Factors associated with depression and anxiety in children with intellectual disabilities

D. G. Whitney, iD **D. N. Shapiro, M. D. Peterson & S. A. Warschausky**

Department of Physical Medicine and Rehabilitation, University of Michigan, Ann Arbor, MI, USA

Abstract

Background   Individuals with intellectual disabilities (ID) are at increased risk for depression and anxiety disorders; however, there is a paucity of research that pertains to associative factors for these mental health disorders in this population. The objective of this investigation was to determine factors associated with depression and anxiety problems in children with ID.
Methods   Children 6–17 years with ID ($n = 423$; 63% male) from the 2016 National Survey of Children's Health were included in this cross-sectional study. Outcome measures included depression and anxiety problems. Predictor variables included sociodemographics, ID severity, co-morbid conditions (autism spectrum disorders, epilepsy, cerebral palsy, Down syndrome and attention-deficit/hyperactivity disorder), physical factors (i.e. physical activity, sleep duration and pain) and social factors (e.g. participation in activities and bully victimisation). Multivariable logistic regression was performed to determine the association between all factors and depression and/or anxiety problems among children with ID.
Results   The prevalence of depression and/or anxiety problems was 35.4%. After adjusting for sociodemographics, Hispanic race was associated with lower odds [odds ratio (OR), 0.3; 95%

confidence interval (CI), 0.1–0.8] of depression and/or anxiety problems. After adjusting for race, co-morbid conditions, and physical and social factors, autism spectrum disorders (OR, 4.4; 95% CI, 1.1–10.1), Down syndrome (OR, 0.2; 95% CI, 0.1–0.8), attention-deficit/hyperactivity disorder (OR, 5.9; 95% CI, 2.5–14.3), pain (OR, 7.0; 95% CI, 2.9–17.1) and bully victimisation (OR 2.3; 95% CI, 1.0–5.3) were each associated with depression and/or anxiety problems.
Conclusions   The present study identified both treatable and modifiable, as well as unmodifiable, factors associated with depression and/or anxiety problems in children with ID.

Keywords   anxiety, children, depression, factors, intellectual disabilities

Introduction

Mental health disorders are a growing global public health issue (Murray *et al.* 2012; Global Burden of Disease Paediatrics *et al.* 2016) that substantially contributes to the global burden of disease and represents a leading cause of non-fatal diseases (Whiteford *et al.* 2013). Depression and anxiety disorders are the mental health-related diseases (Murray *et al.* 2012) with the highest economic (Hoffman *et al.* 2008) burden and affect nearly 2 and 4 million US children, respectively (Global Burden of Disease Paediatrics *et al.* 2016). Importantly, depression or anxiety disorders in childhood are

Correspondence: Dr Daniel G. Whitney, Department of Physical Medicine and Rehabilitation Michigan Medicine, University of Michigan, Ann Arbor, MI, USA. Phone: 734-936-7175; Fax: 734-615-1770 (e-mail: dgwhit@umich.edu).

strongly associated with increased risk of mental health disorders into and throughout adulthood (Pine *et al.* 1998).

