traffic injuries

Over 1.2 million deaths worldwide are due to road traffic injuries, accounting for 2.3% of all deaths. Some predictions suggest that by 2020 road traffic injuries will be the third greatest cause of death and disability (McCarthy, 1999). In high-income countries, about 50-60% of road traffic injuries result in driver or occupant deaths. Fatalities involving pedestrians are more common in urban areas with increased risk for children and adults over 60 (WHO, 2002). The risk of death from road traffic injuries is related to social class. For example, in the United Kingdom, children in the poorest families are four times more likely to be involved in traffic accidents than children from the wealthiest families. In the United States, drivers from low-income areas have higher rates of accidents than those from rich areas (McCarthy, 1999).

Education can provide protection against this risk factor through income effects on the the choice of living circumstances. For example, more desirable areas tend to be more expensive such as those where traffic is highly regulated and there is lower traffic density; they are more desirable because children and the elderly feel safer (McCarthy, 1999).

Modes of transport and patterns of travel also have implications for health. Individuals with lower incomes are more likely to use public transportation while people with higher incomes more frequently travel by car. These differences also have implications for the environment via pollution, but also for individual health. Equally, there are benefits of transport to health through exercise. Commuting by walking or cycling for transportation in combination with a balanced diet and not smoking are important for cardiac health (McCarthy, 1999). As demonstrated elsewhere in this text, education is related to the propensity to exercise.

Housing

Housing circumstances impact upon health directly, through the physical and social issues of the home and area, and via the health-damaging effects of social exclusion.

Some research suggests that differences in self-reported health can be explained by experience of housing stressors and perceptions of the local environment. Factors such as overcrowding, dampness, area reputation, neighbourliness, fear of crime, and areas satisfaction are important predictors of self-reported health (Macintyre *et. al*., 2003).

Again, in the case of housing and neighbourhood options, income is a major factor in determining access to environments that promote health. For example, research suggests that home-owners are less likely to dwell in housing or in areas with health-damaging physical and social features.

Social capital effects of learning

Putnam (1993) suggests that education and learning can be a valuable source of social capital formation. At the level of primary education, learning can promote societal cohesion and strengthen citizenship when individuals of all socioeconomic backgrounds are enrolled in the public education system. Learning experiences through the lifecourse can:

- provide opportunities to gain and practice social capital skills, such as participation and reciprocity;
- provide a forum for community activity;
- provide a forum in which students can learn about responsibility and civic participation;
- extend and deepen social networks;
- support the development of shared norms and the values of tolerance, understanding, and respect; and
- affect individual behaviours and attitudes that influence community (Heyneman, 2001; Schuller *et al.*, 2002).

These influences of education might be experienced at community and or national levels. We place them here to emphasise the important potential of education to enhance civic life and community empowerment and participation.

Context 4: macro-level inequality and social cohesion

In this section we consider approaches that emphasise macro-level issues, analysing the effects of education systems or macro-level distributions of resources. The central argument is that it is important to focus on relative rather than absolute levels of education and income within countries. At the individual level, Marmot *et al.* (1978) were among the first to demonstrate the existence of a socioeconomic gradient, which shows that health outcomes are not confined to extremes of rich and poor, but are observed at all levels of SES. Decreasing returns to income suggest that the finding may result from relativities in SES rather than absolute gains. At the societal level, recent studies have shown that the degree of relative deprivation within a society is strongly associated with overall mortality and life-expectancy (Daniels, Kennedy and Kawachi, 2000). Middle-income groups in relatively unequal societies have worse health than comparable or even poorer groups in more equal societies. This result holds even in countries that have universal health care systems.

The exact nature of the processes linking social inequality with health inequality is not always clearly specified, in part due to the methodological challenges in estimating the direct effects of education on health at the societal level. Macro-level exploration of this relationship is stymied by poor data with imprecise measures or proxies for the variables of interest, and by necessary limitations in the sample size for national-level analyses. However, much of the theory implicates social capital and identity capital as key pathways.

Using a psychosocial approach, Wilkinson (1996) argues that the income distribution in a country may directly affect individuals' perception of their social environment, which in turn affects their health. Thus, macro-level issues impact on individual level outcomes, in part through interactions of social and identity capital as elements of social structure. In other words, an individual's sense of his/her status within social hierarchies has a direct impact on health.

Based on qualitative evidence, Wilkinson finds that more egalitarian societies have better health outcomes. Egalitarian societies are characterised by high levels of social cohesion, he argues, because market orientation and individualism are restrained by a social morality, thereby allowing the public arena to become a source of supportive social networks rather than of stress and potential conflict (Wilkinson, 1996, p. 4). Hence, the structural impact of hierarchical status relations is softened and reduced, with benefits for health.

In an alternative formulation of this mediation model, inequality undermines civil society and political participation. This assertion is supported by evidence from the United States showing that states with the highest income inequality are least likely to invest in human capital and to provide generous social safety nets (Kawachi *et al.*, 1997). In another study, Kaplan *et al.* (1996) find a correlation for states of the United States between inequality of the distribution of income and a large number of health outcomes and social indicators, and with mortality trends. They also find evidence that these differences parallel relative investments in human and social capital, in that states with greater income inequalities tend to invest less in education. Under these conditions, income inequality may drive educational inequality which is in turn associated with poor health outcomes.

Using crime and social dislocation as proxies for social cohesion, Preston and Green (2003) also find a strong statistically negative relationship between educational inequality and social cohesion through income inequality. That is, educational inequality leads to income inequality which in turn results in lower levels of social cohesion. They also find that educational inequality has a direct impact on social cohesion, in other words that educational inequality, in and of itself, leads to lower levels of social cohesion with detrimental effects on health and well-being.

Identity capital: the link back to the self

These approaches highlight the important link between social and identity capital in that even though social capital can moderate or mediate the relationship between inequality and health, inequality matters in and of itself because of the direct impact it has on individuals' perceptions of their self-worth and other aspects of psycho-social well-being, as discussed in relation to Figure 4.2.2. In this sense then, we cannot understand the role income inequality plays in affecting health without looking at the ways in which

social capital interacts with identity capital – that is, psychosocial capabilities – to moderate the relationship between inequality and health.

Using a socio-anthropological approach to investigate the relationship between social inequalities and health, Dressler (1999) links income inequality with individuals' perceived abilities to attain the culturally normative standard of living (cultural consonance), which is in turn linked to health outcomes. Cultural consonance has two dimensions – lifestyle and social support. Cultural consonance in lifestyle – the accumulation of consumer goods and the adoption of behaviours that signify being a success in life – is negatively associated with diastolic blood pressure (Dressler, 2005). Cultural consonance in social support – the perception that help and assistance in times of need will be forthcoming within one's social network – is also negatively associated with diastolic blood pressure (Dressler and Dos Santos, 2000; Dressler *et al.*, 2002; Dressler, 2005). In other words, having high cultural consonance in lifestyle and social support is associated with lower blood pressure and fewer symptoms of depression. Hence, the relationship between income inequality and health is mediated by the degree of cultural consonance in lifestyle or status incongruity on the one hand, and on the other by the depth and breadth of social networks.

As well as mediating the effect of inequality, social capital can also moderate the effect. That is, it can provide protection against the negative consequences of inequality. For example, evidence from ethnographic work in the United States and Brazil suggests that high levels of social capital can be a protective factor against the deleterious effects of income inequality on status incongruity and health. In this formulation, the positive protective features of social networks and relationships can offset the health risks associated with social structure.

4.3. Methodological issues for the review of the evidence

It must be emphasised that we have not conducted a systematic review as the basis for the presentation on the evidence in the next two sections. Given the range of outcomes and methods considered here that would have been neither feasible nor appropriate. Rather, we have conducted a conceptual review that has sought to identify the most robust evidence in relation to each of the many channels for effects of education hypothesised in the conceptual model. These search criteria are set out in more detail in Section 4.7.

The complex and dynamic way that learning is associated with the health of individuals, families and at the level of society creates a challenge for the estimation of consistent and robust empirical evidence. This review is primarily concerned with two questions:

- What is the magnitude of the causal effect of education?
- What are the mechanisms for this effect?

A definition of causality

The finding that the education and health of individuals are positively correlated is an almost universal observation across countries. This observed association is informative as it tells us about the current disparity in relation to health of those with different levels of education. This provides an indicator of educational inequality and comparisons in this across nations are also informative in terms of the national differences in educational inequality.

Yet in order to move from this important feature of health inequality to the view that this results from effects of education, it is necessary to make an assessment of the one-way causal impact of education on health. This can be difficult for a great many reasons, not least the fact of important reverse effects of health on education, difficulties of measurement, the non-random sorting of individuals into education and the firm likelihood that those with more education will tend also to have many other advantages and capabilities that may also independently lead to better health.

The definition of causality used in this report is in terms of the attempt to estimate a generalisable impact that can provide policy makers and others with a reasonable guide to the likely impact of a policy change. Much might be said about this definition. *The intention is to focus on studies that have attempted to determine the likely magnitude of change in health outcomes that would follow if a random sample of the population were to receive an additional increment of education*, in the terms in which education is commonly defined in quantitative analysis.

This definition focuses attention on attempts to reproduce quasi-experimental evaluation of one-way impacts in which differences between those in study samples who

receive the "treatment" of an increment of education and those who do not receive the increment are unrelated to the differences in outcomes. There are a number of problems with such attempts. Firstly, as discussed elsewhere in this review, there is the difficulty of measuring or even fully conceptualising what is meant here by treatment. As we have emphasised, the health effects of education may be a matter of the quality of education as much or more than of the quantity of education. This "treatment," therefore, may be hard to observe, making issues of causal estimation secondary to the often overwhelming problem of measurement.

Secondly, this definition of causality focuses on the evaluation of the scale of effects, not on the contexts within which such effects can be judged to be valid. An evaluation of the causal effect of education in one national or local context, for one group or sub-group of the population, in one educational context may not necessarily be a good guide to the effect in other contexts. This question of external validity must be borne in mind. Issues of heterogeneity are also important. If there are important differences in the effect of education between sub-groups such that there are important gains for some and losses for others then consideration of the average effect will provide a very false (null effect) picture of the true significance of education.

Thirdly, the focus on average effect size commonly neglects consideration and genuine assessment of the mechanism for effects. This is a crucial gap in that without firm knowledge of the pathways through which education brings about benefit, one cannot be sure that the apparently causal estimate will follow in different circumstances of time or place. That is why the distinction between absolute and positional mechanisms for the effect of education on health is so important. Without knowing the extent to which each type of mechanism is responsible for effects of education, one cannot predict with great confidence what the impact would be of policy changes that brought about substantial adjustments to the current distribution of education.

However, all of these considerations are also true of measures of the raw, unadjusted correlations between education and health, as they are of attempts to assess the likely one-way causal impact of education on health. Moreover, the raw association of education levels and health is a worse guide to this likely impact as education and health are likely to be associated for a number of reasons, primarily selection bias (see glossary in Appendix 4.1) and reverse causality. The former term is a general one referring to the likelihood that those who achieve higher levels of education may also achieve better health not because education results in processes that improve or protect health, but because they have other unobserved or excluded factors that lead both to higher levels of education and to better health. Reverse causality refers to the likelihood that there is also an effect of health on education. Either of these sources of estimation bias would erode confidence that the observed association of education and health is a good guide to the likely effect of a change in the provision of education.

Identifying causal effects

There are a number of statistical techniques that can be used to attempt to rectify these estimation problems. The most robust in most settings is the medical model ideal of a social experiment. However, for most situations in the social sciences this is not a viable possibility. More feasible is a natural experiment (see glossary in Appendix 4.1) in which some key feature of the education system, for example, undergoes a change that is not due to the actions of the individuals whose education and health is to be studied. A good

example of this is a change in the minimum school leaving age which is an exogenous shift in the sense that it is determined from outside the agency of the individuals studied. If this change causes random impacts on the education received by individuals then under certain assumptions discussed further below the impact of these changes in education cannot be the result of selection bias or reverse causality. The methods of natural experiments and instrumental variables IV (see glossary in Appendix 4.1) are strongly linked and both have been applied by economists in particular, attempting to use these shifts to identify genuine causal impacts, in the sense of causality defined above.

Estimation by instrumental variables requires the identification of a quasi-experimental change that causes variation in education but not in health other than through education. The change is quasi-experimental in the sense that it is also unrelated to any underlying factors that may explain both education and health. Under such circumstances, the changes in health brought about by the quasi-experimental change provide a guide as to the impact of education on health.

There are a number of problems with the use of such estimation. Firstly, tests of the validity of the assumptions are often inconclusive such that there is often disagreement about the validity of the resulting estimates. Secondly, the estimation results will be biased toward the scale of effects for those in the study who were most effected by the quasi-experimental change. For example, consider the use of changes in the school leaving age as a quasi-experimental condition. This policy shift will cause random variation in education that may result in health benefits. If two areas that are otherwise alike introduce such changes at different times then the differences between the changes in the education-health relationships in the two areas can provide a good guide as to the impact of the extra education for those who experienced most strongly the impact of the change in the school-leaving age. Since the extra education will mainly be brought about for those who would choose to leave at the minimum school leaving age, the resulting estimate will be biased toward the effect size for that group, not an unbiased estimate of the average, generalisable effect.

Thirdly, the estimate of the marginal effect of education in a given study provides an indication of the likely impact of education under the assumption that the change in education for the marginal person does not change the impact for other current participants in education. In economic terms, this is the partial equilibrium assumption, discussed elsewhere in this review. It is important because if changes to the allocation and distribution of education cause changes to the marginal benefit of education then estimates evaluated when there is one particular level of participation in education will not be a good guide to the impact of education in the circumstances of widened participation.

Despite these caveats, we focus in this study on estimates resulting from such methods because they go one step further than other studies in their attempt to identify the one-way causal impact of education. Any assessment of the costed benefit of education must be based on a causal effect in this sense, unless statistical association is to be taken for causation. Despite their difficulties and omissions, and subject to the validity of their assumptions, estimates from quasi-experimental or IV estimation are the most rigorous available in terms of the guidance they provide as to the likely impact of changes in the quantity and distribution of education. In this sense, they are very informative so long as their assumptions and omissions are remembered.

Slightly less rigorous than such methods but still useful are methods that rely on the changes observed over time in longitudinal data. These methods attempt to recreate a

before-after dichotomy in which a like-with-like comparison can be drawn under the following assumption: for two individuals with similar outcomes on observed measures at time A who then experience differences in education and have differences in outcomes at time B, the differences can be explained as the effect of the education. The difficulty with this assumption is that it is unlikely that available measures can fully recreate the level playing field at time A and that changes in education between times A and B may be explained by time-varying selection bias not picked up by the prior measures. Nonetheless such methods can substantially remove estimation bias and add considerably to the evidence base, particularly when taken together with other studies using more or fewer controls and using different methods.

While this dynamic nature is acknowledged within the literature, typically attempts to model the effects of years of schooling on health outcomes are based on cross-sectional single equation models, mainly due to the lack of multi-period data. The lack of information in cross-sectional data (see glossary in Appendix 4.1) regarding individuals' situations before education took place, makes it impossible to tell whether associations are due to reverse causality, selection bias or educational causation.

In this review we highlight in particular the evidence from IV studies that offer the most reliable estimates of precise effect sizes. In the detailed presentation of the evidence below, these studies are included under the heading of "Studies estimating causal effects." Studies using longitudinal data with rich control sets are included under the heading of "Associational evidence", although we emphasise that this evidence is still informative. However, we bring out the results from the IV studies in order to best summarise and present the likely effects of education on health in quantitative terms. Of course, the best basis for policy decisions is replication. The results of any single study may be strongly influenced by the context and time of that study and by the quality of measures and methods used.

Mediation and moderation

Some have attempted to assess the extent to which features of our general conceptual model explain or channel effects of SES on health. Other studies have attempted to explore the process by which key influences on health actually work. These studies may be quantitative using structural equation modelling (see glossary in Appendix 4.1) or qualitative. Both are particularly useful for the aim of assessing the mechanism or process by which education impacts on health.

It may be useful to briefly define these terms. If the reason or channel for the effect of education on health is that education leads to increased income which buys resources which are productive for health, then we can say that income mediates the effect of education. The mediator is the channel or mechanism for the effect. There may be other important mediators and studies may be interested to compare the relative strength of the different mechanisms, although it is unusual for it to be feasible to do this while still maintaining a rigorous focus on addressing selection bias and reverse causality.

If we hypothesise that education changes the nature of the effect of income in that those with more education might spend more of their income on health enhancing resources (allocative efficiency) then we say that education moderates the effect of income.

Within and between country evidence

Most of the evidence reviewed in this study is from data for single countries in which samples of individuals are followed over time. Subject to estimation limitations, this enables assessment of the effects of education on health in the context of national systems of health care, education provision, social and economic inequality and wider features of national culture, environment and demography. To the extent that these national factors impact on health, moderating the nature of the education effect, individual level within-country estimation can only provide a partial picture of the full effects of education on health.

Evidence from national level, between-country studies can, subject to estimation issues, assess the impact of national level differences on national level features of health. However, these studies are limited by small sample sizes (there are only so many countries) and data comparability. A particularly important limitation of cross-country studies drawing is in their capability to assess causality as the small sample sizes make it difficult to adequately address issues of confounding bias (see glossary in Appendix 4.1). Thus, for example, it can be hard to tell whether an association of educational inequality and population health is an effect of education inequality or the result of third factors such as national wealth, low social cohesion or of the poverty of particular social or regional groups. Sample size constraints make it difficult to adequately control for these other factors. Moreover, because cross-national data tend also to be cross-sectional it can be hard to tease out the effects of factors such as education which exert their impact over long periods of time. Finally, cross-national studies conflate national level between-country differences and individual level within-country differences.

The implication of this discussion is that the most useful new evidence would come from data that were based on longitudinal sampling of individuals in different countries, thus providing variation at the individual and national levels, across time.

The measurement of education

Education is commonly defined in terms of the number of years in which an individual has participated in schooling, or sometimes in terms of the level of qualifications attained. Both of these measures are important and relevant to the study of education effects. However, the conceptual framework highlights that some of the mechanisms for effects of education are to do with the nature and quality of the education or learning experienced. It is regrettable that so few studies have attempted to include these features of this general set of mechanisms within their data collection or modelling framework.

4.4. Overall summary of findings from the evidence

Direct effects

The main findings of the review of the direct evidence of educational effects are:

- Those with more years of schooling tend to have better health, well-being and health behaviours and that this effect is causal to a substantive extent. Substantive causal findings are expressed in quantitative terms in Table 4.4.1 below.
- Table 4.4.1 also describes the level of statistical robustness of causal estimation in relation to each of the outcomes of health, well-being and health behaviours reviewed. The effects are particularly robust and substantive for the outcomes of adult depression, adult mortality, child mortality, child anthropometric measures at birth, self-assessed health, physical health, smoking (prevalence and cessation), hospitalisations and use of social health care.
- A number of studies have expressed causal effects in costed terms or in terms of quantifiable indicators such as life expectancy or Quality of Life Years (QALYs). The findings from these studies are summarised below in the section "Costing the benefits."
- In general, IV results indicate that the effect of education is larger than the estimated effect by OLS. This may be explained by the fact that the instruments utilised are based on policy interventions, such as school reforms to increase participation or changes in compulsory school leaving age laws, that affect the educational choices of individuals at the margin, generally those with lower levels of education (Card, 1999; Angrist, Imbens and Rubin, 1996). It may also be that education is commonly measured with error (Card, 1999).
- Evidence on the different stages of schooling and learning is sparse, most studies focusing on the number of years of schooling as an indicator of education.
- Few studies have examined non-linearities in the impact of education on health outcomes. However, there is evidence for the following non-linearities:
  - In the United Kingdom, effects of education on a reduction in the risk of depression are highest at the level of secondary education.
  - In the Netherlands, educational effects on life satisfaction and on self-rated health seem to be non-linear, reaching a maximum at intermediate levels of education.
  - In the Netherlands, individuals with primary schooling and intermediate secondary education are 2.6 and 2.8 time more likely to initiate excessive alcohol consumption compared to individuals with higher education. There is

no difference between individuals with higher secondary education and higher education in terms of their likelihood to initiate excessive alcohol.

- In the United States, evidence shows an inverse, non-linear relationship between education and obesity, with greater impacts at higher education.
- In Sweden, the relationship between education and self-rated health is positive with decreasing returns.
- In the United Kingdom, effects of education on uptake of cervical screening are at the level of secondary education.

- We have not ascertained a clear picture as to whether there are differential effects of different types of schooling at similar levels of attainment (Fuchs, 2004). For instance, is it the case that university graduates in arts and humanities have lower health benefits than graduates from science and engineering? Are graduates who majored in biology healthier than French literature majors?
- Moreover, the evidence on the impact of different types of schooling or learning or of different curricula or pedagogies is sparse, most studies focus on the number of years as the indicator of education. This raises the question: to what extent does the content of schooling matter for health outcomes? If so, what are the different pedagogies or curricula that have the most important effect on health?
- Most of the evidence is from within-country analysis in which aspects of national level policy, culture and society are held constant. This enables assessment of the impact of an extra year of schooling within these aspects of context but not of the impact of these features of context on the education-health relationship. As the evidence is context specific, policy decisions should be based on empirical research that covers the relevant contexts.

Table 4.4.1. Assessment of the evidence-base for education effects on health and well-being outcomes and behaviours

Outcome	Strength of effects	Evidence
Mortality	Substantial	*Reasonably strong evidence of large effects of years of schooling.* For the case of the United States, for individuals born between 1914 and 1939, an additional year of schooling is estimated to reduce the probability of dying in the next 10 years by 3.6 percentage points (Lleras-Muney, 2005).
Physical health conditions	Substantial	*Overall, robust effects of years of schooling on different domains of physical health.* For white American males aged 47 to 56 in 1991, an additional year of schooling reduces the probability of having a work-limiting condition by 2.6 percentage points, from a mean value of 12.5% (Arkes, 2004). For the cohort of Swedish men born between 1945 and 1955, an additional year of schooling reduces a standardised index of bad health by 18.5% (Spasojevic, 2003). For US born individuals between the ages of 51 and 61 in 1992, an additional year of schooling: (i) increases the probability of finding it easy to climb stairs by 4 percentage points for both males and females from a mean value of 79% for men and 68% for women; (ii) increases the probability of being able to walk a block without difficulties by 1.7 percentage points and 2.3 percentage points for men and women, from mean values of 95% and 93%, respectively; (iii) increases the ability to independently take a bath or shower by 0.8 percentage points for both males and females (from a mean value of 98% for both men and women); (iv) increases the ability to pick up a dime by 0.8 and 0.6 percentage points respectively for males and females, from a mean value of 97%; and (v) improves the ability to stoop, kneel or crouch by 2.6% for men only from a mean value of 83% (Adams, 2002).

Outcome	Strength of effects	Evidence
Functional ability during adulthood	Contradictory	*Robust evidence but mixed results.* Results from Arkes (2004) and Adams (2002) on schooling effects on having a mobility limitation for men are mixed. Arkes does not find evidence of a causal effect, whereas Adams finds evidence of a causal effect on different measurements of functional ability.
Adult depression	Substantial	*Reasonably good evidence of the effects of achieving Level 2 or equivalent qualifications.* Results for the United Kingdom show that attainment of at least O-levels reduces the risk of adult depression by 6 percentage points. In other words, taking women without qualifications to Level 2 would lead to a reduction in their risk of adult depression at age 42 from 26% to 22% (Chevalier and Feinstein, 2006). *Note that UK National Vocational Qualification at Level 2 is roughly equivalent to secondary education.
Life satisfaction and happiness	Small	*There is no robust evidence on the causal effect of education.* Correlational evidence suggests that education may affect life satisfaction through both psycho-social and economic mechanisms as the observed association between education and well-being is significantly reduced when variables are introduced to account for confounding bias (Ross and van Willigen, 1997; Hartog and Oosterbeek, 1998; Helliwell, 2002).
Self-rated health	Substantial	*Robust evidence on the causal effect of years of schooling.* In Denmark, the gradient between education and self-reported health appears more than four times greater when estimated by IV methods. The odds ratio for men and women of excellent health can be up to 8 times higher for those with 18 years of schooling compared to those with only 7 years (Arendt, 2005). In the United States, for individuals born between 1931 and 1941, an additional year of schooling improves good rating of health for men from 81% to 84.4%. It also improves the probability of reporting excellent health from 24% to 27.2%. For women, the effect of an additional year of education on good health is 4.8 percentage points, from 79.5% to 84.3%, on very good health 6.3 percentage points, from 54% to 60.3%, and on excellent health 4.2 percentage points, from 23% to 27.2% (Adams, 2002).
Child health		
Child mortality	Substantial	*Robust evidence of effects of parental years of schooling.* Breierova and Duflo (2004) use the Indonesian government's implementation of a primary school construction project in the years 1973-79 in their instrumental variables estimation. Their results show that an increase in the average number of years of education in the household reduces child mortality by approximately 10 percentage points from a mean level of 22.5%.
Child anthropometric measures at birth	Substantial	*Robust evidence of effects of parental years of schooling.* IV estimates from Taiwan suggest that an additional year of mother's schooling lowers the probabilities of very low birthweight and prematurity by 0.7 percentage points and 1.3 percentage points, respectively (Chou *et al.*, 2003). For the United States, Currie and Moretti (2002) estimate that 12% of the decrease in the probability of low birthweight and 20% of the decrease in the probability of pre-term birth between the 1940-50s and the 1980s can be attributed to increased maternal education.
Health behaviours		
Smoking	Substantial	*Good evidence for effects of education at the level of university or college.* In the United States, for individuals born between 1937 and 1956, one year of college education decreases smoking prevalence by 3.8 percentage points, from a mean value of 52%, and increases smoking cessation by 5 percentage points, from a mean value of 46% (de Walque, 2004). For women at the margin of college enrolment, being able to enrol in college and stay for a minimum of two years decreases the probability of smoking during pregnancy by 5.8 percentage points. This is a large effect given that on average only 7.8% of the women in the sample smoked during pregnancy (Currie and Moretti, 2002).
Alcohol consumption	Uncertain	*The causality of this relationship has yet to be robustly tested.* Evidence suggests a strong association between low levels of education and binge drinking. Results from the Netherlands indicate that individuals with lower levels of qualifications were almost three times more likely to start excessive alcohol consumption than individuals with a university degree (Droomers, Schrijvers, Mackenbach, 2004). However, other studies have found very different effects.
Obesity	Substantial	*Robust evidence of causal effects of years of education.* In Sweden, for the cohort of men born between 1945 and 1955, an additional year of schooling improves the likelihood of having BMI in the healthy range, (*i.e.*, BMI greater than or equal to 18.5 and lower than 25) by 12 percentage points, from 60% to nearly 72% (Spasojevic, 2003). In Denmark, education has a significant, causal, protective impact on BMI for males (Arendt, 2005).
Fruit and vegetable intake	Uncertain	*Positive education gradient, but lack of data availability constraints the estimation of causality.* Educational effects have been found to be gender-specific and depend on the measurement of nutrient intake. A study in the United States looking at the distribution of micronutrient intake finds that education has an effect on reducing saturated fat intake for men only, whereas for fibre intake educational effects were more uniform between men and women (Variyam, Blaylock and Smallwood, 2002). Results from a Finish longitudinal study show that levels of education are not significantly associated with changes in the quality of the diet from childhood into adulthood (Mikkilä *et al.*, 2004).

Outcome	Strength of effects	Evidence
Physical activity	Substantial	*Clear associational evidence, but causality not confirmed.* In the United States, an additional year of schooling increases the amount of exercise per 2 weeks by 34 minutes, weekly strenuous exercise from 2.9 to 3.0 days per week, and walking from 3.2 to 3.4 days per week (Ross, 2000). In the United Kingdom, participation in adult learning increases the chances of taking more exercise by a factor of almost a fifth (Feinstein *et al.*, 2003).
Use of illicit drugs	Uncertain	*Strength and nature of educational effects on illegal drug use remain uncertain.* There is a stronger negative association between education and heroine use in adulthood than between education and marijuana use in adulthood. However, it is difficult to establish the protective role of learning against future drug dependence because of the reverse impact of drug use on school drop out.
Teenage parenthood	Contradictory	*It remains a challenge to identify causality.* Associational evidence from the United Kingdom shows that for both males and females, the odds of becoming a young parent are more than three times higher for children attaining the lowest reading and maths test scores at age 7, 11 and 16 than children with the highest test scores (Hobcraft, 1998).
Service use		
Use or primary health care	Contradictory	*Associational evidence is contradictory and there is a shortage of studies investigating causality.* In Canada, men and women with higher levels of educational attainments were more likely to take advantage of access to GP services (Dunlop, Coyte and McIsaac, 2000). In the United Kingdom, individuals with higher vocational degrees and teaching and nursing degrees, given the level of health and ill-health, are less likely to visit the GP than individuals with qualifications below O-Levels (Windmeijer and Santos Silva, 1997). In the United States, Deb and Trivedi (2002) find that years of schooling is positively associated with the number of contacts with a physician.
Use of specialist care	Substantial	*Clear associational evidence of higher service use by those with more education.* Associational evidence for Switzerland, Demark and Canada shows an increase in specialist use with education. In Switzerland, for example, higher education leads to a sharp increase in specialist utilisation, by 45% (Schellhorn *et al.*, 2000).
Hospitalisations	Substantial	*Robust evidence suggests that years of schooling reduce hospitalisations.* In Denmark, results show that educational attainment beyond primary schooling significantly reduces hospitalisation by 1.9 percentage points for women and by 1.5 percentage points for men (which correspond to relative effects of 39.7% and 32.2%, respectively) (Arendt, 2004). However, once hospitalised, educated women have more hospitalisations in a given year than women with no education, which Arendt interprets as the result of effects on social inclusion.
Use of preventative health care	Substantial	*The use of instrumental variables and longitudinal data may help to estimate the causal effect of education on the demand for preventative health care.* Associational evidence from the United States, the United Kingdom, Canada and Australia suggests that more education is associated with greater utilisation of preventative health care (Katz and Hofer, 1994; Taylor *et al.*, 2001; Selvin and Brett, 2003; Sabates and Feinstein, 2006).
Use of emergency services	Small	*Poor evidence of education effects.* There is correlational evidence that having college education appears to reduce unnecessary use of emergency department utilisation.
Use of social health care	Substantial	*Robust evidence of causal effects of years of schooling.* For white American males aged 47 to 56 in 1991, education reduces the probability of requiring personal care by 0.67 percentage points (Arkes, 2004). This effect is large if we consider that only 3.2% of US white adult males between 47 and 56 years in 1990 required personal care.
Managing chronic health conditions	Substantial	*Clear associational evidence, but causality not confirmed.* Associational evidence suggests that education has very important effects on the management of chronic illnesses.

Costing the benefits

We have presented wide-ranging evidence of the effects of education on health. Here we summarise the evidence that has been developed to assess what these effects mean in terms of monetary savings or other health policy measures.

- In a simple calculation, results from Chevalier and Feinstein (2006) are used to assessing the benefits of education for reduced depression in monetary terms. Simulating the effects of taking women without qualifications to Level 2 in the United Kingdom would lead to a reduction in their risk of adult depression at age 42 from 26% to 22%, that is a reduction of 15%; this population represents 17% of depressed individuals. Assuming that this reduction is constant throughout the working life, and with an estimated cost of depression of GBP 9 billion a year (Thomas and Morris, 2003), the benefit of education would be to reduce the total cost of depression for the population of interest by GBP 200 million a year. These estimates using IV and matching methods are relatively robust to concerns about reverse causality and selection bias.
- Groot and Maassen van den Brink (in press, 2006) analyse the links between education and self-reported health using a large cross-sectional survey for the Netherlands. Education is measured as years of schooling. The equation for self-rated health controls for family background, such as parental education, and for reverse causality by including prevalence of diseases and handicaps. The size of the coefficient for education on self-rated health is -0.018 for men and -0.011 for women. This indicates that as education increases the likelihood of reporting bad health decreases. In terms of Quality of Life Years (QALYs), the effect of education is 0.006 for men and 0.003 for women, implying that a year of education improves the health state of men by 0.6% and for women 0.3%. Calculated at the average value of GDP per capita, the health return on education is about 2.5 to 5.8% for men and between 1.3 to 2.8% for women. These results are robust to reporting heterogeneity, where individuals with higher levels of education answer questions on their health differently than individuals with lower levels of education. They are also robust to time-invariant unobserved heterogeneity.
- Lleras-Muney (2005) shows that there is a large causal effect of education on mortality. While Generalised Least Squares (GLS) (see glossary in Appendix 4.1) estimates suggest that an additional year of education lowers the probability of dying in the next 10 years by approximately 1.3 percentage points, IV estimation shows that the effect is larger: 3.6 percentage points. To better understand the impact of education, Lleras-Muney calculates how this effect translates into life expectancy gains. Her findings indicate that for people in the United States in 1960, one more year of education increased life expectancy at age 35 by as much as 1.7 years.
- Sabates and Feinstein (2004) estimate the effects of adult learning on cervical cancer prevention using the estimated effect on cervical screening. They simulate the impact if 100 000 women were enrolled in adult learning. The marginal effect ranges from 1.9 to 2.3%, so we would expect between 1 900 to 2 200 new screenings. From all adequate smear tests analysed in 2002, 92.4% were negative, 3.9% showed borderline changes, 2.2% showed mild dyskaryosis (dyskaryosis is an abnormality of nuclei seen in cells from the uterine cervix), 0.8% moderate

dyskaryosis, 0.6% severe dyskaryosis and 0.1% glandular neoplasia (cellular changes that may develop into cancer). Using these statistics we estimated that a minimum of 1 756 of the new smears for adult learners will be negative, 76 will show borderline changes, 42 mild dyskaryosis, 15 moderate dyskaryosis, 11 severe dyskaryosis and possibly two glandular neoplasia. Finally, according to the NHS Cancer Screening Programme (2003) cervical screening can prevent 80 to 90% of cancer cases in women who attend regularly. Assuming the lower bound percentage for prevention, 80%, then we expect between 116 to 134 cancers prevented for every 100 000 women in adult learning. In the same way, we expect between 61 to 213 cancers prevented for every 100 000 women who quit smoking.

- Spasojevic (2003) includes a person's current income in the first-stage equation of her IV estimates of educational effects on an index of bad health to account for a contemporaneous income effect on education. Her findings support the hypothesis of a causal effect of education. Assuming that a person's current health is also a function of her current income and also that the majority of people complete their formal education by 25 years of age, Spasojevic estimates how much of the total effect of education on health is a direct effect of education on health and how much is mediated by income. In the 1991 OLS model of bad health, about one-fifth of education's total effect on health is the effect through income. This effect is much smaller (about 4%) in the IV bad-health model with income in the second stage only. Hence, education produces substantially greater effects through channels other than income. Additionally, the relative magnitudes of schooling and income effects on health can be quantified if the change in the stock of health is held constant. In the 1991 model of bad health, the OLS result suggests that a year of schooling is equivalent to an increase in income of nearly USD 1 700 in terms of its health effect. The IV result suggests that a one-year increase in schooling nearly equals a USD 17 700 income increase in terms of health.
- Currie and Moretti (2002) use coefficients derived from their instrumental variable estimation to estimate the impact of schooling on health outcomes. First, the increase in maternal education between the cohort of women who went to college in the 1940s and the 1950s and the cohort of women who went to college in the 1980s is about 1.6 years. The probability of low birthweight and pre-term birth decreased by 6 percentage points and 3 percentage points, respectively, during these periods. Their estimated effect suggests that 12% of the decrease in the probability of low birthweight and 20% of the decrease in the probability of pre-term birth can be attributed to increased maternal education. Moreover, the increase in education induced by college openings is estimated to have reduced the incidence of low birthweight and preterm delivery by closer to 2% and 1%, respectively. While these may seem like small improvements, the costs of low birthweight and prematurity are large. For example, it is estimated that between birth and age 15, low birthweight children incur an additional USD 5.5 to 6 billion more in health, education, and other costs than children of normal birthweight (March of Dimes, 2002) (pp. 34-35).

Evidence on mechanisms for educational effects

- Most features of the conceptual model in Section 4.2 have been shown to be important mediators of the education effect. In Table 4.4.2 we summarise our findings on the importance of each potential mediator.

- We conclude from this review of the mediation effects that there are important channels for effects of education on health in all of the contexts considered, at every level of social aggregation from the household to the macro-level context.

- To some extent these different contexts mediate education effects because of the effects of education on the physical and chemical environments that people come to inhabit and to some extent education effects are channelled through social and economic relations in each of these contexts.

- It is not possible to specify the relative importance of each of these features of each of these contexts with any confidence given the current state of the evidence base.

- There is also substantive evidence to suggest that education has direct impacts on features of the individual that have direct benefits for health as well as supporting individuals in moderating the impacts of the contexts they inhabit.

Table 4.4.2. Assessment of the evidence-base for factors that mediate education effects on health and well-being outcomes and behaviours

		Strength of mechanism for education effects
The self	Self-concepts	Self concepts are associated with learning across the lifespan, though a causal link has not been determined through rigorous testing. There is also some evidence that self-concept and self-esteem provide protection against some adverse health outcomes through fostering resilience. This finding has not been consistent.
	Beliefs about health	There is good evidence that beliefs about health and health care, shaped and influenced by socio-demographic factors including education, determine health behaviours. Randomised controlled trials testing the efficacy of interventions has demonstrated that education has the potential to change health beliefs and behaviours if designed and delivered to appropriately address particular notions about health and illness.
	Patience	Patience may be an important channel for education effects if it is an outcome of education but patience may also precede education. The evidence is unclear and although there are grounds for believing that the channel may be very important we cannot be sure about its strength.
	Resilience	Though important, the connection between education and resilience is not clear from large sample empirical analysis. Associations suggest a link and an impact upon health, but more precise modelling and tests for causation are required.
Family	Income	The income returns to education are well theorised and supported by robust causal empirical evidence. The size of the effect of income on health varies depending on the country's provision of health care. Income is an important channel for education effects but not as large as the simple associations suggest.
Workplace	Environmental health risks	The evidence is not clear cut. Our tentative conclusion is that education appears to have some effect, in that individuals with a high school diploma select themselves out of the most hazardous jobs. However, once these individuals are in their respective types of jobs, education is not very protective of health.
	Social and economic relations	Social and economic relations in the workplace appear to mediate some of the effect of education on health such that this appears to be a strong channel for educational effects on health.

		Strength of mechanism for education effects
Neighbourhoods and communities	Environmental health risks	There is evidence that education, mainly through its effect on income, mediates the relationship between physical and environmental risk factors and health, such that higher SES individuals appear to select themselves into safer and cleaner areas. There is also some evidence that education has an independent effect on health such that higher SES individuals respond to information about health hazards by modifying their behaviour accordingly, more readily than do low SES individuals. Overall, the findings suggest that this is a relatively weak channel for educational effects on health.
	Crime, unemployment and deprivation	Although the theoretical grounds for an effect of income and education (parents' and own) on neighbourhood choice are strong, we find no evidence that empirically establishes a causal role. Hence, we cannot specify the extent to which that education *causes* residential sorting. In terms of the relationship between neighbourhood attributes and health we find that although neighbourhood effects remain after controlling for individual and household characteristics, the magnitude of these effects is small. This suggests that this is at most a weak channel for educational effects on health.
	Bridging and bonding community capital	There is a great deal of associational evidence that various forms of social support are correlated with a variety of health outcomes. There is evidence of a causal relationship between education and civic participation. Robust evidence from a randomised clinical trial also points to the causal effect of social support on improvements in depression and social functioning.
Macro-level	Inequality	Many studies point to a very strong association between educational/income inequality and health. The most persistent association is income inequality and infant mortality. However, to our knowledge, there is little or no *causal* evidence linking inequality per se to health.
	Social cohesion	There is associational evidence of a relationship between education and social cohesion and social cohesion and health. This relationship does not appear to be purely causal. Social cohesion appears to moderate the relationship between social and economic relations and health at the community level. Individual level factors have a greater impact on health than does social cohesion. Nonetheless, in particular settings and where there is a large community element to the desired outcome, this pathway may be very important in achieving positive health outcomes.

To summarise:

1. All of the potential individual mechanisms may be important:

- Self-development.
- Access to all contexts.
- Healthier role in each context.

2. Mechanisms at all levels of context may be important.
3. The mechanisms probably interact.
4. Thus, education impacts on health because:

- Individuals exist in multiple, multi-layered and interacting contexts.
- Each of these contexts is a domain of social relations and environmental health.
- Education impacts on each factor in each context at each level.

Interpretation of the finding of health effects

The evidence we have presented suggests that the impact of education on health is substantive and universal. To the extent that this impact is causal, absolute and the result of the quantity of schooling, one may conclude that an expansion of supply and uptake would bring considerable public benefits. However, this issue of causality is complex because policy decisions need information not just on causality but also on process and contexts and the impacts are not just absolute in nature but also relative. These issues are now discussed in more detail.

Causality of impact

This review of the evidence has concluded that there is generally good evidence of causality for direct effects of years of schooling on a range of health outcomes. However, less is known about the mediation mechanisms. Evidence on the psycho-social mechanisms is important but weak on the identification of causality. Thus, although we have firm theoretical and qualitative foundations for the view that education impacts on health through a range of mechanisms at different levels of social organisation, we cannot draw firm conclusions about the relative importance of each of these mechanisms.

The issue of process is very important in guiding policy as without knowing the mechanism for the impact of a policy it is difficult to be confident about its effectiveness in different circumstances. This is particularly apparent and relevant in terms of the discussion of the difference between absolute and relative effects of education.

Context is also important. There are important similarities and differences between OECD nations in terms of educational provision and the nature of their health systems. These features are partly the result of policy provision (supply) but also the result of social and cultural differences in the take-up of services and public expectations, requirements and needs. There are also important differences and similarities in terms of the distribution of access to resources of health, education and to wealth generally. All of these differences and similarities may have important impacts on the effectiveness of education provision, on public health and on the relationship between the two.

Absolute versus relative effects

It is very important to recognise the positional aspect to the benefits of education. We highlight this for two reasons in particular. First, in policy terms, to the extent that education effects on health are causal and absolute, caused for example by benefits of good learning for neurological development or cognitive functioning, one may assume that expanding participation would result in improvements to population health. However, *to the extent that benefits are due to relative gains one cannot generalise from an estimated causal effect of education to what would happen under a system of wider participation in education*. If benefits are positional and relative, changes in the distribution of participation are likely to have unintended consequences that may or may not lead to improvements in overall public health but rather may change the distribution of health amongst the population.

Secondly, in terms of effect sizes, it is important to recognise the positional impacts of education because to the extent that access to education is slanted toward those in search of positional advantage, education is allocated with a selection bias such that it would always be false to assume that an association of education and health implies an effect of education.

Focusing on the policy aspect, there are elements of the conceptual framework that imply absolute impacts, others that result from positional or relative status shifts. Others are a combination of the two. For example, the impact of education on patience or time preference creates an absolute personal health benefit that is not influenced by the rate of time preference of others. Individuals will be helped not to smoke if they understand the health risk and care about future outcomes. This does not depend directly on whether or not their rate of time preference is higher or lower than that of others. There may be important peer group effects on smoking and on time preference so this argument does not imply that there are no interactions with others in the determination of smoking

propensities. Rather, the argument is that there may be absolute effects of education on health via the mechanism of time preference.

