


Psychiatric comorbidity of eating disorders in children between the ages of 9 and 10

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Background: Eating disorders exhibit high comorbidity with other psychiatric disorders, most notably mood, substance use, and anxiety disorders. However, most studies examining psychiatric comorbidity are conducted in adolescents and adults. Therefore, the comorbidity among children living with eating disorders is unknown. The aim of this study was to characterize co-occurring psychiatric disorders with eating disorders in a US sample of children aged 9–10 years old utilizing the Adolescent Brain Cognitive Development study. **Methods:** The analytic sample included 11,718 children aged 9–10 years. Anorexia nervosa, bulimia nervosa, binge eating disorder, and other specified feeding and eating disorder subtype diagnoses were examined. Statistical analyses were conducted using complex sampling. Odds ratios and 95% confidence intervals were calculated comparing the likelihood of being diagnosed for a psychiatric disorder when having an eating disorder, as compared to children without an eating disorder, children diagnosed with major depressive disorder, and children diagnosed with posttraumatic stress disorder using binary logistic regression. **Results:** Co-occurring psychiatric disorders were substantially higher in children with eating disorders as compared to children without eating disorders, but not as compared to children diagnosed with major depressive disorder or posttraumatic stress disorder. The most common comorbidities for the eating disorder group were anxiety disorders (71.4%), attention deficit/hyperactivity disorder (47.9%), disruptive/impulse control disorders (45.0%), mood disorders (29.6%), and obsessive-compulsive disorder (28.8%), largely in line with previous research. **Conclusions:** This study extends prior research finding high rates of comorbidity in eating disorders, specifically with anxiety, mood, and disruptive/impulse control disorders. Clinicians assessing for psychiatric disorders should be aware that eating disorders can occur in children 9 and 10 years old and are associated with severe comorbidity. Referrals for specialty mental health care should be considered. **Keywords:** Eating disorder; anorexia nervosa; bulimia nervosa; binge eating.

Introduction

Eating disorders have the highest mortality rate of all psychiatric illnesses, including both medical complications and death by suicide (Arcelus, Mitchell, Wales, & Nielsen, 2011). Eating disorder treatment is often complicated by comorbidity with other psychiatric disorders, as approximately 87%–94% of adults with a lifetime diagnosis of an eating disorder also meet criteria for another lifetime mental disorder (Udo & Grilo, 2019). The most common comorbid diagnoses in adults include mood, substance use, and anxiety disorders (Udo & Grilo, 2019). Among adults with a lifetime diagnosis of an eating disorder, 54%–79% met criteria for a mood disorder, 40%–59% met criteria for an anxiety disorder, and 60%–67% met criteria for a substance use disorder (Udo & Grilo, 2019).

While there are many studies that examine psychiatric correlates in adolescents and adults, comorbidity in children younger than 12 is relatively understudied. Previous studies of comorbidity in mixed samples of adolescents and children found similar patterns to that of adults such that mood and anxiety disorders are the most consistently found comorbidities (Jaite, Hoffmann, Glaeske, & Bachmann, 2013; Mammen, Russell, & Russell, 2007;

Mohammadi et al., 2020; Tsai et al., 2018). However, these studies examined adolescents and children together, precluding any conclusions about comorbidity in children younger than 12 as compared to older adolescents (Nicholls & Bryant-Waugh, 2009). Furthermore, most of these studies were published using criteria from older diagnostic manuals (e.g., Diagnostic and Statistical Manual of Mental Disorders, 4th edition); thus, comorbidity in children utilizing the most current criteria is unknown. For eating disorders, assessment with updated criteria is especially important given that binge eating disorder (BED) is a new disorder in the Diagnostic and Statistical Manual of Mental Disorders, 5th edition (DSM-5; American Psychiatric Association, 2013). Therefore, it remains unknown what comorbidity children with eating disorders may exhibit, especially considering BED. The aim of this study was to characterize co-occurring psychiatric disorders with eating disorders in a US sample of children aged 9 and 10 years old utilizing the Adolescent Brain Cognitive Development (ABCD) study (Volkow et al., 2018). As an additional exploratory analysis, rates of comorbidity in eating disorders were compared to rates observed with two other psychiatric disorders in the sample with similar prevalence: major depressive disorder (MDD) and posttraumatic stress disorder (PTSD).

