



# Understanding and critiquing quantitative research papers

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**ABSTRACT** Lee, P. (2006) Understanding and critiquing quantitative research papers. *Nursing Times*; 102: 28, 28-30.

This article, the second in a three-part series on research, explores quantitative research.

Quantitative research aims to focus on objectivity, and therefore searches for answers that can be generalised to other situations. Quantitative researchers believe that it is possible to focus on objective reality within the world.

When reading quantitative research, readers are faced with a lot of specialist terminology. It is important to be familiar with this jargon in order to be able to interpret the report. Some of the terminology has been introduced in the first article in this series (Lee, 2006), which looked at quantitative (numerical) and qualitative (non-numerical) data.

Within quantitative research there are different approaches (methodologies). The example used throughout this series of giving the patient an experimental drug to treat hypertension and then measuring the patient's blood pressure, may be set up in one of several ways. Researchers may ask GPs to record the patient's blood pressure, before starting treatment and thereafter every month for a year, as well as recording the patient's attitudes to taking the medication. This type of research is known as 'survey research', although the research may not necessarily take into consideration other factors such as the patient's diet or exercise regime.

### BOX 1. SOME COMMONLY USED RESEARCH FRAMEWORKS

- Bray and Rees (1995)
- [www.phru.nhs.uk/casp/casp.htm](http://www.phru.nhs.uk/casp/casp.htm)
- Benton and Cormack (2000)

An alternative method is to divide the patients into two groups and measure the participants' blood pressure as above, ensuring that both groups do not change any lifestyle factors (variables such as diet or exercise) that might affect their blood pressure. The first group would receive the drug to be studied, while the second group would receive a placebo drug. This is known as the randomised controlled trial (RCT) and to date in health research it has often been considered to be the 'gold standard' of research.

### Critiquing frameworks

When it comes to critiquing research, students can call upon various frameworks to assist them. Some frameworks have been constructed for the critique of both qualitative and quantitative research, which raises the question of whether such frameworks can truly evaluate either when the background beliefs (philosophies) of the two worldviews (paradigms) are so different. There are other frameworks that have been designed to deal solely with quantitative or qualitative research (and can only be used for that purpose). Box 1 lists some of the most commonly utilised frameworks within the nursing literature.

Caution should be exercised when choosing a suitable framework, as each framework asks slightly different questions of the research. Within quantitative research there are different critiquing frameworks for the different methods used. For example, there are separate frameworks for evaluating randomised controlled trials (RCTs), cohort studies and case control studies. The ten main questions that the Critical Appraisal Skills Programme (CASP) asks of RCTs are discussed here and listed in Box 2.

### Did the study ask a clearly focused question?

Quantitative research should ask a clearly focused question. With an RCT the question can be rephrased as a hypothesis that is refuted or agreed with. Survey research still aims to answer a focused question.

## Learning objectives



Each week *Nursing Times* publishes a guided learning article with reflection points to help you with your CPD. After reading the article you should be able to:

- Understand the purpose of quantitative research;
- Know the role of critiquing frameworks;
- Understand what these frameworks aim to achieve;
- Be familiar with how quantitative research can help practitioners.

**Was this an RCT?** Some research questions are best addressed by quantitative inquiry and others by qualitative inquiry. In the example of the patient with hypertension – the researcher who wants to measure the effects of a drug on a patient’s hypertension is clearly seeking to use a quantitative paradigm.

If research uses an RCT the report should clearly state that an RCT was undertaken. Likewise with quasi-experimental or survey research, both should state clearly what sort of research design was used. Consideration should also be given as to whether it was appropriate to undertake either an RCT or other form of quantitative research.

**Were participants appropriately allocated to intervention and control groups?** Once the population for a quantitative research study has been determined, the researcher must then decide what proportion of the population (sample) will be included in the research study. If you want to be able to generalise the results beyond the study population, the study participants must have been chosen randomly for one of the groups in an RCT.

In other forms of quantitative research other sampling methods might be used but it should always be determined if the sampling method is appropriate to the research design (Polit and Beck, 2004).

**Were participants, staff and study personnel ‘blind’ to the study group?** With an RCT study participants are allocated randomly to the study or control group (sometimes there are more than two groups). When the research participants do not know whether they are in the study or the control group – that is they do not know if they are taking the actual medication or a placebo – the results are more convincing since psychological factors have been ruled out.

Similarly, any health service staff caring for such patients and any researchers recording the patients’ blood pressure are less likely to be influenced or introduce bias if they, too, are unaware of which group the study participants belong to.

**Were all the participants who entered the trial accounted for at its conclusion?** Some participants who entered the research trial may not be included in the data analysis at the end of the trial. There may be various reasons for this, but the data analysis should reflect all the participants (even those who may have died as an indirect result of their hypertension).

**Were the participants in all groups treated in the same way?** In order to avoid bias it is important that all research participants are treated in the same way. Every person in the trial should receive the same dose of any medication (or placebo) and any follow-up treatment or measurements should be conducted with the same equipment and at the same time intervals.

