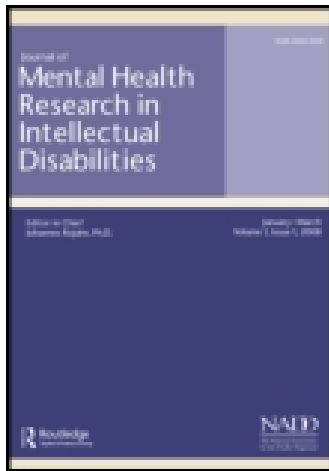


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A Systematic Review of the Prevalence of Psychiatric Disorders in Adults With Intellectual Disability, 2003–2010

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Research regarding the prevalence of psychiatric conditions co-occurring with intellectual disability in adults was reviewed. Particular attention was paid to the qualities of sampling and diagnostic methodology, which have been identified as needs in two recent reviews. Sixteen articles published in peer-reviewed journals between 2003 and 2009 met inclusion criteria for this review. Overall prevalence rates for co-occurring psychiatric symptoms or disorders reported in these studies ranged from 13.9% to 75.2% with much of this variation due to differences in the diagnostic criteria utilized and the specific samples examined. Results indicated that although several studies have evidenced improvement in methodology, problems remain regarding sampling and general lack of consistency regarding diagnostic definitions and tools. Suggested directions for future research include expansion of geographic and cultural diversity in participants, increased use of population-based sampling, and improved concurrence regarding evaluation methods and diagnostic criteria.

KEYWORDS *intellectual disability, mental retardation, comorbid, mental health, mental disorder, epidemiology, mental ill health, prevalence, adults, measurement*

Over the past several decades many authors have stated that individuals with intellectual disability (ID) may be at increased risk for psychopathology

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or mental disorder (e.g., Lewis & MacLean, 1982; Moss, Emerson, Bouras, & Holland, 1997; Parsons, May, & Menolascino, 1984; Pyles, Muniz, Cade, & Silva, 1997). Unfortunately, there is also significant agreement that these findings may not be wholly comparable due to a variety of factors including but not limited to inconsistency in definitions of psychiatric disorder, inconsistency in definition of ID, lack of studies using non-ID comparison groups, lack of consistency in diagnostic screening tools, overuse of administrative samples, and use of small sample sizes (Kerker, Owens, Zigler, & Horwitz, 2004; Smiley, 2005; Whitaker & Read, 2006).

Although there is a litany of individual factors (e.g., diagnostic classification, severity of symptoms, evidence-based treatment options) related to allocation of funding and services, valid data on the prevalence of mental disorder in individuals with ID may be important for clinical, system, policy, and economic reasons. The functions of assessment in ID include diagnosis, classification, and planning systems of supports (Schalock et al., 2010). Valid prevalence rates of dual diagnosis depend upon consistent assessment frameworks, practices, and diagnostic reliability. Many factors (e.g., severity of symptoms, types of disorders, and availability of evidence-based treatment) may influence funding, creation, and maintenance of support systems. Accurate overall prevalence data are, however, part of the process in determination of how to provide targeted, effective systems of supports and services for the potentially affected population (Kerker et al., 2004; Smiley, 2005); shaping of increasingly responsive policies; and planning for the future, including future resource needs. Therefore it is essential that continued efforts be directed toward conducting well-formed research in this area and evaluation of the state of this research as a whole.

Two recent reviews (Kerker et al., 2004; Whitaker & Read, 2006) examined the published data pertaining to the prevalence of mental disorders in individuals with ID. These reviews included the past several decades of research in this arena for both child and adult samples. Whitaker and Read (2006) reviewed 14 articles published between 1979 and 2003 that included dual diagnosis prevalence data involving both children and adults. The authors declined to report any specific cumulative prevalence figures for adults. They concluded that there was scant evidence that individuals with ID at higher IQs (IQ 50–70) have any higher prevalence of psychiatric disorder than the general population. They found evidence that individuals identified as having ID with lower IQs are more likely to have evidence of mental disorder. Similarly, Kerker et al. (2004) reviewed 12 articles published from 1970 to 1995 and found that reported prevalence rates ranged from 0% to 40% depending on the measures and definitions used. Specifically, the authors found that when administrative samples were used, the rate of dual diagnosis was significantly higher in the individuals identified as having ID with higher IQ. However, their review also found that when population-based data were gathered the prevalence of co-occurring disorders was significantly higher in

the group identified as having ID with lower IQ. The authors of both reviews agreed that there have been several common shortcomings or limitations of these data that have resulted in this disparity of findings. In brief, Kerker et al. (2004) and Whitaker and Read (2006) concurred that these shortcomings included but were not limited to (a) inconsistency in definition of what constitutes a mental disorder and/or the tools used for diagnosis, (b) reliance on administrative sampling, and (c) use of small sample sizes.

A more recent review (Cooper & van der Speck, 2009) examined a range of epidemiological data from studies of dual diagnosis published since 2008. Cooper and van der Speck (2009) focused on dual diagnosis prevalence rates associated with specific conditions (e.g., Fragile X, autism, Down syndrome) in adult samples. Down syndrome was found to be a protective factor with regard to mental illness whereas the presence of borderline intellectual functioning was found to be a risk (Cooper & van der Speck, 2009). The authors did not report on the potential role of variation due to measurement/diagnostic tools or the effect of sampling methodology utilized in the reviewed studies.

In this review we concentrate on the studies of the prevalence of psychiatric conditions co-occurring with ID in adults published since 2003. Reported prevalence rates are compared and analyses of possible improvements in consistency of sampling and diagnostic methods/criteria are provided.

METHOD

Sixteen articles were identified for this review using a combination of electronic database search, citation review, and browsing (see Figure 1). The literature was searched for studies that included data on the prevalence of ID and co-occurring mental disorder in adult populations. Inclusion criteria were peer-reviewed journal articles that included a clear research protocol and data on prevalence in an adult sample. Searches were limited to those published between 2003 and 2010. Exclusion criteria included any article reviewed by Whitaker and Read (2006) or Kerker et al. (2004) and articles that reported or focused only on the presence or prevalence of problem behaviors without data regarding mental disorder. In addition, we excluded articles that examined prevalence rates in persons under 16 only or that did not delineate between findings regarding persons over 16 versus those under 16. We established the cutoff age of 16 in order to follow the form found in some of the reviewed studies (e.g., Cooper, Smiley, Morrison, Williamson, & Allan, 2007a) wherein "adult" was defined as age 16 and above. The one exception to this cutoff was the research by White, Chant, Edwards, Townsend, and Waghorn (2005) that included some participants age 15.