Self-concepts provide an example of a mechanism that is a complex combination of absolute and relative effect. Self-concepts are to a substantive extent formed by an individual's perceptions of her/his relative achievement, status and/or ability. How these judgements and perceptions are managed in learning environments is very important in the development of personal efficacy and continued learning engagement, all good for health. Therefore, the impact of learning on self-concepts depends on an interaction between actual performance and relative position, moderated by the nature of educational experiences. Good classroom management and teaching can achieve an absolute effect to the extent that the damage to self-esteem of negative relativities can be lessened. However, one key source of the effect is the differences between learners in their observed capabilities. It would be a mistake to erode these signals completely as they are important in the process by which learners and education systems choose specialisms and manage their pathways through learning.

Human capital is also a mechanism that can channel both absolute and relative effects. The educational achievement of an individual can produce an income or occupational benefit for that individual, which may enhance the capability of that individual to sustain good health or respond to poor health. However, at the social level, if the nature of the education effect is that education is a sorting mechanism by which individuals are allocated to income levels or occupations, then education has no actual social impact on health and changes in the distribution of education would alter the sorting mechanism but not impact on the overall distribution of health. However, human capital gains are not a zero sum story at the macro level if there are substantial productivity or growth externalities to education, as suggested for example, by endogenous growth theory. To the extent that social level increases in educational achievement lead to productivity spillovers, learning by doing, or skill-biased technological change that reduces the levels of environmental pollution or occupational ill-health, then one would predict absolute health benefits through the mechanism of human capital.

Moreover, the positional benefits do not necessarily suggest a zero-sum outcome at the national level as in a globalised economy the movement of labour and capital create competitive markets in labour at supra-national levels and this may also be true in terms of features of personal and professional status that may be important for health. Thus, even to the extent that health benefits are positional if the relativities are experienced supra-nationally there will still be benefits for nations that expand educational participation and investment.

To the extent that the mechanisms are due to positional gains, then we point out that the level of educational disparity or inequality between those with the highest and lowest educational achievement exacerbates the impact of the relative effects where they exist and may produce negative consequences for average health as well as worse health for those at the worse end of the distribution. There may be overall health gains, therefore, to a reduction of educational disparities.

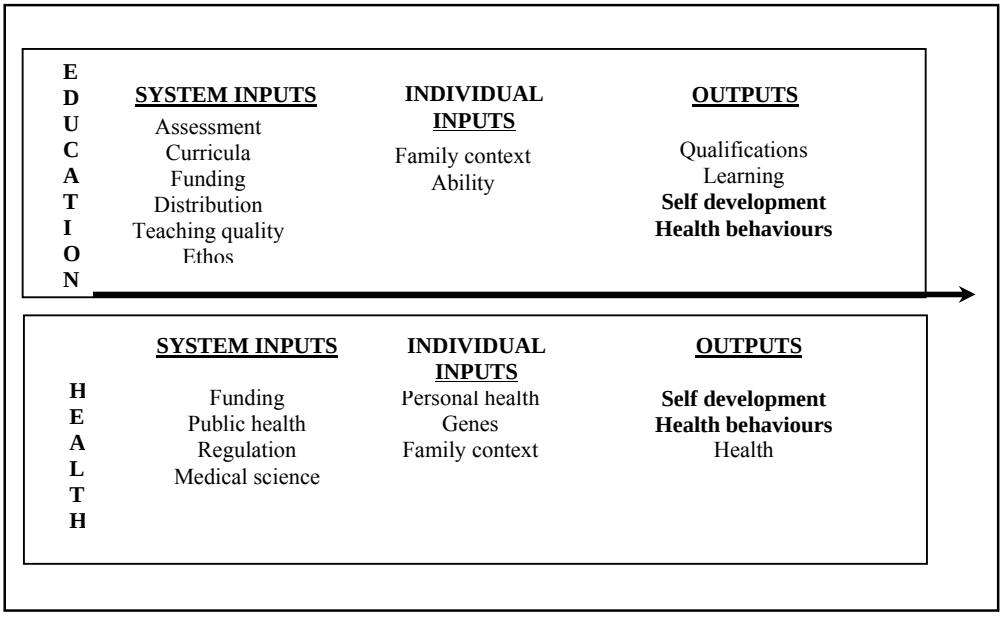
Our review indicates that the effects of education on health include both absolute and relative elements such that *increased educational participation would bring social benefits through the absolute mechanisms for effects of education on health. In addition, reductions in educational inequality may have the capability to change the nature of the effects of positionality in ways that may improve overall population health. However, this depends to a great extent on the nature of that participation and not just on the quantity.*

4.5. Indicator development

This review is intended to inform the selection and development of appropriate international indicators. It is not the purpose of this review to recommend specific indicators but we do hope to provide useful background evidence for the development of such indicators. Ultimately the key test for any indicator is that it be of interest to policy makers. Any discussion of relevant indicators should also involve practitioners, particularly here medical and health professionals. Here, our intention is merely to contribute to what we hope will be a continued debate on the issue as we conclude from the review of theory and evidence that indicators in this domain could contribute much of interest to policy makers.

Our central finding is that the health effects of education are substantial, adding social benefits to the private wage benefits gained by individuals. Thus, education provides inputs to health systems. These complementarities, crossovers and synergies tend to be insufficiently recognised in policy, leading to inefficiency in policy provision, relatively ineffective expenditures on treatment rather than prevention, lost opportunities in the education sector and unproductive use of public funds. This is highlighted in Figure 4.5.1 which shows inputs and outputs of the health and education policy systems. We have not described all of the important inputs and outputs of these two domains of policy. Rather, the intention is to provide a general overview of how the two systems inter-relate, focusing on two key outputs, namely self development and health behaviours.

Figure 4.5.1. Inputs and outputs of the education and health systems



As we have shown in this review, self-development and health behaviours are in part outputs of the education system to the extent that educational investments impact on these outcomes. Moreover, these outputs are vital inputs to health as well as being outputs of well-designed programmes of public health. Yet there are few major funding and policy streams in most countries that recognise these important synergies, tensions and complementarities. This may lead to major inefficiency in the use of public resources. We conclude from this that *indicators could usefully be developed to provide information for policy makers about the extent to which education and health systems compare internationally in the harnessing of educational productivity in the service of health outcomes.*

For example, comparison of the prevalence of smoking by individuals with similar levels of education across countries would enable policy makers to assess the extent to which cross-national differences in smoking were related to education or universal to that society. This would help policy makers in both domains to understand causal mechanisms and in the development of appropriate policy responses. Data on smoking, a core psycho-social factor such as self-esteem and education would be sufficient to support important cross-national comparisons of this kind.

It would be still more informative, if this data could also be linked to information on educational quality as well as quantity, in order to address the concern emphasised in this review about the shortage of information to guide policy in relation to the quality effects of education on health.

In the remainder of this section we set out the currently available international data relevant to the study of the effect of education on health, so as to:

- support discussion of analyses that might be carried out in existing data;
- clarify the set of available information to which new indicators might add;
- inform consideration of what new measures might be created in which datasets.

Summary description of relevant international datasets

Another feature of the background to the question of the choice of appropriate indicators is the availability of existing data collection exercises that provide a context for continued measurement. Therefore in Appendix 4.2 we describe in summary form the existing international datasets that can provide vehicles for continued indicator development and/or can provide measures at national level that can be linked to new indicators.

These datasets provide a wide-ranging set of resources for understanding cross-national patterns in a great range of features of education and personal and social development. Many already include measures that might be investigated in order to clarify cross-national patterns in the relationship of education and health. Such a study would provide a mechanism for piloting the development of indicators in this area, testing the usefulness of inferences and the interest in them of policy makers. Analyses of ALLS, PIRLS and ISSP datasets would be particularly useful in this regard, as would analysis of the PIAAC data when they are completed.

Table 4.5.1 sets out some of the key dimensions of difference on which we already have cross-sectional data for most OECD countries, drawing in great measure from the datasets set out above. There are important similarities and differences between OECD

countries on all of these features of education and health. These should form part of the background to decisions about the relative merits of different new forms of data collection and indicator development.

Table 4.5.1. Important available cross-national measures of health and education, OECD

Education policy	Health policy
Expenditure	**Health expenditure and financing**
Educational institutions expenditure, public and private, % of GDP	Total expenditure as % of GDP
Annual expenditure on educational institutions per student, primary to tertiary, USD	Public expenditure as % of total expenditure on health
Ratio of annual expentiture per student on primary education to expenditure per student on secondary education	Health expenditure per capita USD
Ratio of annual expenditure per student on primary education to expenditure per student on tertiary education	Pharmeceutical expenditure as % of total expenditure on health
Annual expenditure on educational institutions per student, primary to tertiary, relative to GDP per capita	Public health expenditure as % of total expenditure on health
Participation	% of total health budget on mental health
Typical graduation ages in upper secondary education, general programmes	% of population covered by private health insurance
Education attainment of adult population, upper secondary or higher, 25- to 64-year-olds, %	**Health services**
Educational attainment of adult population, post-secondary non-tertiary, 25- to 64-year-olds, %	Acute care beds per 1 000 population
Tertiary graduation rates, % of tertiary graduates to the population at the typical age of graduation for type-A, all programmes	Practicing physicians per 1 000 population
Performance	**Health status**
Mean score and variation in student performance on the PISA mathematics scale	Life expectancy at birth, total years
Mean score and variation in student performance on the PISA problem solving scale	Fertility rate, children per woman aged 15-19
Mean score and variation in student performance in reading literacy, PISA data	Infant mortality rate, per 1 000 live births
Prevalence of students with low sense of belonging, PISA data, %	% of population smoking daily
Prevalence of students with low participation, PISA data, %	Alcohol consumption, litres per population aged 15+
Impact of education	% total population obese, BMI>30kg/m2
Employment rates and educational attainment, % 25- to 64-year-olds in employment, by level of education attained	**Causes of mortality**
	Cerebrovascular disease (deaths per 100 000 population)
	Diseases of respiratory system (deaths per 100 000 population)
	Diabetes mellitus (deaths per 100 000 population)
Source: *Education at a Glance: OECD Indicators 2004*, OECD, Paris, 2004 *www.oecd.org/edu/eag2004*	*Sources*: OECD (2005), *OECD in Figures*; OECD (2004), *Private Health Insurance in OECD countries*, Paris; *OECD Health Data 2005*; WHO *http://www.who.int/*

We conclude that there already exist data that could form the basis of very informative cross-national studies of the relationship of education and health.

Causality

Most of the datasets reviewed are cross-sectional and few enable multivariate, longitudinal assessment of causality. However, that is not a barrier to the usefulness of indicators developed from them. Indicators are distinct from research tools in part in that they do not need to provide a vehicle for establishing causality. Rather it is to be preferred

that causality has been demonstrated before indicators come to be developed. However, if new data are to be generated then it is efficient to also consider its usefulness in relation to the research questions.

Within and between country studies

The necessarily small sample size of any cross-national study seriously limits the capability of such studies to address issues of causality. The study of the effects of education on economic growth has been heavily influenced by this difficulty. For this reason much of the research set out in the review of evidence, above, has been drawn from individual level, within-country micro data. Yet such micro-level studies hold national contexts constant and thus are silent on the importance of national level factors such as differences in the extent of educational participation by stage or in educational or economic inequality.

It is also important that data be longitudinal as this significantly enhances the capability of studies to address issues of causality. Studies considering change over time can more effectively compare like with like as they support comparison of outcomes for individuals before and after contextual shifts rather than, as with cross-sectional data, comparing different individuals at a single point in time where those individuals may differ in many unobserved ways causing estimation bias. At a national level, longitudinal data enable assessment of the impact of historical and policy shifts.

This suggests that the most informative studies will be based on a panel of individuals in different countries, each followed over time. This allows variation over time both within-country and between countries, thus supporting investigation of the effects of individual level and national level changes and differences.

Natural experiments

However, even with cross-national panel data it is important to clearly specify cross-national differences in order to address issues of causality. The notion of natural experiments is very relevant here. A natural experiment in this context refers to the situation in which two countries differ on a dimension of interest such as education policy or social inequality but not in terms of other important determinants of health. This enables assessment of the effects of the provision difference. However, in order to identify two such countries (or groups of countries) it is first necessary to have:

- a clear conceptual model of the key determinants of health in order to clarify which features must be held constant;
- a good understanding of the causal process of interest;
- the necessary data including the relevant measures.

The precise components of these requirements will depend on the causal process of interest. We hope, however, in this review to have sketched out the conceptual frame within which such natural experiments can be identified.

Natural experiments can also be useful for deepening understanding of the relevant causal processes. This was the case for the study of income effects discussed above, in which it can be seen that the effect of income in countries with universal provision is not surprisingly less than in countries with private insurance-based systems. Comparison of effect sizes in these different national contexts provides evidence on the precise extent to

which the system of health provision mediates effects of income on health and to which other causal mechanisms are at play.

Conclusions

There already exists a wide range of cross-national measures of features of the education and health systems of OECD countries and of the broader aspects of national income, and social and educational inequality that also provide channels for effects of education on health. Therefore, it would be feasible to undertake in existing data cross-national studies of the relationships between education and health that would offer useful information to policy makers and help address unanswered questions as to the causal importance of national level features of education and society that may impact on population health.

There are also on-going data collection mechanisms that could provide the opportunity for longitudinal, panel studies that would enable assessment of the relative importance of between country and within-country factors in the explanation of the education effect on health. This would substantially add to the evidence base as most studies have been undertaken within national contexts that must take the national level factors as fixed.

Multi-level studies have the great advantage over between-country studies that it is possible to test the extent to which the effects of education are at the level of the individual or at higher levels of social aggregation such as the household, community, region or nation.

Therefore, the addition of a few appropriate measures to on-going cross-national panel data such as PISA or PIAAC would both add to the existing evidence base substantially and enable the development of clear indicators of national performance in relation to the health effects of education. *We recommend that the focus of new indicators be the relationship between educational investments and health outcomes as a source of information on the productivity and efficiency of education investments in terms of spill-over benefits for health.*

4.6. Policy discussion

We draw the following conclusions from this review of the evidence:

- Education has substantial effects on health that provide personal and social benefits, not captured in the calculation of the personal wage benefit of education. These benefits accrue to individuals, families, communities and nations.
- Education is important in the formation of health not just because it has effects on the individual but also because it impacts on the access of the individual to relatively healthy contexts in terms of physical/chemical environments and social and economic relations.
- The importance of education for health is not just a matter of the access of the individual to educational provision but also of the social level of access. As the social level of access changes so will the individual levels of benefit.
- There may be very important externalities from the education of some to the health of others.

The effect of education on health is substantial and substantive. It feeds into inequalities in health as well as to average levels of population health. Wide-ranging, different aspects of health, well-being and health behaviour are impacted on by education and there are also effects on the next generation. Education is not just a marker of genetic capabilities or personal agency and well-being but has independent causal effects that have been replicated across many studies in many different contexts. *The conclusion that education has benefits beyond those of personal labour market advantage and economic productivity is well-supported by theory and evidence.*

If education has private and social benefits of the kind indicated above then there is a basis for the view that expenditure on education is too low. This would follow if the public and private funders of education were making choices about funding and participation on the basis of a calculation of its wage, employment and economic benefits without considering the value in terms of improved health. Failure to recognise this additional benefit may lead to under-investment in education and to unnecessary personal and social costs in terms of ill-health and reduced well-being. It may also be that some individuals and governments do implicitly recognise the range and scale of potential benefits from education and so do factor these wider considerations into their funding and participation decisions. We hope that this review can provide useful information so as to enable more informed assessment of the health benefits that may accrue from learning and education.

The conceptual analysis in this report suggests that not all of the health benefits of education occur at the individual level. Some of the effects of education may be experienced in terms of improvements to social support, to the tensions in social and economic relations in the workplace and other contexts and in overall improvements to environmental factors such as through reductions in polluting technologies in line with

skill-biased technological change. Many of these potential types of benefit are externalities in the sense that the benefit is accrued by social groups or society as a whole and so are ignored in the calculation by individuals of the benefit to them of education. Externalities of this kind are the basis for public investment in the perspective of classical economics.

However, the total magnitude of the benefit does not give a clear guide to the recommended relative contributions to education expenditure of households, firms and governments as this depends on the location of the externalities and benefits and on political, institutional and legal questions beyond the frame of this report. Nonetheless, although we do not provide a precise indication of the relative health benefits of education for households, firms and society as a whole, the conceptual model and related evidence does suggest that all three are contexts for education effects and that there are external benefits for all three that have been insufficiently recognised.

Yet, there are many important questions that our review has not been able to address:

- To what extent are these social benefits?
- To what extent are these positional benefits?
- What are the non-linearities?
- What are the effects of cross-country differences?
- What is the effect of educational quality?
- What are the effects of learning of different curriculum types and at different stages and ages?

These questions remain unanswered on the whole because the topic has been insufficiently conceptualised and investigated. Detailed policy conclusion would be greatly assisted by the answer to these questions. We have attempted to clarify the current level of knowledge bearing in mind and attempting to integrate the many challenging and competing explanations and hypotheses. We have found in our review of evidence that there are many important mechanisms for education effects on health and that the overall effect is large enough to justify greater general levels of investment in education. The evidence is not yet sufficiently informed as to be compelling in terms of the relative trade-off between different forms of investment in education for health at different stages of the lifecourse or at different levels of education. However, the evidence does already suggest that there are likely to be health benefits to greater investment in the quality and quantity of education at all ages.

However, it is worthwhile emphasising that *recognition of the substantive health benefits of education does not merely lead to the conclusion that there is under-investment in education.* Perhaps *more significant and controversial is the conclusion that educational systems and programmes should recognise more explicitly their responsibility in relation to personal development and well-being, as the foundation of benefits for health.* Governments have a well-founded focus on the function of education as a driver of human capital development, but education has wider potential also. This might raise concerns over conflict in already crowded curricula but the more fundamental challenge is to develop education systems in which objectives of empowerment and self development can run alongside objectives in relation to academic or technical success as the standard outputs of the education system. This is not always a win-win choice, as sometimes objectives of educational standards and personal development do act in

opposition but there are many cases in which the two do complement each other, particularly in situations of learner-centred, high quality learning.

Quantity and quality

Throughout this review we have emphasised that education effects are not just effects of quantity. We have reported a considerable body of rigorous evidence that points to effects of quantity but this may in fact only be a small proportion of the overall capability of the education system to impact positively on health. The study of the psychosocial channels for education effects suggests that education can impact positively on psychosocial characteristics which are protective of good health but that this is not a question of the total number of years of participation but more a question of the content of what is learnt, the pedagogical style and who one learns with.

Our review of this evidence suggests that there are a number of key features of learning experiences. The provision of contexts in which learners – particularly those in vulnerable or at risk groups – can form relationships with educators and/or mentors who are reliable and responsible and give the learner the security they need to develop trust, autonomy and initiative, can enhance health. Health-enhancing educational experiences foster resilience through the development of social competence, problem-solving skills, critical competence, autonomy and a sense of purpose. The achievement of these outcomes depends particularly on the direct practices over which teachers have most control, for example, classroom management, climate and teacher-student interactions. Resilience is enhanced if education is provided within a setting which is challenging but co-operative, inclusive but heterogenous, and which encourages active participation. It is critical for education impacts on psychosocial development that the content of learning is meaningful to the learner, and that the level of challenge and support suits the learner. These are features of the learning experience that depend directly on classroom processes and ethos but these processes also depend on the provision of well-supported structures for learning in which appropriate curricula, tracking or streaming mechanisms, funding and teacher training enable these positive and personalised teacher-student interactions to develop.

Such types of educational experience can in the long-run be both beneficial for health and support success in exams.

4.7. The presentation of the evidence

In the following sections we present the detailed findings from our review of the evidence. In Section 4.8 we summarise the evidence we have identified in relation to direct effects on health outcomes and in Section 4.9 in relation to effects of education on health behaviours. In Sections 4.10 and 4.11, we consider the evidence on the mediating mechanisms of features of the contexts (Section 4.10) and of the self (Section 4.11).

As highlighted above this review is primarily concerned with two questions:

- What is the magnitude of the causal effect of education?
- What are the mechanisms for this effect?

Therefore, in order to structure our review of the evidence, we classify research according to whether it:

- is primarily *associational*;
- can identify *causality*;
- explores *mediation, moderation* or more complex issues of *process*.

We also include a summary of findings in relation to each outcome considered.

In this review we highlight in particular the evidence from IV studies that offer the most reliable estimates of precise effect sizes. These studies are included below under the heading of "Studies estimating causal effects". Studies using longitudinal data with rich control sets are included under the heading of "Associational evidence", although we emphasise that this evidence is still informative in relation to causality and subject to the inclusion of a wide range of prior measures. They can offer substantially more rigorous and robust evaluation of causality than do cross-sectional data. Of course, the best basis for policy decisions is replication. The results of any single study may be strongly influenced by the context and time of that study and by the quality of measures and methods used.

Search criteria for evidence

The following methodology was used to identify relevant articles for this review. First, the papers referenced in the OECD's SOL background document were browsed for leads to evidence on seminal work that had been conducted in the field. Some of these papers were subsequently reviewed or referenced in the evidence section of this review. Another useful source of papers was the Grossman (2005) review. We also conducted searches on Google.com and Google Scholar using a variety of search terms and criteria. This yielded a number of important papers, as well as the names of well-known researchers who have done empirical work estimating the relationship between socioeconomic characteristics and health. Once the well-known researchers were identified, we procured a list of relevant papers, usually from their websites.

For more recent papers, that is, papers in the last approximately five years, we used a variety of keyword searches on the websites of various online, scientific publishers. The most heavily used were Ingenta, Elsevier Science Direct and JSTOR. We also conducted keyword searches on the websites of journal publishers. Blackwell Synergy, Taylor and Francis, Oxford Journals and Sage were the publishers most frequently consulted. Key journals were also identified and the abstracts of virtually all articles from these journals published in the last two to three years were browsed. Relevant articles were then downloaded and printed from the website, or a hard copy obtained from a University of London library. A list of all the journals which we searched for relevant papers is included in Appendix 4.3.

Finally, we also contacted the main representative for OECD/CERI for the participating countries who funded this project and requested a list of the main universities in their country or names or researchers in their countries working in the area of health and education. Countries included were Austria, Belgium, Canada, Luxembourg, Netherlands, New Zealand, Norway, Sweden, Switzerland, and Korea. In December 2005, emails were sent to all universities and/or researchers in universities that were identified by the CERI representative. We received responses from Korea, Sweden, Austria, and Netherlands and have used these responses in our review.

4.8. Direct effects on health

In this section we review educational effects on five health outcomes: (i) mortality, (ii) physical health, (iii) mental health and well-being, (iv) self-rated health, and (v) intergenerational transmission of education on health, *i.e.* the effects of parental education on child mortality.

Mortality: does education make lives longer?

The empirical literature has shown that years of schooling had a strong association with mortality rates and that this association remains after controlling for income or other socioeconomic variables. We start by describing the associational evidence focusing on the strength of the association. We then discuss more sophisticated approaches that have attempted to identify the specifically causal effect of education.

Associational evidence

Rosen and Taubman (1982) estimate mortality regressions for white males aged 25 through 65 in 1973 and for white males 65 and over in the United States and find that years of schooling remain significant after the inclusion of income, marital status and health as control variables. Deaton and Paxson (2001a), using data from the US 1976-1996 Current Population Survey and the National Longitudinal Mortality Study (NLMS), show that years of schooling is negatively correlated with mortality for persons under the age of 60 and for persons over 60. For the later group of individuals, years of schooling is negatively associated with the probability of dying within the next year. Income is not protective when entered along with education in a multivariate regression.

Education has also been shown to be more important than income inequality in predicting mortality rates. Muller (2002), using cross-sectional data on all US states and multiple regression (see glossary in Appendix 4.1) analysis, found that the income inequality effect disappears when the indicator for schooling is incorporated into the regression models. A higher percentage of the population without a high school diploma is associated with an increase of 2.1 deaths per 1 000 population.

Although some evidence has challenged the importance of schooling as a determinant of mortality in the sense that the schooling coefficient was not statistically significant (Duleep, 1986; Behrman *et al.*, 1991 and Menchik, 1993) recent studies continue to suggest that education is indeed a strong determinant. Studies using panel data (see glossary in Appendix 4.1) estimation techniques show that changes in education are associated with changes in mortality rates. Bopp and Minder (2003) explore the relationship between education and mortality in German-speaking Switzerland over the years 1990-97. Their results, based on multiple logistic regression (see glossary in Appendix 4.1), show that there are sizeable mortality gradients by education for all age groups and for both sexes. For example, the mortality odds ratio decreased by 7.2% per

additional year of education for men, and by 6% for women. Gardener and Oswald (2004), using a restricted sample of adults aged 40 and above in 1991 from the British Household Panel Survey, show that mortality rates are lower for more educated men and women. A male educated to degree level is predicted to have a 5% lower mortality risk than men with no formal qualification. For women, in contrast, education is associated with an approximately 3 percentage point lower probability of mortality.

From a cross-country perspective, Or, Wang and Jamison (2005) estimate different indicators of mortality for OECD countries conditioning on national income, average level of education, the efficiency of health professionals, and availability of medical technologies. Selected mortality indicators are life expectancy at birth and at 65, infant mortality, and premature mortality by heart disease. Using multilevel methods, results suggest that in countries with higher levels of education, there is an associated average increase of 0.082 and 0.072 percentage points in life expectancy at birth, and 0.40 and 0.28 percentage points in life expectancy at 65, for women and men, respectively. This evidence does not address concerns about causality.

Evidence on causality

Lleras-Muney (2005) tests the causality of education effects on mortality in the United States using instrumental variables estimation techniques. Data from US censuses are utilised to construct cohorts of individuals born in the United States that were 14 years old between 1914 and 1939 and to estimate their mortality rates. Cohorts are matched to compulsory attendance laws that were in place in the individuals' state of birth when they were 14 years old. The variability between states in compulsory education laws is used to instrument for educational effects. Using OLS (see glossary in Appendix 4.1) estimation techniques, an additional year of schooling lowers the probability of dying in the next 10 years by 1.3 percentage points. Using the IV method, the effect of education increases. An additional year of schooling is then estimated to reduce the probability of dying in the next 10 years by 3.6 percentage points. This implies that educational effects of mortality could be larger than those estimated using OLS regression.

Glied and Lleras-Muney (2003) test that hypothesis that educational effects on mortality are larger in periods when greater advances in technological health care take place. To empirically test this hypothesis, the authors link education gradients in mortality to a measure of medical innovation (the number of active drug ingredients recently approved by the FDA to treat a disease). They use two datasets – the Mortality Detail Files and the Surveillance, Epidemiology and End Result – for empirical analysis. Educational effects on mortality rates are instrumented using compulsory attendance laws that were in place in the individuals' state of birth when they were 14 years old. The sample is restricted to white cohorts born between 1901 and 1925. Results show that the interaction term between education – measured as years of compulsory schooling – and number of drug ingredients approved has a negative impact on mortality. Sensitivity analyses show that the effect of education is not driven by geographical variation or by personal income. This means that individuals with higher levels of education appear to benefit from the development of new health care technologies more rapidly than those with lower levels of education.

Summary

Overall, we find reasonably strong evidence of large effects of education on mortality, where education is measured in terms of years of schooling. This conclusion is based on micro evidence from the United Kingdom, Switzerland, and the United States. For the case of the United States, for individuals born between 1914 and 1939, an additional year of schooling is estimated to reduce the probability of dying in the next 10 years by 3.6 percentage points. There is also evidence that the causal effect of education on mortality is larger in periods when new health care technologies have developed rapidly. The interaction between years of post-compulsory schooling and number of new drugs approved by the FDA has a negative impact on the educational gradient in mortality in the United States. This indicates that one of the possible mechanisms for education effects is the adoption of new health technologies. The IV evidence suggests that the true causal, partial equilibrium effects of educational participation at the individual level could be larger than estimated by simple OLS regression analysis.

More work is required to identify robust educational effects using available cohort or panel data from other OECD countries. From a cross-country perspective more work is required to clarify the relative strength of the different national factors that impact on mortality, specifically the distribution of resources, growth, poverty, and education.

Physical health conditions

In this section we summarise the evidence on the relationships between education and two indicators of physical health: physical functioning and general physical health. Physical functioning has been defined as the degree of functionality or lack of physical limitations to undertake daily activities. The empirical evidence for educational effects on physical functioning has been mainly drawn from samples of older individuals. General physical health is usually measured as an index of different health symptoms and it is usually combined with self-reported health. The health symptoms measure pertains to the presence of various illnesses and ailments (conditions) in a given period of time, usually the previous year. Health symptoms could range from minor illnesses (such as a cough or cold) to chronic illnesses (such as back pain or fatigue) to major health conditions (such as heart attack, high blood pressure, diabetes or cancer).

Associational evidence

In the United States, House *et al.* (1994) using data from the US survey, "Americans' Changing Lives: 1986 & 1986-1989", find that education is a significant predictor of functional status. Furthermore, declines in health functioning over 2.5 years are two or three times greater at the lowest levels of education than at the highest levels of education, even after controlling for demographic and lifestyle variables. They also find independent effects of education on the way health varies with age. For example, those with the lowest levels of educational qualifications manifest levels of chronic conditions at ages 35-44 which are not seen for those with the highest qualifications until two decades later in life.

A study by Leigh and Dhir (1997) of heads of households 65 years and older, uses data from the 1986 wave of the Panel Study of Income Dynamics (PSID). They find a strong, negative, statistically significant relationship between years of schooling and physical functioning for women, and between schooling, physical functioning and

exercise for men. Wagstaff (1993), using data from the Danish Health Study and maximum likelihood (see glossary in Appendix 4.1) to estimate structural equations, finds positive effects of years of schooling on functional limitations for individuals under 41 years of age, an estimated coefficient of -0.072.

On the other hand, Ross and Mirowsky (1999), using data from the 1995 US Aging, Status and the Sense of Control Survey, do not find effects of schooling – measured as years of education – on physical functioning when socio-demographic variables, work and economic conditions, social psychological resources and different measurements of lifestyle are introduced in the analysis. However, in this multivariate methodology they may have conditioned on the mediating factors in the regression, making the specific education parameter a spurious indicator of the full education effect. They do find, however, a significant benefit associated with possession of a university degree and that this effect is mediated by healthy lifestyles. This study suggests the possibility of nonlinear effects of education on physical functioning, with important effects toward higher educational levels.

Smith and Kington (1997) find that having some college or having completed college (but not higher degrees) is associated with fewer physical limitations at older age. This result is found using data from the first wave of AHEAD, a dataset that includes over 6 000 households with at least one member over 70 in 1994. Controlling for reverse causality by introducing previous health covariates in the estimation, the relationship between a college degree and physical functioning at older age is estimated to be five times larger than the one for having some college education. They also find that spousal education is also significantly associated with an individuals' own physical limitation, possibly indicating positive sorting in marriage.

Sickles and Taubman (1986), using five binennial panels of males in the US Retirement History Survey (RHS), estimate that education has an impact on the decision to retire, and subsequently on the health of the individual. For example, a college educated male would, at age 64, be almost 12% less likely to retire than a high school graduate. In turn, an increase in completed education from 12 years to 16 years would increase the probability of being in better health by about 0.056, relative to those of the same age with less than a high school education.

Mediating and moderating relationships

Mirowsky and Ross (1998) explore the relationship between education, personal control or self-efficacy, lifestyle and health. They use data from the 1995 US Aging, Status and the Sense of Control Survey, which is a cross-sectional survey of approximately 2 500 adults aged 18-95 living in the United States. Using structural equation modelling with controls for economic resources, social support and parents' education, Mirowksy and Ross find that previous level of education correlates with personal control or self-efficacy. In particular, in this double-mediation model, education is associated with improved health measured by physical functioning and self-reported health and this association is explained by the enhanced sense of personal control that correlates with both level of education attained and with having a healthy lifestyle. Overall, the authors find that having a healthy lifestyle (exercise, weight, drinking and smoking) mediates approximately 83% of the correlation between education and health. This correlation can be decomposed into two parts, with education accounting for 43% of the development in a person's sense of control, and a sense of control in turn accounting for approximately 37% of the development of a healthy lifestyle.

Evidence on causality

Berger and Leigh (1989) investigate the causal effect of education on middle-aged individuals' physical functioning (aged 20 to 40). They use instrumental variables techniques and data from the National Health and Nutrition Examination Survey (NHANES I) and the National Longitudinal Survey of Young Men (NLS), covering the period 1971 to 1976. The schooling variable is operationalised as the years of schooling completed. This is instrumented by IQ, Knowledge of Work test scores, and parents' schooling. Their results show that the schooling coefficient estimated by IV methods is statistically significant, but smaller than the corresponding OLS estimate. Berger and Leigh show that those with more education, that is, individuals with more years of completed schooling, are observed to have lower blood pressures, and when estimating this relationship using instrumental variables the schooling coefficient increases by 21%. However, we questioned the reliability of these instruments as they may violate the assumption that the instruments do not cause the health outcome.

For white males Americans aged 47 to 56 in 1991, Arkes (2004) finds significant effects of schooling on reducing the likelihood of having a work limitation but insignificant effects on mobility limitations. Arkes uses intra-state differences in unemployment rates during individuals' teenage years as an instrument for educational effects. He finds that an additional year of schooling reduces the probability of having a work-limiting condition by 2.6 percentage points, relative to the baseline that 12.5% of the sample has such a condition. The additional year of schooling does not have a causal effect on having a mobility limitation. These are LATE (local average treatment effects) (see glossary in Appendix 4.1), and represent the causal effect of schooling on health outcomes for those students whose schooling level depends on the state unemployment rate during their teenage years. These students are probably those at the margins of dropping out or staying in high school. Thus, it appears that for these marginal students, there is a causal effect of high school education on reducing the likelihood of having a work limiting condition.

For male and female Americans aged 51 to 61 in 1992, Adams (2002) finds significant effects of education on most measures of functional ability. He uses compulsory education laws in effect from 1915 to 1939 in the United States to instrument for educational effects. Functional ability is a self-rated measurement of how easy individuals find climbing up stairs, stooping, kneeling or crouching, walking a block, bathing or showering and picking up a coin. He finds positive and significant effects of additional years of schooling on all measurements of functional ability for men and for women except for the ability to stoop, kneel or crouch. He also finds that IV estimates of educational effects on health are greater in magnitude than the corresponding OLS estimates.

Results from Arkes and Adams on schooling effects on having a mobility limitation for men are mixed. Arkes does not find evidence of a causal effect, whereas Adams finds evidence of a causal effect on different measurements of functional ability. It is important to highlight that these studies are different in their use of samples, outcome variables, models and instruments. Unless further tests regarding the comparability of these studies are made, it will be difficult to infer why educational effects are significant in one setting but not in the other.

For Sweden, Spasojevic (2003) uses the 1950 comprehensive school reform to estimate the effects of education on an index of bad health, which combines around 50 health symptoms and self-reported health. The Swedish school reform extended the

required years of schooling from seven or eight to nine years of basic education. The cohort of men born between 1945 and 1955 is the most affected by this reform, so the analysis is performed only for men. Results show that schooling significantly improves health when education is treated as exogenous. The marginal effect of education on a standardised bad-health index equals 0.022 and is significant at 5% level – negative schooling effects represents better health. With instrumental variables, an additional year of schooling reduces the standardised index of bad health by -0.185 after controlling for a set of family background characteristics and is significant at 10%. The effect of education by IV methods is larger than the one obtained by OLS, highlighting the fact that educational effects may be larger than previously estimated.

Summary

The relationship between education and physical functioning has been investigated for different cohorts of individuals and for men and women separately. This is because health, on average, decreases with age and there are systematic differences in life expectancy by gender. Associational evidence shows educational effects in some domains of physical functioning exclusively for men. There is consistent associational evidence between years of schooling and improving physical health and some indication that education effects may be greater at higher levels of education, *e.g.* university or college, than at lower levels of schooling. Lifestyles are an important mediator of educational effects, as the estimated parameter of schooling is significantly reduced when these factors are taken into consideration.

Instrumental variable estimation finds robust effects of years of schooling on different domains of physical health. For white Americans males aged 47 to 56 in 1991, an additional year of schooling received reduces the probability of having a work-limiting condition by 2.6 percentage points, from a mean value of 12.5%. For the cohort of Swedish men born between 1945 and 1955, an additional year of schooling reduces a standardiszed index of bad health by 18.5%.

Further results from studies using IV methods show that for US born individuals between the ages of 51 and 61 in 1992, an additional year of schooling: (i) increases the probability of finding it easy to climb stairs by 4 percentage points for both males and females from a mean value of 79% for men and 68% for women; (ii) increases the probability being able to walk a block without difficulty by 1.7 percentage points and 2.3 percentage points for men and women, from mean values of 95% and 93%, respectively; (iii) increases the ability to independently take a bath or shower by 0.8 percentage points for both males and females (from a mean value of 98% for both men and women); (iv) increases the ability to pick up a coin by 0.8 and 0.6 percentage points respectively for men and females, from a mean value of 97%; and (v) improves the ability to stoop, kneel or crouch by 2.6% for men only from a mean value of 83%. However, for males born in the United States between 1934 and 1943 the instrumental variable estimation on the effects of education on having a mobility limitation was statistically insignificant.

Mental health and well-being

Here we focus on the links between education and mental health and well-being. Educational effects are different in these domains. As indicated by Bynner, Woods and Butler (2002), women with higher levels of education are less likely to be depressed but

also more likely to have lower job satisfaction. In this sense, these women are not achieving what they would like in the labour market, but their education still has important protective elements against the risk of depression.

We focus on depression as an indicator of mental health conditions. There are several reasons why we focus exclusively on depression. First, other mental health conditions such as schizophrenia, mental retardation, autism and, ADHD, have low prevalence among the population. Depression is a common form of psychological distress experienced by everyone at some time to some degree and it correlates with other forms of distress such as anxiety and anger (Miroswki and Ross, 2002). Secondly, developments on measures for detecting mental health disorders have traditionally not been as advanced as those for physical health. Further, cultural stigmas associated with mental health disorders prevent individuals from seeking treatment (WHO, 2003). Finally, causes of depression are both biological and societal. Education has the ability to impact upon environmental factors that lead to depression.

In terms of well-being we will focus on two main areas: life satisfaction and happiness.

Depression

It is well established that at all level of education, female depression rates are higher than those of males. Statistics from Parsons and Bynner (1998), using data from the 1996 sweep of the NCDS, show that 36% of women and 18% of men who had very low literacy skills suffered from depression, compared to 7% of women and 6% of men with good literacy skills. The relationships were smaller but still very substantial in relation to numeracy. Eighteen percent of women and 11% of men with very poor numeracy skills suffered from depression, compared to just 5% of men and women with good numeracy skills.

This correlation, however, may be the consequences of upbringing, individual attributes and attitudes, and socioeconomic background. Mirowsky and Ross (2002) investigate the role of education as a protective factor against depression in the context of entry age of parenthood, controlling for a large set of background characteristics. Using the US 1995 Survey of Aging, Status and the Sense of Control, results show years of schooling to be associated with a decrease of 6% in the logarithm of the symptoms of depression. When other socioeconomic variables and physical health are introduced as controls in the analysis, the estimated coefficient is reduced to 2.3%. Feinstein (2002), using data from the UK national cohorts and matching methods, show that controlling for childhood abilities, health and family background factors, women from the 1958 cohort with qualifications at UK National Vocational Qualification at Level 1 – which is roughly equivalent to lower secondary education – have 6 percentage points lower likelihood of depression than women with no qualifications. For women in the 1970 cohort the estimated effect is 10 percentage points. For men these effects are weaker. In general, results show that differences between those with qualifications above Level 1 are substantially eroded when selection bias is dealt with using matching methods.

Chevalier and Feinstein (2006) rely on a rich longitudinal dataset to control for childhood determinants and measures of mental health over the individuals life span to account for possible endogeneity (see glossary in Appendix 4.1) of education. They use matching methods to account for selectivity and instrumental variables to estimate the causal effect of education. Their instruments include teacher's expectations concerning the schooling of the person when he/she was a child and the number of cigarettes smoked

at age 16 (as a proxy for time preference). In their estimations, the impact of the highest qualification is strengthened and independent of work- or family-related controls. They consistently find that achieving qualifications significantly reduces the risks of adult depression. The effect is non-linear and is larger at low to mid-levels of educational qualifications. Estimates using two-stage least squares (see glossary in Appendix 4.1) are much larger but in most cases, it was not possible to reject the exogeneity of education. Using propensity score matching (see glossary in Appendix 4.1), they estimate that individuals with at least O-levels reduce their risk of adult depression by 6 percentage points. This effect is similar for men and women.

The effect of education on depression may be ambiguous since there may be contrasting mechanisms. For example, a higher occupational grade is associated with more control over working lives, more varied and challenging work and thus has a positive effect on mental health and reduces rates of morbidity (Marmot *et al.*, 1991). However, higher occupational attainment also leads to higher levels of stress (Rose, 2001). There may be important trade-offs between stress and satisfaction that may lead to a complex and non-linear relationship between educational success and mental health (Hartog and Oosterbeek, 1998). Miech and Shanahan (2000) look at the relationship between education and depression over the lifecourse. Using data from the 1990 Work, Family and Well-Being Study in the United States, they find that the association between education and depression strengthens with age, and that individuals with higher education are more successful at lowering the likelihood of depression because they have better physical health.

Well-being

Empirical studies using cross-country data have shown that wealthier countries have a low positive correlation between education and happiness. Some studies have found that this correlation may even be negative, indicating dissatisfaction among individuals with higher levels of education may be due to the lack of jobs at higher levels or the stress related to jobs at higher positions. In contrast, the poorer the nation, the higher the correlation tends to be between education and happiness (Veenhoven, 1995). Additionally, over time the proportions of people who are very happy in Western countries have not changed at all although the real income in each group, and especially at the top end of the distribution, has risen considerably (Layard, 2003).

Helliwell (2002) estimates a multivariate regression using individual level data from the World Values Survey for 46 countries. Results show that when well-being – defined as overall life satisfaction – is regressed on education, there is a strong, statistically significant, positive association. However, when other individual and national variables were included in the model, the association disappears. This suggests that educational effects may be mediated by other factors. Ross and van Willigen (1997) obtain similar results for the United States. They find that the relationship between education and well-being is mediated by psycho-social resources. In contrast, using data from Switzerland in 1992-1994 and OLS, Frey and Stutzer (2002) estimate that achieving middle and high levels of formal education increases life satisfaction by 2.19 and 2.09 percentage points.

One drawback from the above studies is their inability to control for early life circumstances which may be associated with educational attainment and later life outcomes. These factors are important to account for confounding bias. Hartog and Oosterbeek (1998) use data from a cohort of adults born in 1940 in Holland in the province of Noord-Brabant to investigate the relationship between education and

happiness, controlling for wealth and health and early life circumstances. Their results indicate that the relationship between education and happiness reaches a maximum for intermediate level of qualifications. The parabolic relationship between education and happiness remains, but it is significant only for intermediate qualifications and for a higher vocational qualification when prior health and wealth are included as controls.

