HHS Public Access

Author manuscript

Psychol Med. Author manuscript; available in PMC 2019 April 01.

Published in final edited form as:

Psychol Med. 2019 April ; 49(6): 952–961. doi:10.1017/S0033291718001605.

Intellectual disability and mental disorders in a US population representative sample of adolescents

Jonathan M. Platt[1], **Katherine M. Keyes**[1], **Katie A. McLaughlin**[2], and **Alan S. Kaufman**[3]

[1]Department of Epidemiology, Columbia University, New York, NY, USA

[2]Department of Psychology, University of Washington, Seattle, Washington, USA

[3]Child Study Center, School of Medicine, Yale University, New Haven, Connecticut, USA

Abstract

Background—Most research on the prevalence, distribution, and psychiatric comorbidity of intellectual disability (ID) relies on clinical samples, limiting the generalizability and utility of ID assessment in a legal context. This study assessed ID prevalence in a population-representative sample of US adolescents and examined associations of ID with socio-demographic factors and mental disorders.

Methods—Data were drawn from the National Comorbidity Survey Adolescent Supplement (N = 6256). ID was defined as: (1) IQ ≤ 76, measured using the Kaufman Brief Intelligence Test; (2) an adaptive behavior score ≤76, and (3) age of onset ≤18 measured using a validated scale. The Composite International Diagnostic Interview assessed 15 lifetime mental disorders. The Sheehan disability scale assessed disorder severity. We used logistic regression models to estimate differences in lifetime disorders for adolescents with and without ID.

Results—ID prevalence was 3.2%. Among adolescents with ID, 65.1% met lifetime criteria for a mental disorder. ID status was associated with specific phobia, agoraphobia, and bipolar disorder, but not behavior disorders after adjustment for socio-demographics. Adolescents with ID and mental disorders were significantly more likely to exhibit severe impairment than those without ID.

Conclusions—These findings highlight how sample selection and overlap between ID and psychopathology symptoms might bias understanding of the mental health consequences of ID. For example, associations between ID and behavior disorders widely reported in clinical samples were not observed in a population-representative sample after adjustment for socio-demographic confounders. Valid assessment and understanding of these constructs may prove influential in the legal system by influencing treatment referrals and capital punishment decisions.

General Scientific Summary—Current definitions of intellectual disability (ID) are based on three criteria: formal designation of low intelligence through artificial problem-solving tasks, impairment in one's ability to function in his/her social environment, and early age of onset. In a national population sample of adolescents, the majority of those with ID met criteria for a lifetime

Author for correspondence: Jonathan Manion Platt, jmp2198@cumc.columbia.edu.

Supplementary material. The supplementary material for this article can be found at https://doi.org/10.1017/S0033291718001605

mental disorder. Phobias and bipolar disorder, but not behavior disorders, were elevated in adolescents with ID. Findings highlight the need to consider how behavioral problems are conceptualized and classified in people with ID.

Keywords

Adaptive behavior; adolescence; intellectual disability; intelligence; mental disorders; psychopathology

Introduction

The definition and diagnosis of intellectual disability (ID) have been subjects of considerable attention for over a century (Seguin, 1846). Diagnostic criteria for identifying individuals with ID have undergone significant revisions, changes perhaps best chronicled through the versions of the Diagnostic and Statistical Manual of Mental Disorders (DSM) (Brue and Wilmshurst, 2016, pp. 3–4). Recent articulations of the diagnosis have emphasized the need to meet standards of mental deficiency as well as show evidence of impairment of developmentally typical functioning within society (Yell *et al.*, 2006). This definition has been formalized in the three-pronged criteria currently used to identify individuals with ID in DSM-5 (Schalock *et al.*, 2010). This definition requires: (a) significantly sub-average general intellectual functioning, determined by standardized intelligence testing; (b) difficulties in adaptive behavior; and (c) the presence of both (a) and (b) before age 18.

While conceptual and nosological issues in the assessment of ID remain important areas of inquiry, there has been limited empirical work on the prevalence, distribution and psychiatric comorbidity of ID in the general population. Most studies of ID employ data from clinical samples. Based on the array of investigations of clinical populations, results indicate that co-occurring mental health and neurodevelopmental conditions are three or four times higher in ID populations than in the population at large (American Psychiatric Association, 2013; Brue and Wilmshurst, 2016), with co-morbidity particularly high for attention deficit hyperactivity disorder (ADHD), autism spectrum disorder, mood disorders, anxiety disorders, and major neurocognitive disorders. For example, in a Dutch study of 474 random ID students ages 7–20 years, 22% of the ID sample also met criteria for anxiety disorder and 25% for disruptive behavior disorder (Dekker and Koot, 2003). In a UK sample of 438 children and adolescents ages 5–15, the likelihood of meeting diagnostic criteria for any one co-morbid anxiety, behavior, or conduct disorder was 39% for those with diagnosed ID *v.* 8% for those without ID (Emerson, 2003).

However, such findings have significant limitations with regard to generalizability. Namely, because clinical populations often come to attention through referral, they are more likely to exhibit psychiatric comorbidity than the general population (Cooper *et al.*, 2007). Not accounting for the diagnostic overlap between mental disorders and adaptive behavior difficulties may inflate ID prevalence estimates, and overestimate associations between ID and mental disorders (Maulik *et al.*, 2011). The risk of comorbidity among populations with ID is consistently reported as being higher than in the general population, highlighting the

need for valid estimates of associations from population-based samples (Brue and Wilmshurst, 2016). Additionally, norms for intellectual and adaptive functioning, measures that comprise the definition for ID, should be developed based on data from a demographically and socio-economically representative sample. Those who seek and have access to clinical services likely differ from the general population in ways that may distort measures of ID and its associations with psychiatric disorders. Existing community studies often define ID status using non-standard measures, such as a designation of learning disability in school, or parent report of learning difficulties. These approaches may cause biased estimates as well, through social desirability effects (McDermott *et al.*, 2007).

Not only might these limitations influence understanding of risk factors and psychiatric comorbidities related to ID, but they have important legal implications for capital punishment cases. Several influential US Supreme Court cases (e.g. *Atkins v. Virginia, 536 U.S. 304*, 2002; *Hall v. Florida*, 134 S. Ct. 1986, 2014; *Harmelin v. Michigan 501 U.S. 957, 1991*) have determined that it is an 8th Amendment violation of cruel and unusual punishment to execute an adult diagnosed with ID, and that the standards for ID designation should be informed by objective factors to the maximum possible extent (Schultz and Vile, 2015). A scale that is normalized on a population with an inflated prevalence of ID may yield a less sensitive diagnostic tool for use in a non-clinical population. That is, individuals with ID may not meet the diagnostic cutoff if scale norms are artificially too low. The consequences of these false negatives for an individual on death row may be the difference between life and death.