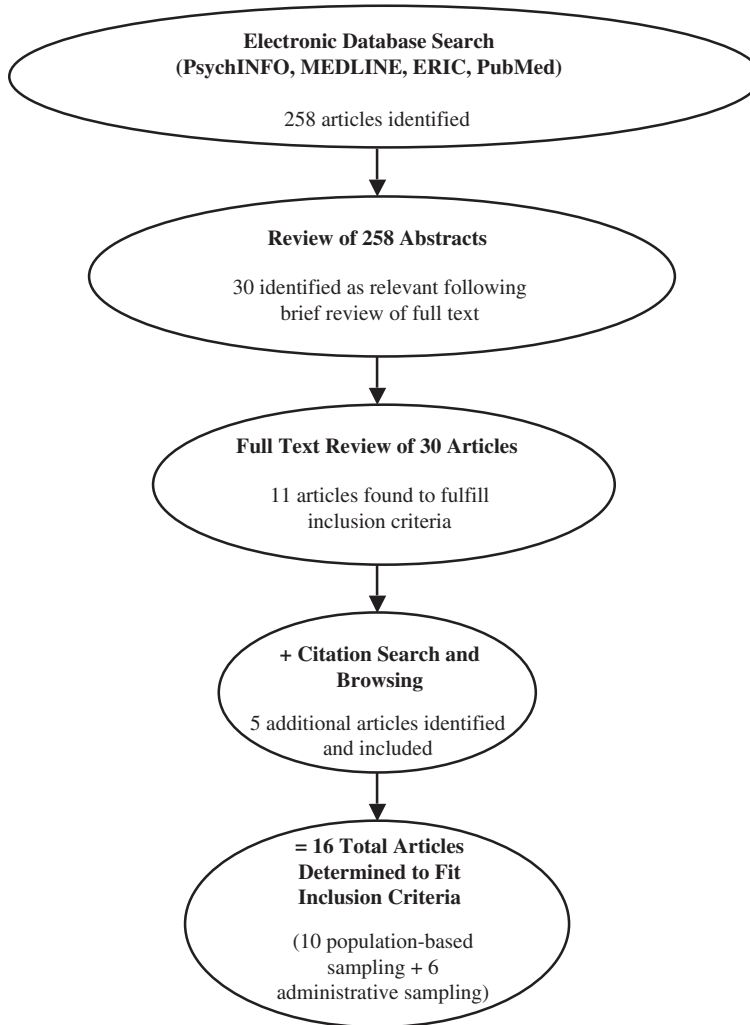


FIGURE 1 Flowchart of method used to identify articles for review.

Electronic Database Search

Searches of PsychINFO, ERIC, PubMed, and MEDLINE were conducted using the following terms: *comorbid*, OR *mental-ill health*, OR *dual-diagnosis*, OR *mental disorder*, OR *psychopathology* AND *mental retardation*, OR *intellectual disability*, OR *learning disability*, AND *prevalence*. Findings were limited to those published between 2003 and 2010. Searches revealed 258 articles. A brief review of titles and abstracts left 89 as potentially relevant. Of these 89, 30 articles were identified as candidates for review. Full-text versions of the 30 identified articles were obtained and read by

the first author. Following this initial read-through, 11 articles were identified as fulfilling inclusion criteria.

Citation Search

The reference list of each screened full-text article found via electronic database search was reviewed by the first author for other studies that appeared relevant. Studies that appeared to fit within the limitations of this review were obtained and read. Four additional studies were yielded via citation search.

Browsing

The 2003–2010 tables of contents for major journals in this field (*Journal of Applied Research in Intellectual Disabilities*, *Journal of Intellectual Disability Research*, *American Journal of Intellectual and Developmental Disabilities* (previously *American Journal on Mental Retardation*), *Research in Developmental Disabilities*, *Social Psychiatry and Psychiatric Epidemiology*) were reviewed by the first author for any articles that appeared to fit the aims of this review. Full-text versions of identified articles were obtained and screened. One additional study was yielded via browsing.

ANALYSIS PROCEDURES

Full-text versions for each reviewed article were obtained and read in full by the first author. Data from each study were compiled regarding sample size and location, composition of a comparison group (if utilized), diagnostic tools utilized, findings, and strengths/limitations. In the studies that included prevalence data across a wide range of psychiatric diagnoses (e.g., Cooper et al., 2007a), only the data regarding the overall rate of co-occurrence were included. Data from the studies that were not relevant to this review were not included in the table or analysis. For example, Cooper, Smiley, Finlayson, et al. (2007) included data regarding the correlation of certain environmental factors with psychosis as well as data regarding 2-year incidence of mental disorder found at follow-up. These data, although important, were beyond the scope of this review and only the data regarding point-prevalence were included.

There is general agreement from recent related literature reviews (Kerker et al., 2004; Whitaker & Read, 2006) that use of population-based sampling is a key component of assessing valid prevalence rates. For this reason reviewed articles were divided into two groups: (a) those that

utilized a population-based sampling method and (b) those that utilized an administrative sampling method.

RESULTS

Studies That Utilized Population-Based Sampling

Of the 16 reviewed studies 10 utilized population-based sampling. Of these 10, 6 were from the research team at the University of Glasgow, Scotland, headed by Sally-Ann Cooper. Each of these is described here in order of publication and followed by a description of the other 4 population-based studies.

In the originating research, Cooper et al. (2007a) gathered population-based data from the Greater Glasgow region of Scotland. The aim of this study was to assess the *point-prevalence* (a snapshot of the rate of mental disorder present at that particular point in time) of co-occurring disorders in this population. The authors estimated that they were able to recruit 70.6% ($n = 1,023$ at Time 1) of the total population of adults (defined as age 16 and above) with ID living in the region via requests made to and returned by 100% of regional general practitioners. Following enrollment and informed consent, demographic information was collected and a team of trained nurses and general practitioners directly assessed all participants. This process included physiological screening to rule out any potential underlying medical conditions that could contribute to symptoms mirroring psychiatric conditions. The Psychiatric Assessment Scale for Adults with Developmental Disabilities (PAS-ADD) Checklist was utilized for initial screening of potential mental disorder. Any individuals deemed to have symptoms of possible mental disorder were then referred to psychiatrists with specialties in ID. These specialists reviewed all relevant historical charts and conducted detailed individual face-to-face assessments of each individual. Psychiatric assessments for this study included semistructured interview and used the Present Psychiatric State for Adults with Learning Disabilities (PPS-LD) to assess psychopathology and lead to classification from clinical, Diagnostic Criteria for Psychiatric Disorders for use with Adults with Learning Disabilities/Mental Retardation (DC-LD), International Classification of Diseases, 10th edition, Diagnostic Criteria for Research (ICD-10-DCR), *Diagnostic and Statistical Manual of Mental Disorders*, 4th edition, text revision (DSM-IV-TR; American Psychiatric Association, 2000) criteria sets. All participants were seen in face-to-face assessment as often as necessary until completed to the psychiatrists' satisfaction. The most familiar support staff and/or family members were also interviewed and involved in this assessment process. Classification of ID was based upon criteria sets from ICD-10-DCR and determined by this same set of practitioners using the C21st Health Check assessment; the Test for Severe Impairment; the Vineland

Scale; and compared with reports from support persons, family, and historical chart notes. Participants were composed of 54.9% men ($n = 562$) and 45.1% women ($n = 461$) with a mean age of 43.9 years. Results evidenced a range of prevalence rates depending on the criteria used and the inclusion or exclusion of autism spectrum disorders (ASD) and/or problem behaviors. The diagnosis of specific phobia was not included as a defined mental disorder in this and the related studies. At the high end, using clinical criteria (a diagnosis based upon clinical interview and assessment by psychiatrists) and inclusive of ASD and problem behaviors the prevalence rate of dual diagnosis in this sample was reported at 40.9%. This rate reduced to 22.4% when ASD and problem behavior were excluded. When data were analyzed using DSM-IV-TR criteria these rates dropped to 15.7% and 13.9%, respectively. The data using DC-LD or ICD-10-DCR criteria fell between these rates. Overall 59.1% of participants in this study were found to have no evidence of a clinical mental health diagnosis regardless of definition and tools used.