The impact of schools on well-being

Research has also focused on the role of schools, teachers and classes on childrens' well-being. Opdenakker and Van Damme (2000) use a sample of 4 889 students enrolled in 276 classes in 52 schools of the "Longitudinaal Onderzoek Secundair Onderwijs" (longitudinal research in secondary education project) in Flanders, Belgium. They find that school effects on achievement were stronger than for effects on well-being. However, school characteristics relating to instruction and understanding information were related to well-being. In a similar study in Finland using 87 341 children aged 14-16 enrolled in 458 schools, Konu, Lintonen and Rimpela (2002) find that factors related to the school context explained 17% of general subjective well-being for boys and 20% for girls. Of the school context indicators, "means for self-fulfilment" emerged as the most important. When combined with background characteristics, the model explained 22% of the boys' and 25% of the girls' general subjective well-being. Indicators of school context showed that the strongest significant relationship to general subjective well-being for both boys and girls was means for fulfilment and social relationships in and out of school.

Summary

There may be some important benefits of education in lowering the risk of depression, although there are many potential mechanisms such as work satisfaction, income and/or resilience. Research has shown that substantial bias can be introduced into statistical analysis if appropriate account of early life circumstances and other health factors is not taken into account when estimating the effects of education on depression. An important finding of these studies is that the relationship between qualification level and depression changes depending on the level of qualifications. In the United Kingdom, for example, results suggest that the main effects of education on the reduction of the risk of depression are at the level of secondary education (O-levels in the United Kingdom).

Recent research has gone some way to testing the causal effect of education using IV and matching methods. Results for the United Kingdom show that attainment of at least O-levels reduces the risk of adult depression by 6 percentage points. This effect is similar for men and women. More work is needed to replicate the methodological approach in other contexts and cohorts.

Overall, evidence in this area suggests that education may affect life satisfaction through both psycho-social and economic mechanisms. The observed association between education and well-being is significantly reduced when variables are introduced to account for confounding bias. Educational effects on life satisfaction seem to be non-linear, reaching a maximum at intermediate levels of education. However, this conclusion is drawn from analyses that do not deal with the endogeneity of education. We conclude that the relationship between education and life satisfaction has not been robustly estimated but that the relationship appears to be mainly mediated through psycho-social and economic resources and to be non-linear.

Self-rated health

Self-rated health (SRH) is a subjective indicator of health that individuals assess relative to a representative person of the individual's own age. The question typically asked is: "*Please think back over the last 12 months about how your health has been. Compared to people of your own age, would you say that your health has on the whole been…excellent/good/fair/poor/very poor?*". Therefore, this concept refers to the individual's perception of health relative to the individual's concept of the norm of their age group.

SRH is also related to a number of other health measures. For example, Borg and Kristensen (2000) note that the vast majority of studies analysing the association between SRH and subsequent mortality find SRH to be a powerful predictor, even after conditioning on medical diagnoses and functional capacity. Burström and Fredlund (2001) find this predictive power to be stable across socioeconomic groups. Categorical measures of SRH have been shown to be good predictors of subsequent use of medical care (see for example, van Doorslaer *et al.* 2000, van Doorslaer, Jones and Koolman, 2002).

Associational evidence

Evidence in this area for different countries has consistently found that education has a strong relationship with self-rated health. In the United States, Grossman (1975), Desai (1987), Ross and Mirowsky (1999), and Gilleskie and Harrison (1998) show that years of schooling is a statistically significant predictor of perceived health, although the level of significance is somewhat reduced when controls for lifestyles and past socioeconomic characteristics are included. For the United Kingdom, Contoyannis and Jones (2004), using Maximum Simulated Likelihood (MSL) for a multivariate probit (see glossary in Appendix 4.1), find that the education to self-rated health gradient remains significant even after the inclusion of controls for lifestyles in the estimation and controlling for unobserved heterogeneity (see glossary in Appendix 4.1). In the Netherlands, Hartog and Oosterbeek (1998) show that higher levels of schooling are significant determinants of self-reported health status compared to lower vocational qualifications, using the terms for schooling qualifications reported in this study. These coefficients are only marginally reduced when controlling for ability (measured by IQ). In fact, the positive effect of ability on self-reported health becomes statistically insignificant when controls for education and family background are included in the analysis. In other words the association of level of qualification achieved and self-reported health is not due to a confounding relationship of IQ and health.

In Sweden, Gerdtham and Johannesson (2001) estimate that the probability of being in good health is 0.89 for those with a university education, 0.86 for those with a high school education and 0.77 for those with less than a high school education. In the Netherlands two studies estimate the effect of education. Groot and Maassen van den Brink (in press, 2006) estimate the size of the coefficient for years of education on self-rated health to be -0.026 for men and -0.022 for women. Hurd and Kapteyn (2003) estimate that high school education is associated with an increase of 0.97 to 1.02 in the odds of maintaining excellent or very good health. More than a high school education is associated with an increase of 0.89 to 2.16 in the odds of maintaining excellent or very good health.

Mediating and moderating relationships

Analysis has also focused on the role of lifestyle in mediating the relationship between education and self-rated health. Using data from the 1995 US Aging, Status and the Sense of Control Survey, Ross and Mirowsky (1999) find that the association between education and perceived health is partially mediated by healthy lifestyles. Contoyannis and Jones (2004) confirm this result using data from the Health and Lifestyle Survey in Great Britain. They also find – accounting for individual unobserved heterogeneity in lifestyles – that the estimated effect of a lack of qualifications on self-reported health is – 0.06 percentage points, half the estimated effect when lifestyles were not included in the analysis. Thrane (2006) extended the analysis to account for the moderating effect of lifestyles on the education-health gradient. Using data from the 1998-99 cardiovascular screening survey in two Norwegian counties, the authors conclude that for Rogaland the education-health inequality may be partially explained by health inputs. However, for Nordland health inputs had a more noticeable effect on health among people with higher levels of education than among people with lower levels of education, supporting the hypothesis of a moderating effect of education in enhancing productive efficiency.

Other important mediators of the educational gradient in self-rated health have been explored by Marmot *et al.* (1998). They use data from the 1995 National Survey of Mid-Life Development in the United States (MIDUS), a representative sample of non-institutionalised persons aged between 25 and 74 living in the United States. Using multiple logistic regression (see glossary in Appendix 4.1) techniques, they find that for males, the four variables that make the largest contribution to explaining the education gradient in self-rated health are smoking, psychosocial work characteristics, perceived inequalities, and low control. These variables are also important for females.

Evidence on causality

The causal effect of education on self-reported health has been investigated by Arendt (2005) and Adams (2002). In Arendt's research, education is instrumented using the Danish school reforms that took place in 1958 and 1975. The reform in 1958 provided universal schooling to all children up to age 14 regardless of attainment. The 1975 school reform increased the minimum school leaving age to 16 years. Using data from the Danish National Work Environment Cohort Study (WECS), OLS results show that the odds ratios of having excellent health are 1.50 and 2.10 for men and 1.55 and 2.25 for women with thirteen and eighteen years of education comparing to those with only seven years of education, respectively. He further finds that when heterogeneity and endogeniety are dealt with as discussed above, the gradient between education and self-reported health becomes more than four times greater.

This last result is confirmed by Adams (2002). Using a sample of individuals born in the United States between 1931 and 1941, the author finds that for males, education is associated with an increase of 3.4, 4.1 and 2.1 percentage points in the probability of having good, very good or excellent health, respectively. For women, the association of education is 3.0, 3.8 and 2.3 percentage points higher probability, respectively. He uses compulsory education laws in effect from 1915 to 1939 in the United States to instrument for educational effects. Using IV estimation techniques, results show larger estimates of the effects of education. For men, the significant effect of education on having good health is 4.4 percentage points and for having excellent health 3.2 percentage points. For women, the effect of education on good health is 4.8, on very good health 6.3, and on excellent health 4.2 percentage points.

Summary

The causal effect of education on self-rated health appears to be substantial. Most evidence shows a clear educational gradient with respect to self-reported health, in which individuals with higher levels of education also report having better health. In Denmark, the gradient between education and self-reported health appears to be more than four times greater when estimated by IV methods. The odds ratio for men and women of excellent health can be up to 8 times higher for those with 18 years of schooling compared to those with only 7 years. In the United States, for individuals born between 1931 and 1941, education improves good rating of health for men from 81% to 84.4%. It also improves the probability of reporting excellent health from 24% to 27.2%. For women, the effect of education on good health is 4.8 percentage points (from 79.5% to 84.3%), on very good health 6.3 percentage points (from 54% to 60.3%), and on excellent health 4.2 percentage points (from 23% to 27.2%).

Recent studies have investigated the mediation and moderation effects of education on self-rated health. These studies investigate how education can mediate or moderate the effects of health inputs or lifestyles, such as smoking, exercise and diet, on health outcomes. Grossman (2005), however, cautions careful interpretation as the measures for these aspects may be endogenous and this could introduce complex biases into the analysis.

Intergenerational effects: children's health

This area of research is vast and complex and we do not intend to fully cover all the aspects of child health on which education may have an impact. We also leave aside the nature versus nurture debate, as it is difficult to measure a child's genetic endowment and because genetic endowment may also affect education. This topic remains a challenge for future research. Here we focus on the evidence looking at the effects of parental education on child mortality, anthropometric (see glossary in Appendix 4.1) measures, uptake of preventative health care for children, general child health, adolescence, and adult health.

Effects on child mortality

Evidence across countries and within countries shows a clear socioeconomic gradient for child mortality, *i.e.* lower child mortality rates for individuals in higher socioeconomic groups (WHO, 1999). Edwards and Grossman (1982) find that more than 80% of the differences in the child mortality between high-income and low-income US families can be accounted for by differences in socioeconomic status, in particular education. The coefficients for parents' schooling with respect to child mortality are larger than for income and remain statistically significant with the inclusion of controls for mothers' health and other socioeconomic background variables. Further analysis by Corman and Grossman (1985) has shown that the increase in white female schooling makes the largest contribution to the decline in white neonatal mortality between 1964 and 1977, about 0.5 deaths per thousand live births. Schooling is the second most important factor contributing to the decline in black neonatal mortality rate, about 0.7 deaths per thousand live births (the most important factor was abortion availability, 1 death per thousand live births).

Breierova and Duflo (2004) investigate the causal element of effects of education on mortality using IV. They use the Indonesian government's implementation of a primary school construction project in the years 1973-79 in their instrumental variables estimation. Specifically, they use the interaction between an individual's cohort and the number of schools built in his/her region of birth to evaluate the impact of the programme. Their results show that average number of years of education in the household has the effect of reducing child mortality by approximately 10 percentage points. Additionally, there is no significant difference in effect for husband's and wife's education. In other words, mother's and father's schooling have about the same negative effects on infant mortality. Although their findings are relatively robust to endogeneity bias, the authors recognise that their results could be driven in part by bias due to assortative matching (see glossary in Appendix 4.1).

Effects on child growth

There is a considerable body of evidence that parents' education impacts on child anthropometric measures. For example, Grossman and Joyce (1990) obtain a direct estimate of schooling on birthweight for blacks in New York City in 1984. Using a maximum likelihood probit estimation on a three-equation model, they find that black women who completed at least one year of college gave birth to infants who weigh 69 grams more than the infants of women who completed between 8 and 11 years of schooling. However, the role of education cannot be clearly determined from these results, as the impact of postsecondary education on the decision to give birth falls and the incremental benefit of a high school diploma becomes statistically insignificant when selectivity bias is corrected for.

In the United States, Meara (2001) finds that a rise in maternal education from 11-12 years is associated with a 1.37 percentage point decrease in the probability of low birth weight for white mothers, 1.1 percentage points for black mothers. A move from less than a high school degree to some college is associated with a 2.7 and 2.2 percentage point decrease in the probability of low birth weight for white and black mothers, respectively. When controls for mothers' health and health habits are added, the implied effects of maternal education fall by half for white mothers and three-quarters for black mothers. Anderson, Butcher and Levine (2003), using the NLSY, estimate years of schooling to be associated with a reduction of -0.004 percentage points in the probability of the child being overweight.

For less developed nations, Thomas, Strauss and Henriques (1991) estimate the effects of education on child height in Brazil in 1986, Wolfe and Behrman (1983) in Nicaragua, Glewwe (1999) in Morocco in 1991 and Alderman, Hentschel and Sabates (2003) in Peru in 1997. In general, these papers highlight the importance of mother's education as opposed to father's education in the provision of child nutrition. The papers also find that regional differences in educational effects may be large. For example in Brazil, a child's height (controlling for age and sex) increases by about 0.50 percentage points on average with each additional year of mother's education. In the urban sector, the effect of mother's education is almost half as large, 0.28 percentage points.

Another important intergenerational aspect of education is the effect on the uptake of preventative health care for children. Berger, Hill and Waldfogel (2005) use data from the NLSY with the inclusion of a large set of demographic controls and state fixed effects (see glossary in Appendix 4.1) controls, finding that having high school or some college is associated with a significant increase in the probability of having a "well baby" visit by

0.07 and 0.08 percentage points relative to mothers with less than high school education. For the indicator of the number of months that the child had a 'well baby' visit, education does not have a statistically significant association. Further results show that, compared with mothers with less than high school education, having some college or having completed college is associated with an increase in the likelihood of breastfeeding between 0.11 and 0.18 percentage points, respectively. When using the number of weeks the child was breastfed during the first year of life as an outcome, educational effects are only significant for women who completed a college degree.

In a population based study in Australia, Hull, McIntyre and Sayer (2001) found that a high level of education and occupation was significantly associated with poor vaccination coverage. Using data from the Australian Childhood Immunisation Register and the Australian Bureau of Statistics, results show that areas with higher levels of education and occupation had poorer coverage of Measles, Mumps and Rubella (MMR) in both urban and rural areas, and poorer coverage of diphtheria, tetanus and pertussis (DTP) in urban areas. A study based in Norwich, United Kingdom, found that delays in MMR vaccination were associated with both the mothers' and the fathers' educational levels (Reading, Surridge and Adamson, 2004). Parents with higher levels of education are less likely to take up MMR vaccination for their children in Brighton (Poltorak *et al.*, 2005). However, in rural West Virginia, in the United States, Gore *et al.* (1999) found that differences in immunisation completion did not differ significantly on the basis of parental education and Berger, Hill and Waldfogel (2005) found no educational effects on the probability that the child would receive all his/her immunisations.

For other measures of child health, Edwards and Grossman (1982) find that the coefficients for parents' schooling with respect to parents' report of their child's health, the allergy status of the child as reported by the parents, and the child's periodontal index are 0.071, 0.045 and -0.131, respectively. Case, Lubotsky and Paxson (2002), using the 1988 US National Health Interview Survey (NHIS), find that children living with high-school-educated mothers and fathers are reported to be in better health than children of parents who did not finish high school. Wilcox-Gok (1983), using sibling and adoption data, find a U-shaped effect of mothers' education on the number of days a child was missing from his/her usual activities due to illnesses or injuries.

Grossman (2005) indicates that in a longitudinal context, mother's schooling dominates father's schooling in the determination of some health outcomes in adolescents, controlling for health during childhood. This is the case for the effect of mother's schooling on school absence due to illness in adolescence, controlling for school absences due to illness in childhood, and for the effect of mother's schooling on obesity in adolescence, with obesity in childhood held constant. Finally, some interesting insights on the effects of education in the lifecourse are shown by Case, Fetig and Paxson (2005). Using the 1958 British National Child Development Survey (NCDS), results show that mother's school leaving age is significantly associated with adult health, and this association becomes more pronounced with age. At age 23, there is little association with mother's school leaving age and the cohort member's health. However, by ages 33 and 42, maternal education becomes strongly, positively associated with better health status, with those cohort members' whose mothers left school at 16 or 17 years of age experiencing the worst self-reported health. With respect to fathers', the important variable seems to be his social class at the time of the cohort member's birth.

Evidence on causality

Currie and Moretti (2002) estimate the effect of maternal education on birth outcomes using data from the US Vital Statistics Natality files for 1970 to 1999. They assess the importance of the following four channels – use of prenatal care, smoking behaviour, marriage, and fertility – in improving birth outcomes. They use the availability of colleges in the womens' county in her 17th year as an instrument for maternal education, which is operationalised as years of schooling. The results of their longitudinal models indicate that an increase in education of one year would reduce the probability of low birthweight by about 0.5 percentage points. The effect on the probability of a preterm birth is smaller, 0.44 percentage points. The result of the changes-on-changes estimates indicate that mothers who increase their education between the first and second births reduce the probability of low birth weight and prematurity as well as increasing their use of early prenatal care and marriage probabilities. After demonstrating that the opening of new colleges is associated with increases in schooling, Currie and Moretti's find that the IV estimates are larger than the OLS estimates. An additional year of schooling reduces the likelihood of low birthweight and pre-term birth by about 1 percentage point. This result reflects the effect of education for women at the margin of college enrolment.

Chou *et al.* (2003) exploit a natural experiment to estimate the causal impact of parental education on children's birthweight in Taiwan. In 1968, the Taiwan government extended compulsory education from six to nine years, which required all school-age children (between 6 and 15) to attend elementary school for six years and junior high school for three years. To accommodate the expected increase in enrolment in junior high schools, the government opened 140 new junior high schools in 1968, a 70% increase. This education reform created the largest expansion in junior high school constructions and student enrolment in Taiwan. Their natural experiment exploits variations across cohorts in exposure to compulsory education reform and across regions in newly established school density. The authors estimate the impact of mother's education on child health by using cohort and newly established school density interactions as instruments for parents' education. Results suggest that mother's schooling has larger effects on child health outcomes than father's schooling. For mothers aged 0 to 11 in 1968, an additional year of mother's schooling reduces the probability of low birthweight, very low birthweight, and prematurity by 1.66 percentage points, 1.13 percentage points, and 1.65 percentage points respectively. The IV estimates are much bigger than the OLS estimates. An additional year of father's schooling reduces the probabilities of low birthweight, very low birthweight and prematurity by 1.28 percentage points, 0.88 percentage points, and 0.91percentage points. When estimating the partial effects of mother's and father's education, results show that the mother's schooling remains significant. In this case, an additional year of mother's schooling lowers the probabilities of very low birthweight and prematurity by 0.7 percentage points and 1.28 percentage points, respectively.

Summary

Based on the evidence reviewed here we conclude that there is robust evidence to support the hypothesis of effects of parental education on child health. This is particularly robust for the case of mortality and anthropometric measurements. For the United States, Grossman, in collaboration with colleagues, has documented evidence that parents' years of schooling has a causal impact on children's health. He finds that the home context in general and mother's schooling in particular play an extremely important role in the

determination of child health. In terms of birthweight, IV estimates from Taiwan suggest that an additional year of mother's schooling lowers the probability of very low birthweight and prematurity by 0.7 percentage points and 1.3 percentage points, respectively. For the United States, Currie and Moretti (2002) estimate that a 12% decrease in the probability of low birthweight and a 20% decrease in the probability of pre-term birth between the 1940-50s and the 1980s can be attributed to increased maternal education.

It is important to highlight Grossman's conclusion that education is not the only factor that plays a role in the intergenerational transmission of advantage. Grossman suggests that the challenge for future research is to separate the causal links associated with genetic and behavioural factors that affect child health (2005, p. 63).

For uptake of preventative health care for children, we did not find consistent supporting evidence of educational effects. Education may be related to the likelihood of breastfeeding, but perhaps not with its intensity. Education has been shown to have positive, negative or null effects on the uptake of immunisations.

4.9. Effects on health behaviours

Risk factor 1: smoking

Associational evidence

There is a well-know correlation between smoking and education, with more educated people being less likely to smoke (Wald *et al.*, 1988). A number of studies have investigated whether this correlation remains significant after controlling for confounding factors. Using data from the US Department of Education's High School and Beyond, Sander (1998) tries to isolate the effect of schooling on smoking by young adults. Using tobit (see glossary in Appendix 4.1) estimation models on the number of cigarettes consumed and controlling for past smoking behaviour as well as income and parental education, results suggest a negative correlation between attending college and smoking. In an earlier study using the US General Household Survey (GSS), Sander (1995a) explores the relationship between education and smoking for five age cohorts (1986-1991), finding a statistically significant relationship between education and smoking for men and women of certain age groups only. For men, a negative relationship between schooling and education was found for ages 25-34 and 45-54. For women, a negative relationship was found for ages 25-44.

In a study of approximately 2 000 white female twins in the state of Virginia in the United States, Kendler *et al.* (1999) try to account separately for the genetic and environmental factors influencing smoking initiation and nicotine dependence. Using structural equation modelling in the longitudinal Virginia Twin Registry dataset, Kendler *et al.* find that controlling for a wide range of demographic, religious, personality and lifetime psychopathological characteristics, people with lower levels of education are more likely to initiate smoking. Amongst those who start to smoke, those with lower levels of education are more likely to become nicotine dependent. Their overall results suggest that while demographic factors such as education are more strongly associated with smoking initiation, personality traits more strongly predict nicotine dependence.

Escardibul (2005) uses data from Spain's National Survey of Health to investigate the relationship between education and the probability of smoking and smoking cessation, controlling for personal characteristics, previous health, and socioeconomic factors. Using logistic regression, the number of years of schooling has a positive and significant effect on the likelihood of smoking for men (about 11%) and women (about 28%). In terms of smoking cessation, schooling increases this probability by 8.4% for men but reduces it by 0.6% for women.

Evidence on causality

The evidence on the causal effect of education on smoking is robust to concerns about the identification of causality. Sander (1995b) uses family background, region and rural residence as variables to instrument for educational effects. Sander finds that schooling has a positive effect on the odds that men and women quit smoking. The magnitude of the effect is large. For example, the odds that men with 16 years of education quit smoking is approximately 0.10 percentage points greater than the odds that men with 12 years of schooling quit. However, the reliability of these instruments is questionable, as these may be correlated with smoking behaviour.

De Walque (2004) focuses on the impact of education on smoking initiation and smoking cessation in the United States. He uses retrospective data from the National Health Interviews Surveys (1940 to 2000) and instruments for schooling effects using the draft avoidance during the Vietnam War for college graduates, in a quasi-experimental, instrumental variables framework. He finds that education affects the decisions to smoke and to stop smoking. Results from OLS suggest that one year of college education decreases smoking prevalence by 4.0 percentage points and increases the probability of smoking cessation by 4.1 percentage points. When controlling for family income, the instrumental variable estimates are very close to the ordinary least square estimates, decreasing smoking prevalence by 3.8 percentage points and increasing the probability of smoking cessation by 5.0 percentage points.

As always with IV, the results must be interpreted as Local Average Treatment Effect (LATE), biased toward those for the group most affected by the policy reform, in this case individuals at the margin of college enrolment.

Currie and Moretti (2002) estimate the effect of maternal education on the probability of smoking during pregnancy using data from the US Vital Statistics Natality files for 1970 to 1999. They use the availability of colleges in the womens' county in their 17^{th} year as an instrument for maternal education, which is operationalised as years of schooling. OLS results show a positive impact of higher education on the incidence of smoking. An additional year of education reduces the probability of smoking during pregnancy by 3 percentage points. The IV estimate of the effect of schooling nearly doubles and remains significant. The reduction in the probability of smoking during pregnancy is 5.8 percentage points. The IV estimate is biased toward the effect of education for women who would not have gone to college had it not been for the fact that a college opened in their county of residence.

Arendt (2005) estimates the effects of education on the probability of never smoking using IV estimation methods. He uses the Danish school reforms of 1958 and 1975 to instrument for educational effects. The 1958 school reform abolished the partition of preschool and middleschool and all children received the same 7 years of schooling. The 1975 reform raised the minimum school leaving age from 7 to 9 years of education. Using simple logit (see glossary in Appendix 4.1) models, results show that an additional year of schooling significantly increases the probability of never smoking for men (0.08) and women (0.06). The inclusion of random effects (see glossary in Appendix 4.1), to control for individual time-invariant heterogeneity, increases the size of the estimated parameter, from 0.08 to 0.72 for men, and from 0.06 to 0.09 for women. Finally, he finds that the estimated parameter from IV is larger than the one obtained by logit estimation (1.43 for men and 0.80 for women), implying that the causal effect of education could be larger than the association found in regression analysis.

Mediating and moderating relationships

Kenkel (1991) explores how the relationship between schooling and consumption of cigarettes is mediated by health knowledge. Using the 1985 US Health Interview Survey and tobit estimation, results suggest that part of the relationship between schooling and the consumption of cigarettes is explained by differences in health knowledge. However, most of schooling's effects on cigarette consumption remains after differences in knowledge are controlled for. The results also indicate a moderating effect of health knowledge on educational effects, in that the more health knowledge a person has the more schooling matters.

Summary

From evidence using IV methods we conclude that education has substantial effects on smoking initiation and cessation. Empirical analyses have shown that the effects of education remain after the introduction of controls for prior health, socioeconomic background, and health knowledge.

Instrumental variables results also indicate robust effects. Results for smoking prevalence and smoking cessation suggest larger effects of an extra year of schooling at higher levels of education, mainly at the level of university graduates. In the United States, for individuals born between 1937 and 1956, one year of college education decreases smoking prevalence by 3.8 percentage points (from a mean value of 52%) and increases smoking cessation by 5 percentage points (from a mean value of 46%). For women at the margin of college enrolment, being able to enrol in college and stay for a minimum of two years decreases the probability of smoking during pregnancy by 5.8 percentage points. This is a large effect if we consider that on average 7.8% of the women in the sample smoked during pregnancy. In Denmark, years of schooling also increase the probability of never smoking. In term of smoke initiation, US results suggest that women with lower levels of education are more likely to initiate smoking.

Risk factor 2: alcohol consumption

Associational evidence

Several studies have found a correlation between the level of binge drinking and the level of education. Using logistic regression analysis, Tien, Schlaepfer and Fisch (1998) find that years of schooling are negatively related with extreme alcohol use (either seven drinks a day for at least 2 weeks or drinking a fifth of liquor or 20 beers in 1 day), controlling for gender and age. For the Netherlands, Droomers *et al.* (1999) find that excessive alcohol consumption (more than six glasses on 3 days or more days a week or more than four glasses on 5 or more days a week) was more common among lower educational groups. In adolescence and young adulthood, poor school achievement and dropping out of school have been shown to be related to higher levels of binge drinking in Finland (Laukkanen *et al.*, 2001).

Droomers, Schrijvers and Mackenbach (2004) describe educational differences in starting excessive alcohol consumption during six and half years of follow-up among an adult, initially alcohol-consuming Dutch population. Data were obtained from the longitudinal study on socioeconomic health differences in the Netherlands (GLOBE

Study). The study provides a unique opportunity to study educational differences in alcohol consumption given that it collected extensive information on educational background, alcohol consumption, psychosocial and material stressors, and lack of social resources. Results show that individuals with lower levels of qualifications were more prone to start excessive alcohol consumption during the follow-up period (almost three times more likely to start excessive alcohol consumption compared to the group that completed higher vocational schooling or university). This result is robust to the inclusion of indicators for stressors (*e.g.* financial difficulties, unemployment, poor self-rated health) and vulnerability (*e.g.* lack of social support). In another Dutch Study using the Risky Lifestyles in Rotterdam Survey, Van Oers *et al.* (1999) find that even though there is a higher prevalence of drinkers at higher educational levels, there was a significantly higher prevalence of excessive drinking by men with the lowest education, although they found no significant results for excessive drinking by women.

Moreover, Droomers, Schrijvers and Mackenbach (2004) found that both educational differences in exposure to stressors (measured by financial problems) and vulnerability (measured by low social support) contributed to the educational differences in starting excessive alcohol consumption and explained 23% of the educational variation in starting excessive alcohol consumption. However, remaining educational differences were still statistically significant.

Kuntsche, Rehm and Gmel (2004) give an overview from a European perspective on factors associated with binge drinking. For the particular case of socioeconomic factors, they conclude that:

> *"socioeconomic conditions clearly affect binge drinking. The mechanisms seemed to vary with age. Ceteris paribus, the more financial resources available for adolescents in high price countries, or the cheaper the alcohol, the higher the binge rates. However, more studies from different countries are needed to draw a clearer conclusion. Economic stress, for example unemployment, and a low level of education led to more binges in adult populations" (p. 117).*

Lundborg (2002) investigates the determinants of youth drinking behaviour in Sweden focusing on the effects of having received education about alcohol, narcotics and tobacco. Using a cross-sectional survey data on 833 individuals aged 12-18 years, educational effects were estimated for participation in drinking, frequency of drinking, intensity of drinking and binge drinking. Separate analyses were conducted for beer, wine and spirits. In general, results show that having received information about alcohol had little effect on drinking behaviour. This is in accordance with other studies that have found school-based drug and alcohol information to be inefficient in reducing drinking behaviours (Gichrist, 1994; Foxcroft, Lister-Sharp and Lowe 1997; White and Pitts 1998). Wechsler *et al.* (1994) suggest that heavy alcohol use is not predominantly a behaviour that is learned in college. Consequently, programmes that address alcohol use among college students need to focus on early detection and intervention rather than primary prevention.

Summary

Even though there is a higher prevalence of moderate alcohol use at higher educational levels, higher prevalence of excessive drinking is associated with low education. The evidence in this area suggests a strong association between low levels of education and binge drinking. Results using a longitudinal study in the Netherlands

indicate that "individuals with lower levels of qualifications were almost three times more likely to start excessive alcohol consumption than individuals with university a degree". This result is robust to the inclusion of several confounding variables such as income, employment, housing and neighbourhood characteristics, financial difficulties, perceived general health, measures of locus of control, coping styles and social networks. However, the causality of this relationship has yet to be robustly tested.

Risk factor 3: obesity

Obesity is measured by the body mass index (BMI), also termed Quetelet's index, and defined as weight in kilogrammes divided by height in meters squared (kg/m^2). According to the World Health Organisation (1997) and National Heart, Lung, and Blood Institute, National Institutes of Health (1998), a BMI value of between 20 and 22 kg/m^2 is "ideal" for adults regardless of gender in the sense that mortality and morbidity risks are minimised in this range. Persons with BMI>30 kg/m^2 are classified as obese.

Associational evidence

In developed countries, the negative relationship between education and adult obesity has been reviewed by Sobal and Stunkard (1989). More recently, Chou, Grossman and Saffer (2004) explore the factors that may be associated with an increase in obese adults in the United States since the late 1970s using data from repeated sweeps of the Behavioural Risk Factor Surveillance System for the years 1984 to 1999. The outcome variables are BMI and a categorical variable indicating whether the person is obese. Education is measured as a categorical variable indicating whether the person had some high school education, completed high school, some college education, and completed college. Further controls in the analysis were state level measurements of per-capita number of fast food restaurants, the price of meals in different types of restaurants, food consumed at home, cigarette and alcohol consumption, and clean air laws. Results indicate that education has a negative impact on BMI and the probability of being obese. There is little evidence, however, that the schooling effect falls as the amount of schooling raises between completion of high school and attending college but not graduating. That is, having high school education reduces the BMI by 0.50 and attending college but not graduating reduces BMI by 0.57, compared to having less than high school. The larger effect is for college graduates, as this is associated with a reduction of –1.50 on the BMI. The estimated model is used to predict how much each of the factors is associated with the rapid increase in obesity in the United States. Education predicts a small decrease in obesity, suggesting a protective role of education against the risk of obesity. From a total BMI change of 2.4 points, education predicts only 0.06 points.

Kan and Tsai (2004) investigate the relationship between obesity, as measured by the BMI, and obesity health risk knowledge at the individual level. By obesity health risk knowledge the authors refer to an individual's awareness of the harmful consequences that obese people may be likely to face. Their empirical evidence is based on data from the Cardiovascular Disease Risk Factors Two-Township Study (CDVFACTS) in Taiwan. Education, measured as years of schooling, is introduced into the analysis as a control. Using quintile regression (see glossary in Appendix 4.1) techniques, results suggest that for males the relationship between obesity health risk knowledge and BMI is positive and statistically significant below the mid-range of the BMI distribution. It becomes almost negligible around the upper percentiles, and significantly negative at the extreme right tail

of the BMI distribution. That is, the negative relationship shows up for individuals who are extremely overweight. The results indicate that, conditional on all other regressors, males around and below the medium of the BMI distribution are less likely to be overweight if they possess more health risk knowledge. For females, the health risk knowledge effect fluctuates around zero. Their results also show that education is significantly associated with the BMI distribution for males, except for the 80th to 95th percentile. For females, education has a significant effect on BMI on the upper percentile of the distribution.

Evidence on causality

Instrumental variables estimation techniques have been utilised to investigate the causality of education. In Sweden, Spasojevic (2003) uses the 1950 Swedish comprehensive school reform to instrument educational effects on BMI. The 1950 Swedish comprehensive school reform was implemented in stages and by municipal areas. Consequently, people born between 1945 and 1955 went through two different school systems, one of which required at least one more year of schooling. Her results only apply for men born between 1945 and 1955. Using data from the Swedish Level of Living Survey, OLS results show that education is associated with an increase in health as measured by BMI in the healthy range. Attending school for one additional year increases one's probability of having BMI in the healthy range. Using instrumental variable estimation techniques results show that an additional year of schooling for men improves the likelihood of having BMI in the healthy range. The educational coefficient increases from 0.014 using OLS to 0.118 with IV, controlling for income, cohort and regional effects, family background and other individual and childhood characteristics. Additionally, the educational coefficient equals 0.145 and is significant at 10% after accounting for income effect on health. This means that for men born betwen 1945 and 1955, the additional year of education had a significant impact on having BMI in the healthy range.

Arendt (2005) estimates the effects of education on BMI using a panel data to deal with heterogeneity and instrumental variables estimation techniques to deal with the endogeneity of education. He uses the Danish school reforms of 1958 and 1975 to instrument for educational effects. Results using OLS estimation suggest that an additional year of education is associated with a decrease of 0.207 and 0.173 in BMI for men and women, respectively. When random effects are introduced to control for time-invariant heterogeneity, the estimated effect of education increases, and the reduction in BMI is 0.232 for men and 0.188 for women. Finally, using instrumental variables, education has a causal, and significant, impact on reducing BMI by 0.355 for men. For women, the estimated reduction is not statistically significant. Men affected by this reform have almost half a year longer education, while women have a third of a year more than those not affected by the reform. This additional half year of education had a causal impact on the reduction of BMI for men.

Summary

Associational evidence shows a negative, non-linear relationship between education and obesity such that more education is associated with less obesity. For example, in the United States, BMI levels are similar for graduates from high school and some college education but substantially lower for those who completed college. In Taiwan, years of

schooling are negatively associated with obesity but not across the whole BMI distribution and with interesting gender differences.

The causality of education on obesity has been tested by two empirical studies using IV methods. In Sweden, for the cohort of men born between 1945 and 1955, an additional year of schooling improves the likelihood of having BMI in the healthy range (*i.e.*, BMI greater than or equal to 18.5 and lower than 25) by 12 percentage points (from 60% to nearly 72%). In Denmark, education has a significant, causal, protective impact on BMI for males. In both studies, the effect of years of schooling on BMI is greater for IV estimates than when estimated by OLS.

Risk factor 4: nutrition – fruit and vegetable intake

Associational evidence

It is generally agreed that food-related behaviours are determined by the interplay of many factors, one of which is education. In the United States, Ippolito and Mathios (1990) explored the determinants of the amount of fibre per 10 ounces of cereal consumed by individuals. Using data from the US Department of Agriculture's Continuing Survey of Food Intakes, they find that individuals' years of schooling completed has a significant and positive effect on fibre intake from cereal. Schafer *et al.* (1999), using a sample of 155 married couples in one US state, find that age and education appeared to be the strongest factors contributing to the intake of fruit and vegetables. In Tromsø, Norway, Jacobsen and Nilsen (2000) investigate the relationship between education and the intake of fat, fibre, beta-carotene and vitamin C. Using data on individuals aged 25 to 69, results show that for women, the intake of fats and cholesterol was negatively related to years of schooling. Both men and women's schooling was associated with increasing fibre intake. Finally, years of schooling were also associated with the intake of fruits and vegetables, which are rich in beta-carotene and vitamin C. For men, the age-adjusted difference between those with less than 10 years of schooling and those with over 16 years of schooling in beta-carotene consumption is 1.3 milligrams per 10 units of energy (each unit of energy equals 0.2388 calories). For women this difference is 1.1 grams per 10 units of energy. The age-specific educational differences in intake of vitamin C for men and women are 14 and 12 milligrams per 10 units of energy in men and women, respectively.

Irala-Estévez *et al.* (2000) provide a systematic review from surveys of food habits across 15 European countries to evaluate the differences in the consumption of fruit and vegetables between groups with different educational levels. Dietary assessments were classified using food frequency questionnaires from 24- and 48-hours dietary recalls. The statistical method used to evaluate these differences was meta-analysis (see glossary in Appendix 4.1). Using nationally representative surveys of adults (18 to 85 years), results were that the difference in the intake of fruit was 24.3 gr/person/day (95% CI 14.0 ± 34.7) between men in the highest level of education and those in the lowest level of education. Similarly, this difference was 33.6 gr/person/day for women (95% CI 22.5 ± 44.8). The differences regarding vegetables were 17.0 gr/person/day (95% CI 8.6 ± 25.5) for men and 13.4 gr/person/day (95% CI 7.1 ± 19.7) for women. It is difficult to contextualise these estimates as the amount of proteins, vitamins, fats, fibre, varies depending on the kind of vegetables and fruits consumed. However, an example can be provided in terms of intake of calories in three different fruits. The average intake of calories in 100 grams

of bananas, apples and pears is 86 calories. The difference between men with higher levels of education and lower levels of education in daily calories intake will be 20 calories of these fruits.

Evidence on causality

In countries with low social inequalities, such as Finland, differences in food habits by educational background may be diminished. Roos *et al.* (1998) examine the determinants of food behaviour using the Finish data from the FINMONICA Risk Factor Survey. Food behaviour was measured by an index including six food items which were chosen based on Finnish dietary guidelines. The food behaviour of men and women with a higher educational level (13 years of more) was more closely in line with the dietary guidelines than that of those with a basic education only (less than 9 years). For men, the odds ratio of behaving in accordance with the dietary guidelines were 31% and 84% higher for secondary schooling and higher education, respectively, compared to basic education. For women, these odds were 30% and 60% for secondary education and higher education compared to basic education, respectively. Mikkilä *et al.* (2004) investigate childhood and adulthood determinants of nutrient intake using a longitudinal study, the Young Finns Study in Finland. Nutrients selected for further examination were those implicated in the risk of cardiovascular disease: saturated, monounsaturated, polyunsaturated and n-3 fatty acids, fibre and salt. An index describing the quality of adult diet was constructed. Multivariate logistic regression was used to identify independent childhood and adult determinants of the quality index. Individuals' level of education, measured as years of schooling, had no significant influence on the quality of adult diet controlling for the quality of childhood diet. This finding can be interpreted as suggesting that levels of education are not associated with changes in the quality of the diet from childhood to adulthood.

Variyam, Blaylock and Smallwood (2002) explore the distribution of macronutrient intake, measured as intake of total fat, saturated fat, cholesterol and fiber, among US adults. Their model estimates the quantity of nutrients consumed as a function of a person's socio-demographic and anthropometric characteristics. To control for unobserved heterogeneity and fixed effects, they include income, household size, region, urbanisation, age, height, weight, race, ethnic origin, survey year and season. Using data from the US Department of Agriculture's 1994-1996 Continuing Survey of Food Intakes by Individuals (CSFII), findings show that an additional year of education reduced men's saturated fat intake by 0.52 grams at the 90th percentile, where intake exceeds the recommended daily allowance (RDA), as opposed to a reduction of 0.18 at the conditional mean. With regard to cholesterol intake, the reduction was larger at the upper quantiles, while for fiber, the effect of education was more uniform. For women, only the results for fiber intake were significant, with the largest effect at the 50th percentile, although the increase at the conditional mean was greater.

Intervention evidence

Several interventions have been put forward to change food habits (see, for example, Dixon *et al.*, 2004, for an intervention in Australia and Devine, Farrell and Hartman, 2005, and McCamey *et al.* (2003), for interventions in the United States). Education, among other socioeconomic factors, is one of the reasons why individual's food habits change (Wahlqvist, 2000). For example, using a survey of adults in 15 members states of

the European Union, Kearney *et al.* (1997) find that overall as education level decreases, the percentage of subjects agreeing with the statement "I do not need to make changes to the food I eat, as it is already healthy" increases. However, when analysing responses within countries results were different. The proportion of individuals agreeing with the statement was independent of education in Greece, Finland, Germany and Portugal. In the other countries the gradient remained.

Summary

There is a strong correlation between education and food-related behaviours. In Finland, for males, the odds ratio of being in accordance with the dietary guidelines were 31% and 84% higher for those with secondary schooling and higher education, respectively, compared to those with basic education. For women, these odds were 30% and 60%. In Norway, the age-adjusted difference between men with less than 10 years of schooling and men with over 16 years of schooling in consumption of beta-carotene is 1.3 milligrams per 10 units of energy (or per 2.388 calories). For women this difference is 1.1 grams per 10 units of energy. The age-specific educational differences in intake of vitamin C for men and women are 14 and 12 milligrams per 10 units of energy, respectively.

More robust quantitative evidence has found that educational effects are gender-specific and depend on the measurement of nutrient intake. A study in the United States looking at the distribution of micronutrient intake finds that education has an effect on reducing saturated fat intake for men only, whereas for fibre intake educational effects were more uniform between men and women. Moreover, results from a Finish longitudinal study show that levels of education are not significantly associated with changes in the quality of the diet from childhood into adulthood.

A key limitation has been the cost of collecting large sample data on food consumption and nutrient intake.

Risk factor 5: physical inactivity

Associational evidence

Regular physical activity has been demonstrated to promote longevity, reduce morbidities, and facilitate well-being. Still, large inequalities remain in terms of the amount of exercise by adults of different educational attainment (Wadsworth, 1997a). Using the 1985 US Health Interview Survey and tobit estimation, Kenkel (1991) shows that an additional year of schooling increases the amount of exercise per two weeks by thirty four minutes, after controlling for health knowledge and other individual characteristics. Ross (2000), using the 1995 US Community, Crime and Health survey and OLS, finds that an additional year of schooling increases weekly exercise by 5% (from a mean level of 2.9 days per week) and increases the number of days walked per day by 6%, from an average of 3.2 days per week (this result is only significant at the 10% level). At the aggregate level, the proportion of individuals with a college degree in the neighbourhood is positively associated with walking, which may indicate that individuals feel secure to walk in the streets in areas with a high proportion of college graduate. In Sweden, Frisk *et al.* (1997) find that the level of education and general

awareness of the importance of a healthy lifestyle positively influenced the likelihood that these women would be physically active on a regular basis.

Evidence has shown that the exercise habits are different for men than for women and that educational effects may be gender-specific. Leigh and Dhir (1997), using the Panel Study of Income Dynamics (PSID), find a strong, positive, statistically significant relationship between years of schooling and exercise for men but not for women. Using an ecological approach, Grzywacz and Marks (2001) explore the independent effects of education on exercise and the moderating effects of education on gender-specific exercise by adults. Using data from the National Survey of Midlife Development in the United States and OLS estimation, results show that the slope between years of schooling and amount of exercise varies depending on age and gender. Exercise is measured by the amount of strenuous physical activity that people engage in, which ranges from several times a week (a value of 6) to never (a value of 1). Education has larger associations with exercise for older individuals. Age decreases the likelihood of engaging in vigorous physical activity by 2.3%, reducing the mean level from 4 to 3.9 for each additional year. However, the interaction between age and education increases vigorous exercise by 0.3% (from 3.94 to 3.96). Similarly, older women are 65% less likely to engage in exercise. Over time, education impacts negatively on the likelihood that older women engage in exercise. For men, however, the opposite holds. Over time, men with higher levels of education tend to exercise more than men with lower levels of education. One possible explanation for this is changes in job characteristics, with low-skilled jobs becoming less physically demanding whereas high-skilled job are providing more flexible working times that allow individuals to exercise.