Intellectual disabilities (ID), characterised by impaired intellectual and adaptive functioning, are common neurodevelopmental disabilities in the USA with approximately 12 children per 1000 (Maenner *et al.* 2016). Individuals with ID are at increased risk for mental health disorders (Einfeld *et al.* 2011; Austin *et al.* 2018). However, adequate screening and accurate diagnosis of mental health disorders can be challenging in this population, leading to a wide range of prevalence estimates (Einfeld *et al.* 2011; Maiano *et al.* 2018). Nevertheless, poor mental health in the general population is associated with functional disability (Chao 2014), morbidity (Rotella and Mannucci 2013; Garfield *et al.* 2014) and early mortality (Jeong *et al.* 2013). These problems may be amplified among individuals with ID (Mccarron *et al.* 2015; Dunham *et al.* 2018) because of a variety of physical and social factors affecting independent functioning, societal integration and transitioning from adolescence to adulthood (Breau and Camfield 2011; Hinckson and Curtis 2013; Shields *et al.* 2014; Bassell *et al.* 2015; Woodmansee *et al.* 2016; Austin *et al.* 2018). These specifically include lower access to community resources, lower rates of employment and fewer social connections (Schatz and Rostain 2006; Daviss 2008; Sterling *et al.* 2008), all of which are known risk factors for depression and anxiety. In addition, there are significant risks for depression and anxiety disorders among individuals with multiple co-morbid neurodevelopmental conditions and IDs, such as autism spectrum disorders (ASD) (Rosenberg *et al.* 2011), epilepsy (Kanner *et al.* 2012), cerebral palsy (Rackauskaite *et al.* 2016) and attention-deficit/hyperactivity disorder (ADHD) (Meinzer *et al.* 2014). This increased risk may stem from primary symptoms of co-morbid conditions (e.g. social skill deficits or behavioural dysregulation with ASD) as well as the combined functional barriers associated with ID and other conditions. For example, individuals with ASD and ID may face particular difficulty coping with and communicating distress (Tordjman *et al.* 2009; Yasuda *et al.* 2016) because of combined lower problem-solving capacity and lower emotional and social awareness. As an exception, Down syndrome, for which ID is a common feature, is associated with a lower prevalence of mental health disorders compared with other groups of children with ID (Dykens and Kasari 1997; Stores *et al.* 1998). To date, research pertaining to these risk factors and their association with adverse mental health profiles in children with ID is lacking (Maiano *et al.* 2018). Accordingly, the objective of this investigation was to utilise a nationally representative sample of US children to examine the factors associated with depression and anxiety problems in children with ID, with specific focus on examining the association of sociodemographics, severity of ID, co-morbid conditions, physical factors and social factors in children with ID. Knowing this information would greatly benefit the development of early intervention strategies aimed at reducing the burden of adverse mental health in children with ID.

Method

Data were from the 2016 National Survey of Children's Health (NSCH). The NSCH was developed to produce state-level and national-level data on demographic and health characteristics of American children 0–17 years of age, their families and their communities. The survey utilised a two-phase, self-administered data collection design using both internet and mailed paper data collection instruments between June 2016 and February 2017. There were >360 000 sampled household addresses that were allocated within states based on the relative household sizes containing at least one child less than 18 years of age, with an oversampling ratio of 5:1 compared with households that had no children. One child per household was selected for the survey. In households that had two or more children, children with special health care needs had a higher probability of being selected (oversampled) to allow for more robust data estimates. A parent or guardian (i.e. respondent) with knowledge of the health status of the surveyed child completed the survey. The completion rate for households that initiated the survey was 69.7%. The 2016 NSCH had an overall weighted response rate of 40.7%. The U.S. Census Bureau conducted a Nonresponse Bias Analysis for the 2016 NSCH and concluded that there was no strong or consistent evidence of nonresponse bias (2016 National Survey of Children's Health Nonresponse Bias A 2017). Because the data used in this investigation are publicly available and de-identified,

approval from an Institutional Review Board was exempt. Additional information about the NSCH methodology, instrumentation and approval is available from http://www.childhealthdata.org/.

Participants

Individuals were considered for this cross-sectional study if a diagnosis of ID was available. The respondents answered the following prompt, 'Has a doctor, other health care provider, or educator EVER told you that this child has Intellectual Disability (also known as Mental Retardation)?' Individuals with a current diagnosis of ID were included in this investigation. Several variables were not administered to children younger than 6 years. Therefore, the sample was restricted to 6–17 years. Because the NSCH oversampled children with special health care needs, we calculated the weighted prevalence in children 6–17 years. The weighted (unweighted) sample included 576 666 (423) children with ID and 48 795 382 (35 099) children without ID. The resulting prevalence of ID was 1.2%, which is consistent with a previous study that found ID prevalence estimates of 1.2% in children aged 2–17 years using two nationally representative surveys in the USA from 2011 to 2013 (Maenner *et al.* 2016).