The use of a large population-based sample in this research with a 70.6% enrollment rate is evidence of a well-formed protocol and definitive strength of this study. However, it is important to note that the participants involved in this study (and the related studies to follow) were 96.4% Caucasian. Although representative of this geographic area, the lack of cultural and linguistic diversity in this sample may raise questions about generalizing these data to other geographic areas. This study included the most rigorous assessment procedure of all studies reviewed. The use of face-to-face multimodal assessment by specialist psychiatrists provides evidence of professional validity present in very little of the reviewed research. The use of multiple diagnostic criteria sets (i.e., DC-LD, DSM-IV-TR, ICD-10-DCR) is useful in that it sheds light on how the criteria used for diagnosis of mental disorder may influence findings regarding dual diagnosis in this population. As the authors noted, one weakness of this study is that individuals in the study region with borderline ID (defined in the study as IQ of 70+) may not have been adequately represented in the sample. This is due to the fact that the initial general practitioner referral may not have picked up individuals in this range. Also, although the authors stated that these prevalence rates in this population “are higher than those observed in the UK general population” (Cooper et al., 2007a, p. 32), they reference only a citation rather than including these data for direct comparison. A final strength of this study was that due to its rigorous design, high sample size, and large set of data gathered, it allowed for additional related studies that analyzed more specific aspects of the data set. These related studies are outlined here.

Cooper, Smiley, Morrison, Williamson, and Allen (2007b) utilized the same data set described earlier to examine the point-prevalence of specific affective or mood disorders (e.g., Major Depressive Disorder) in adults with ID. The authors also examined factors possibly related to the presence of these disorders. Participants ($n = 1,023$), measures, materials, and

methods were all identical to those described earlier regarding Cooper et al. (2007a). The authors found that the point-prevalence of assessed affective disorders varied depending on the diagnostic criteria utilized. Specifically, the diagnosis of depression in this population-based sample ranged from 2.1% using DSM-IV-TR criteria to 4.6% using clinical criteria. Criteria based upon the DC-LD and ICD-10-DCR fell in between with rates of 3.8% and 3.0%, respectively. The authors found less variation with regard to bipolar disorder (in remission at time of assessment) as clinical criteria evidenced 1.2% point-prevalence and application of ICD-10-DCR criteria resulted in a 0.9% point-prevalence. Use of DC-LD and DSM-IV-TR criteria resulted in 1.0% and 1.1% point-prevalence, respectively. The specific diagnosis of in-episode mania was reported to be fairly stable across criteria—ranging from 0.5% (DSM-IV-TR) to 0.6% (clinical, DC-LD, and ICD-10-DCR). Based upon further analyses of these data, the authors “concluded that DSM-IV-TR and ICD-10-DCR are not appropriate manuals to use in work on affective disorders with persons with ID” (Cooper et al., 2007b, p. 880). Through the use of a regression analysis the authors identified “a higher number of [general practitioner] appointments in the preceding 12-month period, having experienced a life event in the preceding 12-month period, being a smoker, not having hearing impairment, and being female” (Cooper et al., 2007b, p. 877) as factors possibly associated with depression in this population. Further, the authors stated that characteristics assumed to be correlated with depression such as “severity of ID, communication impairments or sensory impairments” (Cooper et al., 2007b, p. 879) were not found to be associated features in this sample. The use of population-based sampling, multimodal assessment procedures, and reporting of data from multiple diagnostic criteria sets are crucial strengths of this study. With regard to limitations, the authors indicated, persons with “an IQ in the mild ID range” (Cooper et al., 2007b, p. 877) may have been underrepresented and previous instances of affective episodes may have been underreported due to a variety of factors in service stability. Further, this study may be considered limited due to the cultural (96.4% Caucasian) and linguistic homogeneity of the studied population.

Using the same set of participants, assessment procedures, and diagnostic criteria types described in the preceding paragraphs, Cooper, Smiley, Morrison, et al. (2007) examined the data regarding prevalence of psychotic disorders in sampled persons age 16 and above with ID. This study included a 2-year follow-up assessment (Time 2) that added more longitudinal data compared with only point-prevalence (Time 1). Time 1 participants were again estimated to compose 70.6% ($n = 1,023$) of the total population of individuals with ID residing in the Greater Glasgow region of Scotland. At Time 2 the participant pool was reduced to 651 secondary to deaths and refusals to continue in the study. The authors stated that there was no evident difference between those who chose to continue participation and

those who did not. Results of this study indicated a point-prevalence rate of psychotic disorders in this population ranging from 4.4% using clinical diagnostic criteria to 2.6% using ICD-10-DCR criteria. Citing, but failing to specifically state, recent prevalence data from the general population of the United Kingdom, the authors reported that these rates are upward of 10 times higher in the population of persons with ID. Strengths of this study included a large, population-based sample; rigorous professional assessment; and the use of multiple diagnostic criteria sets. The focus on a singular diagnostic category aided in the ease of interpretation of data. Use of a longitudinal design is an additional strength of this study. As the authors related, use of point-prevalence rates only could potentially skew data as mental disorders are not static in time but dynamic and subject to the effect of many life events. Limitations of this study include the fact “it is not currently possible to diagnose psychosis in persons who have no communication skills (i.e., adults who are at the most disabled end of profound intellectual disabilities, rather than at the most able end of the profound intellectual disabilities range or of greater ability)” (Cooper, Smiley, Morrison et al., 2007, p. 534). The authors noted that this shortcoming could have resulted in an undercount of the actual prevalence rate.

Continuing this series of research, Cooper, Smiley, Finlayson, et al. (2007) examined the data set regarding the point-prevalence of dual diagnosis in the population of individuals labeled by health professionals as having “profound intellectual disabilities” (p. 493). The diagnosis of profound ID was based on ICD-10-DCR criteria using historical IQ data from case and physician notes and scores on the Vineland Scale. The population-based sampling method, other assessment tools, and diagnostic criteria sets were the same as used in Cooper et al. (2007a). At initial assessment the team identified 184 participants with profound ID. This cohort was 53.8% male and 46.2% female with a mean age of 41.5 years. By Time 2 this cohort had reduced to 131 (mean age of 43.7 years, 56.5% male and 43.5% female) due to deaths, inability to find, and consent issues. Time 1 data examined point-prevalence for this population. Findings varied depending on the criteria sets used to define mental disorder. Using clinical diagnosis and including autism and problem behaviors the prevalence rate was reported as 52.2%. When autism and problem behaviors were excluded from the definition of mental disorder, the rate fell to 19.6% with problem behaviors representing the bulk of this difference. Based upon DSM-IV-TR criteria these rates were 11.4% and 7.1%, respectively. Rates based upon DC-LD criteria most closely mirrored the clinical rates at 45.1 and 16.5%, respectively. Time 2 data reported 2-year incidence (the rate of events over the course of the 2 years between measures) of mental disorder in this sample. Although not technically prevalence data, it appears that again, the use of clinical diagnosis criteria evidenced the highest incidence rate (13%), DSM-IV-TR criteria the lowest (2.3%), with DC-LD criteria most closely mirroring clinical rates at 12.2%. The authors

pointed out that these prevalence and incidence rates might be an underestimate as psychotic disorders are inherently difficult to diagnose in individuals with profound ID. Strengths of this study and reported data again hinged on the high percentage population-based sampling method, the use of face-to-face clinical assessment by trained specialists, specific medical assessment, and the use of multiple psychiatric diagnostic criteria sets. The application of such comprehensive methodology with focus on individuals identified as having profound ID represented a definitive move forward in the research of dual diagnosis in this population. Shortcomings can again be found in the lack of cultural and linguistic diversity in this sample.