Conflict of interest statement: No conflicts declared.

Methods

Sample

The analytic sample included 11,718 children aged 9–10 years who participated in the baseline visit of the ABCD study (Volkow et al., 2018). The ABCD study is a multisite study examining brain and cognitive development over the course of development. Children were primarily recruited for the study through school systems based on a multistage probability sample of eligible children designed to recruit a sample that largely matches the US population based on age, gender, race and ethnicity, socioeconomic status, and urbanicity (Garavan et al., 2018). Inclusion criteria were (a) being in the required age range of recruitment (i.e., 9 or 10 years old) and (b) ability to provide informed consent from the parent/guardian and assent from the child (Garavan et al., 2018). Exclusion criteria were (a) lack of English language proficiency on the part of the child; (b) lack of English or Spanish language proficiency on the part of their parent/guardian; (c) sensory, intellectual, medical, or neurological issues that would interfere with the quality of data or the child's ability to participate; and (d) contradictions to MRI scanning (Garavan et al., 2018). This study examines the full baseline dataset (ABCD Release 2.0.1; Jernigan et al., 2019).

Ethical considerations

Written consent for this study was obtained from the parent or guardian and assent was obtained from child subjects (Garavan et al., 2018). Ethics approval was obtained through the designated central Institutional Review Board at University of California San Diego, and some sites also obtained local approval (Auchter et al., 2018).

Measures

The computerized, self-administered parent/guardian version of the Kiddie Schedule for Affective Disorders and Schizophrenia (KSADS-5) was used to determine psychiatric diagnoses (Barch et al., 2018). Although specific data on concordance between clinician-rated and parent/guardian self-administered versions of the KSADS-5 for eating disorders are not available, prior research findings suggest that there is a 76%–94% diagnostic agreement between these versions for other psychiatric diagnoses (Townsend et al., 2020). Three full syndrome eating disorder diagnoses [i.e., anorexia nervosa (AN), bulimia nervosa (BN), and BED] and two other specified feeding and eating disorder (OSFED) subtype diagnoses (i.e., OSFED BN, and OSFED BED) were examined. In addition, omnibus 'any OSFED' and 'any eating disorder' categories were created. Finally, in cases where children met criteria for more than one eating disorder in their lifetime ($n = 3$), current disorder was used to classify cases. If there was no current disorder, cases were classified in the well-established eating disorder hierarchy based on the DSM-5 criteria (American Psychiatric Association, 2013) and prior literature (i.e., past BN excluded those with past AN; past BED excluded those with past AN or BN; past OSFED BN excluded those with past AN, BN, or BED; and past OSFED BED excluded those with past AN, BN, BED, or OSFED BN; Udo & Grilo, 2019).

Statistical analysis

Statistical analyses were conducted using the IBM SPSS software (Version 25; IBM Corp., 2017) using complex sampling. The complex sampling plan used recruitment site as the cluster variable and a propensity score as the sample weight that was included in ABCD Release 2.0.1 (Heeringa & Berglund, 2020). The propensity score matched key sociodemographic

variables in ABCD (i.e., children's age, birth sex, race/ethnicity, household family income, family type, household size, parents' work force status, and census region) to the American Community Survey, a large probability sample of US households. Therefore, while the ABCD study is not designed to be fully representative of the US population, results are roughly matched to the US population of children aged 9–10 on the aforementioned sociodemographic variables through complex sampling analyses. The results below are based on the sample weighed using the above procedures. Odds ratios and 95% confidence intervals were calculated using binary logistic regression comparing the rates of comorbid disorders for children diagnosed with eating disorder as compared to children without an eating disorder, children with MDD, and children with PTSD. MDD and PTSD were selected because children in the current sample demonstrated similar rates of eating disorders as compared to the selected disorders.