Outcome measures

The respondents answered the following prompt, 'Has a doctor or other health care provider EVER told you that this child has [specified disorder]?' The child was considered to have a mental health disorder if the respondent reported a current diagnosis of 'depression' or 'anxiety problems'. An outcome event of having depression and/or anxiety problems was combined because (1) both conditions are often co-morbid and are the leading mental-health related paediatric burden of disease (Global Burden of Disease Pediatrics *et al.*, 2016) and (2) for statistical considerations to improve sample size to adequately assess multiple factors associated with these conditions.

Predictor variables

Predictor variables were chosen based on their relevance to children with ID, depression or anxiety disorders, and availability in the 2016 NSCH.

Sociodemographics

Sociodemographic variables that were available in the 2016 NSCH included age, sex, race/ethnicity and household poverty status (as a ratio of the federal poverty line). We used the predefined NSCH age grouping categories of 6–11 and 12–17 years. Because household poverty status had missing data for 18.6% of the 2016 NSCH sample, imputed data were provided for the missing values using methods as described for previous NSCH data (Blumberg *et al.* 2012).

Severity of intellectual disabilities and co-morbid conditions

The severity of ID was determined by the respondent's subjective report as 'mild' or 'moderate or severe'. Presence of a current reported co-morbid condition of ASD, epilepsy, cerebral palsy, Down syndrome and ADHD was determined by the same prompt for depression and anxiety problems.

Physical factors

Physical factors that were available in the 2016 NSCH included physical activity, sleep duration and pain. Physical activity was determined by the number of days that the child exercised, played a sport or participated in physical activity for 60+ min. The NSCH stratified physical activity participation categories as 0, 1–3, 4–6 and 7 days. We combined the latter two groups into one category of 4–7 days. A dichotomous variable for sleep duration was determined if the child slept age-appropriate hours or not. The 2016 NSCH utilised a guideline developed by the American Academy of Sleep Medicine, which recommends children 6–12 years should sleep 9–12 h per 24 h, and children 13–18 years should sleep 8–10 h per 24 h (Paruthi *et al.* 2016). A dichotomous variable for pain was determined if the child had 'FREQUENT or CHRONIC difficulty' with 'repeated or chronic physical pain, including headaches or other back or body pain'.

Social factors

Social factors that were available in the 2016 NSCH included participation in activities and bully victimisation. A dichotomous variable for participation in activities was determined if the child

participated in one or more extracurricular organised activities or lessons after school or on the weekends in the past 12 months. Activities included sports teams or lessons, clubs or organisations and any other organised activities or lessons. A dichotomous variable for bully victimisation was determined by how well the following phrase described the child, 'This child is bullied, picked on, or excluded by other children'. The child was considered to have experienced bully victimisation if the respondent answered 'definitely true' or 'somewhat true'. The child was considered to not have experienced bully victimisation if the respondent answered 'not true'. No time frame was given for this variable.

Statistical analysis

The 2016 NSCH uses a multistage survey design to enhance the representativeness of the sample to the US population of children and adolescents. We accounted for the primary sampling unit and sampling strata to obtain correct variance estimation, and weighted estimates to account for oversampling, survey nonresponse and distribution of the target population. All statistical analyses were performed using SAS 9.4 (SAS Institute, Cary, NC) with statistical significance determined using two-sided confidence intervals (CIs). Unweighted sample size and weighted estimates of all variables are presented as percentage (95% CI).