Another offshoot of the Cooper et al. (2007a) research set, Mantry et al. (2008) aimed to examine prevalence of dual diagnosis in individuals with Down syndrome. The same assessment tools, methodology, and population-based sample were utilized as in the previously described studies. The authors again examined the data at two points in order to ascertain both point-prevalence and 2-year incidence rates for co-occurring disorders. At Time 1 ($n = 186$) point-prevalence rates for mental disorder of any type including problem behaviors were reported as 23.7% (clinical criteria), 19.9% (DC-LD), 11.3% (ICD-10-DCR), and 10.8% (DSM-IV-TR). These rates adjusted to 15.6%, 13.4%, 11.3%, and 10.8%, respectively, when problem behaviors were removed from the definition of mental disorder. In addition to the strengths and limitations described in the aforementioned related research, this particular study benefited from the focus on the interplay between mental disorder and the particular developmental diagnosis of Down syndrome.

The final study reviewed from the data set of Cooper et al. (2007a) was designed in part to examine dual diagnosis prevalence in the population of individuals with both autism and ID. Melville et al. (2008) investigated point-prevalence rates of other mental disorders in the sample of individuals diagnosed with autism and ID and compared these rates with the sample of individuals with ID but not autism. Utilizing the same screening and diagnostic tools as in the previous studies the authors identified individuals ($n = 77$; 76.6% male, 23.4% female; mean age 37.8 years) from the overall population-based sample ($n = 1,023$) who had both autism and ID. The diagnosis of autism was made by consensus of the consulting psychiatrists as part of the comprehensive psychiatric evaluation. Point-prevalence rates for mental disorder of any type including problem behavior were 48.1% (clinical criteria), 36.4% (DC-LD criteria), 6.5% (ICD-10-DCR criteria), and 6.5% (DSM-IV-TR criteria). When problem behaviors were excluded from the definition of mental disorder these rates changed to 20.8%, 15.6%, 5%, and 5%, respectively. The authors then compared these data with prevalence data both from the overall population-based sample data found in Cooper et al. (2007a) as well as with a matched control group that excluded individuals diagnosed with Down syndrome. Once problem behaviors were excluded from the definition of

mental disorder the prevalence rates for the group with autism and ID were not significantly different from the nonautism matched comparison group in this study. Based on these findings, the authors concluded that the diagnosis of autism in individuals with ID is not predictive of a higher rate of other mental disorders. Although having a relatively small sample size these data remain strong as they originate from a population-based sample. As with the other studies from this data set, the lack of cultural and linguistic diversity in the sample is a limitation. The methodology of face-to-face evaluation by specializing psychiatrists utilizing multistage, multitool, and multiple criteria sets again separates this study from most others.

Using data from a countrywide, population-based survey (The National Disability, Ageing, and Carers Survey; Australian Bureau of Statistics, 1988), White et al. (2005) endeavored to establish rates of dual diagnosis prevalence in Australia. The authors analyzed the data collected from 37,580 individuals ages 15–64 for presence of ID and mental disorders including psychosis, depression, and anxiety disorders. Autism and problem behavior were not included as possible mental disorders in this study. Nonmedically trained interviewers used definitions provided by The World Health Organization's (1980) International Classification of Impairments, Disabilities and Handicaps and the ICD-10 to code the data for analysis. The authors reported that prevalence of ID in this sample was found to be 1.3% (or approximately 563 individuals). The authors found an overall prevalence rate for ID co-occurring with included mental disorders (anxiety, depressive and psychotic disorders) of 23.3%. The use of direct interview of participants or familiar support persons to gather data is a strength of this study as is the large population-based sample size representing many geographic regions of Australia. The authors used nonmedically trained interviewers and self-report, however, as the only method for defining presence of a psychiatric disorder. There was no mention of how medical or physiological factors were or were not assessed for their effect on possible psychiatric symptoms. Likewise, as the authors stated, there are a variety of factors (e.g., intellectual distortion, psychosocial masking) that make diagnosing psychiatric conditions in persons with ID a very complicated endeavor. Unfortunately, there is no discussion of how these complications were addressed within this particular study.

Using previously gathered data from adults (defined as age 16 or above) living in private households in the United Kingdom ($n = 8,450$), Hassiotis et al. (2008) compared rates of psychiatric conditions between individuals defined as having borderline intelligence ($n = 1,040$ or 12.3% of the total sample) and individuals defined as normal-range intellectual functioning. The authors conducted a secondary analysis of data originally gathered in 2000 from the British National Survey of Psychiatry Morbidity. In this originating survey (Singleton, Lee, & Meltzer, 2000), letters explaining the survey were sent to a random sample ($n = 12,792$) of households

in the United Kingdom. The final sample of 8,450 (48.7% male, 51.3% female, 95% Caucasian) was determined following refusals, problems contacting, and other factors. Initial assessment with each participant was conducted using a structured interview and assessment tools administered by trained but nonclinical interviewers from the Office for National Statistics Interviewers. Scores from The National Adult Reading Test (NART) were converted to IQ scores and then used to determine intellectual functioning. Borderline intelligence was defined as a score of 70–84 and normal range intelligence as individuals with an IQ of 85+. Psychiatric symptoms and disorders were assessed using the Alcohol Use Disorder Identification Test (AUDIT); the Severity of Alcohol Dependence Questionnaire (SAD-Q), a five-question screening regarding symptoms of drug dependence; and the Clinical Interview Schedule-Revised (CIS-R). For individuals who evidenced symptoms of a personality disorder and/or psychosis, a second interview was conducted by psychologists and utilized the Structured Clinical Interview for DSM-IV (SCID II) and the Schedule for Assessment in Neuropsychiatry (SCAN) to ascertain a more accurate clinical profile. Out of the 8,450 participants, 12.3% ($n = 1,040$) were identified as having borderline intelligence. Analysis of the assessed data revealed that participants with borderline intelligence had a significantly greater rate of phobias, depressive episodes, general neurotic presentation, personality disorder, and substance misuse. Rates of psychotic disorder were found to be higher in the group identified as borderline intelligence but the difference was not statistically significant. Although the authors reported on the percentage of each mental disorder measured in the sample, they did not provide overall data on the general prevalence of mental disorder as a whole in either group or in the sample as a whole. With the numerical data that were provided it proved impossible to garner this data. This study benefited from community-based sampling and a large sample size. Although not specifically aimed at persons with ID, the focus on individuals with borderline intelligence represents an important move to assess this portion of the population that can often go overlooked in other dual diagnosis prevalence studies. The utilization of face-to-face assessment is a key strength as well, although it does suffer some from the use of nonclinically trained interviewers in the initial assessment. There is also the question of how underlying medical or physiological factors may have played a role in any perceived psychiatric process. Without a thorough medical evaluation, a clear diagnosis of mental disorder is problematic. The authors also reported that the use of NART scores to establish intellectual functioning may be questioned although they pointed out that the rate of borderline intelligence found in the study (12.3%) is roughly what one would expect in the normal distribution.