To address these limitations, the current study is the first to assess ID in a nationally representative US sample of adolescents. We estimate the prevalence of ID, and its two constituent elements, low intelligence, and low adaptive behavior. We present ID prevalence estimates as well as associations of ID with socio-demographic characteristics and mental disorder prevalence and severity.

Methods

Sample

Data were from the National Comorbidity Survey Adolescent Supplement (NCS-A), a US population-representative study of psychiatric disorders in adolescence. The sample was selected through a dual-frame design, with adolescents recruited from both schools and households (Kessler *et al.*, 2009*a*). The sample includes 10 148 adolescents' age 13–18 years, who were assessed from 2001 to 2004. Of these, 10 073 (99.3%) completed a supplemental survey that included an individually administered measure of fluid intelligence, described below. Additionally, one parent/ caregiver of each adolescent completed a self-administered questionnaire (SAQ) to collect information on adolescent mental and physical health, and other family- and community-level factors. The SAQ was completed by 6491 parents (Merikangas *et al.*, 2009). Post-stratification weighting adjusted for minor differences in sample and population distributions of 2000 census socio-demographic and school frequencies, as well as systematic differences between complete and incomplete parent–adolescent pairs (Kessler *et al.*, 2009*a*). Parents/guardians gave written informed consent and adolescent participants gave written informed assent after

receiving a complete description of the study, in accordance to the procedures approved by Human Subjects Committees of Harvard Medical School and the University of Michigan. The Institutional Review Board of Columbia University approved the present analysis (IRB-AAAN1104). Study participants were compensated $50 for participation. Additional study details are available elsewhere (Kessler *et al.*, 2009*b*). The analytic sample included those with complete data for both adolescent and parent surveys with non-missing survey weights (n = 6256).

Variables

Mental disorders—Mental disorders were ascertained using an adolescent version of the Composite International Diagnostic Interview (CIDI) for DSM-IV (Kessler *et al.*, 2009*b*; Merikangas *et al.*, 2009), a valid and reliable measure for use in adolescent populations (Kessler *et al.*, 2009*b*; Merikangas *et al.*, 2009). Disorders were grouped into five empirically defined clusters: (1) fear disorders (specific phobia, agoraphobia, social phobia, panic disorder); (2) distress disorders [separation anxiety disorder, post-traumatic stress disorder (PTSD), major depressive episode/dysthymia, generalized anxiety disorder]; (3) behavior disorders ADHD, oppositional defiant disorder (ODD), conduct disorder; (4) substance use disorders (alcohol and drug abuse, with or without dependence); (5) bipolar disorder; and (6) eating disorders (anorexia, bulimia, binge eating) (Kessler *et al.*, 2012*b*). ADHD symptoms were based on parent-report only. ODD and depression combined parent- and child-report of symptoms using an ‘or’ rule (Cantwell *et al.*, 1997). PTSD was assessed only among those with a lifetime experience of a traumatic event. Respondents who met criteria for a diagnosis completed further questions to assess the extent that symptoms of the focal disorder interfered with home, school or work, family, and social life using the Sheehan Disability Scale (Leon *et al.*, 1997). Severe impairment was defined as a score of 7 or higher on any one of the four dimensions, each scored on a 0–10 Likert scale, consistent with prior research (McLaughlin *et al.*, 2012*b*).

Intellectual disability—In accordance with DSM-5 criteria, probable ID status was determined based on a combination of low intelligence and low adaptive behavior. Further, the third prong of the definition (onset before adulthood) was met as well. Most of the adolescents in the sample were below age 18; and the parents who filled out the questionnaires for 18- and 19-year-olds were answering questions about their sons and daughters when they were children as well as their functioning as older adolescents. The measure we described below is consistent with clinical, conceptual, and psychometric guidelines for ID, and with contemporary thought on adaptive behavior assessment (Tassé *et al.*, 2012); while not a formal clinical diagnosis of ID, we will nevertheless heretofore refer to the construct as ‘intellectual disability’.

Intelligence was measured using the 48-item nonverbal portion of the Kaufman Brief Intelligence Test (K-BIT), a standardized measure of fluid intelligence and fluid reasoning (Kaufman and Kaufman, 1990*b*; Kaufman and Wang, 1992). This task uses abstract matrices similar to those developed by Raven (Raven, 1936), which have become widely accepted as prototypical measures of fluid reasoning and general intelligence (g) (Kaufman, 2009). The K-BIT was administered by non-clinical interviewers who received appropriate training and

practice, in accordance to the original administration procedures (Kaufman and Kaufman, 1990*b*; Bain and Jaspers, 2010). Although a comprehensive measure of IQ is preferred for ID diagnosis (Schalock and American Association on Intellectual and Developmental Disabilities. User's Guide Workgroup, 2012; American Psychiatric Association, 2013), a broad body of literature on fluid reasoning shows this construct has demonstrated good reliability and validity and has been shown empirically to be a proxy for *g* and is an excellent measure of IQ for a research setting (Canivez *et al.*, 2005; Bain and Jaspers, 2010; Kaufman *et al.*, 2012; Floyd *et al.*, 2013; Reynolds *et al.*, 2013). The K-BIT nonverbal sections have strong internal consistency (range: 0.87–0.92) and test-retest reliability [range: 0.76–0.89 (Kaufman and Kaufman, 1990*a*; Salthouse, 2010)]. The instrument has demonstrated invariance by gender and ethnicity and has established good construct validity with theory-based and other established measures of intelligence throughout adolescence (Kaufman and Kaufman, 1990*a*; Kaufman and Wang, 1992; Wang and Kaufman, 1993; Canivez *et al.*, 2005; Homack and Reynolds, 2007; Kaufman *et al.*, 2008; 2009; Bain and Jaspers, 2010).

The K-BIT involves a series of progressively more challenging items. Test administration was discontinued when an adolescent responded incorrectly to all items in a set (sets include five items initially and four items for the last two sets). K-BIT norms were created specifically for the NCS-A by the test developer and co-author (Kaufman), as the NCS-A is considerably larger than the original normative sample for the K-BIT; in addition, the K-BIT was published in 1990, so its norms were outdated and did account for known cohort effects on IQ (Flynn, 1984; Weiss, 2010). Raw scores were generated based on the K-BIT manual for 92.62% of tests, which were administered and scored exactly as prescribed. An additional 7.08% of tests could be scored despite deviations in test administration. For example, some respondents were only asked the most difficult item in each set. In these cases, the K-BIT score was imputed based on the number of correct items and the level at which they met discontinuation criteria. A small percentage of cases (0.3%) were excluded due to invalid test administration. Scores were normed within 6-month age groups to mean 100 and standard deviation 15. The K-BIT Matrices test demonstrated good internal consistency (Cronbach's $\alpha = 0.90$).

