

CHILD AND ADOLESCENT MENTAL HEALTH DURING COVID-19: CONSIDERATIONS FOR SCHOOLS AND EARLY CHILDHOOD PROVIDERS

KEY POINTS

- Children and adolescents had high likelihood of having a mental health condition after a COVID-19 diagnosis, negative COVID-19 test or COVID-19 like symptoms only.
- Likelihood of mental health diagnosis after a COVID-19 related event increased with age.
- Type of mental health condition among diagnosed children who also experienced a COVID-19 related event varied by age, with different patterns of diagnosis for children age 0-5, age 6-11, and adolescents age 12-17.
- The odds of developing a mental health condition following COVID-19 related event were higher among children with adverse childhood experiences.
- Children with an Intellectual Disability/Developmental Disability had high odds of having new or recurring mental health condition after a COVID-19 related event.
- Early childhood education providers and schools are essential resources to meet the post-COVID mental health needs of students returning to educational settings.

POLICY ISSUE

After a prolonged period of social isolation and school closures during the COVID-19 pandemic, the re-opening and continuing operation of schools and early childhood education (ECE) providers for in-person learning is a public health priority. The President's Executive Order on school and ECE re-opening¹ identified the need for "trauma-informed care, and behavioral and mental health support" for younger children, and the "promotion of mental health and social-emotional well-being" as schools and other educational institutions re-open. Studies on child and adolescent mental health and well-being indicate that the COVID-19 pandemic's social restrictions prompted a surge in the mental health needs of children^{2,3,4,5,6,7,8,9,10,11} with worse mental health outcomes among children and adolescents exposed to adverse childhood experiences (ACEs).^{3,4,12} At the same time, research on adults found potential heightened risk for mental health conditions after COVID-19 diagnosis^{13,14,15} but no such analysis has been done on children or adolescents. Nationwide 4.3 million children/adolescents have been diagnosed with COVID-19 as of August 2021,¹⁶ and many of them will be returning to early childhood and school settings. Schools and ECE programs have long been essential settings¹⁷ for delivery of mental health services where children, students, and especially low-income and non-Hispanic Black students,¹⁸ face fewer structural barriers to accessing services.

This brief is using descriptive analysis to expand on prior research and provide more detailed information on the mental health needs, co-occurring conditions, and ACEs experienced by a cohort of young children age 0-5, children age 6-11, and adolescents age 12-17 during the time of the COVID-19 pandemic. The large sample of children and adolescents (N=4,168,031) allows us to examine patterns across all COVID-19 related events (COVID-19 diagnosis, negative COVID-19 test, or COVID-19 symptoms only). The data for the study were extracted from December 2018-April 2021 from the IQVIA multi-payer health insurance claims database, covering all 50 states and Washington, D.C. Children and adolescents age 0-5 (early childhood/ preschool), age

6-11 (middle childhood/elementary school) and age 12-17 (adolescence/middle and high school) with and without prior mental health diagnoses were included in the sample. The sample was further divided into two cohorts: children/adolescents who were diagnosed with COVID-19 (COVID-19 diagnosis cohort) and children/adolescents who either tested negative for COVID-19 or who exhibited COVID-19 symptoms without a COVID-19 diagnosis or test (No COVID-19 diagnosis cohort). The analysis generated descriptive statistics of new or recurring mental health condition following a COVID-19 related event. The findings seek to inform efforts by school mental health providers and state and local educational agencies to plan for the mental health needs of students returning to school this fall.

FINDINGS

A higher percentage of children with a COVID-19 diagnosis experienced a mental health condition compared to children who either tested negative for COVID-19 or had a COVID-19 like symptom (10.1% vs 7.8%) (Table 1). This finding is consistent with prior research on adults^{13,15} and shows that children who had a COVID-19 diagnosis returning to schools may have a greater need for mental health services than the rest of the school population. We observed a similar pattern when examining rates of mental health conditions among children with a negative COVID-19 test result or COVID-19 symptoms, but with smaller magnitude.

Compared to children ages 0-5, children ages 6-11 are five times more likely and adolescents ages 12-17 are seven times more likely to experience a new or recurring mental health diagnoses after a COVID-19 diagnosis (Table 2). The high likelihood of developing mental health conditions for 4.4 million children in our sample with a COVID-19 event indicates these children and adolescents will be returning to classroom and care settings with significant mental health needs. The high odds of either newly diagnosed or recurring mental health conditions were not limited to children/adolescents with a COVID-19 diagnosis and were seen also for those with a negative COVID-19 test or COVID-19 symptoms (OR* 3.99 for ages 6-11 and OR 6.37 for ages 12-17). This suggests that the observed level of mental health diagnoses may be a result of underlying population occurrence, potentially exacerbated by social isolation, quarantine, and overall stress and adversity related to the pandemic rather than the COVID-19 diagnosis itself. The detrimental mental health effects of social isolation and quarantine on children have been well documented⁵ and there is a robust evidence base about the negative impact of chronic or toxic stress.^{19,20}