Morgan, Leonard, Bourke, and Jablensky (2008) conducted a secondary analysis of previously collected data from the records of 245,749 individuals. These data were originally collected from both the Intellectual Disability

Register (IDR; $n = 13,295$) and the Mental Health Information System of Australia (MHISA; $n = 232,454$). The authors aimed to use this secondary analysis to calculate an estimated prevalence rate of co-occurring ID and mental disorder. The authors noted that the IDR and MHISA used the 1992 American Association on Mental Retardation (AAMR) definition to identify individuals as ID. This group was then expanded to include individuals whose records indicated a diagnosis of mental retardation by the International Classification of Diseases, 9th edition (ICD-9) standards. Presence of psychiatric diagnosis was based upon chart records indicating the presence of at least one ICD-9 defined mental disorder and/or what the authors termed “psychiatric disturbance” as an unspecified type of mental disorder. As the reviewed register and system data go back many decades, covering many changes in terminology and diagnosis, the authors “rearranged the Heber codes into groups that were more consistent with the current classification systems” (Morgan et al., 2008, p. 365). In order to control for variables stemming from changes in terminology and diagnostic methods the authors then divided the sample into a younger birth cohort ages 23–37 and an older birth cohort ages 38–52. Analysis of the data indicated the prevalence of co-occurring ID and mental disorder at 31.7% for the whole sample. The authors found no significant difference between the dual diagnosis prevalence for the younger cohort (35.5%) and the older cohort (32.1%). By then analyzing the data from each of the registries individually, the authors found that the rate of dual diagnosis would have been greatly underestimated if only data from the ID register had been analyzed. The authors stated that these estimates compare with a recent study from The Netherlands that found a lifetime prevalence of psychiatric disorder in the general population of 41.2% (Bijl, Ravelli, & van Zessen, 1998). The use of whole-of-population data is a strength of this study. By using data from both the ID register and the mental health system the authors addressed the problem of service separation between individuals with ID and persons with mental illness. Although this methodology likely resulted in more accurate data, the authors pointed out that there are several factors (e.g., noninclusion of private psychiatric records, difficulty in psychiatric assessment for individuals with ID) that continue to result in underestimation of dual diagnosis rates. The reliance on review of historical records, although a necessary feature of this type of epidemiological research, does have some inherent limitations. There may be errors in coding either historically or as the authors transferred data. There is no method for determining if the psychiatric symptoms/diagnoses listed had a possible medico-physiological etiology rather than being representative of a clear psychiatric condition. In addition, it is possible that diagnostic information from primary care providers may have been excluded from the data used in this study. As some psychiatric conditions (e.g., anxiety and depressive disorders) may be more likely to be treated in a primary care setting, the

exclusion of these data might have resulted in underrepresentation of these conditions in the authors' reported statistics.

Strydom, Hassiotis, and Livingston (2005) examined the social and mental health status and needs of individuals with ID over 65 years old living in two economically deprived boroughs of London. The purpose of this study was to assess service needs in the participating communities, but there are sufficient prevalence data to be included in this review. The authors identified potential participants via review of the local Intellectual Disabilities Register and by referral from providers of support services in the area. Individuals with Down syndrome were excluded from this study due to the common confounding variable of dementia found in this population. Out of the total population of 39 individuals who fulfilled inclusion criteria in the study area, 59% ($n = 23$; 70% male; median age = 69; 91% identified as Caucasian UK born) consented to participation. Interviews and assessments of all participants were conducted at the individuals' location(s) by a psychiatrist. Participants were screened for dementia using the Dementia Questionnaire for persons with Mental Retardation (DMR). A psychiatric history interview with individuals or a familiar support person, a review of health records, and the PAS-ADD Checklist were used to assess psychiatric symptoms. The behavior domain from the Vineland Scale was used to assess presence of behavioral challenges. Information regarding disability level and medical history was obtained via interview of support persons and review of health records. Results indicated the presence of psychiatric symptoms in 74% of the participants with 30% of the sample being reported as receiving current care for a psychiatric disorder. The authors hypothesized that this disparity may be evidence of underdiagnosed mental health conditions in this population. Those who were determined to have signs of co-occurring mental illness were significantly more likely to also have problem or maladaptive behaviors. Although a small overall sample number, this study does represent a population-based methodology for the eligible individuals in the identified study area. It could be argued that the authors' sampling method was more administratively defined as they relied mostly on the information in the local Intellectual Disabilities Register. The authors argued, however, that within the age cohort studied it would be unlikely to find individuals who had not been enrolled in the register. They did allow for the possibility that there may have been some sampling error that could have skewed results. The use of in-person interviews by a psychiatrist was a clear strength of this study despite the fact that there was no detailed face-to-face assessment process. In addition, the authors clearly interpreted the PAS-ADD data within the bounds of its design as a symptom-screening instrument rather than as a diagnostic tool. The focus on an older cohort is important in that mental health status can change over time and may vary with age. Gathering specific data on how these processes may be expressed in later age can help to direct service provision through the life span.

Studies That Utilized an Administrative Sampling Method

Holden and Gitlesen (2003) assessed and compared the prevalence of psychiatric symptoms in a sample of individuals ($n = 165$) in Norway identified as having ID with or without challenging behavior. The authors aimed to see if there was a significant difference in psychiatric presentation between the two groups. The group of individuals with challenging behavior and ID ($n = 96$) were recruited following referral for treatment of the challenging behavior. The control group (individuals with ID but no identified challenging behaviors; $n = 59$) was recruited from the general habilitation services in the same geographic area. All data for the study were gathered via scoring by the direct care staff member most familiar with the individual. Tools used included a rating based upon the DSM-IV definition of mental retardation, a translated version of the PAS-ADD Checklist that used only a present/not present format, and a general rating of type of challenging behavior (e.g., aggression, property destruction, self-injury, or other). Scores on the PAS-ADD were then used to determine presence of mental disorders including anxiety, depression, hypomania, and psychosis. Prevalence rates for co-occurring mental disorders were reported as 59.4% for the control group and 83.4% for the group identified as having both ID and challenging behavior. Rates of psychosis and anxiety were found to be significantly higher in the group with both ID and challenging behavior. The prevalence rate for co-occurring diagnosis for the entire sample was 75.2%. These prevalence rates are quite high when compared with other prevalence studies. This increase may be due in part to the use of a distinctly administrative sample. The individuals referred for challenging behavior may have been more likely to have underlying mental disorder and thus presented a higher prevalence than the general population of individuals with ID. Second, the use of nonclinically trained raters using a mailed-in basic checklist to determine psychiatric status may have skewed the results regarding mental disorder. Diagnosis of mental disorder in individuals with ID can be difficult for even highly trained specialists. Although staff ratings may provide a good starting point for screening and referral, their use as evidence of mental disorder may warrant reduced weight. The lack of medical screening is a further limitation of this study. Some of the challenging behaviors and/or symptoms of mental disorder may have been secondary to underlying medical or physiological causes (e.g., hypothyroidism, chronic pain, gastroesophageal reflux disease [GERD]). Without this medical information, the etiology of behaviors (i.e., whether they are the result of a primary mental disorder or secondary to a general medical condition) will be unclear.

Gustafsson and Sonnander (2004) aimed to assess the prevalence of co-occurring psychiatric problems and ID in a sample of Swedish persons age 18 or above. The overall sample ($n = 296$) was composed of groups from two counties. Participants from county A were compiled via three methods.