**Did the study have enough participants to minimise chance?** When undertaking quantitative research it is important to realise that studying a small number of people (sample) may produce chance results. The study sample therefore should be large enough to reduce any chance bias from creeping in.

**How are the results presented and what is the main result?** The results of all quantitative research are presented as statistical data. Some statistics simply describe or summarise the research results and these are known as ‘descriptive statistics’. They include such terms as mean, frequency, normal distribution and standard deviation. However, other statistical tests may be undertaken to make inferences from the data. These are known as ‘inferential statistics’ and include such terms as probability.

**How precise are these results?** When examining statistical results readers should have some understanding of the different probability values and therefore how significant they may be to the research results.

**Were all important outcomes considered so the results can be applied?** If quantitative research results are to be applied to other similar populations, then all the outcomes of the research should be reported and understood, not just those research outcomes that appear to be either the most significant or most interesting to the researcher.

### What are critiquing frameworks for research trying to achieve?

It can be seen from working through the above example of a framework for evaluating quantitative research that the questions tend to be sequential. That is, it is vital for readers to understand the research aims and questions in order to answer subsequent sections of the evaluative framework.

The critiquing frameworks enables readers to make a judgement regarding the soundness of the research. It is possible to critique a piece of research without using a critiquing framework, but the frameworks are very useful for those who are not used to critiquing research.

### What do academic journals expect?

When reading reports in published journals and then critiquing the reports readers should bear in mind several points. First, the research report in a professional journal is likely to be much shorter than the researcher’s original paper. This is because of the restricted word allowances of professional journals. Many health journals restrict their research reports to between 3,000 and 5,000 words whereas some research papers may be around 10,000 words long, and those submitted for a higher degree may be up to

## REFERENCES

- Benton, D.C., Cormack, F.S. (2000) Reviewing and evaluating the literature. In: Cormack, D. (Ed) *The Research Process in Nursing*. Oxford: Blackwell Science.
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This article has been double-blind peer-reviewed.

For related articles on this subject and links to relevant websites see [www.nursingtimes.net](http://www.nursingtimes.net)

**BOX 2. EVALUATING THE VALIDITY OF A RANDOMISED CONTROLLED TRIAL**

1. Did the study ask a clearly focused question?
2. Was this a randomised controlled trial (RCT) and was it appropriately so?
3. Were participants appropriately allocated to intervention and control groups?
4. Were participants, staff and study personnel 'blind' to the participants' study group?
5. Were all of the participants who entered the trial accounted for at its conclusion?
6. Were the participants in all groups treated in the same way?
7. Did the study have enough participants to minimise the play of chance?
8. How are the results presented and what is the main result?
9. How precise are these results?
10. Were all important outcomes considered so the results can be applied?

100,000 words. It is clear therefore that not every topic can be covered in a journal's report. Readers should be careful before boldly stating that the researcher did not consider a certain aspect, because it may have had full coverage in the original (unpublished) research report. Readers would do well to look at the author guidelines of professional journals and then relate this to the critiquing framework outlined above.

Second, the terminology that is used in some of the journals would still require inexperienced readers to explore meanings further. The RCT, and following on from that, descriptive and inferential statistics, would be fully understood by the researcher but not necessarily fully understood by readers.

Readers should still be able to determine the validity and reliability within quantitative research. Once the above terms have been understood then it should be possible to determine if the research can be generalised, that is transferable to other situations/

locations. Additionally, nursing journals have different expectations regarding how much should be included regarding the validity and reliability of research.

Lastly, the implications for nursing should be considered. These implications relate to the practice, education, research and management of nursing.

**How quantitative research assists practitioners**

Careful examination of quantitative research gives practitioners a greater understanding of how an action (in this example, giving patients with hypertension a particular drug) affects a group of people. After reading the research paper, individual practitioners would be able to enhance their practice and contribute to evidence-based practice.

**Conclusion**

This series outlines the two main approaches to research (recognising that there are other more specialised approaches) and explains how to read and critique qualitative and quantitative research (see next week's issue for part three in the series). The development of such skills should assist pre-registration students with relevant assignments. They should also help practitioners to determine if a piece of research is relevant and suitable to be implemented in their practice. The skills outlined in this series are also essential prerequisites for those intending to undertake a critical review of literature, begin their own programme of research, or undertake systematic reviews of research.

As practitioners gain a deeper understanding of critiquing a single piece of research, they should consider critiquing several research studies on a particular topic, searching for common themes. They could then write a critical review of the literature on that chosen topic. ■

**Guided reflection**



**Use the following points to write a reflection for your PREP portfolio:**

- Outline where you work and the relevance of this article to your practice;
- Identify the last time you came across a piece of quantitative research;
- Discuss something new that you have learned about quantitative research after reading this article;
- Explain how this information could have informed your care of a patient;
- Outline how you will take what you have learned from this article and disseminate it among your colleagues.

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**REFERENCES**

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**Reference name.** (1999) '*Reference title*' of the source document follows the authors name.

Publishers name follows in 'Ref. body' text style.

Note all right hand side-text columns containing reference information always have the copy range left.

For Journal articles

Reference name. (1999) individual references for each article in the Clinical section is twelve.