In the DSM-5, the cutoff for low intelligence is defined as scores of approximately two standard deviations or more below the standardized population mean (i.e. 70), including a 95% confidence interval (conventionally ± 5 points – i.e. 65–75). In our sample, the empirical upper bound of this confidence interval was 79, which is higher than the 75 typically used to define ID; therefore, we adjusted the cut score for eligibility as meeting the criterion of 76 or lower (range = 40–138), representing a compromise between convention and our empirical cutoff, defined in accordance with clinical training and judgment. The range of IQs for our sample indicates a moderate to mild level of ID.

Adaptive behavior reflects the typical development and functioning in society as perceived by others. It assesses one's ability to function in his/her social environment, distinct from a formal assessment of intelligence through artificial problem-solving tasks (Mercer, 1974). As mentioned, rigorous methods to assess adaptive behavior have existed for over 30 years (Sparrow *et al.*, 1984), though were not widely accepted until clinical standards were

published in DSM-IV and the American Association on Mental Retardation (Luckasson *et al.*, 1992). These standards were updated in the DSM-5, which defines AB as significantly sub-average functioning in at least one of three skill domains: conceptual, social, and practical skills (Schalock *et al.*, 2010). Conceptual skills refer to those used in language, reading, writing, and numbers. Social skills refer to interpersonal functioning, social responsibility, self-esteem, and adherence to social norms and rules. Practical skills refer to activities for daily routines and self-care, the ability to access and apply instrumental activities of daily living (e.g. school, occupation, health care), as well as the use and management of time and money (Schalock, 2015).

The present study examined these three domains of AB from both self-reported items in the NCS-A and responses provided by parents/caregivers in the SAQ. We constructed our measure of AB through the following steps. Initially, two authors (K.M. and A.K.) selected 66 items that corresponded to formal AB measures, namely the Adaptive Behavior Assessment System-3 (ABAS-3) (Harrison and Oakland, 2015) and Vineland-3 (Sparrow *et al.*, 2016). Next, items were removed if they overlapped with the diagnostic criteria of mental disorders, in order to avoid creating an artificial dependency between ID classification and psychiatric disorders. Items were further reduced based on the results of exploratory factor analysis with oblique rotation, removing items with factor loadings of less than 0.3 and several that had notable cross-loadings onto two or more factors. We retained 10 items with almost equal loadings on 2 or 3 factors. The factor analysis yielded four interpretable factors, comprising 44 items. The factors corresponded with the DSM-5 AB domains (conceptual, social, practical), although items representing the social factor were split, with one factor representing social problem solving (e.g. patient with others) and one representing social isolation (e.g. tends to do things alone). Overall, the EFA provided good evidence of construct validity for the AB measure as indicated in Supplementary Table S1. The global AB score yielded good internal consistency ($\alpha = 0.91$). Each of the factors (composed of 7–18 items) had adequate to good internal consistency ($\alpha = 0.73–0.91$). Item descriptions, scoring details, scale structure, and factor loadings are shown in Supplementary table S1. The total AB scale and each factor score were normed and converted to standard scores (mean = 100; standard deviation = 15), to be able to compare factor distributions and to use the same metric for IQ and AB. Low adaptive behavior was defined as a score of less than or equal to 76 in the total AB score, or on any one of the four individual factor scores (range = 34–133); the range of scores indicates that the sample included severe to mild adaptive functioning. This procedure is consistent with DSM-5 guidelines, which state that deficits in only one domain (conceptual, social, or practical) may support a diagnosis of deficient adaptive behavior (Schalock and American Association on Intellectual and Developmental Disabilities. User's Guide Workgroup, 2012; American Psychiatric Association, 2013). The AB cutoff of 76 or lower was chosen to be consistent with the cutoff for low intelligence, in accordance with the guidelines used by clinical practitioners when interpreting sub-average functioning on formal AB measures (Harrison and Oakland, 2015; Sparrow *et al.*, 2016). We also repeated our analyses considering additional thresholds ranging from 75 to 79 to verify the robustness of our definition. Although the two social factors were kept separate for identifying adolescents with ID, they were combined into one overall social domain for subsequent analyses, as both social factors are closely associated

with the AB social construct (Tassé *et al.*, 2012; Harrison and Oakland, 2015; Sparrow *et al.*, 2016).

Models were adjusted for potential confounding by including covariates associated with both the ID and mental disorders, including: gender, age (range: 13–18), race/ethnicity (Hispanic, non-Hispanic Black, non-Hispanic White, other), parental education (less than high school, high school graduate, some college, college degree or more), parental income (<1.5, 1.5–3, 3.1–6, >6 times the poverty level), number of parents living with the child (range: 0–2), any lifetime parent psychiatric disorder, and any lifetime parent substance use disorder.

Analysis

Cross-tabulations were used to estimate the prevalence of low IQ, low AB, and ID as a function of socio-demographics, lifetime mental disorder, and high-severity past-year disorders. Statistical significance was assessed through chi-square tests. Logistic regression models were used to calculate the odds of lifetime disorder among those with ID, compared with those with no ID. Analyses were estimated with survey design weights; standard errors estimated with Taylor series linearization implemented in SAS© version 9.4.

Results

The prevalence of ID in the total study sample was 3.2%. Individuals meeting criteria for ID were significantly closer to the poverty level, reported lower parent education, and had fewer biological parents in the home than those without ID. The frequencies of ID among all socio-demographic groups are presented in Table 1.

Table 2 compares the prevalence of psychiatric disorders between those with and without ID.

Compared to those without ID, individuals with ID had a significantly higher prevalence of any disorder (65.1% *v.* 52.7%) and any fear disorder (40.8% *v.* 27.5%). With regard to specific diagnoses, those with ID had higher rates of specific phobia (30.5% *v.* 18.4%), agoraphobia (7.3% *v.* 2.2%), conduct disorder (9.1% *v.* 4.2%), and bipolar disorder (8.0% *v.* 1.0%).

Adjusted models comparing the odds of the disorder among respondents with and without ID are in Table 3. After adjustment for confounders, only specific phobia (OR 1.66, 95% CI 1.02–2.68), agoraphobia (OR 2.46; 95% CI 1.02–5.93), and bipolar disorder (OR 7.24, 95% CI 2.10–24.99) were more common among those with ID compared with those without ID.

The prevalence of severe impairment among those meeting criteria for each psychiatric disorder, separately for those with and without ID, is in Table 4. ID was associated with greater severity of specific phobia, agoraphobia, social phobia, panic disorder, GAD, ADHD, ODD, conduct disorder, drug abuse, and bipolar disorder. The prevalence of severe impairment among those with ID was notably high for many disorders, especially GAD (64.3%) and oppositional defiant disorder (65%). For those meeting criteria for drug abuse, 100% of individuals with ID reported severe impairment from the disorder. Results were robust to the variation in AB thresholds, in a sensitivity analysis.