Multivariable logistic regression analyses were performed to determine the association between factors and depression and/or anxiety problems (reference: without depression and without anxiety problems). Covariates were introduced into models as groupings. Model 1 included sociodemographic variables. After this step, if sociodemographic variables were not significantly associated with the dependent variable, they were not included in subsequent models to enhance model parsimony. Model 2 included significant variables from model 1, severity of ID and co-morbid conditions. After this step, if severity of ID or co-morbid conditions were not significantly associated with the dependent variable, then they were not included in subsequent models. Model 3 included significant variables from model 1 and model 2, as well as physical and social factors.

There is a high prevalence of co-morbidity among ASD and ADHD in children (Taurines *et al.* 2012). Therefore, if the ASD and ADHD conditions were both significantly associated with depression and/or anxiety problems in the final model (i.e. model 3), we performed an exploratory analysis to identify condition-specific contributions to the dependent variable. Specifically, we created the following groups: (1) no ASD and no ADHD (n = 161); (2) ASD and ADHD (n = 98); (3) ASD only (n = 85); and (4) ADHD only (n = 76). Individuals that had missing

Table 1 Descriptive characteristics of children with intellectual disability (ID; n = 423)

	% (95% CI)
Outcome measures	
Depression	15.4 (9.0, 21.8)
Anxiety problems	33.9 (24.8, 43.1)
Sociodemographic variables	
Age (years)	
6–11	37.7 (27.7, 47.7)
12–17	62.3 (52.3, 72.3)
Male	63.3 (51.7, 74.9)
Race	
Non-Hispanic White	48.1 (37.5, 58.7)
Non-Hispanic Black	19.6 (11.4, 27.8)
Hispanic	26.2 (13.3, 39.1)
Other	6.1 (3.5, 8.7)
Household poverty status (%)	
0–199	53.5 (42.6, 64.4)
200–399	25.0 (14.4, 35.7)
≥400	21.4 (13.7, 29.2)
Severity of ID and co-morbid conditions	
Severity of ID	
Mild	36.0 (24.3, 47.8)
Moderate or severe	64.0 (52.2, 75.7)
Autism spectrum disorders	42.0 (31.9, 52.2)
Epilepsy	16.6 (9.6, 23.6)
Cerebral palsy	12.7 (5.7, 19.6)
Down syndrome	10.0 (5.1, 14.9)
ADHD	39.6 (29.7, 49.5)
Physical and social factor variables	
Physical activity ≥60 min (days)	
0	31.6 (19.8, 43.3)
1–3	35.6 (25.2, 45.9)
4–7	32.9 (23.8, 41.9)
Sleeps < age-appropriate hours	36.8 (27.1, 46.6)
Pain	22.2 (13.7, 30.6)
Participation in activities	47.5 (36.6, 58.3)
Bully victimisation	59.1 (48.8, 69.4)

ADHD, attention-deficit/hyperactivity disorder; CI, confidence interval.

data (<4% for any variable) were included in the analysis, and the unweighted sample size for each model is presented.

Results

Descriptive characteristics of study participants for all variables are presented in Table 1. The combined prevalence of depression and/or anxiety problems was 35.4%.

Table 2 shows the results of the multivariable logistic regression model to determine the associations of sociodemographic variables. After adjusting for sociodemographics, Hispanic race was associated with depression and/or anxiety problems [odds ratio (OR), 0.3; 95% CI, 0.1–0.9], but age, sex or household poverty status were not.

Table 3 shows the results of the multivariable logistic regression model to determine the associations of severity of ID and co-morbid conditions. After adjusting for race, severity of ID and co-morbid conditions (model 2), ASD (OR, 3.9; 95% CI, 1.8–8.4), Down syndrome (OR, 0.1; 95% CI, 0.1–0.7) and ADHD (OR, 5.2; 95% CI, 2.4–11.3) were associated with depression and/or anxiety problems, but severity of ID, epilepsy or cerebral palsy were not.