Results

The prevalence of AN, BN, and BED was 0.1%, 0.1%, and 0.8%, respectively. The prevalence of OSFED BN was 0.1% and OSFED BED was 0.6%. In the overall sample, 1.6% was diagnosed with any eating disorder, including children diagnosed with OSFED. Sociodemographic characteristics including race, ethnicity, total parent/caregiver income, and highest education achieved by parent or caregiver are presented in Table 1. Lifetime prevalence rates of comorbid psychiatric disorders by eating disorder diagnosis status are presented in Table 2. Co-occurring psychiatric disorders were substantially higher in children with eating disorders as compared to children without an eating disorder. Table 3 presents odds ratios for psychiatric disorders by eating disorder status. Children with an eating disorder demonstrated higher odds of having each psychiatric disorder examined as compared to children with no diagnosis. There were largely nonsignificant differences in the odds of comorbidity between children with an eating disorder and the clinical comparisons (MDD and PTSD). Children with eating disorders demonstrated higher odds of bipolar disorder and lower odds of suicidal ideation and non-suicidal self-injury as compared to the MDD control group. Children with eating disorders demonstrated lower odds of separation anxiety disorder, generalized anxiety disorder, disruptive/impulse control disorders, attention deficit/hyperactivity disorder (ADHD), and nonsuicidal self-injury as compared to children diagnosed with PTSD. However, the differences in odds noted above are of small effect sizes, except the higher odds ratio observed for children with eating disorders being diagnosed with bipolar disorder, as compared to the MDD control group.

Discussion

Overall, high rates of comorbidity were observed in this study such that 91.8% of children with an eating disorder were also diagnosed with another psychiatric disorder, a similar finding to previous studies in

Table 1 Sociodemographic prevalence [% (*SE*)] in the sample and in the eating disorder group^a

Sociodemographic characteristic	Overall sample	Any ED
Sex assigned at birth		
Male	51.1 (0.4)	55.4 (3.8)
Female	48.8 (0.4)	44.6 (3.8)
Other	0.2 (0.0)	0
Race ^b		
White	72.6 (2.9)	68.9 (6.3)
Black/African American	18.1 (2.8)	26.2 (7.2)
Native American, Alaska Native, and Native Hawaiian	3.3 (1.3)	2.9 (1.4)
Pacific Islander	0.4 (0.2)	0.3 (0.3)
Asian	5.6 (1.1)	3.9 (1.7)
Other	7.5 (1.5)	14.0 (3.2)
Ethnicity		
Hispanic/Latino/Latina	24.2 (6.2)	41.5 (9.2)
Not Hispanic/Latino/Latina	75.8 (6.2)	58.5 (9.2)
Highest Parent or Caregiver Education Level		
Less than High School	6.1 (1.3)	6.8 (2.6)
High School Diploma or GED	11.2 (1.0)	17.6 (3.6)
Some College or Associate Degree	29.7 (1.9)	43.2 (3.6)
Bachelor's Degree	24.0 (1.6)	18.5 (4.3)
Graduate Degree	29.0 (2.3)	13.9 (2.8)
Total parent or caregiver income		
Less than \$12,000	9.1 (1.2)	19.5 (3.8)
\$12,000 through \$24,999	9.6 (1.3)	15.1 (2.6)
\$25,000 through \$49,999	20.4 (1.7)	26.3 (5.4)
\$50,000 through \$99,999	30.9 (1.4)	24.9 (4.1)
\$100,000 and greater	30.0 (3.1)	14.2 (3.0)

ED, eating disorder; *SE*, standard error.

^aAll analyses adjusted for complex survey design of Adolescent Brain Cognitive Development study.