The effect of adult learning on health is a little researched area. One of the few exceptions is Feinstein *et al.* (2003). This study uses the 1958 British Cohort to investigate the effects of work-related, vocational, academic, leisure oriented and other types of adult learning courses on a variety of health outcomes, which includes an indicator of whether or not people increased their level of exercise between age 33 and 42. Using fixed effects models, results show that participation in adult learning has positive effects on exercise. Results show that 38% of adults with the characteristics of learners would increase their level of exercise between 33 and 42 without taking any courses. The estimated effect of taking three to ten courses is 7% points, increasing this percentage from 38% to 45%. This represents an increase in the chance of exercising by a factor of almost a fifth.

Based on a systematic peer-reviewed literature review, using papers published between 1998 and 2000 with physical activity as an outcome (and including exercise and exercise adherence), Trost *et al.* (2002) conclude that education is among the most important socioeconomic predictors of exercise. Interestingly, twenty-four studies examined psychosocial resources as important mechanisms impacting on exercise. These factors may be outcomes of learning or mechanisms for educational effects on health behaviours. The authors conclude that attitudes, expectation of benefits, cognitive generalisations about the self in the context of exercise or physical activity, knowledge of health and exercise, self-efficacy, and motivations all correlate with physical activity. Self-efficacy in relation to physical activity, defined as a person's confidence in his or her ability to be physically active on a regular basis, emerged as the most consistent correlate of physical activity behaviour.

Summary

Overall, there is clear associational evidence of an educational gradient in the amount of physical exercise performed by individuals. In the United States, an additional year of schooling increases the amount of exercise per two weeks by 34 minutes, weekly strenuous exercise from 2.9 to 3.0 days per week, and walking from 3.2 to 3.4 days per week. In the United Kingdom, participation in adult learning is related to exercising more. Results show that 38% of adults with the characteristics of learners in the sample would increase their level of exercise between ages 33 and 42 without taking any courses. The estimated effect of taking three to ten courses is 7% points, increasing this percentage from 38% to 45%. This represents an increase in the chance of exercising more by a factor of almost a fifth. However, the size of the causal effect of education on exercise remains uncertain due to the lack of research using robust techniques for estimating causality.

The role of education goes beyond raising awareness of the importance of exercise, but also includes moderating the relationship between age, gender and exercise and between characteristics of the context and exercise. A study from the United States shows that 1 year of aging decreases the likelihood of engaging in vigorous physical activity by 2.3%, reducing the mean level from 4.04 to 3.94 as individuals age. However, the interaction between age and education increases vigorous exercise by 0.3% (from 3.94 to 3.96). Over time, education has a negative impact on the likelihood of older women engaging in exercise. For men, however, the opposite holds. These results indicate that interventions to increase physical exercise need to be sensitive to the age, gender and education of the target population.

Risk factor 6: illicit drugs

Associational evidence

The relationship between education and consumption of illegal drugs might be specific to the habit in question. For the case of marijuana use by young adults, Goodman and Huang (2002), using data from the National Longitudinal Study of Adolescent Health in the United States, find a significant relationship between parental education and marijuana use by adolescents. This relationship was only present for non-white teenagers and showed an inverse-U-shape, which indicates that marijuana use first increases with parental education but decreases at higher levels of parental education. However, Aughinbaugh and Gittleman (2004) using the NLSY79 and its young adult supplement do not find parental education effects. Using maternal education, maternal ability and maternal grandparents' education measured as the highest grade completed, and ability by the Armed Forces Qualification Test, results show that none of these educational variables are significantly associated with an indicator variable for ever smoking marijuana or with an indicator for smoking marijuana once or twice per week in adolescence.

Sander (1998) uses the longitudinal survey of high school students and probit models to estimate the likelihood of marijuana use, controlling for education, health knowledge, cognitive ability, income and parental education. Results suggest that although attending college is negatively correlated with using marijuana, there is virtually no effect of attending college on marijuana use when future education (a proxy for time preference) and past use are taken into account. Sander also finds no relationship between cognitive

ability and marijuana use. The results suggest that the observed association between schooling and marijuana use may be the result of a third variable, in this case time preference, affecting both schooling and marijuana use.

For the case of more addictive drugs, Goodman and Huang (2002) find a weak, inverse linear relationship existed only between education and cocaine use among white non-Hispanic teenagers (mean change for education, -0.013; 95% CI, -0.026 to -0.0004). Johnson *et al.* (1995) investigate the predictors of heroin use by age 32 using a sample of African American adults living in a poor community of Chicago. Using simple correlations, results show that heroin use by age 32 was correlated with age 16 inhalant use, marijuana use, alcohol use, cigarette use and low education. Low socioeconomic status or poor neighbourhood during adulthood was not associated with heroin use. After adjustment for other factors, alcohol and cigarette use were no longer significant, but inhalant use, marijuana use and low education were still significant.

Miech and Chilcoat (2005) use the US National Longitudinal Study of 1979 to investigate the influence of maternal education on adolescents' drug use or the reverse causality proposition, from maternal drug use to adolescent achievement. The results indicated that adolescent drug use became more concentrated in families with low maternal education during the 1980s and 1990s. Adolescent use of cocaine and marijuana by age 17 was actually more prevalent among families with higher levels of education in the mid 1980s, but the prevalence changed over time so that by 1998 cocaine use was significantly more prevalent among families with lower levels of education, while marijuana use was not related to maternal education. The results indicate that inter-generation change in cocaine and marijuana use resulted almost entirely from the influence of mother's education on adolescence drug use.

Summary

Education effects on illegal drug use are difficult to estimate clearly in quantitative studies. The main reason for this is that adolescence is both an important stage in the engagement in illegal drug use and also the period of learning and school attendance. Therefore, learning and use of illegal drugs are simultaneously determined which means that very good data are needed to estimate the inter-relationships. Moreover, education may have positive, as well as negative effects on drug use depending on the definition of education and the type of illegal drug used. There is a stronger negative association between education and heroine use in adulthood than between education and marijuana use in adulthood. However, it is difficult to establish the protective role of learning against future drug dependence because of the reverse impact of drug use on school drop out. This is particularly important for heroin use, as it could impact upon school drop out and the possibilities for learning. Therefore, the strength and nature of educational effects on illegal drug use remain uncertain.

Risk factor 7: sexual health

In this section, we review evidence on the direct effects of sex education programmes on reducing the risk of unsafe sex. This evidence comes mainly from programme evaluation in the United States. We also review evidence on the impact of education on reducing the risk of unplanned teenage parenthood, as this is one of the main outcomes of unprotected sex among adolescents.

Sex education programmes: intervention evidence

In addressing sexual risk-taking behaviours that effect sexual health outcomes such as HIV, STIs and unplanned pregnancy, the role education has largely been assessed in terms of targeted sex education programmes. The efficacy of these programmes to impact on risk-taking behaviour is debated. In the United States, Kirby *et al.* (2004) evaluated the "Safer Choices" intervention for its impact upon sexual risk-taking behaviours among different subgroups of high school students. The programme employed a range of activities that not only included the traditional information-based curriculum but added changes to the school organisation, a curriculum for staff, peer education, parental education and links between the school and the community. The programme aimed to reduce the number of students engaging in unprotected sex by reducing the number who begin or have sex in their high school years and by increasing condom use. Twenty schools in two sites were randomly assigned to receive the intervention or the traditional information-based curriculum. The trial followed 3 869 9th grade students for 31 months. Statistical analysis of the data included multi-level, repeat measures logistic and Poisson (see glossary in Appendix 4.1) regression. The Safer Choices programme did not appear to reduce the initiation of sex, but did significantly increase overall condom use. From the analysis of the subgroups it appears that the programme also had a significantly greater impact upon males, Hispanic students and high risk youth who were engaging in unprotected intercourse before the start of the intervention.

Tremblay and Ling (2005) analysed data on 14 to 22 year olds from the Youth Risk Behaviour Supplement of the 1992 National Health Interview Survey using multinominal logit analysis to determine the effects of AIDS education at school and at home on the sexual behaviour of young people in the United States. Data on 6 615 individuals were included in the study. AIDS education programmes reveal the risk and consequences associated with unprotected sex and provide information on safer sex. In this study, results from a multinomial logit model showed that AIDS education reduced the probability of engaging in sex without a condom in all subgroups except for young men. In contrast to the above study, AIDS education significantly increased the likelihood of condom protected intercourse for women. From these results, it appears that AIDS education reduces the potential for exposure to the HIV virus by encouraging safer sex practices.

Silva (2002) conducted a meta-analysis of 12 studies testing efficacy of school-based abstinence-only sex education interventions to delay the onset of sexual intercourse. Through pooling the results of standard deviations, t-tests, chi-squared test and significance levels from the 12 pieces of primary research, the synthesis found a very small overall effect on abstinence behaviour. Neither abstinence-only interventions nor interventions that included information on contraception appeared to significantly increase abstinence. Parental participation in the education programme and the percentage of females included appeared to significantly moderate the relationship between the intervention and effect sizes of abstinence behaviour in both univariate tests and the multivariate model. However, the reliability of this meta-analysis was limited by the lack of information in the primary research literature. The author was constrained by a lack of data on the treatment of potential confounders that are known to influence sexual activity in the primary research and the general quality and quantity of experimental research in this area. Thus, the results of the meta-analysis are to be considered with caution.

Teenage motherhood

Education affects the timing of motherhood for women through two main channels. First, education increases the opportunity cost of having children. Women with higher levels of education spend longer in schooling and delay marriage and childbearing. High educational attainment could increase future earnings and subsequently increase the opportunity cost of having children. Secondly, education increases women's agency, ability or sense of power to take control of their lives, empowering them over the choice of fertility, partly through effects on self-esteem and aspirations, but also through changes in life possibilities. This may lead many women to delay child rearing into later adulthood.

Empirical studies show that women with low levels of educational qualifications tend to have children younger than their better educated counterparts (Rowlingson and McKay, 1998). Statistics from the UK Labour Force Survey show that less than a third of women with degrees had children by the age of 30 compared to four fifths of women with no qualifications. The correlation is clear but this may be driven by a number of underlying causal processes, which make it problematic for empirical analysis to unpack the causal relationship between education and fertility.

The main difficulty in estimating the causal effect of education is the reverse causality of fertility on education (Hobcraft, 1998). The presence of a child could prevent mothers attending school and, consequently, decrease the likelihood of high school completion. Therefore fertility would cause low educational attainment. In order to deal with the problem of reverse causality, Hobcraft estimates the effect of early educational tests scores on the likelihood of becoming a teenage parent, using normalised tests of educational attainment at ages 7, 11 and 16 added together into a single variable. For both males and females, the odds of becoming a young parent – either a father before the age of 22 or a teenage mother – are more than three times higher for children attaining the lowest reading and maths test scores than children with the highest test scores. However, this is an effect of low cognitive attainment or ability not of educational participation.

Ermisch and Pevalin (2003) investigate the family background and childhood factors that are associated with teenage pregnancy using two longitudinal datasets: the BCS70 and the BHPS. Mother's education, measured as an indicator variable for having any qualifications above O-Level – which is roughly equivalent to secondary education – have strong effects on the likelihood of becoming a teenage mother even after addressing reverse causality issues by controlling for a large range of child specific and family measures later in childhood. Their results show a consistent association between low parental education and high likelihood of teenage pregnancy both in the BCS70 and in the BHPS.

Not only qualifications, but school experience, positive or negative, can potentially impact upon sexual risk-taking behaviour and teenage pregnancy. Bonell *et al.* (2005) consider the relationship between dislike of school and sexual risk-taking behaviour and pregnancy using longitudinal data on girls between the ages of 13 and 16 in schools in central and southern England. As part of a cluster trial on sex education, baseline and two waves of follow-up data were collected from 27 mixed comprehensives randomly selected to either receive the sex education intervention or to serve as a control. Even after adjusting for measures of socioeconomic status, expectation of parenting, lack of expectation of education/training, and lack of knowledge or confidence about sexual health information, girls who disliked school were twice as likely to become pregnant in their teenage years. This research does not demonstrate a causal relationship, but rather

highlights the strong relationship between attitude to school and risk of teenage pregnancy.

Summary

The efficacy of targeted sex education interventions on risk-taking behaviour is debated. Programmes seem to be effective at increasing condom use, but not at reducing the age for initiation of sex. Programmes have not been particularly effective in increasing abstinence. There are key elements of programmes that appear to increase behaviour change, such as parental involvement. What seems to be most important in increasing the efficacy of sex education programmes is not so much increase in information, but appropriate design and delivery of the programme.

Unplanned teen parenthood is one of the most common outcomes of unprotected sex. Education is an important protective factor against the risk of teenage parenthood. Education raises awareness about the importance of safe sex, future orientation and planned decisions. But in empirical analysis, several problems remain in this area. The most difficult is that of identifying causality. There are many unobserved or unobservable factors that may affect both education and mother's age, for example labour market ambition. Women with high levels of economic ambition may tend to both choose higher schooling and delay childbearing, leading to an association of education and age of mother that is in fact due to labour market ambition.

Service use

The provision of high-quality health services remains one of the top priorities for governments around the world. To achieve this aim in Britain, for example, Wanless (2002 and 2004) suggests that the government's strategy should be based on improvements in the supply of health services together with reductions in the demand for health care. Yet not just in Britain, there is a tendency for governments to concentrate on the expansion of the supply of health services, leaving the level of demand for health care services to be determined by other factors.

In this section, we define service use in a general sense to include not just the uptake of services per se in terms of quantity of resources used but also in terms of the efficiency of service use. For this reason, we present evidence on the effects of education on three elements of service use, namely the responsive element, the preventative element and in terms of the management of chronic or disabling conditions. Yet, the role of the uptake of health services in this model is not straight-forward. To the extent that education improves health it reduces the uptake of *responsive* services in a socially optimal way. On the other hand, to the extent that education increases the uptake of preventative health it leads to short term costs with longer term savings.

The key issue here is that education has been found to have an effect on health via the adoption of health related practices, raising awareness of health information, and increasing personal resilience to effectively cope with difficulties or stress inducing circumstances. Certain aspects of education improve the ways in which individuals understand their health situation, express their symptoms, and communicate with the health practitioner (see Hammond, 2003). More education can either increase or decrease the demand for treatments.

Education may improve access to services if it enhances the inclusion of individuals in society and provides the means and incentive for individuals to know and demand their rights to receive health care from the government. As LeGrand (1982) points out, even with public provision of health services, access is biased toward the better educated groups which possess superior information about and greater willingness to claim their entitlements.

Responsive health care

The relationship between education and health service utilisation depends on whether utilisation is considered in terms of access to primary care, specialist care, hospitalisation, social care, and utilisation of the emergency care services.

Evidence on access to primary care

For access to primary health care, ten Have *et al.* (2003) find that people with more education are less likely to use primary care for mental health problems in Denmark. Similarly, Schellhorn *et al.* (2000) show that in Switzerland, old people with a higher educational degree register 18% fewer visits to a primary physician than old people with lower levels of education.

On the other hand, Dunlop, Coyte and McIsaac (2000) considering a one-year period in Canada, find that conditional on actual health status men and women with higher levels of educational attainments were more likely to take advantage of access to General Practitioner (GP) services, leading to long-run health benefits. Windmeijer and Santos Silva (1997) find a more complex relationship in Britain as individuals with higher vocational degrees and teaching and nursing degrees, given the level of health and ill-health, are less likely to visit the GP than individuals with qualifications below O-Levels. However, individuals with higher academic qualifications, university degree or higher, are more likely to visit the GP than individuals with lower qualifications, conditional on health status. In the United States, Deb and Trivedi (2002) find that years of schooling are positively related to the number of contacts with a physician and also to the number of outpatient visits with a physician or other health professional.

Evidence on access to specialist care

For the case of specialist use, results for Switzerland, Demark and Canada show an increase in specialist use by those with more education. In Switzerland, for example, higher education leads to a sharp increase in specialist utilisation by 45% (Schellhorn *et al.*, 2000). Under a publicly provided, universal health care system, a referral to the specialist should be made on the grounds of health need. However, the finding of disparities in access to specialists suggests that individuals with lower levels of education may be less able to indicate their preferences or need for care. It also suggests that individuals with higher levels of education can access the service more effectively, and perhaps better claim specialist care from the public health service.

Evidence on access to hospitalisation

Geil *et al.* (1997) investigate the factors determining the demand for hospitalisation in Germany. Using the 1984 to 1989, 1992 and 1994 sweeps of the German Socioeconomic

Panel, their results suggest that having at least secondary education, having a degree from a university or college, and having passed a vocational training were not significant predictors of hospitalisation for either males or females.

In contrast, and by the use of more robust IV techniques and a clear definition of the health symptom that lead to hospitalisation, Arendt (2004) estimates a causal effect of education. He uses the Danish school reform that took place in 1958 to instrument for educational effects on the demand for hospitalisations if nutritional, heart, circulatory, digestive or respiratory diseases occurred. He also investigates the effects of education on the number of days in hospital given that hospitalisation had occurred. Using data from the Danish National Register of Patients, IV results show that educational attainment beyond primary schooling significantly reduces hospitalisation by 1.9 percentage points for women and by 1.5 percentage points for men (which correspond to relative effects of 39.7% and 32.2%, respectively). Once hospitalised, there are no significant differences in the number of days in hospital for men with and without education. But women with more education have more number of stays in hospital once hospitalised (5% more days). The estimated effect can be given a useful interpretation as a Local Average Treatment Effect (LATE). Individuals most likely to be affected by the 1958 reform are mainly low income people in rural areas, particularly girls. Therefore, this provides evidence that education has an effect on reducing hospitalisation mainly for those with low educated. One possible interpretation for the higher number of stays in hospital for more educated women once hospitalisation occurs is that it reflects a higher demand for health care and more efficient use of follow up services once hospitalised.

Evidence on access to social care

Arkes (2004) investigates the effects of schooling on the probability of requiring personal care for white male Americans aged 47 to 56 in 1991 using OLS and IV methods. Arkes uses intra-state differences in unemployment rates during individuals' teenage years as an instrument for education effects. State unemployment can have an income and a substitution effect on educational attainments. With higher unemployment, household income lowers and there may be the need for teenage children to quit school and help the family by doing income generating activities. With higher unemployment, the opportunity cost of schooling falls leading to higher enrolment in educational programmes. As long as the substitution effect dominates the income effect, the unemployment rate as instrument for education is valid. Using data from the 1990 US Census or Population and Housing, OLS results show that an additional year of schooling is associated with a decrease of 0.52 percentage points in the probability of requiring personal care for adults. The estimated effect using IV is larger, with a reduction of 0.67 percentage points. This effect is large if we consider that only 3.2% of US white adult males between 47 and 56 years in 1990 required personal care.

Evidence on access to emergency medical services

In a study investigating the use of emergency department (ED) services, Dismuke and Kunz (2004) use data from the Community Tracking Study, a repeated cross-sectional, large sample survey of 60 representative communities in the United States. In particular, Dismuke and Kunz are interested in potentially unnecessary emergency department use, that is, use of emergency services for conditions that could be treated by a physician at a GP practice. They find that moving from high school to greater than high school education appears to reduce potentially unnecessary ED utilisation, with the impact being

greater for the insured. Graduating from high school decreases potentially unnecessary ED use among the insured. However, for those individuals without insurance, graduating from high school is associated with an increase in the use of unnecessary ED. Thus, in the United States, the relationship between education and ED utilisation appears to be mediated by insurance status.

Summary

Overall, associational evidence shows that higher levels of education lead to a more efficient selection of health services for specialist care. In general, individuals with higher levels of education are more likely to visit a specialist directly without seeing first the primary care physician (in Switzerland and Denmark) and are more likely to be referred to a specialist (in Canada). There is also correlational evidence that having college education appears to reduce unnecessary use of emergency department utilisation. The effect of education on the use of primary care, however, appears to depend on the national system of health service provision and/or other aspects of national context. For instance, individuals with higher qualifications are less likely to receive primary care in Switzerland and Denmark, but more likely in Britain, Canada and the United States.

The causal effect of education on service use has been tested in terms of the number of hospitalisations and the use of social health care. For hospitalisations, results suggest that increased years of schooling reduce hospitalisations. In Denmark, educational effects from the 1958 school reform reduced hospitalisation rates by 32.2% for males and 39.7% for females (relative to mean numbers of hospital stays in a given year of 0.063 for women and 0.075 for men.) However, once hospitalised, educated women have more hospitalisations in a given year than women with no education. For first time hospitalisations, Arendt interprets these results as suggesting that the effect of education on service utilisation is channelled more through health (education improves health and hence reduces service utilisation) than through social inclusion (education induces social inclusion and hence increases service utilisation). However, for subsequent treatments, the opposite may be the case for women.

For the use of social health care, defined as the need for personal care in adulthood, US results find a substantial causal effect of schooling. For white adult males born in the United States between 1934 and 1943, an additional year of schooling reduces the need for personal care by 0.67 percentage points. This result is substantial considering that only 3.2% of U.S. white adult males between 47 and 56 years in 1990 required personal care.

Preventative health care

Jepson *et al.* (2000) carried out a systematic review to examine factors associated with the uptake of screening programmes using data from several developed nations. Results for educational effects on uptake of screening were mixed. From 42 studies reviewed that considered education effects on the uptake of screening, 12 found significant effects (10 in the direction that education increases uptake of screening and two in the opposite direction). In another more recent review of inequalities of access to screening in high-income nations, Chiu (2003) mentions that variables shown to have a particular and consistent negative effect on the uptake of screening were low income, low education and age. The main reason for this mixed picture is that education has been considered in the analysis as a confounding variable and included in the analysis together

with other socioeconomic determinants of screening. Therefore, the lack of educational effects may be because in the methods used, the channels for education effects have been included in the estimation, spuriously knocking out the direct effect of education.

Goddard and Smith (2001) reviewed the evidence on equity of access to preventative health care in the United Kingdom. Their findings suggest that low utilisation of health promotion and preventative health services is linked to deprivation at an area level and poor socioeconomic status (SES) at an individual level. Even with universal coverage by the public health sector, individuals in manual social classes (who on average also have low levels of education) are 10% less likely to attend their GP for preventative reasons than those in non-manual groups (McCormick *et al.*, 1997). In the United States and Canada, women with higher levels of education were more likely to receive screening for breast and cervical cancer than women with low levels of education (Katz and Hofer, 1994). One possible explanation of the gradient in access to preventative health services in the United States is that access is costly so women living in poverty are constrained by low income from utilisation of the service. But this result is found in Canada, where insurance coverage is uniform, universal, and requires no patient cost-sharing. Therefore, the elimination of income and insurance related barriers is not sufficient to overcome the large disparities in screening in Canada and the United Kingdom.

Evidence from Australia, where Medicare covers 75% of medical costs, has shown that women with higher levels of education are more likely to report the take up of a cervical smear test (Taylor *et al.*, 2001). The data used were the Australian NHS, a representative population-based survey of health and illness. Their results show that, compared with women with a bachelor or higher degree, the odds of reporting having a smear test within the past three years in women with trade or diploma was lower but not statistically significant. Women with no post-school qualification had significantly lower odds (0.86) than women with a bachelor's degree or higher degree. A statistically significant rising trend in reporting smear tests was found with increasing levels of education.

Results from studies on uptake of preventative health care services typically utilise cross-sectional information, limiting the possibility to deal with unobservable factors affecting education and uptake of services. For instance, Selvin and Brett (2003) find that non-Hispanic white women in the United States with a bachelor's degree have an uptake of cervical screening which is 2.5 times greater than that of women with less than high school. However, this may just reflect unobservable differences between these groups of women. One cannot determine whether education leads to an increase in uptake or whether education is simply acting as a proxy for other individual characteristics.

In order to distinguish between these two possible explanations for the role of education Sabates and Feinstein (2006) utilise women's histories of screening as well as changes in educational qualifications. They find that adult learning has a direct impact on the uptake of preventative screening which is not channelled by income, occupation or social class. The fact that the positive effect of education remains significant even after the inclusion of income, class and occupation (and controlling for age and parental SES) indicates the possibility that education increases service utilisation for preventative reasons through knowledge, awareness, agency, and social inclusion or is a confounded proxy for these and other features including time-varying selection biases. Sabates and Feinstein conclude that education is one of the most important factors in explaining uptake of cervical screening.

Summary

The uptake of preventative health care services is not solely the responsibility of Government. Wanless (2004) points out that individuals are primarily responsible for decisions about their personal health and that of their children. Therefore, achieving good health for the nation requires individuals to be fully engaged, taking care of their health, changing risk behaviours, and utilising preventative measures in order to reduce future demand for health care.

Evidence suggests that more education is associated with greater utilisation of preventative health care. For cervical screening and mammography, evidence from the United States, the United Kingdom, Canada and Australia show that women with higher education are more likely to uptake regular screenings. However, the specific causal effect of education on the demand for preventative health care has not yet been fully addressed empirically. This is because most health service data contain detailed information on the uptake of preventative care but define socioeconomic status in a very broad way. Hence there is a tendency in the field of public health to associate lower uptake of preventative care with low social class or poverty or low education. Whether it is class, education or income that dominates as cause seems to be of little importance. Yet, there are complex interactions between socioeconomic status, education, income and other background variables. Barriers to the uptake of preventative health care are not just about income but are also educational, cultural and social, including factors such as lack of awareness, time constraints and health behaviours. The use of instrumental variables and longitudinal data may help to estimate the causal effect of education on the demand for preventative health care.

Management of chronic/disabling conditions

A patient's education may determine not only access to medical treatment but also the effectiveness of that treatment. This is because patients with more education appear to be better informed and advised about the nature and management of their illnesses, and also tend to comply more with medical advice. For example, Rudman, Gonzales and Borgida (1999) surveyed almost 400 renal transplant patients in the United States and report that those with more years of education were more likely to comply with their post-trauma medical regimens. The association was small in magnitude, but statistically significant nevertheless. Peyrot, Mcmurry and Kruger (1999) report similar findings in relation to glycemic control amongst just under 200 adult patients in Michigan (United States). Having a college education as opposed to not having one was associated with better chronic glycemic control for Type 1 diabetes.

Rosenzweig and Schultz (1989) compare success rates of different contraception methods for women with different levels of education, finding that success rates are identical for all women for "easy" methods such as the pill, but the rhythm method is only effective for educated women. Lleras-Muney and Lichtenberg (2002), using the 1997 US Medical Expenditure Panel Survey, find that the more educated are more likely to use drugs recently approved by the Federal Drug Administration. A study outside the United States of women living in Haifa (Israel) found that women who had participated in education for more years were more likely to initiate screening for breast cancer than women with fewer years of education, even after controlling for socioeconomic status, age, and ethnicity (Hagoel *et al.*, 1999).

Goldman and Smith (2002) develop and test a model in which the level of adherence to a treatment regimen for diabetes and HIV impacts upon self-reported and objective health measures. Using data from the Health and Retirement Survey and the HIV Cost and Services Utilisation Study between January 1996 and January 1998 and ordered probit regression analysis, Goldman and Smith find that high school dropouts with HIV are less likely to use the most effective drugs, and that after controlling for other factors, more educated HIV patients are more likely to adhere to therapy and their adherence results in improvements in self-reported general health. For example, 57% of high school graduates adhere to their treatment regimen as opposed to 37% of high school dropouts. Diabetics who are less educated are much more likely to switch treatment, which leads to worsening general health. In a test of what types of people are more likely to follow poor health maintenance regimes, they find no statistically significant gender, age, race or ethnic difference in this behaviour. In an attempt to address the question of why education might matter, Goldman and Smith add the WAIS (Wechsler Adult Intelligence Score), a test of higher level reasoning, to the model. The inclusion of WAIS renders the schooling variable insignificant, while WAIS seems to fully capture the education effects. This suggests that the education effect may be spurious.

In the same study, Goldman and Smith also investigate the relationship between self-management and self-rated health in the DCCT (Diabetes Control and Complications Trial), a randomised prospective clinical trial examining the effects of intensive treatment of diabetes mellitus in preventing or delaying complications from the disease. Patients enrolled between 1983 and 1989 and were followed until April 1993. Each patient was assigned to either the conventional therapy group or the intensive therapy group, and assignment to treatment was random by education group. In the randomised setting, intensive treatment regiments that compensated for poor adherence led to better improvements in glycemic control for the less educated diabetics. These results suggest that the effect of schooling on health is moderated by level of adherence to a prescribed regimen.

Summary

The evidence suggests that education has very important effects on the management of chronic illnesses. Evidence from a randomised controlled trial (see glossary in Appendix 4.1) (Goldman and Smith, 2002) suggests that schooling effects work in combination with different treatment regimes, whereby less education may be compensated for by an intensive treatment. However, this randomised control trial was not designed to test for educational effects, but for treatment efficiency. This limits its relevance for our review. One study challenges the notion that this is an effect of education, as when IQ is included in the analysis, educational effects disappear. In as much as schooling improves cognitive ability, then cognitive ability may enable patients to better comprehend or adhere to complicated regimens, to manage their time, and to monitor their condition and make appropriate decisions. The findings on cognitive ability are suggestive, however, rather than conclusive.

4.10. Evidence on the mechanisms: effects on contexts

The review of evidence on the indirect mechanisms for effects of education on health is necessarily different in structure to the evidence on the direct effects on health outcomes. In this section we consider and present the evidence that education impacts on individual determinants of health rather than on actual health outcomes or health behaviours as in the previous section. Here, the evidence is necessarily less conclusive and must be treated more tentatively. However, our conceptual framework makes clear that there are sound theoretical foundations for the view that contexts (such as the family, work and occupation, neighbourhoods and communities, and macro-level contexts) and psychosocial resources (such as self-concept, resilience, beliefs about health care, and intertemporal choices) may be outcomes of education and may also impact on health.

In the following sub-sections we present the evidence that addresses these issues, describing separately evidence that education influences the relevant factor and that the factor is indeed an influence on health. If both statements are true then this suggests that the factor is a mediating mechanism for effects of education on health. However, few studies have tested the relevant mediating hypotheses explicitly and so we depend to a large extent on evidence that has addressed only one element of the wider picture.

The first set of summaries address the evidence in relation to contexts, considering two questions:

- Does education impact on individuals' contexts?
- How important are contexts for health outcomes? We consider the following contexts:
  - the family;
  - work;
  - neighbourhoods and communities; and
  - the macro-level context: inequality and social cohesion.

For the family context we focus on the effects of education on the generation of economic resources, mainly income, for the household production of health and on income effects on health. (We will subsequently consider the evidence for impacts mediated by family relationships in the family context.) For work and occupational health risks we assess the importance of education on the sorting of individuals into occupations with different degrees of environmental health risks. We also assess the effects of social and economic relations in the workplace on health outcomes.

For the effects of neighbourhoods and communities on health we explore the environmental health risk factors associated with living in certain areas and how these vary by the average level of education in the community. We also explore the effects of education on economic and social relations at the community level and the impact of

these relations on individual health outcomes. Finally, in the macro-level context section we investigate the effects of education on income inequality and on social cohesion and from these factors to health outcomes.

The remaining sub-sections focus on key features of the self. Important cognitions can take the form of beliefs (both general and more specific to individual health outcomes), attitudes (including stereotypes of gender, culture and activity), aspirations and expectations, interest, values and knowledge. These cognitions may interact with each other as well as with other factors such as income to influence health outcomes. The term "psycho-social resources" refers more to skills and attributes, such as resilience. The relationship between these domains of individual psychology is close and complex but we do not address that issue here, focusing instead on the key aspects of personal development that both impact on health and may be influenced by education.

To focus the analysis, we concentrate on the following features of the self:

- beliefs;
- inter-temporal choice;
- and resilience.

Again, for each feature we consider whether and how education impacts on the potential mediating factor and on the impact of the factor on health.

It is important to note at the outset that the evidence in this domain is of a different nature to that in relation to the other elements of the model. In part this is an issue of disciplinary practice, that the notion of causality used by researchers in the area of cognitions is often different to that of econometricians, for example. Issues of measurement are more difficult for the latent measures of within-person cognition than for social variables with a standard metric such as income. The concern of quantitative researchers in the fields of psychology concerned with cognitions and psycho-social development has been more about measurement and the identification and assessment of pathways of impact, rather than on establishing direct and generalisable causal effect sizes. The complexity and difficulty of the relationship between learning and psychological development also means that some of the most useful evidence discussed here is qualitative. This evidence is vital in identifying possible causal mechanisms and conceptual relationships. However, it does not provide robust, generalisable hypothesis testing.

A second important difference is that the nature of the effect of education on cognitions and psychosocial development may be very different to the effect on contexts, such as occupation or income. There may be some element of a positional or signalling impact on these features of the self, such that achievement of advantage in terms of qualifications brings a sense of relative status with benefits for well-being and health. However, much of the theory and evidence about the relationship between education and cognitions and psychosocial resources focuses on the effect of the quality of the learning experience, rather than on qualifications achieved or the number of years of participation in schooling. The psychological effects of education include a considerable risk of negative consequences that may follow from inappropriate learning, learning that ends in experiences of apparent failure or experiences of discrimination, bullying or environmental injury in learning environments. Therefore, the discussion of the psychological impacts of education are cast more in the light of the quality and nature of the learning experience, less in terms of the quantity of learning.

These disciplinary differences are evident in the different nature of the methods and findings of the studies described in this section.

Context 1: the family

Education effects on income

There is a large body of literature that links educational attainment to income and we do not review it fully here. Useful sources are: Blundell *et al.* 1999, 2003; Card, 1999 for estimates of the causal returns to education; Blundell *et al.*, 2003 for changes in income over time induced by education; Heckman and Vytlacil, 2000 for the role of ability in explaining changes in returns to education.

The research in this area has been carefully designed to control for confounding factors that affect both education and future returns such as ability. Longitudinal datasets and large scale surveys such as the Labour Force Survey have been utilised to control for time variant and time invariant (see glossary in Appendix 4.1) individual heterogeneity that determines educational and economic outcomes, such as motivation and affect the relationship between education and income. Twin studies, in combination with IV estimation methods, have also been used to remove – as much as possible – ability bias due to genetic effect and family background.

Returns to education have been calculated according to vocational and academic qualifications as well as individual qualifications, for men and women and on different sectors of the economy (Dearden *et al.*, 2002). The private internal rate of return for obtaining a university level degree from an upper secondary level of education is 4.8 and 3.4% in Denmark, 8.6 and 7.2% in Sweden, and 15.8 and 15.4% in Finland for men and women, respectively (OECD, *Education at a Glance*, 2005). The economic benefits of education differ considerably across countries and the gender gap remains high for some countries. Finland and Portugal showed some of the highest returns to schooling and Norway the lowest. Ireland has the largest gender gap and Finland has an insignificant gender gap.

Estimates based on twins samples shows that returns to schooling are of considerable magnitude. Arias, Hallock and Sosa-Escudero (2001) estimate that returns to schooling in the United States are never lower than 9% and can be as high as 13% at the top of the conditional distribution of wages but they vary significantly only along the lower to middle quantiles. Ashenfelter and Krueger (1994) estimated a return of 13% per year of schooling. In Australia, returns to schooling in 1985 were estimated to be 3.3% for a sample of male twins and 5.8% for a sample of female twins (Miller, Mulvey and Martin, 1997). In Sweden, the estimated return to schooling in 1990 for the pooled sample of twins was 5.2% (Isacsson, 2004) and 7.7% in the United Kingdom in 1999 (Bonjour *et al.* 2003). For Denmark, the estimated return for male twins was 9.4% and for female twins 5.3% in 2002 (Bingley, Christensen and Walker, 2005).

Average levels of education are associated with countries' aggregate productivity. Sasieni and Van Reenen (2003) estimate that a one-year increase in average education raises the level of GDP per capita between 3 and 6%. The impact of increases at different levels of education seems to depend on the countries' level of development, with tertiary education being the most important for growth in OECD countries.

Income effects on health outcomes

Frijters, Haisken-DeNew and Shields (2005) investigate the causal effects of income on health satisfaction in Germany in the years after reunification. Data utilised are the German Socioeconomic Panel for the period 1984 to 2002. The reunification of Germany is used as a natural experiment, which resulted in a rapid and exogenous rise in average real household income for East Germany but not so for West Germany. Fixed effects methodology is used to control for time-invariant individual heterogeneity. Results show that changes in income lead to increases in self-reported health satisfaction (which includes physical and psychological aspects of health). The size of income effects, however, is small.

Lindahl (2002) utilises the exogenous variation in income resulting from lottery prices to estimate the effects of income on health in Sweden. The income measures used were current household income and household income averaged over a 15-year period. A standardised continuous health measure was constructed from self-assessed health symptoms. Using data from the Swedish Level of Living Survey, 1968, 1974 and 1981, results show that a 10% increase in income is likely to generate an increase in good health by about 0.01 to 0.02 standard deviations. However, the use of lottery prices as sources of exogenous variation to estimate income effects suffers from the weakness that there is no information as to when the win occurred and lottery players are not randomly selected from the population.

Case (2001) uses the exogenous variation in income associated with changes in the South African state pension system to explore the effects of income on health. Elderly Black and Coloured men and women who did not anticipate receiving large pensions in their lifetimes, and who did not pay into a pension system, are currently receiving more than twice the median Black income per capita. These elderly men and women generally live in large households, and this paper documents the effect of changes to the pension system on the pensioners, on other adult members of their households, and on the children who live with them. Using ordered probit models on self-reported health status and cross-sectional data on around 1 300 individuals, results show that the pension protects the health of all household members, working in part to protect the nutritional status of household members, in part to improve living conditions, and in part to reduce the stress under which the adult household members negotiate day-to-day life. However, this result holds only for households that pool income and it may not be generalisable to higher income levels.

Bhattacharya, Curie and Haider (2004) use data from the National Health and Nutrition Examination Survey to examine the relationship between poverty, food insecurity and nutritional status for individuals at different stages of the life course. Poverty is measured by an indicator variable for those households whose combined income is below the US poverty line. The measurement for food insecurity is based on householders' reports on whether there is enough food at home, and whether adults or children skipped meals. Nutritional status is quantified using several indicators: an index for healthy eating, the body mass index, and an index for micronutrients in the blood. Their findings are based on regression analysis by age groups. For preschool children, poverty is associated with nutritional outcomes, but food insecurity is not a significant determinant. Among school-aged children neither poverty nor food insecurity is associated with poor nutritional outcomes. Finally, among adults and the elderly, both poverty and food insecurity are associated with poor nutritional outcomes.

Contoyannis, Jones and Rice (2004) explore the causal effect of income on health using the first eight waves of the British Household Panel Survey (1991-1998). Health is measured using self-reported health and income as equivalised and non-equivalised annual household income. They estimate random effects ordered probit models using both balanced and unbalanced samples, and they explore the issue of state dependence in health by conditioning on previous health states. They also control for the problem of initial conditions arising in dynamic panel data models by including individual-specific characteristic averages and using constructed weights to allow for attrition bias (see glossary in Appendix 4.1). Results show that the mean of log-income for an individual averaged over their years in the panel was significantly associated with better health. However, this does not necessarily demonstrate causality, as noted by the authors, due to the potential correlation between average income and the unobservable individual effect. Conditional on average income, there was also some evidence of a relationship between current income and health, but the quantitative effect was very small and not significant for most of the model specifications presented.

Benzeval, Taylor and Judge (2000) use data from the first six waves of the British Household Panel Study to study the relationship between living in poverty and self-reported health. Poverty is defined as an individual's income averaged over the 6 years in the panel being less than 60% of the median and self-reported health as a binary indicator. Estimates from logit models suggest that recent poverty is a strong predictor of health. For example, individuals who experienced low relative income across the 6 years of the survey were found to be more than twice as likely to report their health as poor or fair than those not living in poverty. However, the lack of controls in the analysis for unobservable heterogeneity, and the lack of exogenous variation in income, mean that this result does not demonstrate causality.

For Germany, Thiede and Traub (1997) investigate the relationship between changes in relative income poverty and changes in income with five different dimensions of health. These dimensions are chronic disease, having health impairment, need of care due to physical functioning, optimism and loneliness. Using structural equation modelling and the German Socioeconomic Panel Data their aim is to capture the dynamic nature of the relationship between health status and poverty. Their results show that changes in income are important in determining individuals' physical functioning ($\rho = 0.020$), optimism ($\rho = 0.033$) and loneliness ($\rho = 0.051$). They did not find evidence that income changes affect health impairment or health perceptions. They also found that the effect of reverse causality – health affecting income changes – is very low, as it explains only 3% of the variability in income changes.

Summary

The income returns to education are well theorised in the literature and with robust causal empirical evidence. There is some disagreement in terms of the size of the income return to education. Blundell, Dearden, and Sianesi (2003) highlight the importance of model specification and allowing for heterogeneous return, that is returns to education that vary across individuals with the same level of qualifications, in estimating returns to education.

The empirical evidence on the income effects on health does not come to a clear conclusion and much depends on the nature of the health system. As stated by Fuchs:

> *"the correlation can vary from highly positive to weakly negative, depending on context, covariates, and level of aggregation… In high-income countries, researchers usually conclude that the correlation is positive and that the causality runs from higher income to better health. The strength of this effect, however, varies greatly by age, disease, level of income, and other variables." (2004, p. 654).*

We conclude, from the evidence reviewed here from countries with universal provision of health care, *i.e.* Germany, Sweden and the United Kingdom, that there are small, causal, income effects on health. The measurement of permanent income is generally the one found to be most strongly related to health. In other countries, such as the United States, income effects on health and access to medical insurance are substantial.

Context 2: the workplace

Education effects on environmental health risks at work

Hazards faced in the work environment have serious implications for health amounting to 1.5% of the global burden in DALYs (WHO, 2002). The variety of potential hazards is broad, ranging from exposure to chemicals to adverse ergonomic conditions. Work-related injuries are another important source of occupational hazard. Occupational injuries are responsible for 0.9% or 13.1 million of global DALYs (WHO, 2002).

In a 1981 study, Leigh explores the ways in which schooling might moderate the relationship between occupational hazard and health. In particular, he is interested in whether the more educated select themselves out of the thirty seven hazardous blue collar occupations represented in the data. Using data from the Michigan Panel Study of Income Dynamics (PSID) 1971-1974, their least squares regression results – controlling for a range of demographic factors – show a negative, but insignificant result for schooling. This suggests that the better educated do not pick safer jobs. Leigh finds the insignificant result for schooling troubling, and suggests that selection effects might be at work. For example, less than 15% of the sample had attended college and therefore, the full range of the schooling variable is not captured.

Kemna (1987) explores the relationship between working conditions in the United States, schooling and health. In particular, he is interested in whether a higher level of education/income is associated with selecting oneself out of physically hazardous occupations. Using data from the 1980 Health Interview Survey (HIS) combined with occupational information from the Dictionary of Occupational Titles, results from the two-stage OLS estimation show that level of schooling is significantly related to better health, with the greatest health benefit of education accruing to those who complete high school. The direct effect of schooling is more important, accounting for 70-90% of the total effect of schooling on health. The occupational linkage explains approximately 10% of the total effect of schooling on health. The results suggest an occupational linkage in the schooling-health relationship, although the magnitude of the effect is difficult to assess.