Table 4 shows the results of the multivariable logistic regression model to determine the associations of co-morbid conditions and physical and social factors. After adjusting for race, ASD, Down syndrome, ADHD, and physical and social factors (model 3), pain (OR, 4.4; 95% CI, 1.8–11.2) and bully victimisation (OR, 2.3; 95% CI, 1.0–5.3) were associated with depression and/or anxiety problems, but physical activity, sleep duration or participation in activities were not.

We performed an exploratory analysis to parse out the contribution of ASD and ADHD to depression and/or anxiety problems in children with ID. Adjusting for the same variables in model 3 and using children without ASD and without ADHD as the reference, the odds of depression and/or anxiety problems were increased in children with co-morbid ASD and ADHD (OR, 24.4; 95% CI, 7.5–79.2) but not among children with ASD only or ADHD only (*P* > 0.05). Using children with ASD only as the reference, the odds of depression and/or anxiety problems were increased in children with co-morbid

Table 2 Multivariable logistic regression model for the association between depression and/or anxiety problems with sociodemographic variables in children with intellectual disability (*n* = 405)

	OR (95% CI)
Age (years)	
6–11	Reference
12–17	1.3 (0.6, 2.9)
Sex	
Male	Reference
Female	0.6 (0.3, 1.2)
Race	
Non-Hispanic White	Reference
Non-Hispanic Black	0.6 (0.2, 1.9)
Hispanic	**0.3 (0.1, 0.8)**
Other	0.6 (0.2, 1.7)
Household poverty status (%)	
0–199	1.2 (0.5, 2.9)
200–399	1.2 (0.5, 3.1)
≥400	reference

CI, confidence interval; OR, odds ratio. Significant ORs are bolded.

Table 3 Multivariable logistic regression model for the association between depression and/or anxiety problems with severity of intellectual disability (ID) and co-morbid conditions in children with ID (*n* = 393)

	OR (95% CI)
Severity of ID	
Mild	Reference
Moderate or severe	0.7 (0.3, 1.6)
Autism spectrum disorders	
No	Reference
Yes	**3.9 (1.8, 8.4)**
Epilepsy	
No	Reference
Yes	0.9 (0.4, 2.4)
Cerebral palsy	
No	Reference
Yes	1.7 (0.6, 4.6)
Down syndrome	
No	Reference
Yes	**0.1 (0.1, 0.7)**
ADHD	
No	Reference
Yes	**5.2 (2.4, 11.3)**

ADHD, attention-deficit/hyperactivity disorder; CI, confidence interval; OR, odds ratio. The model is also adjusted for race. Significant odds ratios are bolded.

Table 4 Multivariable logistic regression model for the association between depression and/or anxiety problems with co-morbid conditions and physical and social factors in children with intellectual disability (*n* = 381)

	OR (95% CI)
Autism spectrum disorders	
No	Reference
Yes	**4.4 (1.9, 10.1)**
Down syndrome	
No	Reference
Yes	**0.2 (0.1, 0.8)**
ADHD	
No	Reference
Yes	**5.9 (2.5, 14.3)**
Physical activity ≥60 min (days)	
0	1.5 (0.5, 4.5)
1–3	1.8 (0.7, 4.7)
4–7	Reference
Sleeps age-appropriate hours	
Yes	Reference
No	1.8 (0.8, 4.3)
Pain	
No	Reference
Yes	**7.0 (2.9, 17.1)**
Participation in activities	
Yes	Reference
No	0.5 (0.2, 1.3)
Bully victimisation	
No	Reference
Yes	**2.3 (1.0, 5.3)**

ADHD, attention-deficit/hyperactivity disorder; CI, confidence interval; OR, odds ratio. The model is also adjusted for race. Significant odds ratios are bolded.

ASD and ADHD (OR, 10.8; 95% CI, 3.4–34.8) but not among children with ADHD only ($P > 0.05$). Using children with ADHD only as the reference, the odds of depression and/or anxiety problems were increased in children with co-morbid ASD and ADHD (OR, 8.2; 95% CI, 2.3–29.8). These results remained statistically significant ($P < 0.001$) after adjusting the *P*-value for multiple comparisons (adjusted *P*-value threshold = 0.017).