^bRespondents could identify more than one race for their child.

adults and adolescents (Ulfvebrand, Birgegård, Norring, Högdahl, & von Hausswolff-Juhlin, 2015). The most common comorbid diagnoses for the eating disorder group in this study were specific phobia (56.4%), ADHD (47.9%), oppositional defiant disorder (ODD; 43.3%), separation anxiety disorder (30.4%), and obsessive-compulsive disorder (OCD; 28.8%). Overall, 71.4% of individuals with an eating disorder were also diagnosed with an anxiety disorder, 45.0% were also diagnosed with a disruptive/impulse control disorder, and 29.6% were also diagnosed with a mood disorder. When considering comorbidity within specific diagnoses of an eating disorder, the overall pattern remained similar. The most common diagnoses were generalized anxiety disorder (51.3%) in AN, OCD (65.4%) in BN, specific phobia (59.7%) in BED, ADHD (58.3%) in OSFED BN, and specific phobia (56.2%) in OSFED BED. Therefore, this study extends prior research finding high rates of comorbidity in eating disorders, though not necessarily higher than other psychiatric disorders such as MDD and PTSD.

This study found that rates of comorbidity are comparable among eating disorders and the psychiatric control groups, with the few observed differences being of small effect size. This is perhaps not

surprising in light of the notable comorbidity found in most psychiatric disorders. Nationally representative studies in adolescents have found that 40% of cases with any psychiatric diagnosis were diagnosed with another mental health condition (Merikangas et al., 2010). In particular, previous research has found that 63.7% of MDD cases (Avenevoli, Swendsen, He, Burstein, & Merikangas, 2015) and approximately 75% of PTSD cases (Kilpatrick et al., 2003) in adolescents are diagnosed with another mental health condition. Thus, children diagnosed with an eating disorder are very likely to also experience comorbid psychopathology; however, this comorbidity may not be substantially dissimilar to that found in other disorders (e.g., MDD and PTSD) within this age cohort.

The psychiatric comorbidity in this study is similar to previous findings in combined samples of children and adolescents (Jaite et al., 2013; Mohammadi et al., 2020) such that individuals with eating disorders demonstrate greater odds of psychiatric disorders as compared to their peers without eating disorders. Specifically, a recent nationally representative sample in Iran found that the most common comorbid disorders among children and adolescents with eating disorders were OCD, agoraphobia, MDD, ODD, and social phobia. Furthermore, a German sample of children and adolescents in outpatient treatment for AN and BN found the most common comorbid disorders to be MDD, somatoform disorders, anxiety disorders, and OCD, but noted that diagnoses of somatoform disorders and anxiety disorders increased with age. This study could not examine somatic symptom disorders because it was not assessed in ABCD, but findings are largely in line with the German sample. A notable difference in the current study as compared to prior studies was the prevalence of specific phobia in the overall sample, as well as within the eating disorder sample. Given that prior studies of psychopathology in youth ages 13–14 estimate lifetime prevalence of about 21% and decrease with age (Merikangas et al., 2010), the current findings may be reflective of developmental changes over time. Therefore, findings are largely in line with previous reports of comorbidity in child and adolescent mixed samples.

When comparing the current findings to previous research in adults, there were some notable differences in diagnosis. Specifically, a prior study in adults noted high rates of persistent depressive disorder, alcohol use disorder, and borderline personality disorder (Udo & Grilo, 2019), which were not examined in this study. This study did not examine diagnoses of personality disorders because they were not assessed in ABCD and are not applicable to children. Further, this study did not examine substance use disorder ($n = 11$) or persistent depressive disorder ($n = 17$) due to small number of cases. Since these disorders are most typically diagnosed in adolescence or adulthood, this difference in observed

Table 2 Lifetime prevalence [% (SE)] of Comorbid DSM-5 Psychiatric Disorders Across Eating Disorder and No Eating Disorder Groups^a