In a cross-sectional study, Warren *et al.* (2004) explore the relationship between occupation, education and two health outcomes – cardiovascular disease and musculoskeletal disorders. Using data from the WLS (see glossary in Appendix 4.1) and

ordered logistic regression, they find differential results by health outcome and sex. They find that after adjusting for family background and physical and psychosocial job characteristics, the coefficients representing the associations between job characteristics and cardiovascular health are significant only for women. With respect to musculoskeletal disorders, they find that the results are only significant for men. There are strong positive associations between how physically demanding men's jobs are and the degree to which they experience musculoskeletal health problems. After adding job characteristics measures, the association is reduced by 14%, but remains significant. Although the results for income (log wage) are significant, the results for education are not. This suggests that the education effect is being captured by income, and that there are no independent education effects.

Summary

From the above studies, the exact nature of the occupational linkage between education and health is not clear. One early study finds no associational evidence between education and selecting oneself out of hazardous jobs (Leigh, 1981). However, by the author's own admission, the failure to identify a relationship between education and occupational choice is troubling, and may be due to the biased nature of the sample whereby less than 15% of the participants had attended college. In a later study using a more representative US sample and two-stage least squares, Kemna (1987) finds evidence that individuals who complete high school select themselves out of the most hazardous jobs, and that the occupational linkage captures approximately 10% of the total relationship between education and health. Although, Warren *et al.* (2004) find a strong positive association between womens' job characteristics and cardiovascular disease, and a 14% positive association between the degree of physical demand in mens' jobs and musculoskeletal health, there appears to be no independent effect of education.

Based on our review, we find associational evidence that education triggers workplace sorting, such that more educated individuals are less likely to take up the most hazardous occupations. However, the evidence we have reviewed does not suggest a causal link between education and workplace sorting. It is plausible that education does sort individuals into more and less hazardous jobs, but once this sorting has occurred, we only have theoretical evidence of the protective role of education. Our conclusion therefore, is that occupation is clearly one context that mediates the relationship between education and health. However, we would like to see more evidence on the extent to which occupation mediates this relationship.

Effects of social and economic relations at work on health outcomes

Most of the evidence to date suggests that physical and psychosocial stressors have a small yet discernible, negative impact on health. Evidence from Japan in Nakata *et al.* (2004) suggests that for white-collar daytime workers, psychological job stress factors such as interpersonal conflicts with fellow employees, job satisfaction, and social support are independently associated with a moderately increased risk of insomnia. Taking a lifecourse perspective, Monden (2005) finds that in a representative Dutch population, less educated men are significantly more exposed to adverse working conditions than higher educated men and that these differences increase over the life course. He finds that lifetime exposure to adverse working conditions explains one-third of the health differences between the most and least educated men in the Netherlands.

In a study that explores the relationship between work and family demands of women and health, Artazcoz *et al.* (2004) find that although working women report better health than housewives, working has a differential impact on women depending on their level of education. For employed women with low educational attainment (less than 14 years of schooling), a high level of family demand showed a consistent negative effect on health and health related behaviours. For women with high educational attainment (more than 14 years of schooling) there was little or no negative association. The authors infer that this is because women with higher levels of education also have higher levels of income. A higher income may moderate the effect of family demand as it would enable women to get paid help with domestic tasks, childcare and care of the elderly. However, this conjecture cannot be confirmed in this study because income was not controlled for. The results, nonetheless point to the importance of family demands in moderating that impact of occupational status on health.

Using data from a non-representative sample of public sector employees from 10 Finnish towns, Elovainio *et al.* (2005) find that after adjusting for age, income, and health behaviours, low procedural and interactional justice are related to long spells of sickness absence. In other words, employees are more likely to have long spells of sickness absence in a work environment where decision-making procedures are perceived as unfair, and if they believe they have been treated poorly by supervisors when procedures are implemented. This association is strengthened during times of uncertainty at the workplace. However, this may not be an effect on actual health so much as on absenteeism.

The following studies use more robust and sophisticated estimation techniques, attempting to deal with selection effects so as to estimate causal effects. Cambois (2004) uses French longitudinal data (the *Échantillon Démographique Permanent*) to investigate the relationship between occupational mobility and mortality. Using 1968-1975 census records augmented by data on mortality risks estimated for 1975-1980, he finds that favourable occupational moves, for example, from clerical to upper class occupations – that is, from clerical to upper managerial or professional and intermediary occupations – leave employees at less risk of mortality than their counterparts who remain in the same occupational class. The inverse is true for unfavourable moves. For example, for men, a move from manual worker to one of the two highest occupational classes between 1968 and 1975 is associated with a 0.59 standardised mortality ratio, while remaining in the manual worker class is associated with a 1.17 standardised mortality ratio. For women, the relationship between mortality risks and the direction of occupational mobility was less clear.

In a study using the 1991-2000 waves of the British Household Panel Study (BHPS), Bardasi and Francesconi (2004) investigate the relationship between individual well-being and atypical employment (temporary, contract and part-time work). Their results from multivariate logistic regression controlling for background characteristics with fixed effects conditional logit regressions, indicate that atypical employment is not associated with poor mental or physical health for either men or women. They do however find evidence that job satisfaction is reduced for seasonal and casual workers compared with those who are permanently employed (OR = 2.39 and 1.30, respectively). In contrast, those who work part-time are less likely to have low job satisfaction than their full-time counterparts (OR = 0.41 and 0.65, respectively). These results hold after adjustments are made for unobserved individual heterogeneity and simultaneity bias.

Luikkonen *et al.* (2004) examine whether social relations and structure in the labour market affect self-rated health and psychological distress. The indicator of labour market structure utilised was trust in the labour market, measured by security of the employment contract. The indicator of social relations is trust in co-worker support, measured by social support received by co-workers. Using a cohort study of 6 028 public sector employees in Finland, results show an association between type of employment contract and health outcomes and between social support received by co-workers and health outcomes. However, when socioeconomic and demographic variables are introduced in a multivariate analysis, co-worker support is not a significant determinant of health outcomes. Having a fixed-term as opposed to a permanent employment contract for women reduces the odds ratio of having poor health by 0.74 and of psychological distress by 0.78 as opposed to having a permanent contract.

Macleod *et al.* (2005) investigate whether subjective or objective workplace social status is a more important determinant of health. For this study, they use a cohort of approximately 5 000 men aged 35-64 recruited from 27 workplaces in Scotland between 1970 and 1973 and followed for 25 years. Social position was measured by the individual's own current, and father's occupational class according to the Registrar General's classification. In addition, participants were asked to describe whether they saw themselves as a manager, foreman/supervisor or employee. Using proportional hazards models (see glossary in Appendix 4.1), Macleod *et al.* find that lower social position – whether indexed by more objective or subjective measures – is consistently associated with an adverse profile of established disease risk factors. In a fully adjusted model, perceived workplace status is only weakly associated with mortality, while the strongest predictors of increased mortality are father's manual as opposed to non-manual occupation, lack of car access and shorter stature (an indicator of deprivation in childhood). A weakly protective effect amongst managers compared to foremen is reversed in the fully-adjusted model (adjusted for age, social position, smoking, alcohol, stress, and job satisfaction). The authors argue that their findings cast doubt on the notion that perceived workplace stress caused by an individual's position in the occupational hierarchy, has an independent effect on mortality. Instead, they maintain, the strong association between father's manual occupation and mortality is an indication that socioeconomic circumstances of childhood have a lasting effect on an individual's health. They take this as an indication that it is material inequality itself, rather than any psychosocial correlate that is the key determinant of health inequalities.

Summary

Empirical evidence on the effect of education on occupational choice is well established and, therefore, it was not reviewed in this section. In terms of the effects of occupation on health, we find that physical or psychosocial work related factors have an impact on health. Cross sectional evidence from Japan suggests that job stress is associated with increased risk of insomnia. In the United States job characteristics are associated with cardiovascular health for women and with musculoskeletal health for men. In Finland, employees are more likely to have long spells of sickness absence if they feel that they have been treated unfairly at work.

Evidence from a longitudinal study in France finds that favourable occupational moves, for example, from clerical to upper class occupations leave employees at less risk of mortality then their counterparts who remain in the same occupational class. The inverse is true for unfavourable moves. A longitudinal study from the United Kingdom,

however, finds that atypical employment is not associated with poor mental or physical health for either men or women.

Evidence from mediation models suggests that occupational factors do appear to mediate the effect of education on health. In the Netherlands, lifetime exposure to adverse working conditions explains one third of the health differences between the most and least educated men. In Spain, the combination of employment, education and family demands is important in explaining health differentials for women. However, most studies conclude that other factors, such as health behaviours, appear to have a larger effect on health than do occupational factors.

Context 3: neighbourhoods and communities

The mediation of education effects by environmental health risks in communities

A major source of risk to health status is physical and environmental risk from urban air pollution, road traffic accidents, and housing. Our first set of evidence focuses on the risk to health as a result of the burning of fossil fuels mainly for the use of transport. Joyce, Grossman and Goldman (1989) assess the benefits of air pollution control on infant health. They explore the impact of aggregate chemical environmental factors on health, using data from the 677 most populated counties of the United States. These are counties with a population of at least 50 000 persons in 1970. Pollution data are from the EPA's SAROAD database. Their neonatal mortality equations are fitted using a two-stage least squares procedure. In the first stage, birth weight, prenatal care, neonatal intensive care, abortion, and organised family planning are predicted on the basis of the pollutants, female schooling, female poverty levels, fraction of high-risk women, neonatal intensive care availability, abortion availability, community health centre availability, and the Medicare programme (government-provided health insurance). Their results indicate that sulphur dioxide[1] is a significant predictor of neonatal mortality, although there is a statistically significant correlation with sulphur dioxide and the other pollutants (carbon monoxide, lead, total suspended particulates, nitrogen dioxide, and ozone). They calculate the magnitude of the effect by estimating marginal-willingness-to-pay measures. They estimate that at the upper-bound, a 10% reduction in sulphur dioxide levels would result in a saving of USD 1.09 billion in 1977 dollars on the cost of neonatal intensive care. At the lower-bound, a 10% reduction would yield an estimated USD 54 million in savings. The social marginal willingness to pay appears to be larger for neonatal care than for prenatal care. Hence, the authors suggest that the same infant survival probability could be produced at lower cost by spending less on neonatal intensive care and more on prenatal care.

Neidell (2003) explores the relationship between air pollution, health, and socioeconomic status. Using data from 1992-1998 on diverse seasonal variation in pollution that arises from local microclimates, Neidell compares how seasonal changes in pollution within a given zip code in California affect changes in seasonal asthma rates for specific age groups. His results from Poisson regression indicate that carbon monoxide – mainly from car emissions – has a significant effect on asthma hospitalisations among

[1] SO_2 can cause eye, nose, and throat irritation along with burning of the skin. SO_2 can cause serious respiratory illness. It can also cause corrosion and discoloration (*www.pasza.ca/home/*).

children ages 1 to 18 years. The results suggest that the impact of carbon monoxide is generally larger for children of low SES. He also finds that the effect of smog alerts is smaller for children of low SES, with statistically significant differences for children ages 6-12 and 12-18. This suggests that smog avoidance behaviour is less actively undertaken by low SES families, and could explain some of the difference in asthma rates by SES. The magnitude of the cumulative effect he finds is large. Additional tests indicate that attempts to control levels of pollution using California's Low-Emissions Vehicle II standards as having been successful, such that nearly 15-20% of the costs from this policy are recovered in lower levels of asthma hospitalisations for children alone. These results appear to be robust as they control for a number of unobservable fixed characteristics of zip codes, seasonal effects and many observable time-varying characteristics. In sum, the findings suggest that local air pollution may be one of the mechanisms by which SES affects health.

Using a similar study design and data as Neidell (2003), Currie and Neidell (2004) explore the impact of air pollution and socioeconomic status on fetal deaths. Using data that combines live births and fetal deaths, they create a sample of pregnancies lasting at least 26 weeks. This is a large sample, which contains data on 4 593 001 live births. An initial exploration of the data indicates that there is some association between an individual's SES and the level of pollution in that individual's area of residence. For example, the number of high school dropouts living in the cleaner areas is 25% compared to 41% in the dirtier areas. The results of their discrete hazards model indicate that high levels of post-natal exposure to carbon monoxide have a significant effect on infant mortality. The magnitude of the affect is large, suggesting that decreases in carbon monoxide levels in California in the 1990s saved approximately 1 000 infant lives. In estimating the value of improvements in carbon monoxide emissions to infant health, Currie and Neidell use two estimates. First, using a conservative estimate following Chay and Greenstone (2003), if they value a life at USD 1.6 million, then the estimated reduction in infant deaths would be valued at approximately USD 1.6 billion. Second, using the US Environmental Protection Agency (1999) estimate, if they value a life at USD 4.8 million, the benefit would grow to USD 4.8 billion.

Another source of environmental risk is road accidents. Over 1.2 million deaths worldwide are due to road traffic injuries, accounting for 2.3% of all deaths. Some predictions suggest that by 2020 road traffic injuries will be the third greatest cause of death and disability (McCarthy, 1999). In developed countries, about 50-60% of road traffic injuries result in driver or occupant deaths. Fatalities involving pedestrians are more common in urban areas with increased risk for children and adults over 60 (WHO, 2002). The risk of death from road traffic injuries is related to social class. For example, in the United Kingdom, children in the poorest families are four times more likely to be involved in traffic accidents than children from the wealthiest families. In the United States, drivers from low-income areas have higher rates of accidents than those from rich areas (McCarthy, 1999).

Education can provide protection against this risk factor through income effects on the choice of living circumstances. Areas where traffic is highly regulated with lower traffic density and where children and the elderly feel safer in the streets are more desirable and as a result more expensive (McCarthy, 1999).

Modes of transport and patterns of travel also have implications for health. Individuals with lower incomes are more likely to use public transportation while people with higher incomes more frequently travel by car. These differences also have

implications for the environment via pollution, but also for individual health. Equally, there are benefits of transport to health through exercise. Commuting by walking or cycling for transportation in combination with a balanced diet and not smoking are important for cardiac health (McCarthy, 1999). As demonstrated elsewhere in this text, education is related to the propensity to exercise.

Housing circumstances impact upon health directly, through the physical and social features of the home and area, and via the health-damaging effects of social exclusion. Some research suggests that differences in self-reported health can be explained by the experience of housing stressors and perceptions of the local environment. Factors such as overcrowding, dampness, area reputation, neighbourliness, fear of crime, and area satisfaction are important predictors of self-reported health (Macintyre *et al.*, 2003).

Summary

Overall, the evidence suggests that physical and environmental risk factors have an impact on health. Over 1.2 million deaths worldwide are due to road traffic injuries, accounting for 2.3% of all deaths. Housing circumstances and air pollution are also directly related to health. Particularly for air pollution, a decrease in the level of air pollution experienced by individuals, particularly children, could result in notable decreases in the incidence of death. A number of studies, for example, show that air pollution is a significant contributor to neonatal mortality, fetal deaths and asthma hospitalisations for children.

The evidence also suggests that socioeconomic status is related to physical and environmental risk factors. Although air pollution and road traffic accidents are large-area phenomena, there is significant variation in the levels of pollution and road traffic accidents within areas and in the demographic characteristics of people who live in more- versus less-"hazardous" areas. For example, a study in the United States finds that the number of high school dropouts living in the cleaner areas versus dirtier areas is 25% and 41% respectively. This association may be driven by residential sorting and strongly affected by income. Hence, it appears that education can provide some protection against this risk factor through income effects on the choice of living circumstances. This extends to factors that are more indirectly related to health, such as modes of transport and patterns of travel.

There is also suggestive evidence of education effects on behaviour change when facing environmental risk. For example, California law requires local air quality management districts to issue smog alerts when criteria pollutants exceed levels specified by the California Air Resources Board. Results show that lower SES families are less likely to modify their behaviour in order to avoid pollution. This could be an education effect related to increased self-efficacy and awareness of the importance to deal with the alert. It is also possible that this could in part be an income effect as low SES families may not be able to afford the cost of in-home child care to allow their children to remain at home.

Social and economic relations in neighbourhoods and communities

Education effects on neighbourhood choice

Distal factors, such as family income and social class, limit where families live either by impacting on their preferences or their constraints (Massey and Denton 1993; Wilson 1997). Thus, although there is little evidence looking specifically at the effect of prior parental education on location, there are strong theoretical grounds to expect a relationship between parental educational level and location. More educated families may choose to (or be able to choose to) live in neighbourhoods with better amenities such as high quality pre-schools, successful schools, low crime and open areas.

Useful evidence on this link comes from Gibbons (Gibbons, 2002), who looked at the relationship between the educational achievement of schools in an area and house prices. Conditioning on other factors, neighbourhood house prices increased with the presence of more educated neighbours. Gibbons argues that the education levels of a neighbourhood and its community matter because of spillovers in the production of human capital in children. He concludes that house purchasers are prepared to pay to live in neighbourhoods with greater potential for human capital formation. Similarly, Gibbons and Machin (Gibbons and Machin 2003) show a positive effect of school quality, measured by national league tables and property prices. These findings suggest that parents value educational characteristics of neighbourhoods.

Effects of neighbourhood crime, unemployment, and economic deprivation on health outcomes

Empirical evidence shows important associations between neighbourhood attributes and health, although the magnitudes of the associations vary. Lindstrom *et al.* (2004), in a study using a cross-sectional sample of 3 602 individuals from Malmo, Sweden, initially find an association between neighbourhood characteristics and self-reported health. However, when all the individual variables are simultaneously introduced into the model, the intra-neighbourhood variance is reduced to zero. Using ward clusters from the 1991 census, and 33 year-old cohort members from Britain's National Child Development Study (NCDS), Wagstaff, Paci and Heather (2001) explore the relationship between individual-level and community-level attributes and self-rated health. They find that inequalities in unobserved community-level influences account for 6% of health inequalities, a much smaller sum than is accounted for by individual-level characteristics. A more recent British study finds even smaller associations. Propper *et al.* (2005) using the British Household Panel Study (BHPS) and multilevel modelling find that after controlling for individual heterogeneity, less than 1% of the changes in mental health can be attributed to neighbourhood effects.

In a comparative study using data from 22 European and North American countries, Torsheim *et al.* (2004) explore the impact of deprivation at the school and country level on the health of 11- to 15-year-olds. Their multilevel logistic regression results suggest that at the country level, after controlling for individual level of family affluence, health behaviours, parental support, and perceived affluence, students from countries with the highest area deprivation have an odds ratio for self-rated poor health that is almost three times higher than that for students in the least materially deprived countries. These associations are stronger for 11-year-olds than for 13-year-olds and 15-year-olds. A combined "individual and area deprivation" model predicts that the most disadvantaged

11-year-old students are eight times more likely to have poor-self rated health compared to the least disadvantaged students.

Brown, Guy and Broad (2005) using data from the Auckland Heart and Health Study 1993-1994 find that individual and community characteristics together predict the onset of stroke, even before controlling for individual risk factors such as smoking, obesity and hypertension. When risk factors are included in the estimation, their results suggest that individual income and average household income are both significant predictors of health behaviours such as smoking and obesity, which are associated with the onset of a stroke.

Perhaps the most robust evidence in this domain is from Boyle, Norman and Rees (2004). The authors of the paper use large sample, longitudinal data for 1971, 1981 and 1991 from the ONS Longitudinal Study for England and Wales to test whether changes in the relative deprivation of an area influenced the health and mortality status of the residents. The sample included people who were living in non-deprived areas and who had not moved house during the 30-year-time period. Measures of household deprivation and the deprivation score of a person's ward of residence were key variables of interest as the researchers were interested in how changes in these two scores over the 30-year-period affected morbidity and mortality. They find that people living in areas which remained the most deprived had the highest standard illness ratio (approx. 115) while people living in areas which remained least deprived had the lowest standard illness ratio (approx. 74). As relative deprivation changed, so did the standard illness ratio in those areas, with the ratio increasing as deprivation in the area increased. Hence, it appears that changing circumstances of the most deprived areas has a demonstrable association with morbidity. There also appeared to be a change in mortality as relative deprivation changed, but the results for mortality were not significant. However, one must recognise that the changes in area deprivation may result from selection bias and/or reverse causality and so the evidence is not robust proof of causal effects.

A number of recent studies try to capture not just the overall neighbourhood effect on health, but also attempt to identify which aspects of areas affect health (Erbsland, Ried and Ulrich, 1995; Stafford *et al.*, 2001, Stafford *et al.*, 2004). For example, Stafford *et al.* (2004) compare the relationship between self-rated health and neighbourhoods in two cities: London and Helsinki. This study takes advantage of the differences in welfare policies and levels of inequality. Using multilevel logistic regression, they find that after controlling for individual socioeconomic position, neighbourhood effects still remain, although there is greater variation in London than in Helsinki. They find that neighbourhood variation in health after controlling for individual characteristics is 2% in London and 0.1% in Helsinki. Three aspects of neighbourhood are particularly related to self-rated health in this study. These are high unemployment, proportion of manual workers and proportion of single households. However, the London and Helsinki samples were not matched, making it more likely that the results are in part driven by selection and unobserved heterogeneity.

Boardman (2004), using a large sample of residents from 1 088 neighbourhoods in Detroit, Michigan finds that neighbourhoods moderate the impact of acute and chronic stress on adults' physical health. However, the moderating capability of a neighbourhood depends on that neighbourhood's stability. That is, given similar numbers and levels of stressors, the effect of stress on physical health is less pronounced among individuals residing in neighbourhoods with higher percentages of home owners and less residential turnover (5 years or more of residing in the same area).

Sundquist *et al.* (2006) explore the relationship between violent crime and increased unemployment in the risk of cardiovascular disease. They use data from the entire population of Stockholm County aged 35-64, who are followed from January 1, 1998 to December 31, 1998. Data for this sample of 336 925 men and 334 057 women are linked to the National Hospital Discharge Register and the Cause of Death Register. Neighbourhoods are defined as small geographic area units whose boundaries are defined by relatively homogeneous socioeconomic structures. The results of their multilevel logistic regression indicate that the highest percentages of women with low income, unemployed women and single women are found in neighbourhoods with the highest proportion of violent crime/unemployment. These women have the highest incidence of cardiovascular disease. The results are similar for men. When neighbourhood violent crime and unemployment increase, so does the risk of cardiovascular disease, with odds ratios of 1.75/1.39 and 2.05/1.50 respectively, for men and women. These average neighbourhood fixed effects remained even after the inclusion of individual-level variables. With the inclusion of individual-level variables in the random intercept model, the between-neighbourhood unemployment variance disappears for women, but remains for men. Although income and employment status are included in the model, education is not controlled for. Their results suggest that social dislocation, proxied here by violent crime and unemployment, are associated with worsening health. Two limitations of the study are the lack of data on 1) individuals' perception of their neighbourhoods and 2) residential mobility.

Dalstra, Kunst and Mackenbach (2006) use an international comparative approach to explore the relationship between education, income tenure and health among the elderly in Europe. Data for individuals 60-79 years of age were obtained from nationally representative health surveys, level of living surveys or similar from 10 European countries. Using standardised prevalence rates and multiple logistic regression analyses, they find that the prevalence of less than good self-rated health was higher among the lowest education group, income group and among renters. For example, in Norway, the prevalence of less than good health was 47.2, 55.1 and 36.0 per 100 residents, respectively for those in the lowest education and income groups and amongst renters, while the prevalence among the highest education groups was 33.0, 34.2 and 31.3 per 100 respondents, respectively. For housing tenure, the socioeconomic differences were much smaller, with the exception of Great Britain, the Netherlands, and Belgium, where the odds ratio of having less than good self-rated health as a renter was 2.02, 2.17 and 1.49, respectively. They find that the association between education and self-rated health was still considerable when it was adjusted for both the effects of income and housing tenure. Further analysis not shown in the paper indicates that when education is adjusted for housing tenure, the relative inequality index reduces much less than when it is adjusted for by income. This suggests that education, while mildly protective, is not as protective as income. It also suggests that at least in Great Britain and the Netherlands, housing tenure may mediate the relationship between education/income and health. Hence, although the most substantial differences in health are to be found using income and education as socioeconomic indicators, there was some difference in health status according to housing tenure.

In a US study that specifically tests the relationship between education, neighbourhood and health, Browning and Cagney (2002) find that education moderates the relationship between neighbourhood and health. As neighbourhood disadvantage increases, the protective effects of education on health decrease. The level of collective efficacy plays a crucial role in this relationship such that the greater the capacity of the

neighbourhood to use its social resources to reduce crime, the greater is the protective effect of education. One striking result indicates that the probability of experiencing fair to poor health in a neighbourhood with low collective efficacy remains roughly the same (17%) across education groups, while the probability of experiencing fair to poor health in neighbourhoods with high levels of collective efficacy declines from 12% to 5% as education level increases from 4th grade or lower to graduate degree. Other aspects of the residential environment showed associations with health, as is reported by Stafford *et al.* (2005) and Cummins *et al.* (2005). These studies find statistically significant associations between health and the following neighbourhood characteristics: left-wing political climate, physical quality of residential environment, some aspects of social capital such as political engagement and integration into wider society, and unemployment.

Summary

Parental education impacts on neighbourhood choice through income, aspirations and lifestyle. The stratification of neighbourhoods by social class and education is strongly apparent in most urban environments. However, although the theoretical grounds for an effect of parents' education on neighbourhood choice are strong, to our knowledge there is no evidence that identifies and establishes empirically a causal role for parents' education.

In terms of the relationship between neighbourhood attributes and health, the empirical evidence suggests that individual and household characteristics are more important than neighbourhood characteristics in explaining health differences between individuals. However, even when adjustments are made for individual and household characteristics, neighbourhood effects still remain, although the magnitude of these effects is small. This does not mean that neighbourhood effects are unimportant as they are perhaps more amenable to policy intervention than are individual and household characteristics. However, this does suggest that neighbourhood effects are not a key mediator of the effects of education on health.

Education effects on bridging and bonding community social capital

Few studies have investigated the sense of connection with others as an outcome of education, but many studies investigate other related outcomes, such as empathy, inter-personal trust, supportive relationships, social interaction, sense of community and voluntary activity. These outcomes, therefore, relate very strongly to the civic participation/social capital outcomes that are treated in the above Campbell report. Yet, these outcomes are also relevant here because social networks and links between people provide resilience and protection that are important for the prevention of ill-health.

In a review of evidence, Emler and Fraser (1999) cite studies which indicate that individuals with more years of education and higher levels of attainment tend to have a greater sense of connection with others and a broader outlook. These outcomes are identified as outcomes of attendance at a summer University by older learners in Britain (Jarvis and Walker, 1997) and of participation in a variety of courses which form part of a programme for people with mental health difficulties living in England (McGivney, 1997). They are also reported as benefits of participation in a variety of adult learning courses in a large scale and in-depth qualitative study of the wider benefits of learning (Schuller *et al.*, 2004).

In her evaluation, McGivney (1997) found that participation in the programme courses led to empathy building and a sense of community. Other qualitative studies have identified these social benefits as outcomes of participation in college based courses amongst users of mental health services (Wertheimer, 1997), US secondary schools (Angell, 1998), and a community-based physical education programme for US high school students (Ennis *et al.*, 1999). Analyses of nationally representative British cohort data suggest that relatively high levels of inter-personal trust are associated with participation in higher education (Bynner and Egerton, 2001). Although the data are longitudinal and the statistical models include controls for many potential sources of confounding bias, there are no measures of trust before participation in higher education and so we interpret the findings as indicative of the possibility of cause and effect but not as proof.

Meeting people and forming supportive relationships are outcomes of education identified in qualitative studies (*e.g.* Hammond, 2004; Dench and Regan, 2000) and an evaluation of mentoring programmes on a health education course for people aged 55 and over living in the Netherlands (Kocken and Voorham, 1998). Quantitative studies provide evidence for the correlation between forming supportive relationships and participation in higher education (Bynner and Egerton, 2001) and years of schooling, having a college degree, or attending a prestigious university (Ross and Mirowsky, 1999).

Marmot *et al.* (1991) report findings from the Whitehall II study, which involved interviews with a large number of civil service employees. Participants in lower status jobs (who would have tended to have relatively low levels of education) had poorer social relations than those in higher status jobs (who would have higher levels of education). More subjects in lower status jobs reported visiting relatives once a month or more, whereas those in higher status jobs visited friends. Fewer people in lower status jobs were involved in hobbies. Fewer men in lower status jobs had a confidante in whom they could confide when they had problems or from whom they received practical support; more reported negative reactions from persons close to them. These patterns were less clear in women.

So which aspects of education promote a sense of connection with others? Kerr *et al.* (2004) report findings from a longitudinal survey combined with case studies of nine schools in Britain that sets out to assess the effects of citizenship education in Britain. Citizenship education in Britain is based around three interrelated components of citizenship: in the curriculum, in the school as a community, and in partnership with the wider community. They highlight the importance of a supportive school ethos and value systems in the school that dovetail with the goals of citizenship education. Also important is the active involvement of students in the school as a community through a range of structures such as school and class councils and peer mentoring, and opportunities for students to learn about and experience citizenship education in a range of contexts. Links between students of different ages promote citizenship and so does involvement in the local community. The authors find that large schools with a positive, participatory ethos, that have previous links with the community and that encourage active participation in class by students are most effective in promoting citizenship.

Effects of bridging and bonding community social capital on health outcomes

Different indicators of bridging and bonding social capital have been used to operationalise this concept in quantitative analysis. There is a growing body of evidence indicating that sense of connection with others, inter-personal trust, community social

trust and feelings of belonging are positively associated with health. Most of the large scale studies use cross sectional data. Prospective studies use much smaller samples and include few controls. Therefore, we cannot yet draw rigorous conclusions about causal effects, although the evidence does help us to understand the likely mechanisms and is suggestive of an important channel requiring better data and further study.

One of the indicators of social capital that has been modelled is membership of voluntary associations, on the grounds that these associations may enable individuals to get support or to access direct resources from other members. Lochner *et al.* (2003), using data from the 1995 Community Survey in Chicago and hierarchical generalised linear models (see glossary in Appendix 4.1), estimate that membership of associations and mortality rates are negatively associated. However, when using cancer-specific mortality rates the association disappears. Similar results are found by Veenstra *et al.* (2005). Using data from a telephone survey of a random sample of adults in the city of Hamilton, Canada, results suggest a small association between associational involvement and BMI, and no association with self-rated health or emotional distress.

Other indicators are political participation and social networks. Kawachi *et al.* (1999) examined the links between women's political participation and health status in the United States. Using OLS regression, results indicate that US states with higher levels of female political participation also had lower female mortality rates and fewer number of days during which women reported activity limitations. Zunzunegui *et al.* (2004) show that networks of family or friends can also impact on health. Using data from two French-speaking Canadian communities (Moncton and Montreal), they find that self-rated health was better for those with a high level of social integration (measured by the number of social activities) and a strong network of friends in both locations. In addition, in the community in Montreal family and children networks were positively associated with good health. In Japan, Okabayashi *et al.* (2004) show that among older Japanese who are married with children, social support from the spouse has a greater association with positive well-being than social support from children and others. However, cognitive functioning is uncorrelated with all sources of positive and negative social exchanges. In contrast, among those without a spouse, greater support from children is significantly correlated with higher positive well-being, less distress, and less cognitive impairment.

A sense of connection with others is also positively associated with health. A study by Berkman (2000) on a sample of 194 men and women, 65 and over living in non-institutionalised settings in New Haven, Connecticut, United States, provides further evidence of a strong association between emotional support and increased mortality risk following a heart attack. A moderately long time series is available as individuals in the sample were interviewed annually from 1982 until 1992, and then less regularly until a final wave of follow-up interviews in 1995 and 1996. In this study, 53% of older men and women who had no sources of support, died in the first six months, compared to 23% of people who had two or more sources of support. Thus, people who lacked emotional support were over twice as likely to die in the six-month period. Their results indicate that the association between emotional support and mortality increases, such that people were almost three times as likely to die in the six-month follow up period if they had no emotional support compared to people who had one or more sources of emotional support (odds ratio: 2.9, confidence interval: 1.2-6.9).

In a large scale randomised clinical trial in the United States, researchers have tried to evaluate the effects of a psychosocial intervention on patients who have had a heart attack and who are depressed or have low social support on a combined endpoint of mortality

and a second episode of cardiac arrest (Berkman *et al.*, 2003). As part of the Enhanced Recovery in Coronary Heart Disease (ENRICHD) trial, the treatment group receive psychosocial intervention conducted by social workers and psychologists who are trained to conduct a standard protocol based on cognitive-behavioural therapy. In a 2003 publication in the Journal of the American Medical Association, the Writing Committee for the ENRICHD Investigators found no reduction in deaths or second heart attacks. However, study participants in the treatment group showed significant improvement in depression and social functioning. At 6 months, depressed patients in the treatment group had a 57% reduction in depression versus a 47% reduction in the usual care group. Patients with low social support in the treatment group had a 27% improvement in this condition compared to an 18% improvement in usual medical care.

Mitchell *et al.* (2000) found associations between feeling part of the community and health in areas characterised by varying levels of decline in industrial employment in the United Kingdom. The individual level data are taken from the 1984/5 sweep of the Health and Lifestyle Survey (HALS) of approximately 9 000 individuals. Using multi-level modelling (see glossary in Appendix 4.1) techniques and controlling for age, the authors found that not feeling part of the community raised the odds of ill health by 28%. The most marked health difference between those who feel part of their community and those who do not is amongst the middle-aged and older population, amongst whom variation in health is also greatest. Phillips *et al.* (2005) find that among elderly Hong Kong residents, although there is no direct impact of (objective) dwelling conditions on health, the relationship between dwelling conditions and psychological well-being is moderated by the degree of residential satisfaction. Residential satisfaction refers to satisfaction with the home in which one lives, but also to the physical aspects of the neighbourhood and pollution.

Young, Russell and Powers (2004) developed a measure of sense of belonging in a neighbourhood using data from a survey of 9 445 women aged 73-78 and living in Australia. A better sense of belonging was associated with better physical and mental health, lower stress, better social support and being physically active. Subramanian (2004) examined relationships between self-rated health and community social trust (measured at the level of the community) and individual trust perception (measured at the level of the individual). Using a large dataset of 21 456 individuals nested within 40 US communities and multi-level modelling techniques, the authors found that higher levels of community social trust were associated with a lower probability of reporting poor health, even after controlling for individual demographic and socioeconomic factors. Controlling for individual trust perception reduced the association to insignificance. However, the health-promoting effect of community trust was greater for high-trust individuals and, conversely, the health-promoting effect of community trust was smaller amongst low-trust individuals.

Other studies using cross-sectional data find that feelings of belonging correlate with lower rates of depression and suicide ideation (Bailey and McLaren, 2005) and that inter-personal trust is associated with happiness (*e.g.* Helliwell, 2002 cited in Layard, 2003). Hill and Angel (2005), using a sample of low-income women with children from three large, metropolitan cities in the United States find that the positive association between an individual's perception of neighbourhood disorder and heavy drinking is largely moderated by anxiety and depression. These cross sectional studies do not provide evidence of effects because it is likely that ill-health may impact negatively on social connections. For example in a qualitative study of Scottish adolescents, respondents reported that social connectedness was a source of psychological well-being and was also

helpful in relation to other health concerns. The absence of such connectedness was reported to be a source of distress and harmful in relation to health.

Summary

Social capital is hypothesised to have a direct impact on health as a result of its beneficial effects on individual attributes and activities and on providing support and social connectedness at important moments. It may also moderate the effects of health behaviours or other socioeconomic background variables, for example social capital may interact with neighbourhood wealth as a determinant of population health.

Additionally, social capital varies by neighbourhood socioeconomic status. In general, stores of bonding social capital may be stronger in neighbourhoods of lower socioeconomic status, bridging social capital tends to be found in greater amounts in neighbourhoods of higher socioeconomic status which provides residents with greater potential success in mobilising to improve their neighbourhoods.

Social networks have a positive association with health. The effects of various sources of social support, for instance family or friends, and their interactions with health vary depending on the specific dimension of health that are assessed as well as the nature of social networks. For example, for some health behaviours such as smoking or drinking during adolescence peer groups have very important effects. However, less is known about peer effects on adults' health behaviours. Our most robust evidence is from a US randomised control trial which shows that social and psychological support is significantly associated with a reduction in depression and improvements in social functioning.

What then, do we know empirically about the relationship between education and social capital? Conclusions at this stage can only be tentative. Nonetheless, a body of evidence is emerging that indicates a causal relationship between education and measures of social capital at the community level, such as voter registration, voting and some other forms of civic participation.

To conclude, the evidence indicates that social connectedness or its absence may be an important outcome of educational experience, depending on the structure and quality of provision and the nature of the experiences. Social networks and social capital and trust are also important in the formation of health outcomes. As with other elements of the conceptual model, the indirect pathways have not been rigorously and explicitly tested such that we are unable to make strong assertions about causality one way or the other, nor can we provide meaningful estimates as to the magnitude of effect sizes. This necessary caution cannot accurately be taken as evidence that these components of the model are untestable or unimportant, as neither statement would be supported by the theory or the available evidence.

Context 4: the macro-level context (inequality and social cohesion)

Changes in income inequality have been usefully reviewed by Aghion, Caroli, and Garcia-Penalosa (1999) and Atkinson (1997). Over the last twenty years we find no universal trends for income inequality, measured by the Gini coefficient. In the United States and the United Kingdom, the Gini coefficient has increased sharply, yet it has remained constant in Germany and decreased in France, Italy and Canada. For the gap in labour earnings, there has been a more general widening in several OECD nations in

recent years. This has been the case for the United States, the United Kingdom, Australia, New Zealand, Canada, Austria, Belgium and Japan. For just a few countries the gap has remained stable, however and the gap has narrowed in some periods in Finland and France, and Germany and Italy.

Education effects on inequality

The role of education on increasing income inequality or on widening the earnings gap is not straightforward. Returns to higher qualifications have increased more rapidly than those to lower levels of qualifications. This tends to be explained by skill-biased technological change.

Education also impacts on employability and so it is relevant that returns to experience have also increased over time. For example, over the same decade the ratio of wages of older to younger workers rose by 5.4% in the United Kingdom. A possible explanation for this increase emphasises the role or organisational change within firms. This is, the specific ways in which workers interact and learn in the workplace are likely to be crucial in determining their productivity, and hence wages.

Education in the aggregate could impact inequality in very different ways (Green, Preston and Sabates, 2003). In one context education could interact with social capital to promote social mobility, but this may impact upon the mobility of others. For example, Ball (2003) cites studies across a number of countries, including the United Kingdom, the United States and France, showing how the activities of middle-class parents in monopolising Parent Teacher Associations and accessing networks of "hot knowledge" concerning schools and universities impede working-class access to education. This limits the potential for education to support social mobility and reduce inequality.

Governments play a crucial role in addressing inequality by means of redistributive policies and other mechanisms of social protection. However, government actions cannot be treated exogenously (Atkinson, 1997). For instance, Nie *et al.* (1996) show that better educated people in contemporary United States are more likely to be more engaged in politics because they are or feel themselves to be better able to understand and engage with political issues effectively, and because their higher levels of education lead to jobs with better access to the "network-central" positions that facilitate political participation. Individuals with higher levels of education are in a better position to bargain for pensions and state benefits from elected governments. Similarly, increases in overall educational attainment or participation may increase the capability of voters to engage in political debate and to hold government to account. Whether or not this leads to pressures in favour of redistribution is another matter.

Effects of inequality on health

Many recent studies have explored the income inequality hypothesis (IIH), the notion that the relative level of income is a more important determinant of health than the absolute level of income. Two versions of the hypothesis can be identified. The strong version holds that income inequality is deleterious to the health of all members of a society, while the weak version posits that the effects of income inequality are felt only by the least well off in a society. Estimating the relationship between income inequality and health is difficult because of the necessarily small sample size of many cross-national studies and difficulties in data comparability. It is also difficult to fully control for the counter-hypothesis that countries with higher levels of inequality have worse health

outcomes because they include a greater number of people with poor access to resources and who therefore suffer from the ill effects of these absolute differences.

For the purposes of this review, we differentiate the papers in three primary ways. First, in terms of what version of the IIH is being tested; second, by whether the analysis is between-country or within country; and third, by whether the data used are primarily individual-level or aggregate data. The evidence with respect to the IIH, tested between countries using primarily aggregate data is mixed. Mellor and Milyo (1999), in their exploration of the relationship between income inequality – measured by the Gini coefficient – across thirty countries for 1960, 1970, 1980 and 1990, find no evidence of a robust association between income inequality and life expectancy or child mortality. In fact, in some specifications of the model, they find that income inequality is associated with increased life expectancy. On the other hand, Asafu-Adjaye (2004) using the same income inequality and income measures, and exploring the same two health outcomes finds a negative association between income inequality and infant mortality and life expectancy, although the precise finding depends on the measure used as a proxy for income. The statistically significant result emerges when the UN's Human Development Index (HDI) is used as a proxy for income. When GDP per capita is used as a proxy for income the association is no longer statistically significant.

The second group of studies explore income inequality between countries using individual-level data. Deaton and Paxson (2001b), explore the causes of mortality in Britain and the United States in the period of 1971-1998, using normal gross weekly household income as their income measure. All other variables in the model are from individual-level data, except for the Gini coefficient, which is an aggregate measure of inequality. They do not find a consistent relationship between income inequality and mortality in either country. Where the findings are statistically significant, they are surprising. For example, greater income inequality in the United States is associated with lower mortality in younger and older men.

In an explicit test of the strong version of the IIH using individual level data from the Whitehall II study in Britain and the GAZEL study in France, Fuhrer *et al.* (2002) find evidence of a strong, negative, statistically significant association between socioeconomic position and morbidity, a relationship that holds for each occupational category.

The third type of studies use individual-level data to explore how differences in income inequality within a country may affect individual health. Almost all of these studies control for income using household income or some variation of it and all include a measure of inequality. Most of the studies in this category use British or American data. As with the multi-country studies using aggregate data, the evidence here is mixed. In US studies, while Lopez (2004) finds a statistically significant negative relationship between income inequality and self-rated health, even after controlling for income, age, sex, metropolitan area per capita and education, Mellor and Milyo (1999, 2002, 2003) fail to find a consistent relationship between income inequality and various health outcomes. In an explicit test of the strong and weak versions of the IIH, Mellor and Milyo (2002) find initial support for both versions of the hypothesis. However, when a variety of controls are included in the estimation, the statistical effects become insignificant and the signs on some coefficients change.

From studies using British data, Shaw *et al.* (2000) find that almost one quarter of all deaths in Britain between 1994 and 1997 can be attributed to unfavourable economic circumstances, such as area based-poverty. By their estimation, 24% of deaths of people aged 15-64 would not have occurred had the mortality rates of the least deprived decile of

the population applied nationally. They also find striking evidence that increasing mortality is not due only to the concentration of poverty – that is, to absolute income – but in fact, that increasing mortality differentials run hand in hand with increasing levels of income inequality.