Discussion

The present investigation found that ASD, ADHD (especially co-morbid ASD and ADHD), pain and bully victimisation were each significantly associated with higher odds of depression and/or anxiety problems. Conversely, Hispanic race and Down syndrome were significantly associated with lower odds in children with ID. These findings add to the body of literature by identifying both treatable and modifiable, as well as unmodifiable, factors associated with adverse mental health disorders in children with ID.

Depression and anxiety problems in children with intellectual disabilities

The prevalence of depression and anxiety problems in children with ID in the current study [15.4% (95% CI: 9.0–21.8) and 33.9% (95% CI: 24.8–43.1), respectively] was higher compared with children without ID or other disabilities from our previous study using the same dataset, variables and procedures [2.7% (95% CI: 2.4–3.1) and 6.2% (95% CI: 5.5–6.8)] (Whitney *et al.* 2018). Moreover, our prevalence estimates of depression and anxiety problems fall within the range reported in previous studies in children with ID that were examined in a recent meta-analysis (Maiano *et al.* 2018).

Factors associated with depression and/or anxiety problems in children with intellectual disabilities

When we examined the association between depression and/or anxiety problems with sociodemographics, we found that Hispanic race was significantly associated with lower odds compared with non-Hispanic White children, which is consistent with another study in the general population of children (Carson *et al.* 2017). The racial disparity may be due to cultural factors or public health knowledge on health outcomes that may be confounded by language barriers, social status, geographical location, and so on. The intertwining of racial and disability health disparities requires further investigation. All other sociodemographic variables were not associated with depression and/or anxiety problems, which is consistent with previous reports in children with ID (Einfeld and Tonge 1996; Molteno *et al.* 2001).

When we examined the association between depression and/or anxiety problems with severity of ID and co-morbid conditions, we found that severity of ID was not associated, which is consistent with previous reports (Einfeld and Tonge 1996, Molteno *et al.* 2001). However, Maiano *et al.* (2018) recently

found that the severity of ID was related to depressive disorders, but not anxiety disorders in youth with ID. Because our dependent variable was combined depression and anxiety problems, we were not able to dissect these associations.

When examining the contribution of co-morbid conditions, we found that ASD and ADHD were each associated with higher odds, while Down syndrome was associated with lower odds of depression and/or anxiety problems in children with ID. These associations remained after adjusting for physical and social factors (Table 4). The finding of lower odds of mental health disorders in children with Down syndrome compared with other groups of children with ID is consistent with previous studies in this population (Dykens and Kasari 1997; Stores *et al.* 1998). However, prevalence of psychopathology in children with Down syndrome is still higher than the general population of children and was recently recommended to be considered a major topic in psychiatry for this population (Vicari *et al.* 2013). While it is well-documented that children with ID (Einfeld *et al.* 2011; Austin *et al.* 2018), ASD (Stewart *et al.* 2006; Simonoff *et al.* 2008; White *et al.* 2009) or ADHD (Lingineni *et al.* 2012) have higher prevalence of mental health disorders compared with the general population of children, the findings from our exploratory analysis help to identify the complexities of these issues. Specifically, children with ID who had co-morbid ASD and ADHD had significantly elevated odds of depression and/or anxiety problems when compared with the other groups of children with ID (no ASD or ADHD, ASD only and ADHD only). ASD and ADHD are themselves highly co-morbid and share common symptoms and risks, including social exclusion and behavioural problems. Children with both conditions are therefore at an increased risk for social and behavioural difficulties relative to children with either condition alone, and symptoms may yet be further compounded in individuals who also have ID, as suggested by our data. ASD and ADHD are thought to be associated with risk for mental health problems both because of underlying neurological factors as well as downstream interpersonal problems and lower community access (Schatz and Rostain 2006; Daviss 2008; Sterling *et al.* 2008). The additional layer of ID may also impact mental health by compounding social and functional risks. Future studies are warranted to disentangle

these unique associations and identify contributing factors among groups of ID and mental health.