Discussion

To our knowledge, this is the first study to assess the prevalence of ID in a population-representative sample of US adolescents and examine its associations with socio-demographic factors and psychiatric disorders. The prevalence of ID in this study was similar to previous estimates of 2–3% in US community samples (Harris, 2006), though higher than the DSM-5 stated prevalence of 1% (American Psychiatric Association, 2013). The prevalence of any psychiatric disorder among those with ID was approximately 65%. Before adjustment for confounders, ID was associated with a wide range of psychiatric disorders. However, ID was also strongly associated with parental SES and family composition. After adjustment for these confounders, ID was associated only with specific phobia, agoraphobia, and bipolar disorder. These findings stand in contrast to prior work reporting high levels of behavior disorders in individuals with ID (Dekker and Koot, 2003; Simonoff *et al.*, 2007), and highlight the potential biases in our understanding of ID and its correlates that have emerged from a literature that has relied almost entirely on clinical samples.

The absence of an association between ID and behavior disorders is contrary to numerous prior studies using clinical samples and/or where ID cases are defined solely by IQ (Dekker and Koot, 2003; Simonoff *et al.*, 2007). Many symptoms of behavioral problems are also considered integral to the adaptive behavior component of ID, and it can be difficult to separate the diagnostic overlap between ID and symptoms of psychiatric disorders. Adolescents with ID who are sampled from schools or clinical populations are often referred for these services in response to behavioral problems in the first place, inflating the prevalence of these symptoms (Harris, 2006). Studies of ID and psychiatric comorbidity that do not account for the adaptive behavior component in their ID criteria might mistakenly attribute those symptoms to comorbid externalizing disorders.

The elevated odds of bipolar disorder among those with ID observed here is in line with some, but not all, previous studies. One Australian community study of individuals with low IQ found no elevated prevalence of bipolar disorder (Morgan *et al.*, 2008), though associations have been reported in some clinical samples (Cain *et al.*, 2003). In contrast, our finding that adolescents with ID had greater odds of lifetime phobias is consistent with prior work (Dekker and Koot, 2003; Emerson, 2003). Adolescents with ID who met criteria for a psychiatric disorder were more likely to face severe impairment from those disorders than adolescents without ID, a pattern that has not specifically been reported in the literature. However, this finding is consistent with the more general observation that the adaptive behavior limitations of individuals with ID (e.g. difficulties in daily living skills, interpersonal problems) are likely to exaggerate the severity of the symptoms of their comorbid disorder (Woods *et al.*, 2015). Also, known risk factors for disorder severity, such as stressful life events, may explain this pattern, as individuals with ID may be less likely to cope with stressful life events and may be at greater risk for experiencing them (Hatton and Emerson, 2004). These patterns suggest that although individuals with ID are more likely to experience only a limited set of disorders, they bear a disproportionate burden of psychiatric morbidity as they are more likely to experience severe impairment from psychopathology across a wide range of disorders than youth without ID.

ID was associated with several indicators of household SES and family composition, which have been ignored in prior work on psychiatric comorbidity among those with ID. These experiences may represent perinatal or environmental risk factors for ID, similar to those that have been identified in etiologic studies of low IQ populations (Keyes *et al.*, 2016). Associations were particularly strong with low parental education; to the extent that parental education may be associated with the parents' own cognitive ability, these associations may represent shared heritability of ID (McDermott *et al.*, 2007; Morgan *et al.*, 2012). Because parental SES and household composition are also associated with child psychopathology (Duncan *et al.*, 1994; Kessler *et al.*, 2012*a*; McLaughlin *et al.*, 2012*a*, 2013), these factors appear to have been key – but ignored – confounders in prior work on ID and psychiatric comorbidity.

Several additional findings are noteworthy. Among adolescents with ID, 65.1% met criteria for a lifetime psychiatric disorder, somewhat higher than typically reported ranges of 30–50% (Einfeld *et al.*, 2011). There are several possible reasons for this discordance. Most studies of ID and psychopathology are based on non-representative populations, such as from students attending special education schools (Emerson, 2003; Bakken *et al.*, 2010). These adolescents represent a subsample of those with ID who are able to attend school regularly. Second, in defining ID, many previous studies give either sole or primary consideration to IQ scores, without also considering low adaptive behavioral functioning. The effect of both of these issues may mean that prior studies are more likely to include milder cases of ID. In our study, ID was defined by IQ and AB criteria and included a sample of adolescents with ID in the general population, representing a mixture of mild and more severe cases. Indeed, population studies that include both mild and severe cases have reported comparable disorder prevalence (Gillberg *et al.*, 1986).

Prior studies of gender differences in ID have yielded inconsistent conclusions, some studies find no differences (Bakken *et al.*, 2010), while others have identified a significantly higher prevalence among boys than girls (Halfon and Newacheck, 1999). In the current study, gender differences were absent. Previous investigations have found significant discordance comparing school- *v.* therapist-referred cases, suggesting that gender bias is a significant factor in the identification of ID (Caseau *et al.*, 1994). Indeed, given that the prevalence of behavioral problems is higher than boys than in girls even in the absence of ID (Keiley *et al.*, 2000), it could be that more boys with ID are identified and referred for services given the other problems that may present alongside ID. More research is needed to compare absolute rates and other sources of bias in diagnostic practices, as this may suggest that boys are overdiagnosed, or that girls are under-diagnosed for ID.

The results of this study should be interpreted in light of several limitations. First, the study was a cross-sectional design, using lifetime diagnosis of psychiatric disorders. However, this potential problem in design is likely mitigated as the NCS-A focused on adolescents, with a short period of recall. Also, the etiology of ID reflects the consequences of genetic and/or developmental exposures that very likely precede the development of psychiatric conditions (Morgan *et al.*, 2012). Second, ID cases were identified using survey items that were not specifically designed to measure the AB construct; however we believe the new measure is a valid proxy for an established measure, based on clinical, conceptual, and psychometric

guidelines, and is consistent with contemporary thought on adaptive behavior assessment (Tassé *et al.*, 2012). Third, adolescents with ID or psychiatric impairment may have increased difficulty in language and comprehension, may show decreased effort during ID assessment, or may show atypical symptoms of the disorder (Woods *et al.*, 2015). These effects may inflate the reported associations between ID and disorders, as well as the relationship between ID and disorder severity. However, the impact of these variables is minimized by the use of parent (SAQ) report on five adolescent disorders (ADHD, conduct disorder, ODD, major depressive episode, and dysthymia) and severity items (Kessler *et al.*, 2009*b*). Thus, for example, even if the adolescents with moderate intellectual impairments had difficulty reading and understanding any study items in the self-report measures used diagnose comorbid psychiatric disorders, their self-report data were cross-validated by parents' data for most diagnoses. Also, the known limitations of ID individuals would not have compromised their ID classification because the measure of IQ was individually administered, nonverbal, with the simple administration; and the measure of AB was derived solely from interviews given to their parents. Though the use of a single parent report is very common in clinical research and practice, the use of multiple sources of reporting (e.g. teachers, other caretakers) might provide future opportunities to further validate a measure of AB. Finally, we acknowledge that the study data were collected more than a decade ago. In order to reflect current information about ID, studies and norms must be updated regularly to reflect population changes in IQ (Flynn, 1984; Weiss, 2010).

