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## **Factors associated with depression and anxiety in children with intellectual disabilities**

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**Short running head:** Mental health in children with intellectual disabilities

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**Short running head:** Mental health in children with intellectual disabilities

## **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.

**Method:** 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, comorbid conditions (autism spectrum disorders [ASD], epilepsy, cerebral palsy, Down syndrome, and attention-deficit hyperactivity disorder [ADHD]), physical factors (i.e., physical activity, sleep duration, and pain), and social factors (e.g., participation in activities and bully victimization). 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, comorbid conditions, and physical and social factors, ASD (OR, 4.4; 95% CI, 1.1-10.1), Down syndrome (OR, 0.2; 95% CI, 0.1-0.8), ADHD (OR, 5.9; 95% CI, 2.5-14.3), pain (OR, 7.0; 95%

CI, 2.9-17.1), and bully victimization (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 or modifiable, as well as unmodifiable factors associated with depression and/or anxiety problems in children with ID.

**Key words:** children, intellectual disabilities, depression, anxiety, factors

## **Introduction**

Mental health disorders are a growing global public health issue (Global Burden of Disease Pediatrics et al., 2016, Murray et al., 2012) 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 million and 4 million U.S. children, respectively (Global Burden of Disease Pediatrics et al., 2016). Importantly, depression or anxiety disorders in childhood are strongly associated with increased risk of mental health disorders into and throughout adulthood (Pine et al., 1998).

Intellectual disabilities (ID), characterized by impaired intellectual and adaptive functioning, are common neurodevelopmental disabilities in the U.S. with approximately 12 children per 1,000 (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) due to a variety of physical and social factors affecting independent functioning, societal integration, and transitioning from adolescence to adulthood (Hinckson and Curtis, 2013, Bassell et al., 2015, Breau and Camfield, 2011, Woodmansee et al., 2016, Shields et al., 2014, Austin et al., 2018). These specifically include lower access to community resources, lower rates of employment, and fewer social connections (Schatz and Rostain, 2006, Sterling et al., 2008, Daviss, 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 comorbid 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 comorbid 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 (Yasuda et al., 2016, Tordjman et al., 2009) due to 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 to 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 U.S. 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, comorbid 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- and national-level data on demographic and health characteristics of American children 0-17 years of age, their families, and their communities. The survey utilized 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 to 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 (2017). Since 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 U.S. 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 comorbid and are the leading mental-health related pediatric 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. Since 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 ID and comorbid conditions*

The severity of ID was determined by the respondent's subjective report as "mild" or "moderate or severe". Presence of a current reported comorbid 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+ minutes. The NSCH stratified physical activity participation categories as 0 days, 1-3 days, 4-6 days, 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 utilized a guideline developed by the American Academy of Sleep Medicine, which recommends children 6-12 years should sleep 9-12 hours per 24 hours, and children 13-18 years should sleep 8-10 hours per 24 hours (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 victimization. A dichotomous variable for participation in activities was determined if the child participated in one or more extracurricular organized activities or lessons after school or on the weekends in the past 12 months. Activities included sports teams or lessons, clubs or organizations, and any other organized activities or lessons. A dichotomous variable for bully victimization 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 victimization if the respondent answered “definitely true” or “somewhat true”. The child was considered to not have experienced bully victimization 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 U.S. 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 2-sided confidence intervals (CI). 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 comorbid conditions. After this step, if severity of ID or comorbid 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 comorbidity 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

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 (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 comorbid conditions. After adjusting for race, severity of ID, and comorbid 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 comorbid 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 victimization (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 comorbid 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 comorbid 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 comorbid 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 comorbid ASD and ADHD), pain, and bully victimization 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 or modifiable, as well as unmodifiable, factors associated with adverse mental health disorders in children with ID.

### *Depression and anxiety problems in children with ID*

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 to 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 ID*

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 to 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, etc. 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 comorbid 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. Since our dependent variable was combined depression and anxiety problems, we were not able to dissect these associations.

When examining the contribution of comorbid 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 to 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, White et al., 2009, Simonoff et al., 2008), or ADHD (Linginini et al., 2012) have higher prevalence of mental health disorders compared to 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 comorbid ASD and ADHD had significantly elevated odds of depression and/or anxiety problems when compared to the other groups of children with ID (no ASD or ADHD, ASD only, and ADHD only). ASD and ADHD are themselves highly comorbid and share common symptoms and risks, including social exclusion and behavioral problems. Children with both conditions are therefore at an increased risk for social and behavioral 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 due to underlying neurological factors as well as downstream interpersonal problems and lower community access (Schatz and Rostain, 2006, Sterling et al., 2008, Daviss, 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 comorbid conditions, pain and bully victimization were significantly associated with higher odds, which is consistent with previous studies in children without ID (Yamaguchi et al., 2014, Bowes et al., 2014, Reijntjes et al., 2010, Patrick et al., 2013). We examined these sets of physical and social factors because they represent prevalent issues experienced by children with ID (Hinckson and Curtis,



2013, Bassell et al., 2015, Breau and Camfield, 2011, Woodmansee et al., 2016, Shields et al., 2014). 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 victimization (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+ minutes 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 (Zuculo et al., 2014, Romeo 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 utilized 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 or modifiable, and unmodifiable factors associated with depression and/or anxiety problems in children with ID, including comorbid ASD and ADHD, Down syndrome, pain, and bully victimization. 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 comorbid disorders, particularly ASD and ADHD, and interventions aimed at reducing pain and bully victimization appear to be particularly fruitful areas for exploration.

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

	% (95% CI)
<b>Outcome measures</b>	
Depression	15.4 (9.0, 21.8)
Anxiety problems	33.9 (24.8, 43.1)
<b>Sociodemographic variables</b>	
Age	
6-11 years	37.7 (27.7, 47.7)
12-17 years	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)
<b>Severity of ID and comorbid conditions</b>	
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)
<b>Physical and social factor variables</b>	
Physical activity ≥60 minutes	
0 days	31.6 (19.8, 43.3)

1-3 days	35.6 (25.2, 45.9)
4-7 days	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 victimization	59.1 (48.8, 69.4)

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

**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	
6-11 years	reference
12-17 years	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	<b>0.3 (0.1, 0.8)</b>
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

OR, odds ratio; CI, confidence interval. 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 comorbid 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	<b>3.9 (1.8, 8.4)</b>
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	<b>0.1 (0.1, 0.7)</b>
ADHD	
No	reference
Yes	<b>5.2 (2.4, 11.3)</b>

OR, odds ratio; CI, confidence interval; ADHD, attention-deficit/hyperactivity disorder. 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 comorbid conditions and physical and social factors in children with intellectual disability (n=381).

	OR (95% CI)
Autism spectrum disorders	
No	reference
Yes	<b>4.4 (1.9, 10.1)</b>
Down syndrome	
No	reference
Yes	<b>0.2 (0.1, 0.8)</b>
ADHD	
No	reference
Yes	<b>5.9 (2.5, 14.3)</b>
Physical activity $\geq 60$ minutes	
0 days	1.5 (0.5, 4.5)
1-3 days	1.8 (0.7, 4.7)
4-7 days	reference

Sleeps age-appropriate hours	
Yes	reference
No	1.8 (0.8, 4.3)
Pain	
No	reference
Yes	<b>7.0 (2.9, 17.1)</b>
Participation in activities	
Yes	reference
No	0.5 (0.2, 1.3)
Bully victimization	
No	reference
Yes	<b>2.3 (1.0, 5.3)</b>

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