In a direct test of the notion that it is relativities that account for differential health outcomes, Wildman (2003a) investigates the relationship between absolute and relative income on self-rated mental health in Britain. Data on annual household income are supplemented by a measure of subjective financial situation. A relative deprivation measure, designed to reflect a person's felt level of deprivation is also included. Wildman argues that an individual feels more deprived as the number of individuals in a society with income y increases. Hence, individuals with income lower than 50% of average income are said to be deprived and given a value of 1, while those with income higher than 50% of average income are said to have no deprivation and are given a value of 0. Wildman finds that increases in relative deprivation increase the ill-health of women, while subjective financial status has a large, negative impact on the health of both men and women. Wildman finds support for both the strong and weak versions of the IIH. In support of the strong version of the IIH, he finds that subjective financial status is contributing a great deal to health inequality, and that health inequalities could be reduced by making poor individuals feel better off, or making the rich feel worse off. For example, for men, "good" subjective financial status is associated with a 0.829 percentage point decrease in health (sig. with t = -7.487), while "very difficult" subjective financial status is associated with a 3.411 percentage point decrease in health (sig. with t = 15.31), which contributes roughly 14% to overall health inequality. In support of the weak version of the IIH, he finds that income inequality differentially impacts those who are concentrated in the lower end of the income distribution, in this study, widowed women, retired persons and older persons. For example, although being a widowed woman is associated with a 2.219 percentage point increase in health (sig. with t =7.137), the concentration index suggests that poor health is more concentrated among those in lower income groups and that the current distribution of widowed women increases health inequality by 25%.

Summary

One consistent result of studies that investigate the income inequality hypothesis (IIH) is that education is a protective factor. That is, it moderates the relationship between income inequality and health, mitigating the effects of inequality on the health of more educated people. It is clear that education has a central role in the determination of income inequality, and other aspects of inequality. However, the role of education depends on labour market considerations, technological changes, within-firm organisation, social positioning, cultural capital, and government policies.

The evidence does not provide a clear conclusion as to the relative accuracy of the different versions of the IIH. Thus far, it appears that there is more evidence in support of the weak version of the IIH (the effects of income inequality are felt only by the least well off in a society) suggesting that relative deprivation amongst those in the lowest income group has a perceptible effect on health, though few studies have good measures of the impact of relativities on an individual's health. However many unanswered questions about the direction and magnitude of the association between inequality and health remain. Effect sizes are often large but statistically insignificant, reflecting the small sample sizes of cross-country studies.

Education effects on social cohesion

With respect to the impact of education on social capital at higher levels of aggregation, we draw on the previous work of the WBL. In a review of the literature and evidence on the macro-social benefits of vocational education and training (VET) and education and training more generally (ET), Preston and Green (2003) find a strong statistically negative relationship between educational inequality and social cohesion, using crime and social dislocation as proxies for social cohesion. Social cohesion is the term used in this study to refer to the stock of social capital at the societal level. They argue that the effect of educational inequality on social cohesion is indirect, although there is more than one pathway linking the two. The most important pathway is through income, such that much of the association between educational inequality and social cohesion appears to be mediated by income inequality, with educational inequality during childhood and adolescence leading to income inequality in adulthood, which in turn results in lower levels of social cohesion.

Preston and Green find that a skewed distribution of education impacts on crime through labour market mechanisms which increase the probability of unemployment and a lower salary for those with low levels of educational attainment. They maintain that although the evidence is still unclear, research to date suggests that income inequality and thereby educational inequality is an antecedent of some types of crime. Education may also impact upon societal cohesion through other pathways, thereby reducing (or exacerbating) other social tensions. For example, a more equitable distribution of education is associated with an increase in institutional trust and a decrease in social exclusion and spatial isolation. Preston and Green note the positional nature of education and caution that simply raising education, skills and training levels is neither a necessary nor sufficient condition for promoting macro-social benefits. Improving the distribution of educational outcomes may be one way in which education and training can make some contribution to more general economic and social redistribution.

This notion is echoed in work by Green, Preston and Sabates (2003) who use cross-national, quantitative data to explore the relationship between education and social cohesion. Using aggregated data for 15 countries from the World Values Survey (WVS), International Adult Literacy Survey (IALS), and Interpol crime statistics, they find no significant relationship between mean levels of education and societal cohesion. However, excluding outliers Germany and Norway – with the lowest and highest social cohesion scores, respectively – they find a negative, significant correlation of -0.765 between social cohesion and education inequality. In a robust regression analysis, a 0.1 change in education inequality, for example from 1.2 to 1.3, will decrease the social cohesion index by -0.583 units. Similarly – again excluding Germany and Norway – Green, Preston and Sabates find a negative, statistically significant correlation (-0.616) between income inequality and social cohesion.

Effects of social cohesion on health

Levels of social cohesion have also been shown to have a demonstrable effect on health. Havemann and Pridmore (2005) explore the relationship between educational intervention and social cohesion, and their subsequent relationship with health in Kenya. In particular, they examine the link between the Community Based Nutrition Programme's (CBNP) intervention, which implemented a social educational process, and change in social cohesion to improve the nutritional status of children aged 12 to 60 months of age. The intervention implemented by the CBNP comprised of a social

educational process using participatory learning and action (PLA) techniques at community level. This process was designed to build community capacity and enable the community to gain better access to the government services delivered to the community (health, education, agriculture, water and sanitation, etc.). Two communities were chosen with each community having an intervention group and a control group. Data for this study were collected between 1995 and 2003. When baseline data were compared to post-intervention data, their results showed that in the community with higher levels of social cohesion, the follow-up survey showed that fewer children in the intervention group were undernourished compared to the control group. However, this was not the case for the community with lower levels of social cohesion. Qualitative data collected throughout the process indicated that while opportunity structures such as equal access to and distribution of resources, capacity building and management were all important, the most important underlying variable was social cohesion. From the evidence, the authors assert that "communities with better social cohesion may be expected to mobilise themselves more quickly and efficiently for dissemination of information and for understanding and demanding voice in the political economy of the systems that surrounds them" (pp. 25).

Other evidence in support of the relationship between social cohesion and health indicates that death rates may also be two to four times as high among those who are poorly socially integrated compared with those with more friends, more social support, or more community involvement (House, Landis and Umberson, 1988; Berkman, 1995). Trust and norms of reciprocity are also associated with health (Kawachi *et al.*, 1997). Using data from the World Values Surveys and multivariate logistic regressions, Lavis and Stoddart (1999) find that trust is directly associated with health in Canada, the United States, Germany, Italy and Japan, even after controlling for potential individual-level risk factors.

Summary

We found no evidence to suggest the existence of a causal relationship between education and social cohesion on the one hand, and between social cohesion and health on the other hand. We suspect that this is because the relationships are too complex and multifaceted to lend themselves to straightforward causal relationships. This is not to suggest, however, that social cohesion is unimportant. On the contrary, we have theoretical reason to believe that education has an impact on social cohesion and that moderate to high levels of social cohesion are important for good health. In fact, there is much associational evidence, linking education to social cohesion and in turn, to health. The evidence reviewed here points to a strong association between the distribution of education – and income – and social cohesion. Much of the association between education and social cohesion appears to be mediated by income. Nonetheless, educational inequality also appears to have independent effects on social cohesion. Studies have also linked social cohesion to health. Associational evidence seems to implicate social cohesion as an intervening variable between structures, policies and interventions on the one hand, and health outcomes on the other. For example, in a Kenyan study, researchers found that policies were more likely to be implemented and yield desirable outcomes in communities with higher levels of social cohesion. It appears, therefore, that social cohesion moderates the relationship between social and economic inputs and health.

4.11. Evidence on the mechanisms: effects on the self

Self-concepts

Education effects on self-concept

The evidence is consistent that education can have positive effects on both global and specific self-concepts. Most of the evidence comes from qualitative studies, especially evaluations, but there is also consistent quantitative evidence of positive correlations between education and self-concept.

Below, we describe evidence from:

- quantitative studies that assess the relationships between initial education and levels of self-esteem and self-efficacy;
- quantitative studies investigating the impacts of adult learning;
- qualitative studies investigating the impacts of adult learning, and;
- evaluations of specific learning programmes.

Evidence that certain factors contribute to self-efficacy is presented and we suggest how these factors are likely to be affected by education. At the end of the section, we discuss what aspects of education are important for the promotion of a positive self-concept.

We have not found many studies that estimate correlations between initial education and self-concept in adulthood, but those that we have found provide consistent evidence that adults with higher levels of education tend to also enjoy relatively high levels of self-efficacy, optimism and happiness. For example, correlations have been found between years of education and self-efficacy, self-esteem, optimism and happiness amongst residents of the United States aged between 70 and 79 (Kubzansky *et al.*, 1998) and pregnant women living in California (Rini *et al.*, 1999). Hammond and Feinstein (2006) analysed data from the British cohort study of individuals born in 1958 and found that after controlling for social and psychological background factors, cohort members who had flourished at secondary school (during the late 60s and early 70s) had, at age 33 relatively high levels of satisfaction with life, optimism and self-efficacy. Interestingly, both educational attainment and engagement at school were important aspects of school flourishing for these positive outcomes in adulthood.

Feinstein and Hammond (2004) and Hammond and Feinstein (2006) analysed the 1958 cohort study data and found correlations between participation in adult learning and changes in efficacy and optimism between the ages of 33 and 42, after controlling for family, social and educational background, and current life circumstances. They were found for both men and women regardless of the levels of education at the beginning of

the course. Hammond and Feinstein (2005) supplemented the findings for self-efficacy with in-depth interviews with members of the same cohort who had left school with poor qualifications. This small-scale qualitative study similarly found that taking courses in adulthood can lead to improvements in self-efficacy for people who did not attain high or indeed any qualifications at school, although these interviews also highlighted the diversity of possible explanations for improvements in efficacy such that we cannot be sure that these indicate genuine causal effects.

Dench and Regan (2000) used a combination of quantitative and qualitative methods to investigate the impacts of participation in learning for adults aged between 50 and 71 living in England and Wales. The learners reported that learning had led to increases in their self-confidence, their enjoyment and satisfaction with life, how they felt about themselves and their ability to cope with everyday life.

A large-scale in-depth qualitative investigation of the impacts of adult learning was conducted by Schuller and his colleagues (Schuller *et al.*, 2002; Schuller *et al.*, 2004). It involved over 140 biographical interviews with adults who were currently participating in various types of adult education together with group interviews with practitioners providing adult education. One of the authors' conclusions is that:

> *"The most fundamental and pervasive benefit from learning of every kind is a growth in self-confidence" (Schuller* et al.*, 2002, p. 14).*

The study found that participation in a range of adult learning programmes could give adults the confidence to take on more active social roles, to try out new things, and to tackle issues rather than ignore them. It empowered some learners to take additional courses and apply for jobs, and to visit places that they would not otherwise have visited, such as art galleries, museums, libraries, and to travel abroad. Learning led to improvements in self-esteem, self-understanding, a clearer sense of identity, the capacity to think independently, a sense of purpose and hope, improved competencies and communication and better social integration (Hammond, 2004). Respondents of both genders, all ages, every ethnic background interviewed, every occupational class, all levels of previous education, and living in families or households of every kind mentioned that they had experienced increased self-esteem (maybe not using this precise term) as an outcome of learning at some point during their life. Almost as many types of respondents mentioned outcomes of learning, such as self-understanding, doing something for oneself, and purpose and hope (Hammond, 2004).

Numerous evaluations of educational initiatives provide evidence that outcomes include self-esteem, self-efficacy and self-understanding, for different types of courses and for different groups of people. These include evaluations of courses in higher education in England taken by mature women (Cox and Pascall, 1994), adults participating in higher education and access courses in England (West, 1995), adults in England who were returning to education (Hull, 1998), older adults receiving mentoring support on a psychosocial support programme in the United States (Koberg, Boss and Goodman, 1998), and courses offered at various levels to adults with chronic health problems and/or employment difficulties living in England (McGivney, 1997).

Wertheimer (1997) reviewed evaluative studies of community-based adult education courses that were attended by mental health service users. She also conducted a survey of over 30 such courses using questionnaires to investigate the experience of participants. She concludes that for mental health service users, participation in these community-based courses led to improvements in confidence, self-esteem, self-efficacy and mental

health. More recent qualitative studies indicate that participation in education has positive outcomes for mental health service users (*e.g.* Westwood, 2003).

Theodorakou and Zervas (2003) found that physical education had impacts on children's self-esteem. They examined the influences of two PE teaching methods on children's self-esteem in a publicly-funded school in Athens. Both methods were associated with increases in self-esteem but the more child-centred approach, which used group discussion and creative techniques was associated with increases in all aspects of self-esteem – cognitive, physical and social, as well as global – whereas the more traditional teacher-directed methods of teaching PE were associated with increased global self-esteem but more particularly with the physical as opposed to the social aspects.

Bandura (1997) reviews the evidence to examine the sources of self-efficacy. One source of self-efficacy is vicarious experience, which refers both to learning from the competence of others (*e.g.* teachers and peers) and social comparison. Social comparison is inevitable in educational settings because students are aware of and interested in each others' attainment and ability.

Another source of self-efficacy is verbal persuasion, when significant others express faith in one's abilities rather than convey doubts. This source of self-efficacy is also relevant to education because students receive from their teachers and peers explicit as well as implicit feedback on their performance and abilities. Bandura suggests that verbal persuasion has more impact when it is within realistic bounds and on people who already believe that they can produce effects through their actions (Chambliss and Murray, 1979a and 1979b), so we predict that teachers' feedback to pupils is particularly likely to impact on their self-efficacy.

The arguments and studies described above present a glowing impression of the potential impacts of education on self-concept. It is important to remember, however, that education also has the potential to undermine self-esteem and self-efficacy and create confusion. In the first study described in this section, Hammond and Feinstein (2006) found that adults who had flourished at secondary school had relatively high levels of efficacy, life satisfaction and optimism. However, every member of this cohort should have attended secondary school and according to the definition used in the research, about half of this group did not flourish there and have relatively low levels of efficacy, life satisfaction and optimism.

Similarly, not all evaluations of adult education programmes report positive impacts of participation. For example, Randle (2003) found that amongst students on a diploma course in nursing, global self-esteem decreased dramatically between the start and the end of the course. The qualitative part of the study indicated that during the 3 years, students felt increasingly powerless to be the sort of nurse they wished to be.

Participation in particular educational streams also appears to have consequences for self-esteem and they are positive for some streams and negative for others. Houtte (2005) examined the consequences for global self-esteem of being in a technical/vocational secondary school as opposed to a general secondary school in Belgium. Houtte found that boys in technical/vocational schools have lower self-esteem than boys in general schools, but for girls there was no difference with school type.

In contrast, a much larger scale study using data from the OECD Programme for International Student Assessment (PISA) found that academic (as opposed to global) self-concept is negatively correlated with the level of average achievement in the school attended (Marsh, 2003). The correlation was statistically significant in 24 of the

26 countries included in the study and non-significantly negative in the remaining two countries. It is equally strong regardless of the individual student's level of achievement. Marsh refers to the relationship as the Big-Fish-Little-Pond Effect (BFLPE).

So which aspects of education are important if we wish to increase levels of self-efficacy, self-esteem and well-being? In the large-scale qualitative study described above, Schuller *et al.* (2002, 2004) found that participation in adult learning programmes has the potential both to promote and undermine psychological development. This is because participation involves risk taking; in order to learn, the individual must be prepared to admit a degree of ignorance and adopt new aspects of knowledge and perspective or try out new skills. If learners feel successful in their endeavours or if they feel that they have benefited from the experience, this will make them feel more confident in themselves and more confident about taking risks. Consequently, it will build their sense of self-esteem and self-efficacy. It may also broaden their horizons so that they understand themselves in a different context, invest more in their future and change their hopes and aspirations. Lack of success, on the other hand, can undermine self-esteem and aspirations and lead to alienation.

The content of what is learnt, the pedagogical style and who one learns with are aspects of learning that influence psychological development (Schuller *et al.*, 2004). For example, self-esteem and self-efficacy increase as learners are praised or receive formal feedback or accreditation for succeeding in tasks which they perceive as challenging. Courses in the social sciences taught through discussion with students from diverse backgrounds promote self-understanding and independent thinking and can lead to changed hopes and aspirations (Preston and Hammond, 2003).

Effects of self-concept on health

We first of all present evidence that self-concept affects health. Most of the evidence presented relates to the effects of self-esteem on eating disorders and suicide. The rest of the section presents evidence concerning relationships between self-esteem and self-efficacy and other factors that impact on health and well-being. These other factors are health behaviours, management and perception of ill health, and coping with stressful circumstances.

We draw on a review of the evidence for causes and consequences of low self-esteem conducted by Emler (2001). He does not address education as a potential cause of self-esteem, but the consequences he considers include eating disorders and suicide. In relation to eating disorders, his first point is that the evidence for a simple correlation between low self-esteem and eating disorders is consistent, extensive and incontrovertible. Studies using cross-sectional data find associations between low self-esteem and anorexia, bulimia, binge eating, disordered eating, unhealthy weight loss, and attitudes toward eating. The association appears to be with global self-esteem rather than with a sum of a set of evaluations about the self.

Prospective studies provide more evidence about the causal relationships linking self-esteem and eating disorders. This research finds that low self-esteem predicts later indications of an eating disorder, although the magnitudes of the associations found are not very large. Calam and Waller (1998) note that the more accurate predictor of eating problems at 19 years old was eating attitudes rather than level of self-esteem at age 12. This raises the question of whether low self-esteem predicts problematic eating attitudes, which lead to eating disorders later on, or whether the association at age 12 exists for

some other reason (for example, lack of family support might affect both self-esteem and attitudes toward eating). Studies that examine the relationships between self-esteem and subsequent changes in eating behaviours still find correlations indicating that low self-esteem may contribute to eating disorders.

Further research in this area indicates that self-esteem is linked to body dissatisfaction. For boys, the aspects of body that are important for satisfaction appear to be chest size and musculature whereas for girls, size and weight are more important. Researchers have investigated whether self-esteem mediates or moderates relationships between body dissatisfaction and eating disorders. Self-esteem may also mediate relationships between eating disorders that develop after stressful experiences such as sexual abuse and parental disapproval.

Numerous studies using cross-sectional data indicate a simple association between low self-esteem and suicide ideation and suicide attempts in a variety of age and cultural groups. A smaller number of longitudinal studies find that low self-esteem predicts later suicidal ideation, suicide attempts and suicide. It appears from other studies that low self-esteem is one of a range of risk factors for suicidal ideation, suicide attempts and suicide. However, the relative importance of self-esteem compared to other contributing factors is difficult to assess.

Studies that investigate the risk factors for suicidal thoughts and/or behaviours provide mixed evidence about the relative importance of self-esteem. In some studies, after including all hypothesised risk factors, the contribution of self-esteem remains statistically significant, whereas in others, it does not. Whether self-esteem remains an important predictor of suicidal ideation and suicide attempts seems to depend on which other risk factors are included in the analysis and how they are constructed.

Self-esteem is closely associated with other measures that are used to assess a person's feelings about themselves, such as depression, negative affect, hopelessness, fatalism, and locus of control. Such measures are included in all of the analyses in which self-esteem does not appear to be an important predictor of suicide ideation or attempts but they are not included in many of the studies which find that self-esteem is a risk factor. It is likely that the observed salience of self-esteem as a risk factor depends on how these measures are constructed and how many are included in analyses that examine the risk factors for suicide. What we can conclude is that how a person feels about him/herself – in other words, his/her self-concept – is almost certainly a risk factor for suicide ideation and suicide attempts.

An additional study provides evidence of an association between self-concept and health and well-being. Herzog *et al.* (1998) found that agentic self-concept (active, hardworking and competitive), and to a lesser degree social self-concept (loved, caring and outgoing) were each correlated with health and well-being amongst older adults living in Detroit, United States.

The rest of this section presents evidence concerning relationships between self-esteem and self-efficacy and other factors that impact on health and well-being; health behaviours, management and perception of ill health, and coping with stressful circumstances.

Emler (2001) reviewed the evidence about the consequences of low self-esteem for drug use and abuse, smoking, and alcohol abuse. He concludes that there is no clear evidence to suggest that these health behaviours are consequences of low self-esteem.

The studies that Emler cites provide contradictory evidence about whether a correlation exists between low self-esteem and drug use and abuse. Neumark-Sztainer *et al.* (1997) used a much larger sample than any others – over 12 000 11- to 12-year-olds. They found a link between low self-esteem and substance abuse but the association was very small in magnitude (a correlation of 0.2). That is to say that if everyone in the sample had had the same level of self-esteem, the variation in substance abuse would have been reduced by only 4%. However, longitudinal studies that assess relationships between earlier self-esteem and subsequent drug use and abuse do not find any such correlations (*e.g.*, McGee and Williams, 2000).

The story is very similar in relation to smoking. Many cross-sectional studies provide evidence that people who smoke tend to have lower self-esteem and many others fail to find these correlations. Most longitudinal studies find no evidence that earlier low self-esteem predicts subsequent smoking (*e.g.* McGee and Williams, 2000; Koval *et al.*, 2000).

There is consistent evidence that alcohol abuse correlates with low self-esteem but longitudinal studies do not find associations between low self-esteem earlier on and subsequent alcohol abuse.

A prospective study (cited above) that examines relationships between self-esteem and multiple health compromising behaviours provides some evidence of a correlation. McGee and Williams (2000) used a survey to measure self-esteem and health behaviours amongst a large sample of young people living in New Zealand. Self-esteem was measured when the young people were aged 9-13 and health behaviours were measured when the same children reached the age of 15. The authors found that global but not academic self-esteem was associated with subsequent multiple health compromising behaviours, for example self-reported problem eating and suicidal ideation. Neither global nor academic self-esteem was associated with the other individual health behaviours.

Studies that provide evidence of relationships between self-efficacy or self-esteem and health behaviours amongst adults tend to estimate interaction effects of these predictors with other factors, for example, perceived risk, mood and attachment style. Using cross-sectional data, Rimal (2001) found that there was a statistically significant interaction between self-efficacy and risk perception on US-dwelling individuals' motivation to think about cardiovascular disease (CVD) issues, use of health information and knowledge acquisition. The study also found similar results longitudinally over a two-year and a six-year period. Huntsinger and Leuken (2004) surveyed 793 university students assessing attachment style, self-esteem and health behaviour. Students with secure attachment styles had higher self-esteem and healthier behaviours than students with insecure attachment styles. Self-esteem partially mediated the relationship between attachment style and health behaviour. This suggests that the development of self-esteem may represent a pathway through which individual styles of interaction with significant others can impact on health behaviours.

There is also some evidence that low self-esteem mediates the effects of other variables on drug use. For example, Dembo *et al.* (1987) found that, for a sample of juvenile inmates, experience of physical abuse appeared to result in drug use and that this was partly mediated by the effect of the physical abuse on self-esteem. Andrews and Duncan (1997) found, in a longitudinal study, that low academic motivation at 13 led to later marijuana use and that this effect was partly mediated by the impact of academic motivation on low self-esteem.

Various studies provide evidence that self-esteem and self-efficacy affect the management and perception of ill health. For example, Wu, Tang and Kwok (2004) found that low self-efficacy and external health locus of control were each correlated with psychological distress in 159 elderly Chinese women who had chronic physical illnesses. This was a prospective study of the importance of multiple sclerosis self-efficacy (MSSE, that is, self-efficacy relating to the condition) on self-reported health status amongst adults with multiple sclerosis (MS). Data were collected on admission to hospital for treatment and then six weeks later. Multiple regression analyses found that changes in perceived walking ability and changes in the perceived impacts of MS correlated with both MSSE on admission and with changes in MSSE. Hampton (2004) examined the factors that contribute to the subjective well-being of individuals with spinal cord injuries. General self-efficacy, perceived social support, perceived health and age at injury were correlated with subjective well-being whereas income, gender, ethnicity and educational level were not.

The studies described above concern the contribution made by self-efficacy to coping with ill health. Other studies concern the contribution of self-efficacy and self-esteem to coping with other stress-inducing circumstances. Mikkelsen and Einarsen (2002) investigated the relationships between exposure to workplace bullying and self-reported psychological and psychosomatic health complaints. General self-efficacy moderated the correlation that was found between exposure to bullying and psychological health complaints; those with higher general self-efficacy tended to be slightly less affected by the exposure than those with lower general self-efficacy. Intriguingly, Shimizu and Pelham (2004) found that amongst a sample of 171 US undergraduates, positive life events were associated with better health only for those with high self-esteem. Among students with low self-esteem, positive life events were associated with poorer health.

Bandura (1997) discusses the effects of self-efficacy on health through biological mediators. He argues that the biological effects of self-efficacy beliefs largely arise while coping with acute or chronic stressors in everyday life. Experiments, performed mainly with animals (Shavit and Martin, 1987; Bandura, 1991; Maier, Laudenslager and Ryan, 1985), suggest that stressors do not result in physiological damage if an individual feels that he or she has control over them. However, stressors over which an individual has no control are associated with various negative physiological impacts including impaired immunological function (Peterson and Stunkard, 1989; Schneiderman, McCabe and Baum, 1992; Steptoe and Appels, 1989).

Summary

There is considerable evidence of important and interesting associations between features of educational experience and self-concepts and between self-concepts and health.

In terms of the link from education to self-concepts, the evidence suggests that self-concepts are not fixed but may be influenced by experiences of learning at any age. However, if signals about low ability are consistently repeated in a context in which ability is also believed to be fixed and innate, negative self-concepts become harder to change, presenting a barrier to subsequent participation in learning. Perceptions of relative achievement in learning environments have been rigorously shown to impact on self-concepts of ability. Causal processes relating to global self-esteem and self-efficacy, as compared to academic self-concepts are related to education in a less straight-forward way, as individuals with low academic self-efficacy will reduce their valuation of the

importance of school in order to protect their global self-concept. However, global and academic self-concepts will tend to be positively correlated. Although this suggests important effects of education on self-concepts, the causal effects implied by such a statement have not been precisely and rigorously estimated.

In terms of impacts on health, many of the observed associations suggest that self-concepts such as self-esteem can change the way life events impact on individuals, providing resilience and protection. The balance of the evidence suggests that low self-esteem is an important risk factor for some health outcomes such as suicide, eating problems and sexual risk-taking but not for others such as use of risky substances such as drugs, alcohol or tobacco.

We conclude from this evidence that self-concepts may be an important channel for effects of education on health but we see the need for more rigorous testing of causal processes and more assessment of the full mediation model. We also conclude that the education effect is more the result of effects of the quality of education than of effects of quantity.

Beliefs about health and health care

Effects of beliefs on health outcomes

Research on the potential for education to influence beliefs and thus behaviour change has generally been found in public health literature reporting the results of interventions built around the Health Belief Model. These specific educational interventions aim to address notions of susceptibility to and severity of conditions and the benefits and consequences of taking action to prevent ill health. Through assessing initial attitudes, perceptions and barriers to screening for colorectal cancer in a population of nearly 3 000 UK adults aged 55-64, Wardle *et al.* (2003) subsequently designed a psychoeducational intervention to increase attendance. An information guide including facts on colorectal cancer and screening and addressing psychological barriers to attendance was mailed to half of the study population. Analysis comparing rates between the intervention and control group found significantly higher (3.6%) attendance among the population receiving the information guide. More specifically, members of the intervention group exhibited lower scores on negative attitudes toward screening and indicated a positive change in the social norms around screening.

To prevent transmission of HIV, numerous interventions have been designed to increase information about the virus and to increase condom use particularly among high-risk populations such as gay men and young people. Albarracin *et al.* (2003) conducted a meta-analysis of 46 longitudinal reports, including 82 independent treatment groups and 29 independent control groups, of the effects of communication interventions in changing behaviour around condom use. Taken together, these interventions appeared to increase knowledge on condom use, and slightly changed attitudes, control perceptions and intentions to use condoms, but did little to alter behaviour. However, particular populations were more likely to benefit from this type of intervention than others. Communication interventions were more effective at increasing condom use when the study population included greater proportions of men and for participants with higher risk for HIV infection.

Minority groups within larger populations often miss the messages designed to educate the dominant culture about health and health care. Socio-culturally tailored interventions use information about specific groups to design programmes that are sensitive to the beliefs, attitudes and concerns of a particular population. Ahmad, Cameron and Stewart (2005) reported on an intervention to improve knowledge and beliefs about breast cancer and attendance for screening among South Asian women living in Canada. Articles written in appropriate languages and addressing cultural beliefs and concerns related to breast cancer and screening were printed in community newspapers. Pre- and post-intervention tests with 74 participants indicated a significant increase in clinical breast examinations and a decrease in beliefs about low levels of susceptibility to breast cancer for South Asian women, perceptions of short survival after diagnosis and barriers to screening.

Effects of beliefs on health outcomes

Parental beliefs can affect the uptake of preventative health care services for children, as for example in the case of vaccinations. Bennett and Smith (1992) explored parents' beliefs about infectious diseases and found that parents showed concern about the triple vaccination in the United Kingdom even before the controversial media publications. Parents show concerns despite believing in the importance of immunisations (Bardenheier *et al.* 2004). In a study using postal questionnaires of 126 respondents in a community in Gloucestershire, Duffell (2001) found that the main reason cited for not being vaccinated included the safety of the vaccine and its effectiveness. She further found that many parents believed that measles is important for a child's development and had beneficial effects for the child's immune system. In a small survey in one London borough, Smailbegovic, Laing and Bedford (2003) found that nearly half of the respondents whose child was not fully immunised perceived having their children vaccinated as more risky than non-immunisation, particularly for measles, mumps and rubella (MMR). This was also found by Evans *et al.* (2001) using six focus groups in Avon and Gloucestershire. They found that most parents were highly concerned about MMR vaccination, but not about immunisations in general. Evans *et al.* further found that parents' lack of confidence in health professionals is in some part due to their knowledge that heath professionals have to reach targets for vaccination in order to be paid. Therefore, the advice of health professionals is not seen as beneficial for the child, but rather as self-interested.

Sutton and Rutherford (2005) investigate socio-demographic and attitudinal correlates of self-reported cervical screening uptake. Attitudes and beliefs about cervical screening are measured by i) the perceived effectiveness of cervical screening; ii) the perceived risk of cervical cancer, iii) worry about cervical cancer; iv) anticipated embarrassment and pain. Using a sample of approximately 1 500 British women who were surveyed between March and May 1999 and multiple logistic regression controlling for a range of socio-demographic variables, Sutton and Rutherford find no evidence that the effects of marital status and education are mediated by attitudinal variables. However, anticipated embarrassment and negative attitudes to screening were significant independent predictors of uptake. This further indicates the importance of beliefs as influences on health outcomes.

Wardle *et al.* (2004) explore socioeconomic variation in participation in screening for colorectal cancer. Using data from a randomised controlled trial of colorectal cancer screening in the United Kingdom on individuals aged 55-64 years old, they test the extent

to which a range of different types of beliefs and attitudes explain socioeconomic variation in the intention to take up an offer for bowel cancer screening. Their results from a series of logistic regressions on a sample of approximately 10 000 individuals, show that after controlling for demographic variables and some health-related variables, the measures which explained the association of screening with SES were the perceived risk and worry about the risk of the cancer, not the perceived stress about the test or the level of social support. Again, this highlights the importance of very specific beliefs about risk in the determination of health behaviours – here the uptake of a preventative test. It also shows how social difference in the beliefs held may in part explain SES variations in health.

In a paper focusing on beliefs about salt and its impacts on health, Smith *et al.* (2006) find that older adults try to reconcile their use of traditional meals, high in salt, with their compliance with medical recommendations. Their paper draws on qualitative studies conducted among older adults in the rural, southern United States. The data were collected in two marginalised and ethnically diverse rural communities. A total of 116 African American, Native American and white adults aged 60 years and older participated in 55 in-depth interviews or seven focus groups. Results show that while adults value their traditional foods and cuisine, which contains high proportions of salt, they also acknowledge the negative sides of salt intake for health. However, there are multiple beliefs on how salt impact upon health. These beliefs are important in mediating the relationship between GPs' guidelines and the patients' own interpretations, which may result in non-compliance with medical recommendations.

Summary

The relationship between education and beliefs is typically measured through randomised controlled trials testing the efficacy of interventions in changing perceptions that influence health behaviours. Following an intervention for increasing colorectal screening among UK adults, a psycho-educational intervention increased attendance among the treatment groups by 3.6%. A meta-analysis of randomised controlled trials which tested the impact of communication intervention in increasing condom use to prevent HIV showed that there was success in changing attitudes toward condom use and the increased intent to use a condom, but that there was not any success in changing behaviours. A smaller study among South Asian women in Canada was successful in increasing attendance at clinical breast examinations and promoting accurate understandings of susceptibility to and severity of breast cancer among South Asian women.

Educational interventions are designed specifically to address particular beliefs around health and health care, as perceptions about health and health care drive choice about health behaviours for adults and their children. Cross-sectional data from studies in large UK samples, demonstrated that after controlling for socio-demographic factors, negative perceptions and beliefs about cervical cancer screening and stress and anxiety related to colorectal cancer screening were independent predictors of uptake. In small surveys of parents in the United Kingdom, explanations for deciding not to vaccinate their children centred around beliefs about the safety and utility of immunisations, particularly MMR.

Patience

Intertemporal choices are defined as decisions involving tradeoffs among costs and benefits occurring at different times (Frederick, Loewenstein, O'Donoghue, 2002). Empirically, time preference can be captured by the discount rate parameter. Estimates of this parameter can be derived from real events that include behaviours such as the decision to purchase electrical appliances that include differential initial and long run operating costs. Other estimates are derived from experimental surveys, where individuals respond to the question: "Which would you prefer: GBP 100 today or GBP 150 in one year?"

Education effects on intertemporal choices

It has been suggested by Fuchs (1982) and Farrell and Fuchs (1982) that intertemporal choices may be a factor inclining individuals to invest in both education and a healthy lifestyle. In terms of education, future orientation can be seen as a mediating factor between education and health-related behaviours – a social causation effect. Grossman and Kaestner (1997) quote Becker and Mulligan (1997), who argue that through the study of history, and through thinking about adulthood and imagined scenarios, pupils may learn to think in a future oriented manner.

Bishai (2004) investigates the factors that are associated with changes in time preference over time. Data used in this study combine the National Traumatic Occupational Fatality and the NLSY. The time preference parameter is estimated using Becker and Mulligan's (1997) theoretical approach. This time preference parameter links the actual risk of fatality per occupation to the wage received by the individual. One assumption made about the time preference is that individuals perfectly perceive the risk of fatality in their occupation. Using multilevel models, results show that highest level of schooling completed is associated with a future time preference. Furthermore, when the level of schooling is controlled for, ability as measured by the Armed Forces Qualification Tests is associated with a more immediate time preference. The author explains this finding by implying that the component of ability that is required to continue in schooling is associated with immediate time preference, but achievement in schooling is associated with future time preference. Clearly there are complex interactions between time preference, schooling and cognitive capability.

Benjamin and Shapiro (2005a), using probit estimation to analyse data collected from two laboratory studies – one conducted with Harvard undergraduates and one with Chilean high school students – find that individuals with greater cognitive ability are more patient over short-term trade-offs and less risk-averse over small-stakes gambles. In both studies, mathematical ability seems to be more predictive of normative decision-making than verbal ability. In the sample of Chilean students, achievement in elementary school is strongly predictive of decisions made at the end of secondary school. Drawing on the National Longitudinal Survey of Youth 1979, they show that, even after controlling carefully for labour income, more cognitively skilled individuals are more likely to participate in financial markets, are more knowledgeable about their pension plans, accumulate more assets, and are more likely to have tax-deferred savings. These findings persist when they use sibling relationships to identify models using within-family variation in cognitive ability. Finally, various institutional measures of school quality are predictive of sophisticated decision-making, suggesting a possible role for education in reducing the impact of psychological biases.

Also in terms of schooling, there is evidence against the hypothesis that education is associated with future time preference. In a pilot study with 257 adult Tsimane Indians, a group of horticulturalists and foragers, in the Bolivian rain forest who were 16 years old or older, Godoy and Jacobson (1998) test hypotheses about the socioeconomic and demographic covariates of time preference. Subjects were asked to make a choice between receiving one candy now or two candies at the end of an interview that lasted 1.5 to 2 hours. Results of a multivariate probit regression after controlling for income, wealth, illness, sex, age, nutritional status, and parents education suggest that own education, measured by the maximum number of years of schooling completed, was associated with greater desire for immediate gratification and illness was associated with greater likelihood of willingness to wait. Age, sex, nutritional status, income, and wealth played a weak role in willingness to delay gratification.

Other evidence finds that the degree of educational effects on time preference depends on the size of the future payment or reward. Jaroni *et al.* (2004) explore the relationship between education and delay discounting in a group of 77 smokers enrolled in a smoking cessation trial in the United States. Education is categorised as i) no college ii) some college and iii) college graduate. Delay discounting was measured using a questionnaire and a computerised adjusting procedure that provided subjects the choice between an immediate and a delayed reward. After controlling for age, gender, BMI, marital status, education, race and smoking history, Jaroni *et al.* found that individuals were likely to discount small rewards more than large rewards. They also found that smokers were more likely to discount future rewards than non-smokers.

Effects of intertemporal choices on health

Does time preference affect health? That is, will more future oriented individuals invest more on health today relative to the future? Theoretical models suggest that uncertainty about future illness and the importance of prevention may increase the demand for current health and health behaviours in future oriented individuals.

Some studies suggest that time preference does not affect current health status. For example, Fuchs (1982) measures time preference in a telephone survey by asking respondents questions in which they choose between a sum of money now and a larger sum in the future. He includes an index of time preference in a multiple regression in which health status is the dependent variable and schooling is one of the independent variables. This study does not demonstrate that the schooling effects on health are due to time preference as the time preference variable is not statistically significant. But in terms of health behaviours, Farrell and Fuchs (1982) find that time preference explains the relative differences in the probability of smoking that are observed at age 24 for individuals with different years of schooling.

Bogin, Komlos and Smith (2004) investigate the links between the rate of time preference and obesity. A high rate of time preference lowers the value of future benefits, hence current food consumptions and the pleasure of leisure become more important than future benefits that may result from diet and exercise. Empirically, the authors use US data on savings rates and consumer debt over time as indicators of the rate of time preference. Both of these relate to consumers' impatience. Comparing these to US obesity rates over time, trends indicate an increase in obesity by 112% whereas the saving rate has decreased by 83% and debts have continued to increase as a proportion of disposable income. In international comparisons, Bogin, Komlos and Smith further find that countries with lower saving rates have higher obesity rates. Countries such as Finland,

Spain and the United States have low saving rates and high obesity rates, whereas Switzerland and Belgium have the highest net domestic savings rates and their obesity rates are about half that of the United States. The evidence is from a cross-section of countries rather than a panel.

Picone, Sloan and Taylor (2004) explore the role of risk, time preference, expected longevity, uncertainty, and education in a woman's demand for regular breast self-exams, mammograms, and Pap smears. They use data from the first three waves of the Health and Retirement Survey (HRS), which was conducted in 1992, 1994, and 1996, limiting the sample to women between the ages of 50 and 64. The schooling variable could take one of three values 1) less than high school 2) high school 2) college graduate. The result of their analysis using probit estimation indicates that individuals with a higher life expectancy and lower time preference discount rates (*i.e.* more patience) are more likely to undergo cancer screening. Less risk-averse individuals are more likely to undergo testing.

Summary

Intertemporal choice may be an important influence on individuals' health outcomes. Its effects may precede education and health and impact upon both schooling and health outcomes. This is known as the time preference hypothesis, which induces endogeneity bias in empirical studies. Alternatively, intertemporal choice may be an outcome of education, in which case its effects may mediate the impact of schooling on health (the mediation effect hypothesis). The evidence on the pathway is unclear and so we cannot be sure about which of these hypotheses portrays the most accurate relationship between intertemporal choices, education and health outcomes.

Evidence on whether education affects time preference is mixed. Some results suggest that education is associated with future orientation. Other studies suggest the opposite, that education is associated with immediate gratification. Another study suggests that the impact depends on the size of the future payment. In terms of the role of cognitive ability results are also mixed. Some evidence suggests that cognitive ability is associated with immediate time preference and others suggest the opposite.

Also with respect to health, studies suggest that the rate of time preference for health outcomes varies. We expect that future oriented individuals will discount the future at a slower rate. But the variation in estimated coefficients does not support this evidence. We do find, however, some suggestive evidence for preventative health care, that future oriented individuals tend to utilise more services.

Reasons for this mixed evidence are provided by Frederick, Loewenstein and O'Donoghue (2002). Based on a review of the literature, they also find a huge variability in the estimates of discount rates. This is partly because of the lack of controls for confounding bias (*e.g.* change in expectations, habit formation, uncertainty, inflation) and also because of wide variation in the methods used to measure discount rates (real world behaviours or experimental studies). Frederick *et al.* recommend the development of theoretical models that account for the fact that intertemporal choices reflect different considerations and several motives before estimating the effects of factors on time preference empirically.

Resilience

Education effects on resilience

There are two sources of evidence for effects of education on resilience. The first comes from combining the findings of studies that examine the outcomes of education such as competencies, self-concept and social connections with studies that seek to identify the factors that contribute to resilience. Many of the factors that contribute to resilience turn out also to be outcomes of education. The second source of evidence comes from attempts to understand how to promote resilience in children and how education, in particular schools, can contribute. We mainly draw on reviews of the evidence. Our conclusion is that schools and adult education have the potential to promote resilience in children and adults but there is little evidence about whether and to what extent they do.

Howard, Dryden and Johnson (1999) review theoretical and empirical literature relating to the development of resilience amongst children. Resilience is defined by success later in life despite growing up in contexts that include a number of risk factors. The authors conclude that the following "internal attributes" characterise the resilient child: autonomy, problem solving skills, a sense of purpose and future, and social competence. These "internal assets" relate very closely to some of the outcomes of education that we describe elsewhere in this section, such as self-concept, inter-temporal choice, and sense of connection with other people. Similarly, Gilligan (2000) draws on evidence from a range of studies to examine the developmental factors that influence the resilience of children and young people. She emphasises the importance of a secure base, self-esteem and self-efficacy. This is not sufficient to show that learning leads to the development of resilience but indicates possible pathways for such an effect.

Place *et al.* (2002) similarly review evidence for the protective factors that reduce the risk of developing mental health problems in later life despite exposure to serious risk and adversity. These factors fall into three broad categories; individual factors, family factors, and aspects of the wider social context (Rutter, 1987; Masten, Best and Garmezy, 1990; Werner and Smith, 1992). Several of the individual factors may also be outcomes of education, for example, high self-esteem and a positive self-concept, ability to self-reflect, maintaining a positive outlook and being able to interact positively with others. Other individual factors include being self-reliant and being able to think and act independently and problem-solving abilities, which are also outcomes of education for some individuals (Schuller *et al.*, 2004). However, as we have said schooling or learning experiences only lead to these outcomes if the experiences are appropriate and satisfactory and this is not guaranteed. Bernard (1991, 1995) suggests that schools should foster social competence, problem-solving skills, a critical competence, autonomy and a sense of purpose in students and that these competencies will contribute to the development of resilience. However, suggesting that schools should foster these capabilities is not the same as finding that they do. Indeed, some schools may do the opposite.

Place *et al.* (2002) suggest that having high levels of activity is another factor that contributes to resilience. This may be an outcome of adult learning; participation in adult learning is associated with adults taking increased levels of exercise and higher levels of civic participation (Feinstein and Hammond, 2004).

Aspects of the wider social context that contribute to resilience include influences exerted by peers (*e.g.* school friends) and having a supportive relationship with an adult outside the family (*e.g.* a teacher) (Place *et al.*, 2002). Overall, having a positive experience within school life exerts an influence beyond the pure impact of academic achievement (Hechtman, 1991; Rutter *et al.*, 1979).