One subgroup ($n = 134$) was randomly chosen from the administratively defined population of individuals with ID in that county. A second subgroup ($n = 71$) was recruited from a local residential institution for individuals with ID. There was a crossover of 33 individuals between this group and the randomly selected group. The third subgroup ($n = 27$) was obtained via referral from local physicians and support services. Participant ($n = 124$) data from county B were obtained from a prior unpublished study regarding mental health services in that county. Familiar direct-care staff assigned ratings regarding level of intellectual functioning for each individual based upon an unnamed measure stated to be similar to ICD definitions. Specific methodology of psychiatric assessment varied by group and was conducted using the Reiss Screen for Maladaptive Behavior (RSMB) and the Psychopathology Inventory for Mentally Retarded Adults (PIMRA). All participants were rated using the RSMB. This tool was administered independently by two staff members and focused on the 3 months prior to the interview. Psychologists interviewed familiar staff using the informant version of the PIMRA to assess current functioning of the institutional sample in county A and 70 of the 124 participants from county B. In the referred sample from county A additional *Diagnostic and Statistical Manual of Mental Disorders*, 3rd edition, revised (DSM-III-R) diagnostic information was gathered from psychiatric records. The whole-sample data garnered from the RSMB revealed an overall dual diagnosis prevalence rate of 37%. For the portion of the sample that was assessed via the PIMRA the rate of dual diagnosis was 45% for the institutional sample and 64% for the sample from county B resulting in an overall average of 54%. Although this study benefited from random sampling, in parts of the design there was marked use of data from individuals who were either from a discretely institutional sample or specifically referred by caregivers. The use of wholly administratively defined samples may lead to underrepresentation of those individuals who have not found themselves in the specific institutions or services. Likewise, this method may overrepresent individuals with co-occurring disorders as they may be more likely to present for care or be living in an institutional setting. Again there was a lack of data regarding medical or physiological conditions that could influence psychiatric presentation and related prevalence data.

Bailey (2007) utilized a wide-ranging survey of services for individuals with “learning disabilities” (LD; p. 36) that identified 934 adults with LD in Northamptonshire, England. From this pool Bailey selected a random sample of 240 individuals age 19 or above to invite for participation in the study. Of this 240, 121 individuals (62.0% male) passed inclusion criteria and agreed to participate. Inclusion criteria for this study were defined as presence of “moderate to profound learning disabilities (i.e., equivalent to having an IQ of below 50, or a developmental age equivalent of below 9 years)” (p. 37). The author used the survey form of the Vineland Adaptive Behavior Scales to ascertain the presence or absence of moderate to profound learning

disability. Bailey attempted to rule out possible physical causes of psychiatric symptoms via a checklist of physical symptoms and a questionnaire (i.e., the physical health section of the Older Americans Resources and Services [OARS] Multidimensional Functional Assessment Questionnaire). Using a semistructured interview and checklists, the author, a psychiatrist with a specialty in learning disability, assessed participants' current psychiatric symptomatology (including problem behavior and autism) and assigned clinical diagnoses. Diagnostic criteria were based upon the DC-LD, the ICD-10-DCR, and DSM-IV. Bailey also identified presence of psychiatric disorder based upon her own clinical judgment. Results indicated considerable variation in the prevalence of co-occurring conditions depending on the diagnostic criteria used. Bailey's clinical diagnosis indicated presence of mental disorder in 61.2% of the sample. Using DC-LD criteria, mental disorder was identified in 57.0% of the sample. With the other two diagnostic sets (the ICD-10-DCR, and DSM-IV), prevalence rates of current psychiatric diagnosis dropped to 24.8% and 13.2%, respectively. This variation appears to be due to the inclusion of "problem behavior" in the DC-LD definition and the author's clinical diagnosis of behavior disorder, which were reported to account for 27.3% ($n = 33$) and 33.9% ($n = 41$) of the prevalence rates, respectively. Bailey benefited from the use of multiple measures applied by a specialty professional practitioner. The relatively small sample size and general cultural and linguistic homogeneity of the sample (97.5% Caucasian all from a specific geographic area) limit the generalizability of this study.

Myrbakk and von Tetzchner (2008) compared the rates of psychiatric disorder in a group of persons with ID and no challenging behavior to a matched group of individuals with ID and challenging behavior. The authors intended to explore the potential relationship between challenging behavior and psychiatric morbidity. The total sample ($n = 181$) was composed of two groups of individuals age 16 and above from certain parts of Norway. One group ($n = 75$) was recruited following its referral to a team that specialized in behavioral problems in persons with ID. The second group was recruited via a request to providers of social and health services in the study area. Based upon the findings on the Aberrant Behavior Checklist (ABC), the participants were assigned to either the problem behavior group or the comparison group of individuals identified as having ID but having no measured behavioral problems. In order to control for as many variables as possible, the authors then matched individuals from each group according to level of ID, gender, and age. This process resulted in two groups of 71 participants each. Level of ID was determined using a variety of instruments including the Leiter International Performance Scale-Revised; the Wechsler Adult Intelligence Scale-III; the Wechsler Intelligence Scale for Children-Revised-III; the Vineland Adaptive Behavior Scales, Expanded Form; and in one case a clinical estimation. The particular tool used depended on individual variables of the participants. The group identified as having problem

behaviors was composed of 30 females and 41 males with an average age of 40. The comparison group was composed of 36 females and 35 males with an average age of 40. No cultural or linguistic demographics were included. Significantly more persons in the comparison group were living with family ($n = 9$) compared with the behavior group ($n = 1$). Psychiatric symptom measures utilized varied depending on the participant's level of ID. The Reiss Screen for Maladaptive Behaviors and the Mini PAS-ADD were administered to all participants. The Assessment of Dual Diagnosis (ADD) was administered to individuals initially judged to have mild to moderate ID. The Diagnostic Assessment of the Severely Handicapped (DASH-II) was administered to individuals initially judged to have moderate to severe ID. Trained mental health workers with at least a bachelor's degree administered all assessment tools. Family members and familiar direct care staff were used as informants for the assessments. As the final rating of ID occurred after the complete assessment, the particular assessments used for psychiatric assessment depended on the rater's opinion of the individual's ID. In some cases this initial opinion did not match the final determination of ID. Results indicated significantly higher prevalence of co-occurring mental disorder in the problem behavior group (69%) when compared with rates from the comparison group (29%). The authors stated that this adds to the evidence that there is a significant correlation between the presence of challenging behavior and psychiatric morbidity in persons with ID. The prevalence rate of the comparison group appears to be consistent with other prevalence data in this review. The group identified as having "mild to moderate ID" (Myrbakk & von Tetzchner, 2008, p. 319) in this study evidenced the highest rates of overall co-occurring mental disorder. This study benefited from the use of multiple measures of both intellectual functioning and intellectual ability that had some specificity regarding the abilities of the sample participants. The use of face-to-face, on-site interview of familiar supports is another area of strength. Although the use of trained interviewers with at least a bachelor's degree is a step up from self-report or staff-based ratings it cannot be said to be equitable to face-to-face clinical assessment by a specializing physician. Again, there was no mention of whether participants had been screened for possible underlying medical or physiological conditions that could play a role in behavioral or psychiatric presentation.