	AN	BN	BED	OSFED BN	OSFED BED	Any OSFED	Any ED	No ED	MDD	PTSD
Unweighted count (n)	11	6	87	16	60	76	180	11,538	318	231
Population estimate (n)	8,160	4,352	63,486	10,235	46,414	56,649	132,647	7,955,293	240,397	179,633
Any anxiety disorder	84.0 (10.8)	48.3 (26.1)	73.4 (5.0)	54.5 (17.5)	72.0 (5.5)	69.1 (5.7)	71.4 (3.2)	33.6 (0.8)	75.2 (3.3)	81.7 (2.8)
Panic disorder	0	19.4 (17.6)	1.9 (1.5)	3.4 (3.3)	2.7 (2.2)	2.8 (1.9)	2.8 (1.4)	0.2 (0.0)	4.1 (1.0)	3.6 (1.4)
Separation anxiety disorder	50.2 (21.0)	0	35.8 (6.6)	17.6 (10.0)	25.2 (5.9)	23.8 (4.7)	30.4 (4.3)	8.9 (0.5)	37.2 (2.7)	52.0 (5.3)
Social anxiety disorder	0	8.4 (7.6)	14.8 (4.7)	3.0 (3.0)	9.4 (4.8)	8.3 (4.1)	10.9 (2.4)	4.6 (0.3)	17.7 (2.2)	17.0 (2.3)
Specific phobia	49.5 (15.0)	48.3 (26.1)	59.7 (5.7)	45.2 (15.0)	56.2 (7.0)	54.4 (6.6)	56.4 (4.2)	27.1 (0.7)	54.9 (3.6)	60.3 (2.6)
Generalized anxiety disorder	51.3 (15.1)	19.4 (17.6)	19.2 (4.8)	7.5 (7.4)	17.6 (5.0)	15.7 (4.2)	19.7 (2.6)	4.3 (0.4)	27.4 (3.2)	32.0 (3.3)
Any mood disorder	32.1 (17.6)	52.0 (25.7)	36.8 (7.0)	14.9 (8.4)	20.6 (6.1)	19.6 (5.0)	29.6 (3.6)	6.3 (0.4)	N/A	39.1 (4.1)
MDD	32.1 (17.6)	8.4 (7.6)	22.6 (7.5)	14.9 (8.4)	6.2 (4.2)	7.8 (3.7)	16.4 (3.3)	2.8 (0.2)	N/A	18.4 (3.7)
Bipolar disorder	0	43.6 (22.1)	16.9 (3.3)	0	14.4 (5.0)	11.8 (4.2)	14.6 (2.5)	3.7 (0.3)	6.0 (1.7)	23.6 (3.8)
Any disruptive/impulse control disorder	32.8 (20.1)	54.0 (21.6)	50.9 (4.6)	31.1 (12.5)	41.0 (5.6)	39.4 (4.4)	45.0 (3.2)	15.1 (1.0)	45.3 (4.7)	59.8 (3.9)
ODD	32.8 (20.1)	54.0 (21.6)	49.2 (5.3)	25.2 (12.4)	39.6 (5.4)	37.2 (4.3)	43.3 (3.0)	13.9 (0.9)	41.3 (4.1)	56.6 (4.3)
Conduct disorder	0	14.0 (15.1)	11.0 (2.6)	10.9 (7.0)	6.3 (3.5)	7.1 (3.3)	8.8 (2.2)	3.3 (0.4)	12.2 (3.1)	17.8 (2.6)
OCD	21.7 (15.5)	65.4 (23.7)	23.8 (3.7)	53.5 (13.4)	28.7 (7.0)	32.8 (6.9)	28.8 (3.9)	9.5 (0.5)	32.9 (2.8)	36.8 (6.4)
ADHD	44.9 (18.4)	58.9 (25.8)	53.4 (7.0)	58.3 (17.3)	37.8 (7.1)	41.2 (6.7)	47.9 (5.1)	20.9 (0.8)	52.5 (4.5)	63.0 (3.7)
PTSD	15.2 (15.0)	13.4 (14.6)	11.5 (3.3)	19.7 (11.0)	6.2 (3.9)	8.4 (3.7)	10.5 (3.1)	2.1 (0.2)	13.8 (2.6)	N/A
Suicidal ideation	37.5 (16.8)	0	16.4 (3.9)	4.6 (3.2)	8.5 (4.5)	7.8 (3.6)	13.5 (2.8)	3.7 (0.2)	25.8 (2.1)	18.1 (3.7)
Nonsuicidal self-injury	34.3 (16.4)	0	13.8 (4.4)	8.5 (7.2)	3.4 (2.5)	4.4 (2.4)	10.6 (3.0)	4.0 (0.2)	19.6 (2.8)	23.2 (2.9)
Any disorder	91.2 (5.6)	100 (0)	93.1 (2.3)	83.8 (15.1)	91.0 (4.2)	89.8 (4.2)	91.8 (2.0)	49.3 (1.0)	90.2 (2.6)	94.6 (1.5)