Schoon (2001), Schoon and Parsons (2002), and Schoon and Bynner (2003) list factors that are associated with the development of resilience in children. Resilient children tend to enjoy school, show a strong belief in their ability and have high educational aspirations. Their parents read to them, visit their teacher to discuss the child's progress, generally show an interest in their education and want their children to continue with education after the minimum school leaving age of 16. A teacher who recognises a child's capabilities and invests time in supporting him or her may also contribute to the development of that child's resilience. These "protective factors" indicate the potential that school and adult education have in the promotion of resilience.

Many writers emphasise the potential importance of teachers in the development of resilience amongst disadvantaged children. For example, Gilligan (2000) suggests that schools provide the opportunity for disadvantaged children to form relationships with adults who are reliable and responsible and give the child the security they need to develop trust, autonomy and initiative (Werner and Smith, 1992; Gilligan, 2000; Comprehensive Training to Assure Resilience in Students, 1996). Evidence from educational interventions suggests that teachers' expectations of disadvantaged children and their support for their education may be critical to breaking the intergenerational transmission of disadvantage (Rutter, 1989; Schweinhart, Barnes and Weikart, 1993; Duncan and Brooks-Gunn, 1997; Schoon, Parsons and Sacker, 2004; Clifton *et al.*, 2004).

Educational success is associated with resilience amongst socially disadvantaged children. Using data from nationally representative British cohorts born in 1958 and 1970, Schoon and Parsons (2002) find that amongst socially disadvantaged cohort members, academic attainment at age 7 predicted success in education and employment at age 26 as well as delayed childbearing. Schoon, Parsons and Sacker (2004), using the 1958 cohort data similarly find that amongst socially disadvantaged cohort members, academic attainment at age 16 predicted adult work success and health at age 33. Academic success at school therefore appears to be a signal or marker of future success; it is not necessarily a cause of future success because other factors such as family values and aspirations might be the root causes of all these outcomes (at ages 7, 16, 26 and 33). Nevertheless, educational success in academic, sporting or social spheres may assist recovery from adversity (Romans *et al.*, 1995; Comprehensive Training to Assure Resilience in Students, 1996).

As mentioned above, Gilligan (2000) describes school as potentially providing a secure base for children who otherwise lack one because it provides a community to which children feel that they belong; routines and structures, which are predictable and become familiar; relationships with adults who are reliable and responsible and give the child security; and an experience of success. Adversity has cumulative impacts, that is, children may be able to cope with one or two serious adversities in their lives, but as they experience more, the cumulative negative impact increases dramatically (*e.g.* Rutter, 1990). For children who experience adversity at home, school may provide a haven of respite in another sphere of their life (Gilligan, 2000). For children growing up in care, school offers an opportunity to identify with peers who are not in care and who do not

face similar difficulties (Aldgate, 1990). However, bullying and other forms of discrimination or negative environmental insult may also result from these interactions.

Howard, Dryden and Johnson (1999) suggest that what is most important for a school to be effective in promoting resilience is the direct practices over which teachers have most control, for example, classroom management, classroom climate and teacher-student interactions. Neighbourhood demographics and state and school policies are less important for each child but they impact on many more individuals than the classroom.

In relation to whole school policies, Howard, Dryden and Johnson (1999) suggest that resilience is enhanced if education is provided within a setting which is challenging but co-operative, inclusive but heterogeneous, and which encourages active participation. In a survey of over 10 000 managers and lecturers working in further education in England, respondents suggested that very similar aspects of provision are important in generating the psychosocial components of resilience (Preston and Hammond, 2003). Rutter *et al.* (1979) reviewed research evidence concerning family and school influences on behavioural development and concludes that successful schools are characterised by a combination of firmness, warmth, harmony, high expectations, good discipline and a practical approach to training.

Effects of resilience on health

Resilience refers to the dimension of individual difference that spans the ways we deal with adversity and stressful conditions and how they affect us (*e.g.* Garmezy, 1985; Anthony; 1974; Rutter, 1990). Amongst vulnerable individuals, adversity and stressful conditions can contribute to a range of outcomes including poor physical and mental health and lowered well-being. Almost by definition, then, resilience leads to health. Effective management of adversity and stressful conditions affects physical as well as mental health. Reliance upon nicotine, alcohol and other addictive substances as well as certain patterns of eating are common responses to adversity and stressful conditions (*e.g.* Allison *et al.*, 1999). Individuals who are more resilient may be inclined to respond in other ways, that are less damaging to their physical health and possibly more effective in reducing levels of experienced stress in the longer term.

Individuals who are more resilient, almost by definition, experience lower levels of chronic stress in response to a given stressor or life event. This will affect health behaviours. It will also have a direct effect upon physical health outcomes. It appears that chronic stress exacts a cost that can both promote the onset of illness and its progression (see Ogden, 1997, and Wilkinson, 1996 for fuller discussions). Levels of experienced stress may also affect the perception of certain symptoms such as pain (Turk, Meichenbaum and Genest, 1983).

A few studies examine relationships between resilience and health. They do not provide strong evidence that resilience leads to health because they use data that are cross-sectional, so it is impossible to know whether correlations found result from the impacts of resilience on health or the impacts of health on resilience. Both are plausible explanations. In addition, the studies include few controls for potential confounding factors such as early deprivation or level of education, which might predict both resilience and health. This is in part because the sample sizes are small. However, all the studies find correlations between resilience and health. They relate to samples of individuals who face different types of adversity.

Riley and Schutte (2003) examine the relationship between emotional intelligence and substance use and the role of coping as a mediator. The authors report that poor psychosocial coping is correlated with drug-related problems but not with alcohol-related problems. Mulatu and Schooler (2002) investigated links between socioeconomic status, health behaviours, psychological distress (anxiety and depression) and physical, emotional and functional health. Using data from 707 men and women and structural equation modelling techniques with controls for gender, age and race, they found that the observed correlation between socioeconomic status and health was substantially reduced (from .24 to .16) when measures of psychological distress were introduced into the model. This provides evidence that if resilience protects individuals from psychological distress, it is likely also to protect their physical, emotional and functional health.

Barnfather and Ronis (2000) examined relationships between psychological development, basic need satisfaction, perceived stress and health amongst 171 adults with low levels of education. Using structural equation modelling techniques, they found correlations between higher levels of psychological development and positive health. Some but not all of this relationship was mediated by low levels of perceived stress, indicating that psychological development, which we take as a rough proxy for resilience, may influence health by reducing levels of perceived and experienced stress but that it influences health by other pathways as well.

Peyrot, Mcmurry and Kruger (1999) grouped individuals by their styles of coping into those who respond emotionally and those who are self-controlled. Controlling for age, sex, education and marital status, the authors found that patients with diabetes better managed their condition in line with medical advice if their coping style was self-controlled than if their coping style was emotionally responsive.

Summary

Conclusions from the evidence for effects of education on resilience must be tentative because the nature of the effect is not a simple impact of years of schooling or qualifications achieved and few studies have attempted to model and test causal effects, most focussing on the identification of risk factors.

However, it would be a mistake to conclude that because the impact is subtle and difficult to measure that it is not important. Improvements in measurement and better data mean that much more could be done to test these hypotheses more rigorously. The evidence to date suggests that features of the educational experience may be very important in the formation or destruction of personal resilience and that this resilience is an important element in the capability of individuals to achieve good health outcomes or manage ill-health.

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Appendix 4.1. Glossary of statistical terms

Anthropometric	Originally a branch of Anthropology that deals with making comparative measurements of the human body.
Assortative matching	The trend that individuals form personal or professional relationships with people similar to themselves in terms of key features such as family background or education.
Attrition bias	Systematic differences between the comparison groups in the loss of participants from the study. It has been called exclusion bias.
Bias	The difference between the parameter and the expected value of the estimator of the parameter.
Confounding bias	A confusion of effects. The apparent effect of the exposure of interest is distorted because the effect of an extraneous factor is mistake for or mixed with the actual exposure effect.
Consistent estimator	An estimator is consistent if the probability that it is in error by more than a given amount tends to zero as the sample becomes large.
Cross-sectional data	Parallel data on a number of units, such as individuals, households, firms, or governments, at one point in time.
Disability adjusted life years (DALY)	The sum of years of potential life lost due to premature mortality and the years of productive life lost due to disability.
Endogeneity	An explanatory variable that is said to be endogenous and determined within a wider system of equations being estimated. This induces the problem of endogeneity bias when estimating the effect of the explanatory variable on the outcome of interest.
Fixed effects	A method of estimating parameters from a panel data set using change over time to add to robustness. In many circumstances the method will remove bias from any unobserved factors that do not change over time.
Generalised least squares (GLS)	A generalisation of the ordinary least squares procedure to deal with situations in which the error terms have properties that do not fit the assumptions of ordinary least squares regression.
Hazard models	Statistical models to estimate the expected duration of an event.
Hierarchical generalised linear models	A modelling technique in which the outcome variable has a clustered or hierarchical data structure, for example students nested within teachers and teachers nested within schools.

Instrumental variables	Either refers to an estimation technique, often abbreviated IV, or to the exogenous variables used in the estimation technique. When estimation is biased due to reverse causality or some other form of endogeneity, this technique can, under certain conditions, remove the bias. The method is akin to a natural experiment. The replacement regressors are called instruments but must meet strict conditions. Such variables are often hard to find and are often controversial.
Likelihood function	In maximum likelihood estimation, the likelihood function is the joint probability function of the sample, given the probability distributions that are assumed for the errors.
Local average treatment effects (LATE)	The effect of treatment on those who change state in response to a change in an instrumental variable. For example, those who are induced to participate by the introduction of a policy.
Logistic distribution	A logistic distribution has the cumulative density function $F(x) = 1/(1+e^{-x})$
Logistic regression	A model in which the dependent variable, that can be only one or zero, is a function of a set of independent variables and the error term is distributed according to a logistic distribution.
Longitudinal data	Datasets which follow cases over time.
Matching methods	Compares the outcomes of individuals with similar background and personal characteristics, some of whom received the treatment (in this case education) and some of whom did not. The method is non-parametric, so nonlinear assumptions are made and all background factors can interact. The method assumes that unobservable factors are not responsible for the difference in likelihood of receiving the treatment. The method is non-parametric.
Maximum simulated likelihood (MSL)	The maximum likelihood estimation is simulated on a number of repetitions, from which it is possible to obtain an average probability and with it to build the simulated likelihood function.
Meta analysis	The process or technique of synthesising research results by using various statistical methods to retrieve, select, and combine results from previously separate but related studies.
Multi-level estimation	Include fixed and random effects and incorporate both individuals and groups of individuals within the same model so that estimation results can be affected by the clustered nature of the data.
Multinomial Logit (MNL)	The multinomial logit model is the generalisation of the logit model when there are more than two alternatives for the outcome variable.
Multivariate or multiple regression	Analysis that allows for assessment of the relationship between one dependent variable and several independent variables.
Natural experiment	An isolated change occurs in one aspect of the environment so that the effects of that change can be studied as if it were an experiment; that is, by assuming that every other exogenous input was held constant.

Ordered Logit models	A model where the dependent variable is categorical and its values follow some ordering. The outcome variable is a function of a set of independent variables and the error term is distributed according to a logistic distribution.
Ordered Probit models	A model where the dependent variable is categorical and its values follow some ordering. The outcome variable is a function of a set of independent variables and the error term is distributed according to a normal distribution.
Ordinary least squares (OLS)	The classical linear regression procedure.
Panel data	Data from a (usually small) number of observations over time on a (usually large) number of cross-sectional units such as individuals, households, firms, or governments.
Partial equilibrium	A special case of the general economic equilibrium, where the clearance on the market of some specific goods, in this case health outputs, is obtained independently from prices and quantities demanded and supplied on other goods' markets.
Poisson regression	Aims at modelling a counting outcome variable, counting the number of times that a certain event occurs during a certain time period.
Probit model	A model where the dependent variable, that can be only one or zero, is a function of a set of independent variables and the error term is distributed according to a normal distribution.
Propensity score matching	An estimate of the probability that an observed entity like a person would undergo the treatment. This probability is itself a predictor of outcomes sometimes.
Quintile regression	Rather than modelling the whole distribution of the outcome variable, this statistical technique estimates the effect of the explanatory variables in different quintiles of the distribution of the outcome variable.
Random effects	The Generalised Least Squares procedure in the context of panel data.
Randomised control trial (RCT)	Scientific procedure that is widely considered the most reliable form of scientific study because it provides the best known design for eliminating a variety of biases.
Reverse causality	The notion that the outcome variable (health) may exert a causal effect on the covariate (education).
Selection bias	Bias in estimation that results from the fact that individuals are not randomly allocated to the state or treatment under investigation.
Structural equation modelling	A statistical method to estimate the associations between the all variables in a structural model. It deals with the way in which explanatory variables relate to each other and how these relate to the outcome of interest. The method relies on its theoretical basis to form the structure of the statistical estimation.

Time-variant/invariant heterogeneity	Synonym for unobserved effects. These sources of bias can be time variant and time invariant.
Tobit models	An econometric model in which the dependent variable is censored or truncated, for example, when the dependent variable is expenditures on durables which cannot take values below zero. This means that this variable is truncated at zero.
Two stage least squares (2SLS)	Two stage least squares is an instrumental variables estimation technique. Extends the IV idea to a situation where one has more instruments than independent variables in the model.
Unbiased sample	A sample drawn and recorded by a method which is free from bias. This implies not only freedom from bias in the method of selection, *e.g.* random sampling, but freedom from any bias of procedure, *e.g.* wrong definition, non-response, design of questions, interviewer bias, etc. An unbiased sample in these respects should be distinguished from unbiased estimating processes which may be employed upon the data.
Weighted least squares (WLS)	The use of weight in the ordinary least squares estimation.

Appendix 4.2. Compendium of relevant international datasets

OECD International Adult Literacy and Skills (IALS)

The IALS is a large-scale comparative survey that seeks to profile the skills of adults in OECD countries through direct assessment in households. It combines household survey methods with direct educational assessment methods. It is cross-sectional data from three waves of collection (1994, 1996 and 1998). The data were collected every two years from one individual living in a sample of households (3 000-6 000 per country). The sample was representative of adults aged 16 to 65 in each country and includes data on education level and participation, and involvement in various social and civic activities. Other important control variables include general demographic variables; parents' education and occupation; labour force participation, occupation, earnings; literacy and numeracy practices at work and in daily life; and direct measures of skill (*e.g.* prose, document and quantitative literacy).

OECD Adult Literacy and Lifeskills Survey (ALLS)

The ALL is a large-scale comparative survey that seeks to profile the skills of adults in OECD countries through direct assessment in households. It combines household survey methods with direct educational assessment methods. The ALL was a 7-country initiative conducted in 2003. In every country, nationally representative samples of adults aged 16-65 were interviewed and tested at home, using the same psychometric test to measure prose and document literacy as well as numeracy and problem solving skills. The data are cross-sectional from face-to-face interviews with one individual from each household sampled (3 000-6 000 per country). Important measures available include: education level and participation; self assessed mental and physical health; and participation in various social and civic activities. There are also a number of variables to be used as controls, such as age, gender, country of origin; parents' education and occupation; linguistic and household information (*e.g.* income); labour force participation, occupation, earnings; literacy and numeracy practices at work and in daily life; familiarity and use of Information Communication Technology; and direct measures of skill – prose and document literacy, numeracy.

OECD Programme for International Assessment of Adult Competencies (PIAAC) (in development)

The Programme for International Assessment of Adult Competencies (PIAAC) aims at developing a strategy to address the supply and demand of competencies that would: identify and measure differences between individuals and countries in competencies believed to underlie both personal and societal success; assess the impact of these

competencies on social and economic outcomes at individual and aggregate levels; gauge the performance of education and training systems in generating required competencies; and help to clarify the policy levers that could contribute to enhancing competencies. These cross-sectional data will be collected every five years from individuals, aged 16-65, in households (3 500-5 000 per country) starting in 2009. The major variables/modules to be collected are still in development, but will be similar to the ALL.

UIS Literacy Assessment and Monitoring Programme (LAMP) (in development)

LAMP is being designed by the UNESCO Institute for Statistics (UIS) in cooperation with various international agencies and technical experts. Such a survey is needed because most current data on adult literacy in developing countries are not sufficiently reliable to serve the needs of national and international users. Cross-sectional data will be collected from individuals, aged 16-65, from a sample of households (3 000-5 000 per country) for a selection of non-OECD countries. The major variables/modules included will be similar to those in the ALL.

OECD Programme for International Student Assessment (PISA)

The Programme for International Student Assessment (PISA) is an international assessment of the skills and knowledge of 15-year-olds which aims to assess whether students approaching the end of compulsory education have acquired the knowledge and skills that are essential for full participation in society. PISA is developed jointly by member countries of the OECD. The survey gathers cross-sectional data from a sample of schools, and will use a new sample of 15-year-olds for each cycle of the survey (between 4 000 and 10 000 per country). PISA assessments take place every three years and focuses on three domains: reading literacy, mathematical literacy and scientific literacy. While the three domains form the core of each cycle, two-thirds of the assessment time in each cycle will be devoted to a "major" domain. Forty-two countries participated in PISA 2003. In addition to general demographic variables, the following major variables are collected: education level for student's father and mother; expected level of completion; type of programme; engagement in school, attitudes toward, attendance; and achievement.

IEA Civic Education Study (CIVED)

The IEA Civic Education Study is a two-phase, cross-national study. The main goal of the study is to identify and examine, in a comparative framework, the ways in which young people are prepared to undertake their role as citizens in democracies. About 90 000 14-year-olds as well as 10 000 teachers and 4 000 school principals from 28 countries participated in the first survey in 1999, about 60 000 16/18-year-old students and 2 000 school principals in a second survey in 1999/2000. The study is concerned with examining aspects of civic education in school. Researchers gather and analyse cross-sectional student data from 29 different countries (roughly 3 000-3 500 students, teachers and principals per country) regarding their factual knowledge and their attitudes toward issues within the following four domains: democracy, national identity, social cohesion and diversity, economics/media and environment.

IEA Trends in Mathematics and Science Study (TIMSS)

TIMSS (the earlier acronym for the Third International Mathematics and Science Study) is designed to measure trends in students' mathematics and science achievement. TIMSS 1999, also known as TIMSS-Repeat (TIMSS-R), measured progress in eighth-grade (age 13) mathematics and science around the world. TIMSS 1999 provided countries that participated in the 1995 testing with cross-sectional trend data at Grade 8. The four-year period between the first and second data collection saw the population of students originally assessed as fourth graders move on to Grade 8. This development allowed countries that participated in 1995 at Grade 4 (age 9) to compare the performance of fourth-graders in that year with their performance as eighth-graders in 1999. As in the 1995 study, TIMSS 1999 also investigated, through background questionnaires, the context for learning mathematics and science in the participating countries. Information was collected about educational systems, curriculum, instructional practices, and characteristics of students, teachers, and schools. TIMSS 2003 assessed the mathematics and science achievement of children in two target populations. These populations correspond to the upper grades of the TIMSS 1995 Population 1 and Population 2 target definitions. Generally, these are the fourth and eighth grades.

IEA Progress in International Reading Study (PIRLS)

PIRLS 2001 was the first in a five-year-cycle of assessment that measures trends in children's reading literacy achievement and policy and practices related to literacy. PIRLS examines three aspects of reading literacy: processes of comprehension, purposes for reading, and reading literacy behaviour and attitudes. The first two aspects form the basis of the written test of reading comprehension. The third aspect, behaviour and attitudes, is addressed by the student questionnaire. This and the parent, teacher, and school questionnaires gather information about home and school factors associated with the development of reading literacy, as well as about the larger context in which children live and learn. In addition, the countries that participated in the 1991 IEA Reading Literacy Study had the option to administer the 1991 test again to provide trends in their students' reading literacy achievement over the period 1991-2001. The target grade was the upper of the two adjacent grades with the most 9-year-olds. In most participating countries this is Grade 4. At this grade level, formal reading instruction is generally completed and transition from learning to read to reading to learn is taking place.

World Values Survey (WVS)/European Values Survey (EVS)

The World Values Survey is a worldwide investigation of sociocultural and political change. It is conducted by a network of social scientists at leading universities all around world. Interviews have been carried out with nationally representative samples of the populations of more than 80 societies on all six inhabited continents. A total of four waves have been carried out since 1981 making it possible to carry out reliable global cross-cultural analyses and analysis of changes over time.

In exchange for providing the data from interviews with a representative national sample of at least 1 000 people in their own society, each participating group gets immediate access to the data from all of the other participating societies. Thus, they are able to compare the basic values and beliefs of the people of their own society with those of more than 60 other societies.

In addition to basic demographics, data on education level and age when completed full time education are available for each respondent, as are measures of the following social outcomes: civic interests, attitudes and values; political interests, attitudes and values; tolerance, trust; environmental attitudes and values.

European Social Survey (ESS)

The central aim of the ESS is to develop and conduct a systematic study of changing values, attitudes, attributes and behaviour patterns within European polities. Academically driven but designed to feed into key European policy debates, the ESS hopes to measure and explain how people's social values, cultural norms and behaviour patterns are distributed, the way in which they differ within and between nations, and the direction and speed at which they are changing.

The data collected are at the individual level and are cross-sectional. Approximately 1 500 face-to-face interviews with adults aged 15 or older are conducted per country. In addition to basic demographic data and measures of education, each round collects data for the following modules:

- For both rounds: Employment, Unemployment, Labor Market Activities, Income, Education.
- Round 1: Citizenship, Involvement and Democracy; Immigration.
- Round 2: Family, Work, and Well-being; Opinions on Health and Care Seeking; Economic Morality in Europe: Market Society and Citizenship.
- Round 3: Personal and Social Well-being; The Timing of Life: The Organisation of the Life Course in Europe.

ESF Citizenship, Involvement and Democracy (CID)

Contemporary democracies such as those of the European Union have been suffering increasingly from declining involvement by their citizens in the political process, and a general weakening of the bonds that hold society together. This network will focus on the relationships between social and political forms of civic engagement and citizenship in contemporary democracies. Current debates about communitarianism, social capital, civil society, trust and the crises of the welfare state provide the general intellectual background, while empirically the network will integrate the results from national studies into a common comparative framework.

Although ESS is separate from the Citizenship, Involvement and Democracy (CID) survey the rotating part includes a module on citizenship, involvement and democracy in Round 1 that is similar to the CID questionnaire. There are further data on demographics, education level, years of schooling and social outcomes, such as opinions on social and institutional relations; political interest, involvement, attitudes; civic interest, involvement, attitudes; institutional trust; tolerance of groups (*i.e.*, ethnic, religion, extremists); social relations at work; and school engagement.

International Social Survey Programme (ISSP)

The ISSP is a continuing annual programme of cross-national (membership of 39 countries) collaboration on surveys covering topics important for social science research. It brings together pre-existing social science projects and coordinates research goals, thereby adding a cross-national, cross-cultural perspective to the individual national studies.

Cross-sectional data are included from face-to-face interviews with adults aged 15 or older (1 500 per country) from a sample of households. Variables included are: education level for respondent, partner, father, mother; years of schooling for respondent; and measures of social outcomes, such as politics, subjective well-being, health, economic morality, and human values among others. Control and other variables of interest available are: socio-demographic profile, including household composition, sex, age, type of area, education and occupation of respondent, partner, parents, union membership, income and marital status.

EC Household Panel (ECHP)/EU-Statistics on Income and Living Conditions (EU-SILC)

In 1991, Eurostat, the Statistical Office of the European Communities, set up a Task Force on Household Incomes in order to respond to the strong demand for information on household and individual income. Although the questionnaire was designed centrally at Eurostat, in close consultation with the Member States, it allowed for some flexibility for adaptation to national systems. The ECHP forms therefore the most closely co-ordinated component of the European system of social surveys. It has been given a central place in the development of comparable social statistics across Member States on income (including social transfers, etc.), labour, poverty and social exclusion, housing, health, as well as various other social indicators concerning living conditions of private households and persons.

The longitudinal, "panel" design of the ECHP makes it possible to follow up and interview the same set of private households (approx. 5000 per country) and persons (ages 16 and over) over several consecutive years. Eurostat recommends the use of the original ECHP data for any analysis covering only the years 1994-96 for countries with two different datasets for the same year. However, for longitudinal analysis covering more years, the converted datasets should be used.

Useful variables include: education level; age when highest level completed and when stopped full time education; adult education and training (general and vocational training courses); measures of social outcomes, including health, social relations and satisfaction and demographic variables including unemployment and migration.

EU Harmonised Labour Force Survey (EU-LFS)

Eurostat activities in the area of Education and Training statistics include the UNESCO-OECD-Eurostat (UOE) data collection on education, the Continuing Vocational Training Survey (CVTS), the EU Vocational Education and Training (EU-VET) data collection and education modules included in different household surveys (*e.g.* LFS).

EU LFS module on LLL

In 2003 a set of specific questions on lifelong learning were added to the LFS (the so-called *ad hoc* module on lifelong learning). Results were to be submitted to Eurostat by March 2004. After that date the quality check and analysis will follow.

The ad hoc module is the first implementation of notions and ideas that resulted from the work of the Task Force for the Measurement of Lifelong Learning (TF-MLLL) and it is considered to be an important first step toward the establishment of a coherent system of statistical information on lifelong learning. The reference period for the variables on participation is 12 months preceding the interview, while questions are also asked on methods used for self-learning (making use of printed material (*e.g.* professional books, magazines, etc); computer based learning/training; online internet based web education (beyond institutionalised education); educational broadcasting or offline computer based (Audio or Videotapes); visiting facilities aimed at transmitting educational content (library, learning centres, etc.).

The cross-sectional data of the LFS allow for the combination of standard variables on participation in education and training included in the LFS with other variables related to labour market. These may be standard LFS variables on demographic and other characteristics of the individuals or variables included in its annual ad hoc modules on specific issues (like working time, childcare, etc.). It covers populations aged 15 and over.

EU Harmonised Adult Education and Training Survey (EU-AETS) (in development)

The Task Force on Adult Education Survey (TF AES) has been created at the request of the Directors of Social Statistics of the European Union with the mandate to reflect on the development of a harmonised reporting system on the education of adults from the perspective of the individual which could take the form of a specific survey. The TF AES continued the work of the Eurostat Task Force on measuring lifelong learning (TF MLLL) which had produced its report in February 2001. According to its mandate the TF AES should assist Eurostat in exploring the feasibility and the requirements for launching an EU Adult Education Survey within the broader framework of the development of Education and Training Statistics. The definition of the survey subject and the way to approach it was the main focus of this work. The proposed AES will only take its final form after consultations with the different partners of the European Statistical System, and of potential users/requesters of the data, are completed. The survey remains in development and a first data collection is planned for 2006.

EU Continuing Vocational Training Survey (EU-CVTS)

CVTS is the first and only community survey to provide comparable data at European level on investment in human resources in companies. It is therefore one of the major tools of the European Union for the establishment of indicators in the area of lifelong learning.

The work on the results of the first survey (CVTS1), carried out in 1994, started in February 1996 and was completed in September 1997. The contractor finalised a database which is the basis for the NewCronos database (Eurostat) prepared with the financial

support of CEDEFOP, developed a series of publications to disseminate the survey's results and performed a critical evaluation of the survey's methodology, which is being used to prepare a second survey (CVTS2).

The Statistical Programme Committee gave its approval to CVTS2 in the year 2000. The Leonardo da Vinci programme is financing a contract to assist the Commission and the participating countries in preparing the survey. The project is being carried out by a team co-ordinated by the University of Sheffield and the project steering group.

The survey's first results will be available at the end of 2000. Complete results will be available in 2001. Variables available include: training programmes in the form of courses and seminars; continuing vocational training in the workplace; and "other" forms of continuing training in enterprises.

Luxembourg Income Study (LIS)

The LIS database is a collection of household income surveys. These surveys provide demographic, income and expenditure information on three different levels: household, person and child. The LIS/LES team harmonises and standardises the micro-data from the different surveys in order to facilitate comparative research.

It is a non-profit cooperative research project with a membership that includes 29 countries on four continents: Europe, America, Asia and Oceania. The LIS project began in 1983 under the joint sponsorship of the government of the Grand Duchy of Luxembourg and the Centre for Population, Poverty and Policy Studies (CEPS). The project is mainly funded by the national science and social science research foundations of its member countries. Recently, LIS and the University of Luxembourg became partners, with offices being provided by the university. Its main features and variables included are similar to ECHP panel survey.

Luxembourg Employment Study (LES)

The LES database includes Labour Force Surveys from countries with quite different labour market structures. These surveys provide detailed information on areas like job search, employment characteristics, comparable occupations, investment in education, migration, etc. The LIS/LES team harmonises and standardises the micro-data from the different surveys in order to facilitate comparative research. This links to EU-LFS type surveys including previous cross-sections and longitudinal components. The harmonisations are designed for international comparative analyses.

It is a parent project of LIS that was initiated in 1994 and is ongoing. This project has been partly funded by the Human capital and Mobility Programme of the European Commission and the Norwegian Research Council. Its main features and variables are similar to the EU LFS survey.

Multinational Time Use Study (MTUS)/Harmonised European Time Use Study (HETUS)

Eurostat has co-ordinated the development of Harmonised European Time Use Study (HETUS) data collection guidelines, which were piloted in 20 countries between 1996 and 1998, and have influenced time use data collection in 21 countries between 1999 and

2003. All HETUS studies draw national samples of individuals aged 16 or over, and most participating countries collected data over a whole year. The diaries cover between 1 and 3 days selected by stratified random sampling to allow for an equal sampling of weekdays and of weekend days. Now as data become available, the challenge of creating useful tables and data files that allow for meaningful cross-national research arises. These cross-sectional data are both quantitative and qualitative.

Appendix 4.3. Journals reviewed in literature search

ACTA Psychiatrica
Addictive Behaviours
AKF Working Paper
Alcohol & Alcoholism
American Economic Review
American Journal of Agricultural Economics
American Journal of Economic Review
American Journal of Public Health
American Psychologist
American Sociological Review
Annals of Epidemiology
Annals of the New York Academy of Sciences
Annual Review of Sociology
British Journal of Cancer
British Medicial Bulletin
Community Health
Demography
Econometrica
Econometrics and Health Economics
Economics of Education Review
Epidemiology Community Health
Epidemiologic Reviews
Handbook of the Economics of Education
Health and Place
Health and Social Behaviour
Health Canada
Health Economics
Health Psychology
HSR: Health Services Research
International Journal of Behaviour Medicine
International Journal of Epidemiology
International Journal of Lifelong Education
International Journal of Obesity
International Journal of Social Economics
Journal of Community Health
Journal of Econometrics
Journal of Epidemiology and Community Health
Journal of Further and Higher Education

Journal of Health and Social Behaviour
Journal of Health Economics
Journal of Human Resources
Journal of Political Economy
London Review of Education
Medical Care
Mental Health Policy and Economics
Oxford Review of Education
Perspectives in Biology and Medicine
PNAS (Proceedings of the National Academy of Sciences)
Political Economy
Preventive Medicine
Psychological Medicine
Psychology and Aging
Psychosomatic Medicine
Research in Nursing and Health
Research on Aging
Review of Economic Studies
Review of Economics and Statistics
Social Biology and Human Affairs
Social Policy and Administration
Social Science & Medicine
The American Economic Review
The Journal of Human Resources
The Milbank Quarterly
The Review of Economics and Statistics

4.A. What does education do to our health?

By Wim Groot and Henriëtte Maassen van den Brink*

Introduction

Education and health are the two most important characteristics of human capital. Their economic value lies in the effects they have on productivity: both education and health make individuals more productive. Education and health have a considerable impact on individual well-being, as well. The wealth of nations is to a large extent determined by the educational attainment and the health status of its population. According to the 2003 Human Development Report, "Education, health, nutrition and water and sanitation complement each other, with investments in any one contributing to better outcomes in the others" (UN, 2003, p. 85).

The positive association between education and health can be partly attributed to differences in income between countries. Health and prosperity are positively related. For example, Behrman and Rosenzweig (2004) show that there is a strong negative association between the log of purchasing power parity (adjusted by GDP per worker) and the percentage of low birthweight babies. Low income countries have fewer resources to spend on publicly financed education and health care. Most individuals in low income countries also do not have the means to purchase education and health care themselves. On the other hand, investing in education and health provide the way out of poverty and are necessary conditions for increasing standards of living.

There are three potential explanations for the positive relation between education and health: 1) a better health enables one to invest more in education; 2) common factors – such as genetic endowment, social background or time preferences – affect health and education in a similar way; and 3) education leads to a better health. Education affects health, but investments in health and education also have some common attributes, as argued by Theodore Schultz in his seminal paper *Investment in Human Capital*: Education as well as health expenditures are both consumption and investment. Returns to investments in education and health are uncertain. There are third-party effects involved in both education and health. And the involvement of the public sector in the provision of education and health care is large.

There is large body of empirical evidence to support the claim that there is a positive relation between education and health. In their survey of non market outcomes of

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education, Wolfe and Zuvekas (1997) identify five health and health related effects of education:

- A positive relation between one's education and one's own health status.
- A positive association between schooling and the health status of one's family members (in particular on one's children).
- A positive link between one's own schooling and the schooling received by one's children.
- A positive contribution of schooling to the efficiency of (consumer) choices (*i.e.* on smoking and on the use of health care).
- A relation between schooling and one's own fertility choices and the fertility choices of one's children (in particular a negative effect on the probability of giving birth out of wedlock as a teenager).

Hunt-McCool and Bishop (1998) argue that the fields of education economics and health economics have bifurcated because of the difficulties in valuing inputs and outputs, and that no (monetary) metric exists to measure health outcomes. It is therefore timely to review the health sciences – *i.e.* the health economics, medical sociology and epidemiology – literature on the relation between education and health.

What do we know about the effects of education on health?

The Feinstein *et al.* paper provides an abundance of evidence in support of a positive association between education and health. In view of that, in our contribution we do not concentrate on providing further evidence on this relation. Rather we will focus on the mechanisms behind this relation and the implications and conclusions that can be drawn from this positive association.

What the Feinstein *et al.* paper shows is that there exists a stable statistical significant association between education and health. Further, it is plausible to assume that at least part of this association reflects a genuine causal effect of education on health. So, we have a statistically significant (causal) effect of education on health. What this does not say is whether this is also a significant – in the sense of a sizeable or important – effect. Statistical significance does not tell us whether this is also a relevant effect. The Feinstein *et al.* paper does not provide much guidance as to the relevance of the effect.

In Groot and Maassen van den Brink (2006b) it is argued that a year of education improves the Quality Adjusted Life Years weight (QALY) by 0.036, this is equal to 28 years of education for 1 QALY. At the margin, the costs of a year of education are about EUR 6 000 (OECD, 2001, p. 67). The costs per QALY then amount to about EUR 168 000. Of course, this only pertains to the costs on education in order to obtain a QALY worth of health gain, while education has wider benefits – *i.e.* it improves earnings, well-being, etc. – as well.

The costs per QALY have to be compared with the life-time value of a QALY in order to determine whether investments in education are welfare improving. To calculate the monetary value of the education effect of the quality of health, we use the literature on the value of a statistical life year. In a meta-analysis of 33 studies that have calculated the value of a statistical life Mrozek and Taylor (2002) infer that the value of statistical life is between USD 1.5 million to USD 2.5 million. At a 5% discount rate this would make the

value of a statistical life year somewhere between USD 76 500 and USD 127 500. An estimate of USD 100 000 for a QALY is exactly in the middle of these two estimates. This is roughly equal to EUR90 000. At a 5% discount rate and with a remaining life expectancy at age 18 of 58 years for men and 63 years for women, the discounted present value of a QALY is approximately EUR 1.7 million, *i.e.* six to seven times as high of the costs per QALY.

What are the (causal) mechanisms behind this effect?

Does it represent a truly causal effect (what is it in education then that generates this?), a reverse causal effect, or an effect of common factors (time preference, social or genetic endowment?). The relation between education and health is merely a correlation and not a causal relation if:

- There is a joint relation between education and health, whereby education not only affects health but there is also a reverse causality where health determines investments in education. A reverse effect would create a positive simultaneity bias in measuring the effect of education on health.
- There are other factors – i.e. variables that are either not observable or not observed – that affect both education and health.

The causality question is important, not only for determining the exact relation between education and health, but also from a policy point of view. Only if the relation between education and health is a true causal relation can a shift in (public) expenditures from health care to education be effective in improving both the level of education and the health status of the population. If the effect is genuinely causal, a re-allocation of resources can be welfare improving if the impact of education on health is larger than the impact of health care on health. So, it therefore not only matters whether the education effect is a causal effect, but also whether the effect is large enough to warrant additional expenditures on education.

Acemoglu, Johnson and Robinson (2003) argue for a reverse causality between education and health. A shorter life expectancy because of poor health conditions shorten the time horizon of individuals. A shorter time horizon lower the returns and therefore the investments in human capital such as education. Furthermore, children who are in poor health are less able or have less energy to attend school, while workers with poor health may be less inclined to invest in on-the-job training.

One reason why a reverse causality might only be a minor source of bias when estimating the relation between education and health is that educational attainment is essentially established in early adulthood and remains stable afterwards. Most health impairments are not incurred until an adult age, however. Of course, especially in less developed countries, child mortality and morbidity is a cause for concern; infant and child health for most children in developed countries does not impart on their educational attainment.

The latter view is supported by the argument in Hammond (2002). There it is argued that the link between education and health increases with age, *i.e.* that the association is stronger among older populations than among younger people. This is explained by the fact that some health behaviors – such as not wearing a seat belt or condom – constitute a constant risk to health, whereas others – such as smoking and excessive alcohol use – constitute a cumulative risk. This means that the education differential in the latter type of

unhealthy behavior is only translated into observable physical health differences later in life (Hammond, 2002, p. 557). Empirical support for this claim is found in Groot and Maassen van den Brink (2006a). This study finds that the effects of education on self-assessed health become stronger as people get older.

According to UN (2003), a cross-country comparison over time shows that increases in educational attainment precede improvements in health status (UN, 2003, p. 87). This temporal sequencing suggests a causal relation between education and health. As argued above, the causal relation between education and health arises because a higher education leads to a healthier life style and because higher educated people are better able to gather, to process and to interpret information about healthy behavior.

Becker and Mulligan (1994) add a further causal mechanism to this. They argue that education leads to a lower time preference for consumption in the present and a higher time preference for consumption in the future: "Schooling also determines … [investments in time preference] partly through the study of history and other subjects, for schooling focuses students' attention on the future. Schooling can communicate images of the situations and difficulties of adult life, which are the future of childhood and adolescence. In addition, through repeated practice at problem solving, schooling helps children to learn the art of scenario simulation. Thus, educated people should be more productive at reducing the remoteness of future pleasures" (Becker and Mulligan, 1994, p. 10).

Education may alter time preferences, but a lower time preference may cause individuals to invest more in education and health as well. So, time preferences may be an intermediate in the relation between education and health – as argued by Becker and Mulligan – but may also be a common (unobserved) causal factor for both investments in education and health. Fuchs (1996) argues that education is correlated with time preference, and that it is time preference that affects health rather than education. This hypothesis is tested by Sander (1995). This study includes cognitive ability and future education as covariates in an equation where smoking and marijuana is explained by college attendance. Future education and cognitive ability are viewed as correlates of time preference. This study finds support for both the argument that education affects health and for the hypothesis that time preference matters.

There is overwhelming evidence for a positive relation between education and health. It is difficult to prove, however, that this relation also represents a causal effect. The studies that have tested for endogeneity in the effect of education on health yield mixed conclusions. The theoretical arguments for a causal relation also do not provide the solid foundation one is looking for. For example, Becker and Mulligan (1994) argue that education leads to a lower preference for consumption in the present and a higher preference for consumption in the future. Education may change time preferences. However, differences in time preference between higher and lower educated people may also reflect a form of self-selection. People who self-select high levels of education are also likely to postpone other immediate forms of gratification that are frequently damaging to one's health. People with a lower time preference to begin with are more likely to defer consumption and to spend time on investments in human capital that have a pay-off at a later date. Similarly this lower time preference may make that people invest more in health behavior and a healthy life style, refrain from smoking, alcohol abuse, drug taking and other health damaging habits. The association between education and health may then be due to a common causal factor: a lower time preference that makes that one invests more both forms of human capital: education and health. All this does not

preclude, however, that education in itself contributes to a lower time preference and that – aside from these common causal factors – education causes people to live healthier.

Our reading of the literature is that the effect of education on health represents a genuine causal effect, that the reverse effect running from health to education is relatively small (at least for adults), and that there are common factors – most notably time preferences – that affect both investments in health and education.

The available evidence suggests that there is a strong link between education and health. This view is supported by the results of the meta-analysis presented in Groot and Maassen van den Brink (2006b). The relationship found in the meta-analysis might actually be an underestimate of the real magnitude of the effect. This is because lower levels of education appear to be associated with underreporting of illness by patients (see Mackenbach, Looman and van der Meer, 1996).

One important aspect that should not be overlooked is the role of intermediate variables in the relation between education and health. One example is that through intermediate variables parental education affects health. Most studies do not find a direct linkage between parental education and health at an adult age if one's own level of educational attainment is controlled for. These studies do, however find that one's own education has a positive effect on health and that parental education is an important factor explaining one's own education. So, parental education does have an effect on health through its effect on educational achievements. But that is not all. The findings also suggest that parental education has an effect on birth weight. Birth weight has both a direct and an indirect effect on adult health. Birth weight affects health indirectly through its effect on subsequent educational attainment. So there are several intermediate factors that provide linkages between parental education and health.

If we accept that there is an effect of education on health, this raises a number of questions, including:

- Is it a *uniform effect* (*i.e.* each year of education adds a similar amount to your health) or a *non-linear* effect (*e.g.* highest for primary and secondary education)? Is there an interaction with the age at which education is taken (*e.g.* smoking initiation when you are teenager at higher secondary school)? Is health education itself an important factor in this?

- Is it an effect on health per se (and if so, is it an effect on life expectancy, on quality of life, or both?), an effect on prevention and healthy behaviour (*i.e.* higher educated invest more in healthy behaviour – are less likely to smoke or obese, take more precaution, have more means to lead a healthier life-style, and are better informed about it – and are therefore in better health), an effect on health care use (*i.e.* higher educated use health care more often and are therefore in better health)?

We know fairly little about the answers to these questions.

A tentative answer to the second question is that the effect of education on health seems to be driven primarily by differences in healthy behaviour. As argued by Grossman and Kaestner (1997) higher educated people are less likely to smoke, exercise more, wear seatbelts more often, and are more likely to participate in screening programmes for breast cancer and cervix cancer. We can add to that the prevalence of overweight and obesity is also much lower among higher educated people. This raises the question why health behaviours differ so much between people of different levels of education.

With regard to the first question, it should be noted that most health related risk behaviours – such as smoking, alcohol and drug use – are initiated during adolescence when young people are in secondary education. In countries with educational streaming in secondary education – *i.e.* most European countries – this is the time when large educational differences in (un)healthy behaviour first occur. For example, in the Netherlands adolescents in the lowest form of secondary education (VMBO) are twice as likely to initiate smoking than young people attending the highest form of secondary education (VWO). Similarly, binge drinking occurs far more frequently among boys (and increasingly so among girls) in the lowest forms of secondary education than among teenagers in the higher forms of secondary education.