In a similar study also from Norway, Hove and Havik (2008) examined the prevalence of co-occurring mental disorders in 592 individuals age 18 and above with administratively defined ID. Participants (294 male, 260 female; mean age of 41.8 years) were recruited via outreach to social service providers in two counties of western Norway. Presence and level of ID was determined by review of medical charts or results of an ICD-10 Guide for Mental Retardation-based checklist. Presence of mental disorder was determined using the Psychopathology Checklists for Adults with Intellectual Disability (P-AID), a tool developed by the authors and based

upon DC-LD criteria. Staff personnel who had at least a bachelor's degree and knew/interacted with the participant(s) for at least a year were asked to complete all checklists. Using algorithms they designed, the authors compiled all checklist data and determined presence of specific mental disorder(s). Evidence of co-occurring disorder was found in 34.9% of the sample in this study. When problem behavior was included in the definition this rate increased to 43%. The authors compared these results with the findings from Cooper et al. (2007a) and concluded that they had determined a higher prevalence rate. This comparison is tenuous, however, as the methodology utilized by Cooper et al. (2007a) was population based and went well beyond a single checklist to determine presence of mental disorder and did not include specific phobia where the present study did. The authors also provided comparison data regarding psychiatric morbidity rates from two recent Norwegian epidemiological studies (Kringlen, Torgensen, & Cramer, 2001; Kringlen, Torgensen, & Cramer, 2006; both as cited in Hove & Havik, 2008). These general-population prevalence rates for mental disorder excluding problem behaviors were reported as 32.8% and 16.5% for an urban and a rural sample, respectively. Although this study benefited from a relatively large sample, it drew from an entirely administratively defined sample. The authors allowed that this may lead to underrepresentation of some portions of the targeted population. In addition, although checklist-based assessment is useful to screen for mental disorder, it is weaker for determining definitive presence of mental disorder. The use of a DC-LD criteria-based tool is a strength as previous studies (e.g., Cooper et al. 2007a) have shown that DC-LD criteria most closely approximate findings from thorough clinical assessment.

Most recently, Vanny, Levy, Greenberg, and Hayes (2009) aimed to examine the prevalence of co-occurring mental disorder and ID or cognitive impairment found in individuals age 18 and above engaged in magistrate courts in New South Wales, Australia. The study protocol was completed by 57 accused individuals (88% male; average age of 31.4 years; 12% self-identified as Aboriginal Australian) from four magistrate courts in and around Sydney, Australia. The Hayes Ability Screening Index (HASI) was used to screen participants for ID. Participants were then assessed using the Kaufman Brief Intelligence Test, Second Edition (KBIT-2) and the Vineland Adaptive Behavior Scales, Second Edition (VABS2) in order to specifically gauge for severity of ID. Psychiatric symptomatology was assessed using the PAS-ADD Checklist. The authors defined mental disorder as any score found to be above PAS-ADD Checklist domains of affective/neurotic disorder, psychotic disorder, or organic disorder. Using the combined scores of the KBIT-2 and VABS2 the authors found 12% of participants fell below a standard score of 80 indicating at least borderline ID. A samplewide prevalence of mental disorder was found to be 38%. The authors then used a cutoff score of 75 to examine potential differences in PAS-ADD Checklist findings. For

individuals who scored below 75 on the KBIT-2, 46% showed evidence of a mental disorder. Individuals who scored above 75 on the KBIT-2 had a prevalence rate of 36%. These scores were similar for those who scored below/above 75 on the VABS2 with prevalence rates found to be at 44% and 37%, respectively. The authors noted that the percentages of persons in this study identified as having intellectual or adaptive functioning deficits was 4 times what one would expect in the general population. As they noted, this indicated that individuals with intellectual and adaptive deficits seem to be greatly overrepresented in the magistrate court system of this part of Australia.

Although an important contribution to the literature regarding persons with ID in the criminal justice system, this particular study has some limitations that prevent comparison with other prevalence findings. First, it is important to note that this study did not measure or screen for age of onset of intellectual or adaptive functioning deficits. Therefore it is possible that some of the individuals might have fallen into another category of cognitive impairment rather than ID. Second, it is possible that the portion of the population of persons with ID who end up in the criminal justice system may be more prone to mental disorder than those not in the criminal justice system. Thus the dual diagnosis prevalence estimates in this study may be skewed.

DISCUSSION

Prevalence Data

Estimates of prevalence reported in the reviewed studies varied greatly. From the population-based studies, prevalence rates depended on the diagnostic criteria sets used, the specific population studied, and the conditions that were included or excluded from the definition of mental disorder. Overall, the reported rates of diagnostic co-occurrence in the population-based studies ranged from 13.9% to 74%. The high end of these rates was reported by Strydom et al. (2005) and was based upon psychiatric *symptoms* in a population sample of persons over 65. Given that symptoms do not equate diagnosis and that an older population may be more prone to psychiatric disorder, these data do not generalize well to the population of persons with ID as a whole. In the middle of this range were the findings of Morgan et al. (2008), who found a co-occurrence rate of 31.7% using data from national registries of persons with ID or psychiatric conditions. When considering these data as a whole, one study (Cooper et al., 2007a) stands out due to the use of multiple assessment measures, comparison of multiple criteria findings, and division of findings based upon level of ID. In this study specifically, prevalence estimates range from 13.9% (DSM-IV criteria not including autism or challenging behaviors) to 40.9% (clinical criteria and

including autism and challenging behavior). This is similar to the findings in the review by Kerker et al. (2004), who found prevalence rates varied from 0% to 45% depending on similar variables. When these data from Cooper et al. (2007a) were divided out by level of ID and used the most rigorous diagnostic method/criteria (clinical criteria not including autism and challenging behavior), prevalence rates for the group identified as mild ID as well as the group with moderate to profound ID were reported at 22.4%. These rates are only slightly elevated from recent estimates from the United States that place the prevalence of overall mental disorder in the general population of the United States at about 20% (Satcher, 2000). Differences in sampling, instrumentation, and method of assessment prevent valid comparison of these data sets. However, the similarity in these data creates an interesting possibility for further research. The inclusion of ASD in these data from Cooper et al. (2007a) brought the co-occurrence prevalence rates to 25.4% for the group identified as mild ID and 30.2% for the group identified as having moderate to profound ID. When ASD was excluded and challenging behavior included, these rates moved to 32% and 40%, respectively (Cooper et al., 2007a). In brief, it appears that the inclusion of challenging behavior in the definition of mental disorder may account for much of the perceived increased risk of co-occurring mental disorder in the population of persons with ID. Figure 2 provides a visual perspective on this variation in the data that is perhaps due to inclusion/exclusion criteria and sampling methods.

Looking at the prevalence rates reported in the studies that used administrative sampling, a consistently higher overall prevalence rate was found. In these studies, estimates of prevalence of a mental disorder in persons with ID ranged from 29% to 75.2%. This increased prevalence gives credence to the statements of Kerker et al. (2004) and Whitaker and Read (2006) that the use of administrative samples may be responsible for the perception that individuals with ID are at consistently increased risk for co-occurring mental disorders. Although the use of administrative sampling is undoubtedly useful for examination of questions in specific circumstances, it is likely not the best choice when trying to ascertain the most accurate overall prevalence data.