Conclusion

This study represents the first US population-representative assessment of the socio-demographic and psychiatric correlates of ID in adolescents. ID was associated with specific phobia, agoraphobia, and bipolar disorders. Just as notably, our findings call into question previously reported patterns, including increased risk of behavior disorders among those with ID and the greater prevalence of ID among male adolescents. Together, these findings highlight the need to consider how behavioral problems are conceptualized and classified in people with ID (Kwok and Cheung, 2007). Study findings not only improve our understanding of the epidemiology and psychiatric consequences of ID but may also prove influential in the legal system, where a valid ID diagnostic assessment may be the difference between a referral for treatment and capital punishment.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

References

American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders (DSM-5®). Washington, DC: American Psychiatric Pub; 2013.

Bain SK, Jaspers KE. 2010; Test review: review of Kaufman Brief Intelligence Test: Kaufman, AS, & Kaufman, NL (2004). Kaufman Brief Intelligence Test, Bloomington, MN: Pearson, Inc. Journal of Psychoeducational Assessment. 28:167–174.

Bakken TL, Helverschou SB, Eilertsen DE, Heggelund T, Myrbakk E, Martinsen H. 2010; Psychiatric disorders in adolescents and adults with autism and intellectual disability: a representative study in

one county in Norway. Research in Developmental Disabilities. 31:1669–1677. [PubMed: 20493660]

Brue, AW, Wilmshurst, L. Essentials of Intellectual Disability Assessment and Identification. Hoboken, NJ: John Wiley & Sons; 2016.

Cain N, Davidson P, Burhan A, Andolsek M, Baxter J, Sullivan L, Florescue H, List A, Deutsch L. 2003; Identifying bipolar disorders in individuals with intellectual disability. Journal of Intellectual Disability Research. 47:31–38. [PubMed: 12558693]

Canivez GL, Neitzel R, Martin BE. 2005; Construct validity of the Kaufman brief intelligence test, Wechsler intelligence scale for children-and adjustment scales for children and adolescents. Journal of Psychoeducational Assessment. 23:15–34.

Cantwell DP, Lewinsohn PM, Rohde P, Seeley JR. 1997; Correspondence between adolescent report and parent report of psychiatric diagnostic data. Journal of the American Academy of Child & Adolescent Psychiatry. 36:610–619. [PubMed: 9136495]

Caseau DL, Luckasson R, Kroth RL. 1994; Special education services for girls with serious emotional disturbance: a case of gender bias? Behavioral Disorders. 20:51–60.

Cooper S-A, Smiley E, Morrison J, Williamson A, Allan L. 2007; Mental ill-health in adults with intellectual disabilities: prevalence and associated factors. The British Journal of Psychiatry. 190:27–35. [PubMed: 17197653]

Dekker MC, Koot HM. 2003; DSM-IV disorders in children with borderline to moderate intellectual disability. I. Prevalence and impact. Journal of the American Academy of Child & Adolescent Psychiatry. 42:915–922. [PubMed: 12874493]

Duncan GJ, Brooks-Gunn J, Klebanov PK. 1994; Economic deprivation and early childhood development. Child Development. 65:296–318. [PubMed: 7516849]

Einfeld SL, Ellis LA, Emerson E. 2011; Comorbidity of intellectual disability and mental disorder in children and adolescents: a systematic review. Journal of Intellectual and Developmental Disability. 36:137–143. [PubMed: 21609299]

Emerson E. 2003; Prevalence of psychiatric disorders in children and adolescents with and without intellectual disability. Journal of Intellectual Disability Research. 47:51–58. [PubMed: 12558695]

Floyd RG, Reynolds MR, Farmer RL, Kranzler JH. 2013; Are the general factors from different child and adolescent intelligence tests the same? Results from a five-sample, six-test analysis. School Psychology Review. 42:383.

Flynn JR. 1984; The mean IQ of Americans: massive gains 1932 to 1978. Psychological Bulletin. 95:29–51.

Gillberg C, Persson E, Grufman M, Themnér U. 1986; Psychiatric disorders in mildly and severely mentally retarded urban children and adolescents: epidemiological aspects. The British Journal of Psychiatry. 149:68–74. [PubMed: 2946351]

Halfon N, Newacheck PW. 1999; Prevalence and impact of parent-reported disabling mental health conditions among US children. Journal of the American Academy of Child & Adolescent Psychiatry. 38:600–609. [PubMed: 10230193]

Harris, JC. Intellectual Disability: Understanding Its Development, Causes, Classification, Evaluation, and Treatment. New York, NY: Oxford University Press; 2006.

Harrison, PL, Oakland, T. ABAS-3. Torrance, CA: Western Psychological Services; 2015.

Hatton C, Emerson E. 2004; The relationship between life events and psy-chopathology amongst children with intellectual disabilities. Journal of Applied Research in Intellectual Disabilities. 17:109–117.

Homack, SR, Reynolds, CR. Essentials of Assessment with Brief Intelligence Tests. Vol. 41. Hoboken, NJ: John Wiley & Sons; 2007.

Kaufman, AS. IQ Testing 101. New York, NY: Springer Publishing Company; 2009.

Kaufman AS, Johnson CK, Liu X. 2008; A CHC theory-based analysis of age differences on cognitive abilities and academic skills at ages 22 to 90 years. Journal of Psychoeducational Assessment. 26:350–381.

Kaufman AS, Kaufman JC, Liu X, Johnson CK. 2009; How do educational attainment and gender relate to fluid intelligence, crystallized intelligence, and academic skills at ages 22–90 years? Archives of Clinical Neuropsychology. 24:153–163. [PubMed: 19185449]

Kaufman, AS, Kaufman, NL. K-BIT: Kaufman Brief Intelligence Test. Circle Pines, MN: American Guidance Service; 1990a.

Kaufman, AS, Kaufman, NL. K-BIT: Kaufman Brief Intelligence Test Manual. Circle Pines, MN, USA: American Guidance Service; 1990b.

Kaufman AS, Wang J-J. 1992; Gender, race, and education differences on the K-BIT at ages 4 to 90 years. Journal of Psychoeducational Assessment. 10:219–229.

Kaufman SB, Reynolds MR, Liu X, Kaufman AS, McGrew KS. 2012; Are cognitive g and academic achievement g one and the same g? An exploration on the Woodcock–Johnson and Kaufman tests. Intelligence. 40:123–138.