We should also distinguish between different forms of (un)healthy behaviour and their impact on future health:

- The prevalence of smoking is much higher among lower educated people. Among others, smoking increases the risk of (lung) cancer and cardiovascular disease. Smoking has a substantial impact on mortality rates. Average life expectancy of smokers is about six years less than for non-smokers.
- On average, higher educated people consume more alcohol than the lower educated. However, epidemiological studies seem to suggest that moderate alcohol consumption has positive rather than negative health effect (*i.e.* lowers the mortality rate). Binge drinking, however, seems to be more prevalent among lower educated youngsters.
- Overweight and obesity is – like smoking – more prevalent among lower educated people. Obesity increases the risk for cancer and cardiovascular disease. However, the main impact of obesity is on morbidity rather than mortality. In particular, overweight and obesity increases the risk of diabetes.

So, the mechanisms by which education can have an impact on mortality and morbidity are diverse. Generally speaking, lower educated people tend toward extreme forms of behaviour more frequently.

The implications for educational policy

Total benefits of education are larger than just income and productivity effects. If Becker and Mulligan (1994) are correct and education changes time preferences, this has an effect not only on health but on all investments in positive behaviour that generate benefits in the future.

Groot and Maassen van den Brink (2003) survey the literature on the rate of return to education and conclude that the average individual return to a year of education – *i.e.* the direct wage effect of education – is 6 to 8%. The total rate of return is higher than this if we also include the value of the education effect on the value of health.

Only if education has a causal effect on health may it be worthwhile to invest in education in order to improve public health. The calculations presented above seem to suggest that the monetary value of the health benefits of investing in education are much larger than the cost of the investment. However, the benefits almost all accrue to the individual who invests in education: the individual is the main beneficiary of reduction in morbidity and mortality because of the higher educational attainment.

Investments in health behavior by higher educated people may create positive externalities. Society may gain if the costs for health care decrease as a result of the better health status of higher educated people. Positive externalities also arise if higher educated people, for example, are more likely to take vaccination, engage in activities to prevent spreading sexual transmittable diseases more frequently, or if their healthy behavior encourages others to adopt similar behavior.

The implications for health care policy

A relevant question for health policy to ask is whether increasing the educational level of the population may not only improve the health status of the population but may also reduce the costs for health care. In all western countries health care costs are rising rapidly, and governments are seeking ways to control these escalating costs. Will the increase in the educational attainment of the population curb the rising health care costs?

Higher educated people are healthier and are therefore less likely to consume health care. So, within every age group higher educated people make fewer costs for health care than lower educated people. However, if one controls for health status – *i.e.* for diseases and handicaps – higher educated are more likely to consume health care. If a higher educated person has an health impairment, (s)he is more likely to seek medical help sooner. Higher educated people are also more informed and more assertive about the opportunities and the possibilities to obtain medical help, which also increases the chance of health care use.

Furthermore, higher educated people have a longer life expectancy. For example, according to van Oers (2003), life expectancy in the Netherlands for men with the lowest level of education is 5 years less than men with a university education. For women this difference is 2.6 years. Elo and Preston (1996) find for the United States large effects of education on mortality as well. For working-age men the ratio of death rates between the lowest and the highest education level is 2.22. For women, education has a somewhat smaller effect: here the ratio between the highest and the lowest education level is 1.79. The higher life expectancy of higher educated people increases the costs for elderly care for this group. Elderly people are also more likely to have a chronic disease.

All in all it seems questionable whether the increase in educational attainment will lead to savings in health care consumption or a reduction in the growth of health care expenditures.

Conclusion

Education is associated with a number of desirable aspects in life. Recent studies have shown that happiness or life satisfaction is positively determined by health, a stable job, and a satisfying family life. Diseases and illnesses, unemployment, divorce and criminal behaviour are strong determinants of depressions and negative attitudes toward life. Many of the aspects that make people unhappy are more prevalent among the lower educated than among the higher educated. Unemployment rates are generally much higher among lower educated workers than among the higher educated. Lower educated people experience more health problems and have a shorted life expectancy than higher educated. Lower educated people are more likely to smoke, engage in excessive alcohol consumption and to be overweight and obese. Lower educated people commit violent crimes more frequently. Other forms of criminal behaviour are also more prevalent

among lower educated people. Only tax fraud is committed more frequently by higher educated people (Groot and Maassen van den Brink, 2003).

Education contributes to lower unemployment rates, less criminal behaviour and less unhealthy behaviour. There appear to be large benefits – both for individuals and for society – attached to education. Nevertheless, these social benefits of education play only a minor role in policy-making. The importance of good education seems to be underestimated. During the past decade in most western countries, public expenditures on health care and law enforcement have increased more than public expenditures on education.

In a sense, western countries try to remedy the negative effects and social costs of a relatively low educated population by providing unemployment benefits, law enforcement through policing and higher sentencing, and by increasing health care budgets to counter the detrimental effects of unhealthy behaviour.

More and better education could yield savings in health care, law enforcement and unemployment benefits. This makes that the relation between education and health has important implications for public policy. Public policies tend to be highly compartmentalised: education is the domain of the Ministry of Education while health care is looked after by the Ministry of Health. What the Feinstein *et al.* paper has shown is that there are large spill-over effects between education and health. This implies that education and health policies do not have an effect within their own domain, but that there are large costs and benefits associated with these policies. This entails that these policies should not be looked upon in isolation, but that rather a more comprehensive or integrated policy approach to education and health is called for.

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4.B. Grounding in a broader framework of determinants of health

By David I. Hay*

Introduction

The Feinstein *et al.* paper summarises an extensive review of literature that examines the hypothesis that education has impacts on health. The authors organise their presentation of findings by highlighting three types of research studies: those that attempt to show robust evidence of causal relationships; those that are primarily associational; and, those studies that explore process issues in education and health relationships.

This paper provides comments on Feinstein *et al.* In particular, the comments provide overall feedback, highlight relevant alternative perspectives on issues covered in the paper, and also make some suggestions for additions and next steps. Section-by-section comments are preceded by some brief general comments and then organised according to the section organisation of Feinstein *et al.* paper. The comments on Feinstein *et al.* follow a general overview of relationships between education and health.

Context: relationships between education and health

Along with occupation and income, education is a common indicator of socioeconomic status. Relationships between socioeconomic status and health have been widely studied for many years primarily by epidemiologists and social scientists (*e.g.* sociologists and economists). Studies have examined relationships using single indicators, multiple indicators, and combinations of indicators into indices of socioeconomic status.

Each of these three indicators of socioeconomic status has a distinct relationship with health, but at the same time, education, occupation and income are also highly interrelated. There is also a temporal dimension to their relationship, *i.e.* an education level is achieved that enables an occupation level to be attained that returns a level of income.

Educational attainment is set relatively early in the life course compared to levels of occupation or income. It is more likely that it is the years immediately prior to retirement from the labour force that a person would attain their highest level of occupational status or prestige, and level of income. This life course "stability" to education makes it a preferred indicator of socioeconomic status.

Another reason education is a preferred indicator is that it contributes to the interpretation of causal direction in relationships with health measures. Beyond early adulthood, changes in health can have far fewer consequences for educational level than

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health changes can have for occupation and income level. Thus it is much safer to interpret evidence from cross-sectional studies of bivariate relationships between education and health as social causation rather than social selection.

There is abundant research evidence of direct and indirect relationships between education and health. Education is generally measured by years of schooling and/or level attained (*i.e.* high school, O- and A-levels, college, etc.). Measures of educational quality are far less common and almost non-existent in this research area. Health is measured in many ways – morbidity, mortality, self-rated health, physical conditions, physical functioning, mental conditions, and so on. While education and health relationships do differ depending on the measure of health, the consistency of a finding between education and health, across many different health measures, is an indicator of the durability of the relationship.

Understanding the strength of observed relationships between education and health is not simple, nor are relationships linear. For example, relationships can be different for individuals at different income levels. At lower levels of income (*e.g.* "poverty" levels), education can have little effect on health, suggesting that educational levels are unable to mediate the stronger effect of material conditions. Also, relationships differ according to one's age, gender, ethnicity, culture, and so on. There are some indications of patterns to these differences (*e.g.* women showing stronger associations between education and mental health), but generally the differences are inconsistent and not predictable. What is important is to include these types of variables in models testing education and health relationships to reveal the strength of interrelationships, instances of co-linearity, and the presence and strength of intervening variables.

Explanations for positive relationships between education and health fall into two general areas. First, it is reasoned that skills and knowledge increase with increasing years of education. Specifically, information processing and critical thinking skills improve giving individuals a greater degree of command and control over resources that influence health. These can include things like social skills that enable more successful interactions with social institutions and service providers. Second, educational level gives individuals important credentials that return benefits of social status and social standing. This can contribute to enriched social networks, higher levels of social capital, and "health-enhancing" socialisation, among other benefits. Of course these things will vary greatly by age, gender, culture, ethnicity, and so on.

There are measurement issues that can compromise our understanding of education and health relationships. Measuring education primarily as an individual attribute is not without consequence. For example, household educational level may be very different from an individual's educational level. What could be the relative contributions to health outcomes of these different levels of education? Heavy reliance on quantitative measures of education means that it is primarily adult populations that have been studied. Children and youth who have not yet completed basic formal schooling fail to "score" with measures of school completion level, for example. Using quantitative measures of education such as years of schooling also makes it difficult to interpret the particular meaning of observed relationships. For example, if people with 12 years of education have better health than those with 11 years of education, is it the additional year that makes the difference, or that 12 years generally denote high school completion? The achievement of the credential, a high-school diploma, is an important social outcome with broad implications, one of which could include better health. Further, in this particular

example, the measure of health, *e.g.* mental or physical, could also contribute to confounding our understanding.

The focus on measuring the educational attributes of individuals, like years of schooling and credentials achieved, and then relating these to a social outcome like health, can also bias orientations to any suggested changes or interventions toward the level of education of the individual. To some extent it also promotes a lack of connection between individual agency and how individual agency operates in social and cultural contexts. Education and learning opportunities are fostered in supportive environments of committed parents, community organisations, policy makers and governments that can develop and support the appropriate family settings and community institutions, be they for early learning, formal schooling, post-secondary education, lifelong learning, and so on.

Comments on Feinstein *et al.* paper

From the overview of the organisation of Feinstein *et al.* provided above, it is clear that their review of the relationship between education and health is comprehensive. For example, the report runs to over 100 pages and the contents of over 60 different journal titles were searched. Internet searches were undertaken, seminal work was examined and other literature reviews were mined for important references. "Well-known" researchers in the area were identified and relevant work obtained. As well, country representatives and contacts for the OECD Social Outcomes of Learning (SOL) project were approached and relevant work solicited.

The depth of the review, however, is less clear. While the seminal work and work identified by the OECD SOL background document cover literature from the past 20 years or more, journal reviews focused on work from only the last 3 to 5 years. Also, given the substantial breadth of education and health issues reviewed, almost all of which have bodies of research sufficient to support paper length reviews of their own, it is difficult to discern if all work of importance has been noted or referenced in this paper. The authors should clearly identify the seminal and well-known work, including previous literature reviews, and then explicitly remark on how and what any additional literature has added to these "baseline" understandings.

Conceptual issues

Section 4.2 of Feinstein *et al.* presents and discusses a conceptual framework for the links between education and health. The intent of Section 4.2 is to provide an overview of key areas and issues with respect to the pathways for the health effects of educational inputs. The authors' goal is to synthesise diverse perspectives from many literatures to maximise the strengths of each, while at the same time presenting a "relatively simple model" that is accessible to policy makers. The model is reproduced in Figure 4.2.1 above.

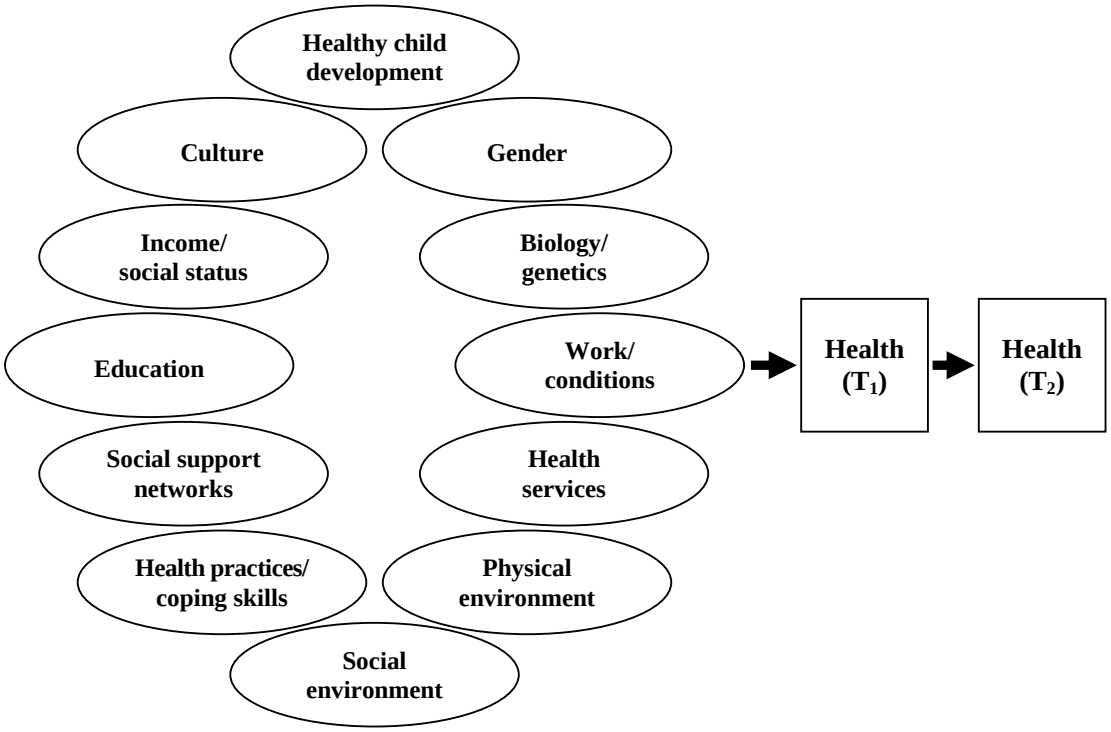
The authors recognise that education does not act on health in isolation from other factors. The model proposes that education has impacts on the individual (the self), within a social context. Key features of context that are mentioned include physical structure and environment (*e.g.* housing, neighbourhoods, employment, etc.), inequality, social position, gender, relationships, and so on. The model further outlines that educational effects on the self, shaped within various social contexts, can then be further influenced

(or mediated in the language of Feinstein *et al.*) by lifestyles (*i.e.* health behaviours such as diet, physical activity, substance abuse, etc.) and service use (*i.e.* the use of preventive and curative health services, and the processes by which they are used). The bulk of Section 4.2 is a considered discussion of the evidence behind these particular features of the self, context, lifestyles and service use and their relationships with health.

The evidence presented is sufficient to accept the soundness of the model presented. In the attempt at model simplification, however, the complexity of the interrelationships between many of the key features is obscured. It does not take a very careful reading of Section 4.2 for this complexity to be inferred. This is not necessarily an argument for presenting a more complex model, but it does make one wonder if the simple model will indeed be as useful to policy makers as the authors suggest.

The model presented also, curiously, ignores the many models in the social epidemiological and public health literatures that outline the "determinants of health". In these models, education is one of a number of high-level determinants. The determinants are a complex of variables, and research studies have great difficulty in reliably sorting out the relative importance of the determinants in predicting variation in health. Many times the relative importance or strength of the relationship of the determinant with health is dependent on the aspect or measure of health that is used. To be fair, however, in some respects the model presented by Feinstein *et al.* can be interpreted as a simplification of models representing the determinants of health. The determinants of health are represented in Figure 4.B.1 below.

Figure 4.B.1. Determinants of health



One thing the Feinstein *et al.* model definitely fails to address is a more dynamic view of the world, in particular a temporal dimension. For example, from longitudinal studies we know that the single best predictor of current health status (*i.e.* health at T_2) is prior health status (*i.e.* health at T_1) (Hay, 1994) (see Figure 4.B.1). The strength of this prediction depends on the amount of time between the two measurement points, but the association generally holds. When prior health status is included in longitudinal studies investigating the influence of social determinants on health, and effects on health from variables such as education are found, the effects are marginal in comparison to the effect of prior health status. This does not mean that social variables such as education are not important – as the abundant evidence reviewed by Feinstein *et al.* makes very clear – but it raises the crucial question of when they are important. The implication is that many social determinants have their largest affect on health very early in an individual's life. This is indeed part of the rationale for the research and policy focus on the "early years", including early childhood education and development (Canadian Institute for Health Information, 2004).

Methodological issues

Section 4.3 of Feinstein *et al.* identifies how research is classified for the review, as associational, casual, or process-oriented (*i.e.* research that explores explanatory variables in the education and health relationship). These classifications are defined and described and the types of evidence and their underlying research methods and statistical techniques employed are outlined. Again, the reader can be confident that the authors have applied fairly rigorous criteria in including and assessing the literature, and that the findings are robust as a result.

Strength of evidence

As the above overview of the relationship between education and health identified, and as Feinstein *et al.* also clearly state, the preponderance of the evidence is that there is a consistent, durable, high-quality and robust relationship between education and health. This holds across time, place, and variability in measures of education (some) and health (much).

The evidence for direct effects of education on health (Section 4.8) begins with four subsections looking at research using mortality, physical health conditions, mental health and well-being, and self-rated health. Again, while findings are generally consistent, they do vary. It would be useful to capture that variance, for example by showing the range of effect sizes across similar studies. This is important to consider when assessing where educational interventions may be most successful in changing health outcomes.

The fifth subsection reviews the evidence on intergenerational educational effects, *i.e.* the impact of parental education on child health outcomes and on preventive health behaviours. The authors conclude that the relationship is robust for child health outcomes, but not for the take-up of preventive health behaviours.

Other subsections (in Section 4.9) review relationships between education and health for various well-known risk factors: smoking, alcohol consumption, obesity, nutrition/diet, physical activity, illicit drugs and sexual health. The authors note that there is good evidence that education contributes to better health outcomes in the presence of the first five risk factors on that list, but not on the last two. This finding is qualified for

the risk factor of nutrition/diet by a comment that generally poor nutritional data reduces the reliability of this finding.

The last subsection examines the effect of education on service use and concludes that higher education increases the likelihood that preventive and curative services will be used, but it is dependent on the type of service or care provided. Interestingly, there is not a corresponding discussion of service need to assess whether or not increased use of services is actually justified on health grounds.

Section 4.10 examines evidence on the indirect effects of education on health. In summary, education has been shown to moderate occupational health risks such as stress and working conditions; parental education is related to neighbourhood choice and conditions, but that individual and household characteristics are probably more important for health; education does increase stocks of social capital and social connectedness, two concepts that have shown evidence of relationships with health; education has been shown to moderate relationships between income inequality and health; and, increased levels of education are positively related to income, and increased levels of income are positively related to health.

It should be noted that some of the evidence in Section 4.10 is merely associational, but the authors conclude that this is sufficient to suggest a pathway exists. For example, in the subsection on income, the relationship of education and income is stated as common knowledge, along with evidence that income matters for health. Without studies that measure and relate education and income simultaneously with health measures, this may be a minor evidentiary "leap of faith".

The last four subsections in Section 4.11 cover cognitions and social resources: beliefs about health and health care, self-concepts, inter-temporal choices, and resilience. While there is some evidence showing findings of relationships, it would seem that the magnitude of effects is smaller and that the findings are generally more inconsistent and less robust.

A general comment on how the evidence is presented in Sections 4.8 to 4.11 is that it is difficult to discern the size of effects, even when they are stated. For example, when it is reported that the effect is a "five percentage point difference in health outcome", a point of reference is not given. The important information to allow interpretation of the size of the effect is missing. So in the five percentage point example, is this from 5 to 10% for one group while the other group has no change, *i.e.* a doubling in outcome as a result of an educational "treatment"? Or is this a change from 80 to 85%, perhaps a significant change, but far less considerable compared to the first example? These instances in the report require clarification.

Scoping of data

Section 4.5 (and Appendix 4.2) of Feinstein *et al.* provides a review of the currently available international data that could support investigations of the relationship between education and health. There is also a brief statement on desired data requirements for such studies. Combining the authors' suggestions with my own, desired data sets would have among other things: longitudinal and developmental dimensions; sufficient sample size to permit multivariate comparative analyses; coverage of the life course (*i.e.* from the prenatal period to death); coverage of measures for different types of learning (*i.e.* family, intergenerational, institutional, adult learning, etc.); sufficient information for the study of at-risk and vulnerable population groups; and, a comprehensive range of the complex of

other variables identified so effects can be parsed across variables and the relative strength discerned.

The good news is that there are lots of datasets that are listed as relevant. The not-so-good news is that only a few of these datasets have more than a few of the desired criteria that are listed above. In particular, only one data set has any information on children, and this is beginning at age 9.

Section 4.5 could benefit from a discussion of types of evidence and their sources. For example, what sufficiently constitutes appropriate evidence? What type of evidence is required? By whom? For what purposes? For what reasons? Raphael (2000) classifies evidence into three categories – investigative (quantitative), interactive (qualitative) and critical (reflective). Investigative evidence is predominant and seen broadly as legitimate, sometimes discounting the contributions of the other two types. Raphael argues for contributions from all three types of evidence.

Section 4.5 does not address research methods, but a comment is warranted all the same. Over the last number of years there has been a rise in the production of systematic reviews, particularly in the medical and public health sciences. Systematic reviews are a method whereby a large volume of studies are reviewed and synthesised, and as such is a form of meta-analysis. Of particular note for Feinstein *et al.*, if they are not already aware, are the systematic reviews undertaken by the Community Guide, a programme of the Centers for Disease Control and Prevention in the United States. Many of the reviews investigate the effectiveness of interventions addressing risk factors and the social environment, including educational interventions (Anderson *et al.*, 2003).

Policy implications

In Section 4.6, the authors state that their review of the evidence of the relationship between education and health "suggests that the impact of education on health is substantive and universal". Further, the authors conclude that "an expansion of [educational] supply and uptake would bring considerable public benefits". This statement is qualified by a recognition that the complexity of the relationship is not sufficiently understood, particularly the timing and quality of education to be delivered. Even with this qualification, however, it is the conclusion of this reviewer that "considerable public benefits" is probably an overstatement, or at least is still unknown.

Given the evidence that has been presented, what has been learned? Notwithstanding the over 100 pages of scholarly review, our understanding that education is a good thing, with many benefits for individuals, families, communities and societies, has not been either removed nor substantially reinforced. Looking at education in relation to a particular desired outcome such as improved health raises more questions than answers.

For example, does this review point to particular levels and/or types of education that will make a substantial difference for health? Not generally, and the places where it does are fairly focused on particular interventions in particular situations for particular health reasons (*e.g.* use of preventive health services or activities that address risk factors). From the number of studies and the quality of data and measurement, marginal health returns are bound to be small, even if they are able to be estimated.

What level of education is a sufficient condition for a reasonable level of health? Is it high school, college, or what? We probably do not know precisely, but if we did, would we endeavour to require and provide, for example, a college level education to all

individuals, no matter what the individual and social "needs" are? Is it functional for everyone to have a college education, given the division of labour and labour force requirements in advanced capitalist societies? What would be the intended and unintended consequences of such a policy?

The strength of the policy conclusions that can be taken from this review are in two areas. First, education remains a good thing and societies should endeavour to provide the conditions, social context, and educational services to support their populations in achieving appropriate and substantial levels of education. Second, marginal gains in social outcomes can be a by-product of education and learning, and one of these social outcomes is certainly health. The evidence from the Feinstein *et al.* review points to particular types of education to be provided for particular purposes to be able to maximise health as a social outcome of learning.

Summary

There is substantial evidence that education matters for many social outcomes, including health. It is also clear that the relationship is complex such that causal mechanisms and pathways are difficult to study and understand. This is partially due to limitations of available data, difficulties in translating multidimensional social concepts into adequate measures, and the challenges of finding research methods and statistical techniques that can appropriately deal with social complexity. These issues need to be addressed, however, if research is to provide information for policy makers that they can understand and use, and also recognise as information that is reliable and valid.

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4.C. Health behaviours: the competence approach

By Laura Salganik*

Introduction

The Feinstein *et al.* paper presents a framework relating education to health and summarises a large body of related research. It is clear from the paper that the relationship between education and health outcomes is complex and multi-faceted. Further, it is certainly reasonable to hypothesise, as presented in Feinstein's framework, that education influences health both through influencing the context in which individuals live and through influencing the actions individuals take. The research appears to support these hypotheses and demonstrates numerous interrelationships between education and health-related factors, suggesting that it may be possible to link health outcomes to individuals' education. In this paper, I discuss issues related to using this work as a starting point for the development of indicators of health-related returns to education.

Indicators and research: rationale for indicators

Much of the material in the Feinstein *et al.* paper focuses on research relating education to a wide range of health outcomes. In reviewing these relationships, it is important to keep in mind the role of such a review for discerning whether the development of indicators relating health outcomes to education is justified. It is important to clarify that the primary rationale for indicators is that they are of interest of policy makers. Statistical indicators are statistics about phenomena that policy makers are interested in, such as health status and educational attainment. Simply put, they are policy-relevant statistics. Policy makers may be interested in various statistics for any number of reasons, including but not limited to relationships supported by research. Commonly-held beliefs about policy goals and beliefs about how social processes work are other sources affecting the interest of policy makers in statistical indicators. Of course, research, commonly-held beliefs, and policy questions are interrelated. But they are also distinct from each other, and it is through their relationship to policy questions that statistics become "indicators".

Thus, when considering indicators of returns to education related to health outcomes, the most important question to consider is: Is the relationship between education and

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indicators of interest to policy makers? Although the research base informs the interest of policy makers, it is not the only input. A few illustrations from other topics highlight why this approach is relevant and appropriate.

Consider returns to schooling for literacy outcomes (again operationalised as differential outcomes for individuals with different educational attainment). It is immediately clear to policy makers and others that one of the policy goals of education is to influence literacy outcomes. If literacy outcomes did not vary with education, one would not conclude that indicators showing the relation between literacy and education were not important. Rather, indicators would likely be interpreted to mean that something is askew in the education system. The relevance of this indicator does not depend on research evidence.

Moving a bit further from such a well-defined arena of education goals, consider returns to schooling for income. Although the mechanism relating education and income is not as direct as the one relating education and literacy, there are commonly agreed on mechanisms through which education affects income, not necessarily the only influence but an influence nonetheless. If there were no returns to schooling on income, would this still be a valid indicator? I suspect it would. Lack of a relationship could be a result of characteristics of the labor market (criteria for hiring, wage differentials) or of the education system. In either case, although the body of research supporting these returns details the mechanisms, provides corroborating evidence, and may contribute to commonly held beliefs, it is not logically necessary for the indicators to be interesting to policy makers in a cross-national context.

Health outcomes take us even further from goals that are typically expressed for the education system. In developed countries, a connection between education and health is not a major element of policy or ideology. Rationales for policies that support education generally do not include improving the health of the population. Yet it is quite reasonable to envision that skills individuals learn in school contribute to their own health.

Additionally, while indicators and research may address the same topics, there is also an important difference in their underlying logic. Researchers look for complexities in relationships. In research, there is always another rock to turn over, another variable to investigate, another methodology to apply to more fully understand a particular phenomenon. Indicators, like research findings, must be high-quality statistics that accurately measure what they purport to describe. But their purpose is to stimulate discussion, not to fully understand the phenomenon. Useful indicators can be generated where linkages are plausible, even if research does not conclusively demonstrate causality. Research proceeds over a long time perspective; indicators operate in a fast-moving policy – and political – environment.

Exploring whether health returns to education are an indicator of interest, like other indicator development, should take place through an iterative process of conceptual and empirical work, each informing the other. Conceptual work provides a foundation for research – for structuring research questions and interpreting findings; research speaks to these questions and suggests modifications to conceptual frameworks. The Feinstein *et al.* paper begins both areas of work. In the conceptual area, Feinstein *et al.* present a broad conceptual framework that relates education to health. The framework shows explicitly that factors from context influence health as well as characteristics of self. It illustrates that education influences context, and that there are direct and indirect influences on health. I have two recommendations for building on the work in the framework arena.

Grounding in a broad framework

The first recommendation is to extend the framework so it represents more fully the questions addressed by both research and indicators. Ideally, there should be a correspondence between the framework and the major questions under discussion. Thus, rather than proposing a framework for how education relates to health, an extended framework would present a broader conceptual view of health-related behaviour and outcomes in which education is one component. The framework then would address the question of what factors "produce" health outcomes of individuals. It is not the place here to propose a particular one, but I assume it would include a place for genetic makeup, early health, socioeconomic status, characteristics of individuals that influence their behaviour, as well as aspects of the health care system and other health-related characteristics of the social and physical environment.

Having such a framework would make transparent the competing hypotheses for how correlations between health outcomes with other factors are generated. Whether correlations between education and health-related behaviours and outcomes reflect indirect effects, selection effects, or reverse causality rather than direct effects is a central question for researchers, and the existence of the competing hypotheses is frequently mentioned in the Feinstein *et al.* paper. Making alternate explanations explicit through a broad framework would aid both in critiquing the research base and in interpreting indicators.

It is a challenge to reach the right level of specificity, but in light of the research questions a framework that places education in a broader framework of health behaviours and outcomes is a necessary step for indicator development, particularly since the topic involves two different policy spheres, health and education. As is generally recommended for indicators development, such a framework is best designed through a consensus process representing multiple viewpoints.

Linking individual behaviour to health outcomes

A conceptual framework for health outcomes that focuses on links between health and education should be explicit about how individuals can influence their own health. The second recommendation is to expand the framework by providing more depth in this area, thus providing an important link toward understanding the processes through which education – going to school – can lead to better health for individuals. (It is of course possible that the link between education and health is totally mediated by placing individuals in a different context – different environment, different services, no germs – but it is far-fetched to posit that the behaviour of individuals has no role to play once they arrive in this context.) What is the conceptual and theoretical base for positing the influence of individuals over their own health?

The findings of another OECD project, DeSeCo (Definition and Selection of Competencies: Theoretical and Conceptual Foundations), shed light on responding to this question. Through international and interdisciplinary interchange among scholars from different disciplines as well as policy makers and policy researchers, DeSeCo addressed the topic:

> *"Beyond reading, writing, and computing, what competencies are needed by individuals to live a successful life and for society to face the challenges of the present and the future in modern, democratic societies?"*

DeSeCo adopted a broad view of a successful life, reaching beyond economic outcomes to all aspects of life, including health. The purpose of the project was to develop an overarching frame of reference relevant to lifelong learning, international assessment of competencies, and the development and interpretation of internationally comparable indicators. Additional information about the project can be found in OECD (2005), Rychen and Salganik (2003b), Rychen and Salganik (2001), and Rychen, Salganik, and McLaughlin (2003). Rather than providing a summary of the findings, which can be found in the OECD Executive Summary (2005), I will focus briefly on the theoretical and conceptual work that most directly relates to linking individual behaviour to health outcomes, *i.e.* the concepts of competence and key competence and the three-fold categorisation of key competencies.

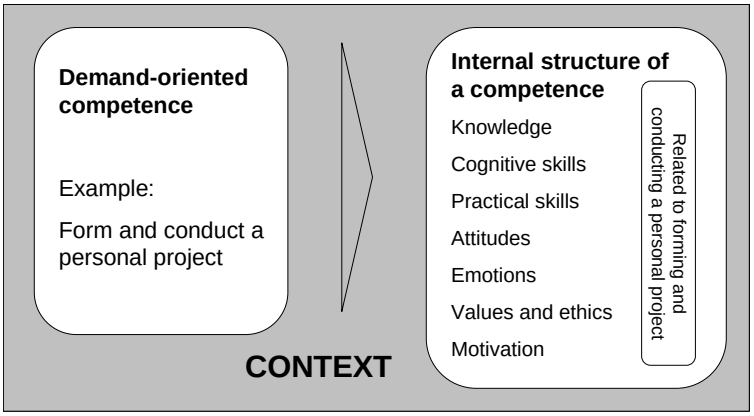
Competence

DeSeCo proposed that for assessment and indicator development, it is most useful to think of competence as "the ability to successfully meet complex demands in a particular context through the mobilisation of psychosocial prerequisites (including both cognitive and noncognitive aspects)" (Rychen and Salganik, 2003a, p. 43).

This conceptualisation incorporates several critical elements (see Figure 4.C.1). First is the idea that competencies are structured around the capability of individuals to meet demands they face in any sphere of life, including health. By putting demands at the forefront of the definition, it contrasts with definitions that focus on internal attributes of individuals. The concept of competence recognises internal attributes as prerequisites that enable action through interacting dynamically among themselves. Internal attributes typically thought of as cognitive (such as knowledge and skills) together with those typically thought of as noncognitive (attitudes, emotions, values, motivation, social skills) play a complex and important role but are not competencies themselves. The final critical element is the role of context. Competencies are played out in the social and physical environment – and thus their specifics, as well as the specifics of their internal components, are influenced by the individual's particular situational context. For this element, DeSeCo drew from Pierre Bourdieu's notion of social fields. According to this theory, individual action takes place within dynamic systems of sets of social interests and challenges, which are referred to as social fields. Meeting demands in a social field involves understanding and being able to operate within the system of capital of the field.

An example from the health domain is the competence to deal with an illness. To respond to the demand associated with an illness, it takes attributes associated with cognitive and non-cognitive domains: knowledge (which symptoms are dangerous, should a doctor be consulted?), motivation to take the necessary actions and do what the doctor ordered, beliefs about self-efficacy and potentially the efficacy of the medical system, in many cases literacy and numeracy, problem-solving, and the ability to plan and think in the future. Each is diminished without the other. What is required of individuals is also affected by the context – the resources available from the health care system and what actions and capabilities are necessary to access them, for example, what is involved to see a doctor or read the directions on medicine containers. A similar example is eating food that contributes to health. To eat a healthy diet requires a range of attributes – including knowledge, motivation, deferred gratification, etc., – and is dependent on elements of the context in which the individual lives such as the availability of healthy food.

Figure 4.C.1. The demand defines the internal structure of a competence



Adapted from Rychen and Salganik (2003b), page 44, Figure 1.

Given that competencies are the ability to meet demands and that they require the mobilisation of numerous individual resources, what competencies contribute to health outcomes? The concepts of competence, key competencies, and three categories of key competencies provide a starting point for this discussion.

Key competencies

DeSeCo defined competencies as "key competencies" if they [1] contribute to highly valued outcomes at the individual and societal levels in terms of an overall successful life and a well-functioning society… [2] are instrumental for meeting important, complex demands and challenges in a wide spectrum of contexts… and [3] are important for all individuals" (Rychen, 2003, pp. 66-67).

The project also developed a three-fold categorisation of key competencies and through an analysis of the use of key competencies in OECD countries, identified exemplar key competencies in each category. he three categories and exemplar key competencies in each group are shown below.

Interacting in socially heterogeneous groups. Human beings are dependent throughout their lives on ties with others, not only for physical survival but also for their sense of self and social meaning. This category addresses interaction with others, and given the pluralistic character of modern democratic societies, the focus is on socially heterogeneous groups – "different others". The key competencies in this group are: the ability to relate well to others; the ability to cooperate; the ability to manage and resolve conflicts.

Acting autonomously. This category focuses on an individual's sense of identity and empowerment to exercise control over his or her own life. Key competencies in this area enable individuals to develop a value system, "to act rather than to be acted upon, to shape rather than to be shaped, and to choose rather than to accept choices decided by others" (Rychen, 2003, p. 91). It should not be interpreted as meaning that individuals can do whatever they want or can freely act in isolation from others; all our actions take place in the context of other people and of social norms and institutions. The identified key competencies are: the ability to act within the "big picture"; the ability to form and

conduct life plans and personal projects; the ability to defend and assert one's rights, interests, limits, and needs.

Using tools interactively. Using tools is a universal activity for human beings. Here, the term "tool" is used in the broadest sense of the term, to include not only physical tools but also socio-cultural ones such as language, information, and knowledge. The adverb "interactively" signifies that what is needed is not just the technical skills to operate a tool (*e.g.*, reading or making a phone call with a cell phone, locating a web site); to use a tool interactively is to understand the potential of the tool for allowing us to do new things, to interact with the world in a different way, to accomplish new goals. Three key competencies were identified in this category: the ability to use language, symbols, and text interactively; the ability to use knowledge and information interactively; the ability to use technology interactively.

This conceptualisation of key competencies provides a starting point for thinking about what is involved with the health-related competencies such as responding to illness, eating a healthy diet, exercising and resting, going to the doctor regularly, refraining from activities that negatively impact health, or other activities that are related to health outcomes. Each of these draws on combinations of inter-related key competencies.

The material compiled for the DeSeCo project – the concepts of competence and key competence, and the categorisation of key competencies – provides a theoretical and conceptual foundation for further research and indicator development that links such concepts discussed in the research literature as self-efficacy, resilience, self-esteem, and time preference; other factors not mentioned by Feinstein *et al.* such as knowledge, problem-solving, literacy and numeracy; as well as aspects of the social and physical context including the health care system to individual actions that affect health outcomes. Such a broad view can be used to make explicit the linkages between education and health and other social outcomes and provide a framework for continuing research and for relating research to indicators and interpreting indicators.

Linking education to health outcomes

Once the process of "producing" health is outlined, the next step is to examine where education fits in. Are there competencies that contribute to health and are they linked to education? Does education influence characteristics such as literacy, self-efficacy, or time preference that may allow individuals to act in the interest of their own health? Does education influence contextual factors that contribute to health? These become the critical questions for developing a framework that relates education to health outcomes. With a framework rooted in all factors affecting health, both research and indicators can be more explicit about how education fits into a picture that includes other influences also, and what methodological challenges await.

Methodological challenges

As with any policy question that involves complex processes in different spheres, analyses of statistics can highlight relationships that were otherwise unnoticed, confirm relationships that some would rather not believe, or lead to interesting further questions. But it is also important to recognise their limitations.

Causality. Much has been written about the concept of causality in social science research, and an in-depth discussion of it is well beyond the scope of this endeavour. I will comment, however, on use of the concept of causality in discussions of indicators, where it is common to establish the criterion that a measure is more appropriate for an indicator if it has a "causal" relationship to the outcome. Feinstein *et al.* write that causality can be used "in terms of a generalisable impact that can provide policy makers and others with a reasonable guide to the likely impact of a policy change". In the context of education policy, it would be helpful to establish whether policies that increase the level of educational attainment in the population would also lead to improvements in health outcomes. Assuming that there was a true causal relationship, indicators would provide information on the extent to which changes in education would cause health outcomes to improve.

The question of causality often arises in the context of one or a few competing hypotheses that represent factors correlated with the predictor of interest. For example, examining the relationship of education to health outcomes and to income, some aspect of socioeconomic status is a factor correlated with education that poses a competing source of "cause". Statistical controls are used to verify whether the relationship persists among those with the same level on the control variable. If it does, and if there are no other such correlated factors under consideration, then the term "causal" is used. It is critical to realise that any conclusion about causality is only valid in the context of the particular model it references. Changing the model by adding another predictor introduces a whole new hypothesis about causality. A factor such as educational attainment may qualify as causal with respect to one model and not with respect to another.

A final word about causality, that is very basic but also very important for both research and indicators, is that statistical models can only demonstrate causality when there is variation. If everyone in a population has an identical characteristic, *e.g.* attending primary school, then statistics cannot demonstrate its effect on a particular outcome, *e.g.* health. As a policy becomes widely implemented or mandated for all, variation in the target characteristics will decline and its relationship to its intended outcome will be diminished. As a result, it will become impossible to tell from the statistical relationship alone whether it is because the policy worked or because it did not work.

This statistical discussion differs substantially from the non-technical use of the word causal, and since indicator discussions need to take place in a non-technical sphere, it can lead to miscommunication and misunderstandings. Interest to policy makers (which often stems from previous research and the plausibility of causality) is a better criterion than causality demonstrated through a statistical process.

Instrumental variables. "Instrumental variables" refers to a statistical technique frequently used in regression analysis when a predictor variable (also called an independent variable) is correlated with the error term of the regression equation; usually this means there is a variable omitted from the model that is correlated with both the independent variables and the outcome variable (also called the dependent variable). This correlation can lead to bias in estimating the relationship between the predictor variable and outcome variable. Statistical theory shows that this bias can be reduced by using an "instrumental" variable in the regression in place of the predictor variable that is correlated with the error term. The criterion for an instrument is that it be correlated with the independent variable as highly as possible but not with the error term. Although econometrics books routinely suggest caution in using instrumental variables, the

temptation to use this technique for inferring causality seems difficult to resist, especially with the importance given to this type of evidence of causality.

But these cautions should not be overlooked. It is easier said than done to identify instruments that are correlated highly with the independent variable and not correlated with the error term. Thus, in practical terms, the correlation between the independent variable and an instrument will be a moderate one. Moreover, it must be recognised that the methodology of instrumental variables relates variation in the dependent variable to the variation in the independent variable but only the part it shares with the instrumental variable, otherwise the variation in the independent variable that is not correlated with the instrument is dropped. There is no way around that, and this limits the meaning of a non-significant regression coefficient.

In addition, analysts should be knowledgeable about the instruments selected. For example, compulsory attendance laws in the United States are used as an instrument for educational attainment in studies cited in the paper. Such laws were typically passed only when enrolment was already high so it is unlikely that they discriminate very well between different levels of educational attainment for individuals.

Additional topics

Some additional topics to consider in the development of indicators are the following:

Interpreting returns to education. As with any analysis of returns to education in developed countries, it is important to remember that conclusions refer to returns to education beyond the level that is attained by just about everyone. Thus, in OECD countries, it is impossible to tell from these analyses whether there are health-related returns to education at the primary and lower secondary levels.

Developing countries. It is widely agreed that there are positive health outcomes when education is introduced in developing countries, and that these are not just an artifact of the benefit of higher incomes. This introduces a different set of policy questions, but considering interest in indicators for projects beyond OECD countries, this should be considered in indicator planning. Bloom (2005), the introduction to a special issue of *Comparative Education Review* on the synergies between education and health for human development, provides an overview of the topic in the context of developing countries.

Next steps

The following are a few recommendations for next steps in developing indicators relating education to health outcomes:

Wide participation in indicator development. It is extremely important to include experts in the fields under consideration, including those with statistical expertise, those with a policy perspective, and substantive experts. Medical and health professionals should be involved in the development of a framework to relate education to health. Communication across different groups of stakeholders, including researchers, practitioners, and policy makers, is critical to the process of indicator development.

As an observer reflecting on the development of indicators in the United States reaching as far back as the unemployment rate (beginning in the 1920s) put it:

> *"From my perspective… the most influential, valid, and reliable indicators are constructed not just through the efforts of technicians, but also through the vision and understanding of the other participants in the policy process. Influential indicators reflect socially shared meanings and policy purposes as well as respected technical methodology. If they were not simultaneously technical and political creations… they would not be valid, since the very concept of validity implies a correspondence of measure and meaning." (Innes, 1990, p. 4)*

Utilise widely-recognised and validated measures. It is important that indicators be understood and recognised as valid by a wide audience. Using measures that have been developed and used for other purposes contributes to this end.

Practical data requirements. At the most practical level, the main data requirements for producing cross-national indicators of health outcomes and health-related behaviours for those with different levels of education are (1) that information on both characteristics be available on the same data set, and (2) that the information be comparable across countries. Longitudinal data have many advantages but in a practical sense are not necessary for indicators. A few carefully-developed questions that could be placed on for example the upcoming OECD Programme for International Assessment of Adult Competencies (PIACC) questionnaire could lead to a number of indicators not only empirical relationships between education and health outcomes, but between what individuals know and can do and their health.

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