When we examined the association between depression and/or anxiety with physical and social factors, we found that after adjusting for race, severity of ID and co-morbid conditions, pain and bully victimisation were significantly associated with higher odds, which is consistent with previous studies in children without ID (Reijntjes *et al.* 2010; Patrick *et al.* 2013; Bowes *et al.* 2014; Yamaguchi *et al.* 2014). We examined these sets of physical and social factors because they represent prevalent issues experienced by children with ID (Breau and Camfield 2011; Hinckson and Curtis 2013; Shields *et al.* 2014; Bassell *et al.* 2015; Woodmansee *et al.* 2016). In addition, these factors are associated with an increased risk for mental health disorders in the general population, including low physical activity (Gudmundsson *et al.* 2015), sleep disorders (Baglioni *et al.* 2011), pain (Gerrits *et al.* 2015) and bully victimisation (Reijntjes *et al.* 2010).

The lack of association between depression and/or anxiety problems with physical activity, sleep duration and participation in activities should be interpreted with caution. An inherent limitation to large population-based survey data, such as NSCH, is the lack of detail for variables. Physical activity was measured as the number of days of 60+ min of activity. This does not give information on the type, location, social aspects or intensity of physical activity, which may correlate differently with mental health functioning. Sleep duration is a quantitative measure of sleep, whereas sleep quality may be a better predictor of mental health functioning in children with neurodevelopmental disabilities (Romeo *et al.* 2014; Zuculo *et al.* 2014). Further, there is limited evidence to suggest that participation as a stand-alone measure may affect social integration in children with disabilities, because participation does not necessarily reflect inclusion or quality of social interactions (Thomas *et al.* 2008). Therefore, future studies with better measures of physical activity, sleep problems and participation in activities are required to adequately assess these associations.

Limitations

There are several additional limitations of this investigation that must be discussed. First, this study

was cross-sectional, and we are unable to determine causality or the direction of the association between associative factors and adverse mental health outcomes, as well as unmeasured confounding. Second, the definitions of depression and anxiety problems were broad. There can be a conflation of the emotions representing mental health disorders and the clinical diagnosis and implications of these disorders. Third, the NSCH survey methodology utilised parent/guardian proxy report with no validation of conditions (e.g. from medical records) or reliability assessment. The presence of outcome measures, factors and ID diagnosis may be subject to bias or misreporting. Adverse mental health symptoms are frequently attributed to an ID diagnosis rather than an indirect consequence of ID. Further, poor cognitive processing may make it difficult for children with IDs to recognise and communicate complex feelings and emotions. These factors increase risk of misreporting mental health disorders in this population. Fourth, we were unable to stratify or statistically adjust for geographic location or urban/rural location, which may influence many of the variables included in the present study.

Conclusions

This study identified both treatable and modifiable, as well as unmodifiable, factors associated with depression and/or anxiety problems in children with ID, including co-morbid ASD and ADHD, Down syndrome, pain and bully victimisation. Given the concerning prevalence and risk of depressive and anxiety disorders in this population, findings highlight the importance of screening for associative factors in addition to mental health symptoms. That said, there is a critical need to develop effective methods for conducting mental health screening in the population with ID (Mileviciute and Hartley 2015; Walton and Kerr 2016). Further, increasing clinician awareness and improving care coordination with mental health services for this population is required. Future studies are needed to develop accessible mental health interventions for children with ID. Clearly, accessible treatment or management of co-morbid disorders, particularly ASD and ADHD, and interventions aimed at reducing pain and bully victimisation appear to be particularly fruitful areas for exploration.

Conflict of interest

All authors declare no conflict of interest.

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