Keiley MK, Bates JE, Dodge KA, Pettit GS. 2000; A cross-domain growth analysis: externalizing and internalizing behaviors during 8 years of childhood. Journal of Abnormal Child Psychology. 28:161–179. [PubMed: 10834768]

Kessler RC, Avenevoli S, Costello EJ, Georgiades K, Green JG, Gruber MJ, He J, Koretz D, McLaughlin KA, Petukhova M. 2012a; Prevalence, persistence, and sociodemographic correlates of DSM-IV disorders in the National Comorbidity Survey Replication Adolescent Supplement. Archives of General Psychiatry. 69:372–380. [PubMed: 22147808]

Kessler RC, Avenevoli S, Costello EJ, Green JG, Gruber MJ, Heeringa S, Merikangas KR, Pennell B, Sampson NA, Zaslavsky AM. 2009a; Design and field procedures in the US National Comorbidity Survey Replication Adolescent Supplement (NCS-A). International Journal of Methods in Psychiatric Research. 18:69–83. [PubMed: 19507169]

Kessler RC, Avenevoli S, Green J, Gruber MJ, Guyer M, He Y, Jin R, Kaufman J, Sampson NA, Zaslavsky AM. 2009b; National comorbidity survey replication adolescent supplement (NCS-A): III. Concordance of DSM-IV/CIDI diagnoses with clinical reassessments. Journal of the American Academy of Child & Adolescent Psychiatry. 48:386–399. [PubMed: 19252450]

Kessler RC, Avenevoli S, McLaughlin K, Green JG, Lakoma M, Petukhova M, Pine D, Sampson N, Zaslavsky A, Merikangas KR. 2012b; Lifetime co-morbidity of DSM-IV disorders in the US national comorbidity survey replication adolescent supplement (NCS-A). Psychological Medicine. 42:1997–2010. [PubMed: 22273480]

Keyes KM, Platt J, Kaufman AS, McLaughlin KA. 2016; Association of fluid intelligence and psychiatric disorders in a population-representative sample of us adolescents. JAMA Psychiatry. 74:179–188.

Kwok H, Cheung PW. 2007; Co-morbidity of psychiatric disorder and medical illness in people with intellectual disabilities. Current Opinion in Psychiatry. 20:443–449. [PubMed: 17762585]

Leon AC, Olfson M, Portera L, Farber L, Sheehan DV. 1997; Assessing psychiatric impairment in primary care with the Sheehan Disability Scale. The International Journal of Psychiatry in Medicine. 27:93–105. [PubMed: 9565717]

Luckasson, R, Polloway, E, Reiss, S, Schalock, R, Snell, M, Spitalnik, D, Stark, J. Mental Retardation: Definition, Classification and Systems of Supports. 9. Washington DC: American Association on Intellectual & Developmental Disabilities; 1992.

Maulik PK, Mascarenhas MN, Mathers CD, Dua T, Saxena S. 2011; Prevalence of intellectual disability: a meta-analysis of population-based studies. Research in Developmental Disabilities. 32:419–436. [PubMed: 21236634]

McDermott, S, Durkin, MS, Schupf, N, Stein, ZA. Epidemiology and etiology of mental retardation. In: Jacobson, JW, Mulick, JA, Rojahn, editors. Handbook of Intellectual and Developmental Disabilities. Berlin/Heidelberg, Germany: Springer; 2007. 3–40.

McLaughlin KA, Costello EJ, Leblanc W, Sampson NA, Kessler RC. 2012a; Socioeconomic status and adolescent mental disorders. American Journal of Public Health. 102:1742–1750. [PubMed: 22873479]

McLaughlin KA, Green JG, Hwang I, Sampson NA, Zaslavsky AM, Kessler RC. 2012b; Intermittent explosive disorder in the national comorbidity survey replication adolescent supplement. Archives of General Psychiatry. 69:1131–1139. [PubMed: 22752056]

McLaughlin KA, Koenen KC, Hill ED, Petukhova M, Sampson NA, Zaslavsky AM, Kessler RC. 2013; Trauma exposure and posttraumatic stress disorder in a national sample of adolescents.

Journal of the American Academy of Child & Adolescent Psychiatry. 52:815–830. [PubMed: 23880492]

Mercer, JR. Latent functions of intelligence testing in the public schools. In: Miller, L, editor. The Testing of Black Students. Upper Saddle River: Prentice Hall; 1974. 77–94.

Merikangas K, Avenevoli S, Costello J, Koretz D, Kessler RC. 2009; National comorbidity survey replication adolescent supplement (NCS-A): I. Background and measures. Journal of the American Academy of Child and Adolescent Psychiatry. 48:367–369. [PubMed: 19242382]

Morgan VA, Croft ML, Valuri GM, Zubrick SR, Bower C, McNeil TF, Jablensky AV. 2012; Intellectual disability and other neuropsychiatric outcomes in high-risk children of mothers with schizophrenia, bipolar disorder and unipolar major depression. The British Journal of Psychiatry. 200:282–289. [PubMed: 22241931]

Morgan VA, Leonard H, Bourke J, Jablensky A. 2008; Intellectual disability co-occurring with schizophrenia and other psychiatric illness: population-based study. The British Journal of Psychiatry. 193:364–372. [PubMed: 18978313]

Raven, JC. Unpublished master's thesis. University of London; 1936. Mental Tests Used in Genetic Studies: The Performance of Related Individuals on Tests Mainly Educative and Mainly Reproductive.

Reynolds MR, Floyd RG, Niileksela CR. 2013; How well is psychometric g indexed by global composites? Evidence from three popular intelligence tests. Psychological Assessment. 25:1314. [PubMed: 23937534]

Salthouse, T. Major Issues in Cognitive Aging. Vol. 49. New York, NY: Oxford University Press; 2010.

Schalock, RL. The Encyclopedia of Clinical Psychology. Hoboken, NJ: Wiley; 2010. Intellectual disability; 1–7.

Schalock, RL. American Association on Intellectual and Developmental Disabilities. User's Guide Workgroup. User's guide: to accompany the 11th edition of intellectual disability: definition, classification, and systems of supports: applications for clinicians, educators, organizations providing supports, policymakers, family members and advocates, and health care professionals. Washington, DC: American Association on Intellectual and Developmental Disabilities; 2012.

Schalock, RL, Borthwick-Duffy, SA, Bradley, VJ, Buntinx, WHE, Coulter, DL, Craig, EM, Gomez, SC, Lachapelle, Y, Luckasson, R, Reeve, A, Shogren, KA, Snell, ME, Spreat, S, Tasse, MJ, Thompson, JR, Verdugo-Alonso, MA, Wehmeyer, ML, Yeager, MH. Intellectual disability: definition, classification, and systems of supports. 7. Washington, DC: American Association on Intellectual and Developmental Disabilities; 2010.

Schultz, D, Vile, JR. The Encyclopedia of Civil Liberties in America. New York, NY: Routledge; 2015.

Seguin, E. Traitement moral, hygiène et éducation des idiots et des autres enfants arriérés. Paris, France: JB Baillière; 1846.