Abbreviations: AN, anorexia nervosa; BED, binge-eating disorder; BN, bulimia nervosa; ED, eating disorder; MDD, major depressive disorder; OSFED, other specified feeding and eating disorder; PTSD, posttraumatic stress disorder; SE, standard error.

^aAll analyses adjusted for complex survey design of ABCD study.

Table 3 Odds [OR (95% CI)] of DSM-5 Psychiatric Disorder Diagnosis if Diagnosed with an eating disorder^a

	No eating disorder diagnosis control group	MDD control group	PTSD control group
Any anxiety disorder	4.94 (3.41, 7.15)***	0.87 (0.54, 1.42)	0.60 (0.34, 1.08)
Panic disorder	12.98 (4.38, 38.46)***	0.69 (0.21, 2.23)	0.86 (0.21, 3.55)
Separation anxiety disorder	4.47 (2.85, 7.02)***	0.80 (0.51, 1.26)	0.42 (0.20, 0.90)*
Social anxiety disorder	2.55 (1.55, 4.20)***	0.53 (0.28, 1.03)	0.62 (0.31, 1.25)
Specific phobia	3.49 (2.39, 5.10)***	1.12 (0.81, 1.53)	0.93 (0.60, 1.45)
Generalized anxiety disorder	5.44 (3.91, 7.58)***	0.67 (0.42, 1.07)	0.54 (0.31, 0.94)*
Any mood disorder	6.25 (4.28, 9.14)***	N/A	0.71 (0.47, 1.07)
MDD	6.94 (3.98, 12.07)***	N/A	1.02 (0.53, 1.98)
Bipolar disorder	4.40 (3.06, 6.32)***	2.76 (1.19, 6.40)*	0.56 (0.29, 1.08)
Any disruptive/impulse control disorder	4.62 (3.67, 5.82)***	0.98 (0.64, 1.51)	0.58 (0.37, 0.90)*
ODD	4.75 (3.75, 6.00)***	1.09 (0.74, 1.62)	0.61 (0.37, 0.99)*
Conduct disorder	2.83 (1.56, 5.11)**	0.65 (0.30, 1.40)	0.47 (0.26, 0.82)*
OCD	3.85 (2.48, 5.97)***	0.84 (0.52, 1.35)	0.77 (0.36, 1.66)
ADHD	3.47 (2.28, 5.31)***	0.89 (0.46, 1.71)	0.55 (0.37, 0.84)**
PTSD	5.48 (2.72, 11.03)***	0.84 (0.33, 2.14)	N/A
Suicidal ideation	4.10 (2.68, 6.28)***	0.47 (0.30, 0.73)**	0.83 (0.47, 1.46)
Nonsuicidal self-injury	2.87 (1.51, 5.49)**	0.50 (0.26, 0.98)*	0.42 (0.22, 0.79)**
Any disorder	11.56 (6.57, 20.35)***	1.09 (0.53, 2.23)	1.74 (0.76, 4.02)

Abbreviations: AOR, adjusted odds ratio; CI, confidence interval; major depressive disorder; MDD; OR, odds ratio; PTSD, posttraumatic stress disorder.