Sampling Methodology

When compared with the findings of previous similar reviews (Kerker et al., 2004; Whitaker & Read, 2006) there appears to have been improvement in the sampling methodology utilized in studies assessing the prevalence of co-occurring psychiatric and intellectual disabilities. The majority (10 out of 16) of studies reviewed utilized population-based methods. Six of these 10 stemmed from the work of Cooper et al. (2007a). This group's work along with the related secondary and follow-up research revealed that population-based samples with thorough assessment and diagnostic procedures are

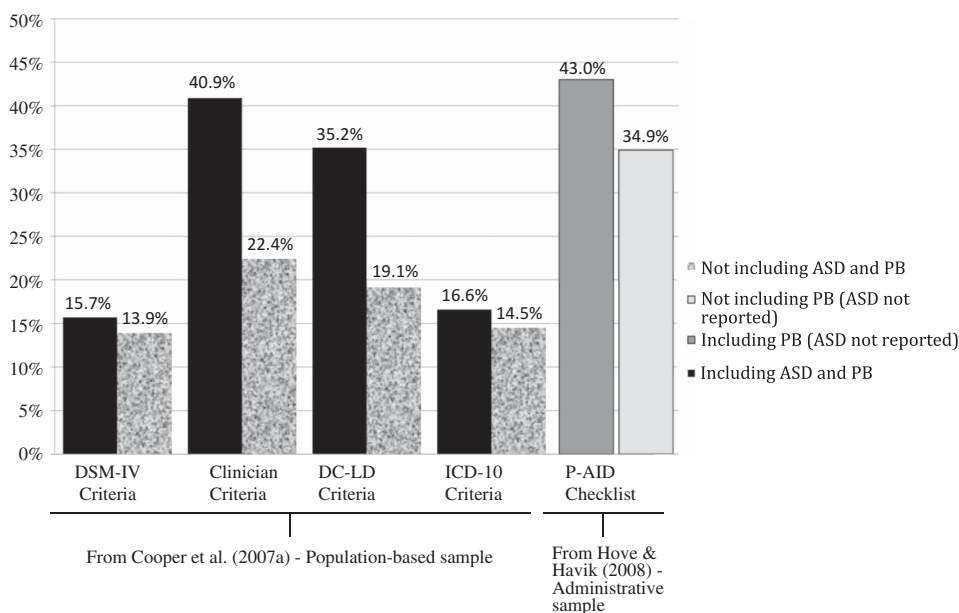


FIGURE 2 Variation of point-prevalence of mental disorder in adults with intellectual disabilities: Effect of diagnostic criteria, inclusion/exclusion of autism spectrum disorder (ASD) and/or problem behavior (PB), and sampling method.

possible and replicable. They appear to have addressed many of the concerns and shortcomings outlined in previous reviews while setting the standard for future research in this domain. Furthermore, the consistent findings between these large sample studies provide a level of reliability to the estimates of prevalence.

Diagnostic Criteria, Tools, and Nomenclature

Psychiatric diagnosis requires both a criteria set used to define particular mental disorders (e.g., DSM-IV, DC-LD) and a tool (e.g., structured interview, questionnaire) with which to apply these criteria. In addition, it is essential that these tools be administered and criteria sets applied by individuals with specific training and experience (American Psychiatric Association, 2000). In the reviewed studies we found significant inconsistencies in these domains. Similar issues were noted in the groups of research reviewed by Kerker et al. (2004) and Whitaker and Read (2006). Specifically there again is the group of research originated by Cooper et al. (2007a). Their method included initial screening followed by face-to-face interviews, review of historical records, interview of familiar caregivers, and formal assessment by psychiatrists on a variety of tools designed for use with persons with ID. Cooper et al. (2007a) also used an array of diagnostic tools and criteria sets. A differing methodology was employed by Holden and Gitlesen (2003)

wherein the presence of a psychiatric disorder was determined by direct-care staff responses on the PAS-ADD Checklist—a tool that Cooper et al. (2007a) noted is designed for screening only and not for formal diagnosis. Morgan et al. (2008) utilized a population-wide sample and gathered diagnostic data from a medical database. Although the research benefited from exceptionally large sample size, the use of chart data for diagnosis may have some inherent problems due to data entry error, the historical changes in definition of ID, and psychiatric conditions and changes in diagnostic criteria sets.

Complicating this matter further are the issues of naming, defining, assessing, and classifying for both mental disorder and ID (Luckasson & Reeve, 2001). With regard to psychiatric conditions, the various diagnostic manuals may use significantly different names and/or definitions of what may or may not constitute what the DSM-IV refers to as a mental disorder. For example, the DC-LD includes challenging behavior as a mental disorder whereas the DSM-IV does not. This difference alone may account for some of the variability in prevalence data across studies. In addition there may be further variation and inconsistency regarding the terminology, assessment, and classification of ID. Issues of naming, defining, assessing, and classifying could also vary geographically, historically, or even across professional disciplines. These concerns can become cumulative. As shown in the reviewed studies, different projects may use varying criteria sets that include or exclude various mental disorders and/or define ID in varying manners. These criteria may be assessed using a wide array of tools with unique strengths, limitations, and idiosyncrasies. In addition, individuals with varying levels of training or experience may administer these protocols. Thus, as an evaluation of an individual proceeds from choice of criteria set to application of label of mental disorder or ID, there are repeated occasions of potential divergence that may affect research results and prevent valid comparison between studies. Without some agreement as to standards for measurement and diagnostic criteria it will remain exceedingly difficult to compare data across studies and with general population findings.

Related to the aforementioned, we note that the works originated by Cooper et al. (2007a) were the only studies reviewed that included a thorough medical evaluation as part of the diagnostic methodology. This is important in that many physical conditions may influence psychiatric presentation (Lennox, 2007) and thus may artificially inflate prevalence rates if not ruled out.

Absence of Studies From the Americas

The method of locating relevant studies described previously revealed no published work that has reported similar prevalence data for adult samples from the Americas. Previous reviews (Kerker et al., 2004; Whitaker & Read, 2006) noted some studies involving participants from the United

States but did not delineate their findings geographically. In relation to this, there was a paucity of data in the reviewed studies reflecting possible cultural and linguistic variables in the presentation of co-occurring diagnoses. This deficit of information is mostly due to the culturally and linguistically homogeneous nature of the geographic areas in which the reviewed studies were conducted. Similar studies in more culturally and linguistically heterogeneous areas and/or studies that provide more demographic analysis would help to address this information deficit. Any research in this domain should follow the course of large sample size, multimodal assessment by trained professionals.

CONCLUSION

The findings of this review show utilization of population-based sampling has increased in comparison with studies prior to 2003. In addition, there has been movement toward utilization of stricter, more appropriate psychiatric diagnostic tools/methods. The issue of using adjusted criteria sets for mental disorder in persons with ID (as suggested in Kerker et al., 2004; Whitaker & Read, 2006) appears to have been well addressed in certain of the reviewed studies. Specifically, the PAS-ADD Checklist and related DC-LD criteria seem to have been well used as indicated by general diagnostic agreement with thorough clinical assessment findings as in the group of research from Glasgow (see Cooper et al., 2007a). The addition of the *Diagnostic Manual-Intellectual Disabilities* (DM-ID; Fletcher, Loschen, Stavrakaki, First, 2007), which outlines adjusted criteria sets based upon DSM-IV-TR, may help to improve diagnostic validity/applicability for practitioners more familiar with the DSM. More studies will be needed to evaluate how this manual compares with the more established criteria sets. Likewise, there has been significant progress in the use of population-based sampling in this domain.

Finally, it can be concluded with reasonable confidence that mental disorders and psychiatric symptoms occur with significant frequency in persons with ID and cause a considerable amount of stress for the individuals as well as their families and support providers. Dual diagnosis prevalence research is important for diagnosis, assessment, and classification purposes. This area of research may raise overall awareness and is useful and necessary from a public health, supports planning, and policy and resource allocation perspective. The continued expansion of population-based sampling would likely aid in settling the general uncertainty behind reported prevalence rates of dual diagnosis. Likewise, psychiatric diagnostic technology continues to evolve. As research in this domain continues it will be essential for practitioners and investigators to be adept at utilizing these specialized tools. This is especially important in assessment of individuals who have difficulty expressing their inner emotional states. Valid identification of mental health

syndromes in persons with ID is most likely when a thoroughly trained professional applies an appropriate protocol following thorough medical screening.

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