Simonoff E, Pickles A, Wood N, Gringras P, Chadwick O. 2007; ADHD symptoms in children with mild intellectual disability. Journal of the American Academy of Child & Adolescent Psychiatry. 46:591–600. [PubMed: 17450050]

Sparrow, SS, Balla, DA, Cicchetti, DV, Harrison, PL, Doll, EA. Vineland Adaptive Behavior Scales. Circle Pines, MN: American Guidance Service; 1984.

Sparrow, SS, Cicchetti, DV, Saulnier, CA. Vineland-3: Vineland Adaptive Behavior Scales. Hoboken, NJ: PsychCorp; 2016.

Tassé MJ, Schalock RL, Balboni G, Bersani H Jr, Borthwick-Duffy SA, Spreat S, Thissen D, Widaman KF, Zhang D. 2012; The construct of adaptive behavior: its conceptualization, measurement, and use in the field of intellectual disability. American Journal on Intellectual and Developmental Disabilities. 117:291–303. [PubMed: 22809075]

Wang J-J, Kaufman AS. 1993; Changes in fluid and crystallized intelligence across the 20-to 90-year age range on the K-BIT. Journal of Psychoeducational Assessment. 11:29–37.

Weiss LG. 2010; Considerations on the Flynn effect. Journal of Psychoeducational Assessment. 28:482–493.

Woods, G, Freedman, D, Derning, T. Intellectual disability and comorbid disorders. In: Polloway, EA, editor. The Death Penalty and Intellectual Disability. Washington, DC: American Association on Intellectual and Developmental Disabilities; 2015. 279–292.

Yell ML, Shriner JG, Katsiyannis A. 2006; Individuals with disabilities education improvement act of 2004 and IDEA regulations of 2006: implications for educators, administrators, and teacher trainers. Focus on Exceptional Children. 39:1.

Table 1

Prevalence and demographic correlates of intellectual disability compared with those with no intellectual disability, and its components (intelligence and adaptive behavior) in a population-representation sample of adolescents

		Dichotomous ID status			IQ and AB components						
	Total	No ID % (ref)	ID %	χ^2; *p* value	No low IQ, no low AB % (ref)	ID %	χ^2; *p* value	Low IQ, no Low AB %	χ^2; *p* value	No low IQ, low AB %	χ^2; *p* value
Total	100	96.8	3.2		74.1	3.2		3.3		19.6	
Gender											
Girls	51.5	48.9	44.9	0.3	51.8	44.9	0.335	35.6	7.2	39.5	15.6
Boys	48.5	51.1	55.1	0.571	48.2	55.1		64.4	0.007	60.5	<0.0001
Age (years)											
13	17.2	16.7	13.5	0.517	16.8	13.5	0.511	11.7	0.633	17.5	0.908
14	23.1	21.6	27.7		21.5	27.7		24.8		21.5	
15–16	39.1	42.4	37.0		42.6	37.0		45.2		40.9	
17–18	20.6	19.3	21.8		19.2	21.8		18.3		20.1	
Income to poverty line ratio											
<1.5	14.2	11.9	24.5	15.2	10.3	24.5	20.2	14.3	0.700	17.8	27.1
1.5–2.9	18.8	17.8	21.5	0.002	17.2	21.5	0.000	17.6		20.0	<0.0001
3–5.9	33.0	34.3	23.0		35.0	23.0		35.4		31.2	
≥6	34.0	36.1	31.0		37.5	31.0		32.7		30.9	
Parent education											
Less than high school	11.3	9.8	25.2	20.2	8.5	25.2	24.8	7.2	0.437	15.6	45.3
High school graduate	28.6	28.0	38.3	0.0002	27.0	38.3	<0.0001	35.3		30.9	<0.0001

		Dichotomous ID status			IQ and AB components						
	Total	**No ID % (ref)**	**ID %**	**χ^2; *p* value**	**No low IQ, no low AB % (ref)**	**ID %**	**χ^2; *p* value**	**Low IQ, no Low AB %**	**χ^2; *p* value**	**No low IQ, low AB %**	**χ^2; *p* value**
Some college	21.0	21.1	17.2		20.9	17.2		16.8		22.8	
College degree	39.2	41.0	19.4		43.6	19.4		40.8		30.7	
Number of biological parents at home											
None	8.1	7.6	19.7	25.2	6.3	19.7	34.5	4.8	0.718	13.5	68.3
One	35.0	33.7	42.9	<0.0001	31.3	42.9	<0.0001	31.4		44.1	<0.0001
Two	56.9	58.7	37.4		62.4	37.4		63.8		42.4	
Parent substance misuse											
No	95.4	94.9	90.8	0.128	95.3	90.8	0.071	97.3	0.268	92.7	0.068
Yes	4.6	5.1	9.2		4.7	9.2		2.7		7.3	
Parent psychopathology											
No	92.5	92.0	87.9	0.179	92.7	87.9	0.117	91.1	0.581	89.5	5.4
Yes	7.5	8.0	12.1		7.3	12.1		8.9		10.5	0.020
Any traumatic event exposure											
No	41.9	42.5	43.2	0.918	44.5	43.2	0.855	43.7	0.875	34.1	15.5
Yes	58.1	57.5	56.8		55.5	56.8		56.3		65.9	<0.0001

ID = Intellectual disability, defined as IQg ≤76 & ABg or any factor score ≤76.

IQ = Intelligence Quotient; AB = Adaptive behavior.

Table 2

Prevalence of psychiatric disorders among adolescents with and without intellectual disability and its components (intelligence and adaptive behavior) in a population-representation sample of adolescents

		Dichotomous ID status			IQ and AB components					
Lifetime disorders, all ages	**Total**	**No ID % (ref)**	**ID %**	***p* Value**	**No low IQ, no low AB % (ref)**	**ID %**	***p* Value**	**Low IQ, no Low AB %**	***p* Value**	**No low IQ, low AB %**	***p* Value**
I. Fear disorders											
Specific phobia	18.8	18.4	30.5	0.008	17.5	30.5	0.003	20.4	0.444	22.2	0.013
Agoraphobia	2.3	2.2	7.3	0.003	1.8	7.3	0.001	2.8	0.420	3.4	0.012
Social phobia	13.3	13.3	19.8	0.150	11.7	19.8	0.066	9.1	0.507	20.6	<0.0001
Panic disorder	2.3	2.4	1.9	0.707	2.1	1.9	0.874	1.8	0.844	3.6	0.091
Any fear disorder	27.9	27.5	40.8	0.018	25.3	40.8	0.005	28.8	0.423	36.6	<0.0001
II. Distress disorders											
Separation anxiety disorder	7.3	7.3	8.1	7.322	6.5	8.1	0.623	8.7	0.263	10.3	0.005
Post-traumatic stress disorder[a]	6.3	6.3	6.0	0.922	6.1	6.0	0.974	5.2	0.631	7.1	0.403
Major depressive episode/dysthymia	12.8	12.7	13.2	0.900	10.9	13.2	0.488	6.2	0.007	21.5	<0.0001
Generalized anxiety disorder	3.2	3.2	6.0	0.145	2.8	6.0	0.093	3.4	0.691	4.4	0.059
Any distress disorder	20.1	20.0	22.6	0.588	17.9	22.6	0.307	12.8	0.056	29.8	<0.0001
III. Behavior disorders											
ADHD	3.9	3.9	3.5	0.745	2.8	3.5	0.573	3.2	0.728	8.8	<0.0001
Oppositional defiant disorder	9.5	9.4	13.1	0.224	7.7	13.1	0.048	9.4	0.427	16.1	<0.0001
Conduct disorder	4.2	4.2	9.1	0.005	2.2	9.1	<0.0001	1.2	0.365	12.2	<0.0001
Any behavior disorder	14.5	14.5	19.8	0.139	11.1	19.8	0.008	12.1	0.590	28.1	<0.0001
IV. Substance disorders											