*** $p < .001$; ** $p < .01$; * $p < .05$.

^aAll analyses adjusted for complex survey design of Adolescent Brain Cognitive Development study.

diagnoses may be reflective of developmental trends in diagnosis rather than specific differences in eating disorder comorbidity based on age. Since the ABCD study intends to collect data on these children through young adulthood, future research may consider examining how comorbidity in children with eating disorders unfolds over time.

There were notable demographic differences between the eating disorder sample and the general sample. The eating disorder sample was primarily male, with a slightly lower percentage of White and non-Hispanic/Latino/Latina cases, as compared to the general sample. Furthermore, the eating disorder sample appears to have less parental education and lower income as compared to the general sample. While not tested for significance in this study, this demographic profile differs in some ways from previous findings in adults and adolescents. Specifically, prior research has found that eating disorder cases are typically female dominated (Hudson, Hiripi, Pope, & Kessler, 2007; Swanson, Crow, Le Grange, Swendsen, & Merikangas, 2011), and Hispanic/Latino/Latina individuals demonstrate largely comparable rates of eating disorders as compared to non-Hispanic White individuals (Perez, Ohrt, & Hoek, 2016). A potential explanation for the observed demographic differences may be that the KSADS-5 was administered via computer, which may have alleviated some of the demonstrated bias against diagnosing individuals who are racial/ethnic minorities, those from socioeconomically disadvantaged backgrounds, and males (Sonnevill & Lipson, 2018). Another possibility is that the observed differences may be the result of diagnostic inaccuracies in the KSADS-5. Alternatively, the current

findings may reflect demographic differences associated with eating disorders in children as compared to adults and adolescents. Given that this study did not statistically test these differences, as well as limitations with the assessment of eating disorders, these results should be considered tentative until confirmed in future studies of eating disorders in children.

Of specific concern, odds of suicidal ideation and nonsuicidal self-injury rates among children with eating disorders were approximately four and three times greater, respectively, than their undiagnosed peers. Suicidal ideation was significantly greater in children with eating disorders than those without eating disorder diagnoses. This suggests that suicidality spectrum behaviors may begin early in diagnosis. While suicide attempts were low in this study ($n = 39$), prior studies of individuals with eating disorders have indicated elevated risk as compared to their undiagnosed peers (Udo, Bitley, & Grilo, 2019). Furthermore, given the role that suicidal ideation and nonsuicidal self-injury play in later suicide attempts (Pérez, Ros, Folgado, & Marco, 2019; Ribeiro et al., 2016), the current findings may connote risk of escalating suicidal behavior later in life.

Limitations

This study has limitations that should be noted. First, diagnoses were constructed from the computerized, parent self-report version of the KSADS-5. Initial validity research has indicated that this version of the KSADS-5 demonstrates 76%–94% diagnostic agreement with the clinician-rated KSADS-5

for other psychiatric diagnoses (Townsend et al., 2020); however, data on concordance for eating disorder diagnoses have yet to be published. Thus, future research should examine the psychometric properties of the computerized KSADS-5 eating disorder diagnoses specifically. Also, while previous research has found acceptable parent-child agreement for BED in the KSADS-5 (de la Peña et al., 2018), other studies have found poor agreement between children and parent report using other assessment methods of eating disorder symptoms (Mariano, Watson, Leach, McCormack, & Forbes, 2013). This may be due, in part, to secrecy being a well-documented facet of eating pathology (Kass et al., 2017) and, indeed inherent to diagnostic standards for binge eating (American Psychiatric Association, 2013). While there is no evidence that eating disorders are more prone to underreporting than other forms of psychiatric illness, the possibility does exist that the secrecy inherent in eating disorders may lead to increased underreporting. This study followed recommended guidelines of prioritizing parent report in children aged 10 and younger (Mariano et al., 2013), but future studies should examine the parent-child agreement on the KSADS-5 for discrepancies and how best to integrate discrepant symptom reports, a significant and ongoing concern in the field of child psychiatry (De Los Reyes et al., 2015). Second, two significant eating disorder diagnoses were not examined in this study: OSFED AN and Avoidant/Restrictive Food Intake Disorder (ARFID). While a serious psychiatric disorder that is associated with the same health risks as AN (Sawyer, Whitelaw, Le Grange, Yeo, & Hughes, 2016), OSFED AN was not examined because the computerized KSADS-5 diagnosed OSFED AN solely due to low weight. Given that the DSM-5 requires all criteria of AN to be met, but the individual must be in the normal weight range despite significant weight loss (American Psychiatric Association, 2013), the diagnoses provided by the computerized KSADS-5 do not fully match the DSM-5, and thus, were not examined in this study. Furthermore, ARFID was not examined in this study because it was not assessed in the ABCD study. Given that ARFID cases tend to be younger than AN, BN, BED, and OSFED cases (Nicely, Lane-Loney, Masciulli, Hollenbeak, & Ornstein, 2014), the prevalence of ARFID may be higher in the 9–10 year old age group than other eating disorders. An important future direction for research would be to examine prevalence and comorbidity in a large US nationally representative sample since prevalence rates of ARFID in US children are sorely lacking. Of note, previous research on children and adolescents with ARFID has found similar patterns of comorbidity noted in this study (Kambanis et al., 2020). Third and finally, this study was unable to account for diagnostic symptom onset and offset sufficiently because this information was not

collected in ABCD. Future research would benefit from collecting information about timing of symptoms since symptoms often overlap among psychiatric disorders.

Conclusion

Clinicians assessing for psychiatric disorders should be aware that eating disorders can occur in children 9 and 10 years old. Medical practitioners may consider use of screening tools such as the Eating Disorder Examination-Questionnaire adapted for children (Kliem et al., 2017) or the children's version of the Eating Attitude Test (Maloney, McGuire, & Daniels, 1988), both of which have been psychometrically validated in children as young as eight. Guidance for clinicians typically emphasizes that eating disorders often onset in adolescence and young adulthood (Sim et al., 2010), which may lead to underdiagnosis of preadolescent cases of eating disorders. Given that earlier connection to treatment has been associated with better long-term outcomes (Andrés-Pepiñá et al., 2020; Fukutomi et al., 2020), accurate and early assessment for eating disorders is of paramount importance. Furthermore, even at a young age, eating disorders are associated with severe comorbidity, which may complicate treatment efforts. Clinicians should consider referrals for specialty mental health care especially as research on the efficacy of primary care-based interventions for pediatric eating disorders is in its infancy (Lenton-Brym, Rodrigues, Johnson, Couturier, & Toulany, 2020).

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Key points

- Studies of eating disorders in adults and adolescents have found significant comorbidity, most commonly mood, substance use, and anxiety disorders. However, comorbidity in children under the age of 12 is comparatively understudied.
- Children with eating disorders demonstrate higher odds of all comorbid disorders. The most common diagnoses were specific phobia, ADHD, ODD, separation anxiety disorder, and OCD.
- Previous studies in adults found high comorbidity with persistent depressive disorder, alcohol use disorder, and borderline personality disorder, but these diagnoses were rare in the current sample. This may reflect developmental trends in diagnosis rather than differences specific to eating disorders.
- Clinicians should be aware that eating disorders do develop in children aged 9 and 10 and are already associated with significant comorbidity, which may complicate treatment efforts.

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