		Dichotomous ID status			IQ and AB components					
Lifetime disorders, all ages	**Total**	**No ID % (ref)**	**ID %**	***p* Value**	**No low IQ, no low AB % (ref)**	**ID %**	***p* Value**	**Low IQ, no Low AB %**	***p* Value**	**No low IQ, low AB %**	***p* Value**
Alcohol abuse	5.7	5.6	7.3	0.385	5.0	7.3	0.219	5.4	0.854	8.3	0.003
Drug abuse	8.2	8.2	7.9	0.910	6.3	7.9	0.461	5.3	0.544	16.3	<0.0001
Any substance disorder	10.4	10.4	9.3	0.669	8.4	9.3	0.730	9.5	0.708	18.8	<0.0001
V. Eating disorders	5.0	4.8	10.5	0.161	4.3	10.5	0.104	3.2	0.540	7.5	0.029
VI. Bipolar disorder	1.2	1.0	8.0	<0.0001	0.9	8.0	<0.0001	2.3	0.074	1.2	0.419
VII. Total number of disorders											
Exactly one disorder	20.8	20.8	22.2	0.095	20.8	22.2	0.017	27.1	0.322	19.2	<0.0001
Exactly two disorders	11.3	11.2	13.9		10.9	13.9		10.6		12.4	
Three or more disorders	21.0	20.7	29.1		18.0	29.1		12.7		33.5	
Any disorder	53.0	52.7	65.1	0.031	49.7	65.1	0.009	50.4	0.904	65.2	<0.0001

ID = Intellectual disability, defined as IQg ≤76 & ABg or any factor score ≤76.

[a]Among those with a lifetime exposure to a potentially traumatic event (*N* = 3634, 58.1% of the total sample).

Table 3

Unadjusted and adjusted odds ratios of the disorder among adolescents with intellectual disability compared with those with no intellectual disability, in a population representation sample

	OR	95% CI	AOR[a]	95% CI
I. Fear disorders				
Specific phobia	1.94	1.17–3.22	1.66	1.02–2.68
Agoraphobia	3.56	1.49–8.52	2.46	1.02–5.93
Social phobia	1.61	0.84–3.10	1.43	0.76–2.68
Panic disorder	0.79	0.24–2.68	0.77	0.24–2.46
Any fear disorder	1.81	1.09–3.01	1.60	0.99–2.57
II. Distress disorders				
Separation	1.11	0.44–2.83	0.86	0.35–2.11
anxiety disorder				
Post-traumatic stress disorder[b]	0.95	0.35–2.60	0.81	0.33–1.98
Major depressive episode/dysthymia	1.04	0.56–1.93	0.91	0.46–1.82
Generalized anxiety disorder	1.95	0.78–4.87	1.94	0.74–5.11
Any distress disorder	1.17	0.66–2.06	1.00	0.55–1.81
III. Behavior disorders				
ADHD	0.88	0.42–1.88	0.61	0.28–1.33
Oppositional defiant disorder	1.46	0.79–2.69	1.08	0.59–1.99
Conduct disorder	2.36	1.26–4.40	1.32	0.66–2.65
Any behavior disorder	1.48	0.88–2.48	1.02	0.59–1.74
IV. Substance disorders				
Alcohol abuse	1.33	0.70–2.51	0.91	0.49–1.69
Drug abuse	0.96	0.49–1.88	0.60	0.32–1.14
Any substance disorder	0.88	0.48–1.59	0.55	0.30–1.01
V. Eating disorders	2.30	0.69–7.62	2.10	0.56–7.92
VI. Bipolar disorder	8.65	2.90–25.83	7.24	2.10–24.99
VII. Total number of disorders				
Exactly one disorder	1.45	0.77–2.76	1.37	0.69–2.72
Exactly two disorders	1.68	0.90–3.13	1.46	0.80–2.65
Three or more disorders	1.90	1.10–3.30	1.54	0.83–2.87
Any disorder	1.68	1.04–2.72	1.46	0.85–2.50

ID = Intellectual disability, defined as IQg ≤76 & ABg or any factor score ≤76.

[a]Adjusted for sex, age, poverty level, parent education, number of parents in the household, any parent psychopathology, and any parent substance use disorder.

[b]Among those with a lifetime exposure to a potentially traumatic event (N = 3634, 58.1% of the total sample).

Table 4

Prevalence of high severity of psychiatric disorders among adolescents with intellectual disability compared with those with no intellectual disability, in a population-representation sample of adolescents

	Total	ID	No ID	*p* Value
Prevalence of high disorder severity (ref = low severity)				
I. Fear disorders				
Specific phobia	225	21.3	7.8	<0.0001
Agoraphobia	107	53.6	17.2	<0.0001
Social phobia	306	38.9	15.2	<0.0001
Panic disorder	112	44.4	25.7	0.0321
II. Distress disorders				
Separation anxiety disorder	38	37.5	26.4	0.2898
Post-traumatic stress disorder[a]	85	33.3	53.0	0.4492
Major depressive episode/dysthymia	342	50.0	59.0	0.38
Generalized anxiety disorder	137	64.3	40.0	0.0111
III. Behavior disorders				
ADHD	27	60.0	25.0	0.0024
Oppositional defiant disorder	129	65.0	39.7	0.0952
Conduct disorder	642	35.8	22.5	<0.0001
IV. Substance disorders				
Alcohol abuse	83	83.3	100.0	0.073
Drug abuse	61	100.0	97.1	0.0324
V. Eating disorders	9	16.7	4.4	0.498
VI. Bipolar disorder	228	60.0	43.5	0.0148

ID = Intellectual disability, defined as IQg ≤76 & ABg or any factor score ≤76.

[a]Among those with a lifetime exposure to a potentially traumatic event (*N* = 3634, 58.1% of the total sample).