Among children diagnosed with a mental health condition after a COVID-19 related event, the rate of Attention Deficit Hyperactivity Disorder (ADHD) was highest for children ages 6-11, compared to children and adolescents ages 0-5 and 12-17 (Figure 1). The high rates of ADHD in middle childhood (56.8% for ages 6-11 vs 32.1% for ages 0-5 and 37% for ages 12-17) following a COVID-related event indicates elementary schools in particular may need to be prepared to devote resources to identify and support children with ADHD. There have been reports during the COVID-19 pandemic of an increase in externalizing behaviors, including hyperactivity, that were difficult for parents to manage during quarantine at home resulting in earlier identification of ADHD.²¹ As these children return to school and care settings, they may benefit from school-based and classroom-based management strategies and supports, including under Section 504 of the Rehabilitation Act or the Individuals with Disabilities Education Act (IDEA).^{22,23}

Rates of anxiety, depression and mood disorder were highest among adolescents age 12-17 who developed a mental health condition after a COVID-related event compared to children ages 0-5 or 6-11 (Figure 1). The

* The odds ratio (OR) is the ratio of the odds of an event occurring in one group to the odds of it occurring in another group. In this study the OR shows the ratio between probability of mental health conditions after COVID-19 diagnosis vs probability of no mental health condition after COVID-19 diagnosis.

increase in depression, anxiety, and mood disorders among the adolescent population is consistent with other studies conducted during the COVID-19 pandemic.^{7,9,24,25} However, this analysis estimated the difference in depression diagnosis between age groups and found that adolescents had a 4.4-fold times higher rate of depression diagnosis compared to 6-11 year olds after a COVID-19 related event (37.9% vs. 8.6%). This tendency is particularly concerning due to the link between depression and suicidal ideation.²⁶ School-based mental health providers should be attuned to screening for and identifying depression¹⁸ among middle and high school populations and be ready to refer these students for additional evaluation and specialty services when needed.

Acute stress disorder diagnosis was most prevalent among young children with mental health diagnosis after experiencing a COVID-19 event, while Post Traumatic Stress Disorder (PTSD) occurrence increased with age and peaked in adolescence (Figure 1). Acute stress disorder and PTSD have been found before to be prevalent among children after health pandemics,²⁷ with higher rates of acute stress disorder than PTSD similar to the findings in the current analysis. Addressing symptoms of traumatic stress early is important to prevent escalation of acute stress disorder symptoms and subsequent PTSD diagnosis.²⁸ Young children are particularly vulnerable to the effects of trauma exposure due to their developing brains and can benefit from support to build resilience and ameliorate risk to healthy development.²⁹ These findings underscore the need for schools and pediatric providers to adopt a trauma-informed approach to identifying and treating both young children and adolescents who have experienced COVID-19 related events, quarantine, and overall adversity.

In the full sample, the odds of developing a mental health condition following a COVID-19 related event were higher among children with ACEs, especially relevant to childhood upbringing (seven times more likely) primary support (four times more likely), and education (five times more likely) (Table 2). ACEs have long been associated with poor child mental health.³⁰ For children and adolescents that have had any COVID-related event, ACEs substantially increased the odds for occurrence of a mental health condition. In this study, children and adolescents were more likely to have worsening mental health if they had experienced problems with literacy and education (academic underachievement, educational maladjustment), childhood upbringing (child abuse and neglect), primary support/family circumstances (losing a family member, addiction in families) and psychosocial events (criminal proceedings, exposure to disaster). Schools and ECE providers may need to provide additional supports and resources for children with ACEs. For example, evidence-based mental health programming in schools that targets resilience has been found to increase student resilience and protective factors.³¹ Schools can also coordinate with local programs and community-based resources within a comprehensive system of care to address economic and social challenges that contribute to poor parent and child mental health post-COVID restrictions.

Children with an Intellectual Disability/Developmental Disability (ID/DD) diagnosis had high odds of having new or recurring mental health condition after COVID-19 diagnosis (more than three times more likely) or other COVID-19 related event (four times more likely) (Table 2). The substantially higher odds for mental health conditions among children with ID/DD in this study align with prior literature which recognizes the additional challenges children/adolescents with ID/DD can experience during COVID-19 compared to those without ID/DD. Individuals with ID/DD were more vulnerable to social isolation during COVID-19 compared to those without ID/DD, as virtual and online learning modules may not be as easily accessible to those with ID/DD that benefit from social interaction and in-person learning.³²

CONCLUSION

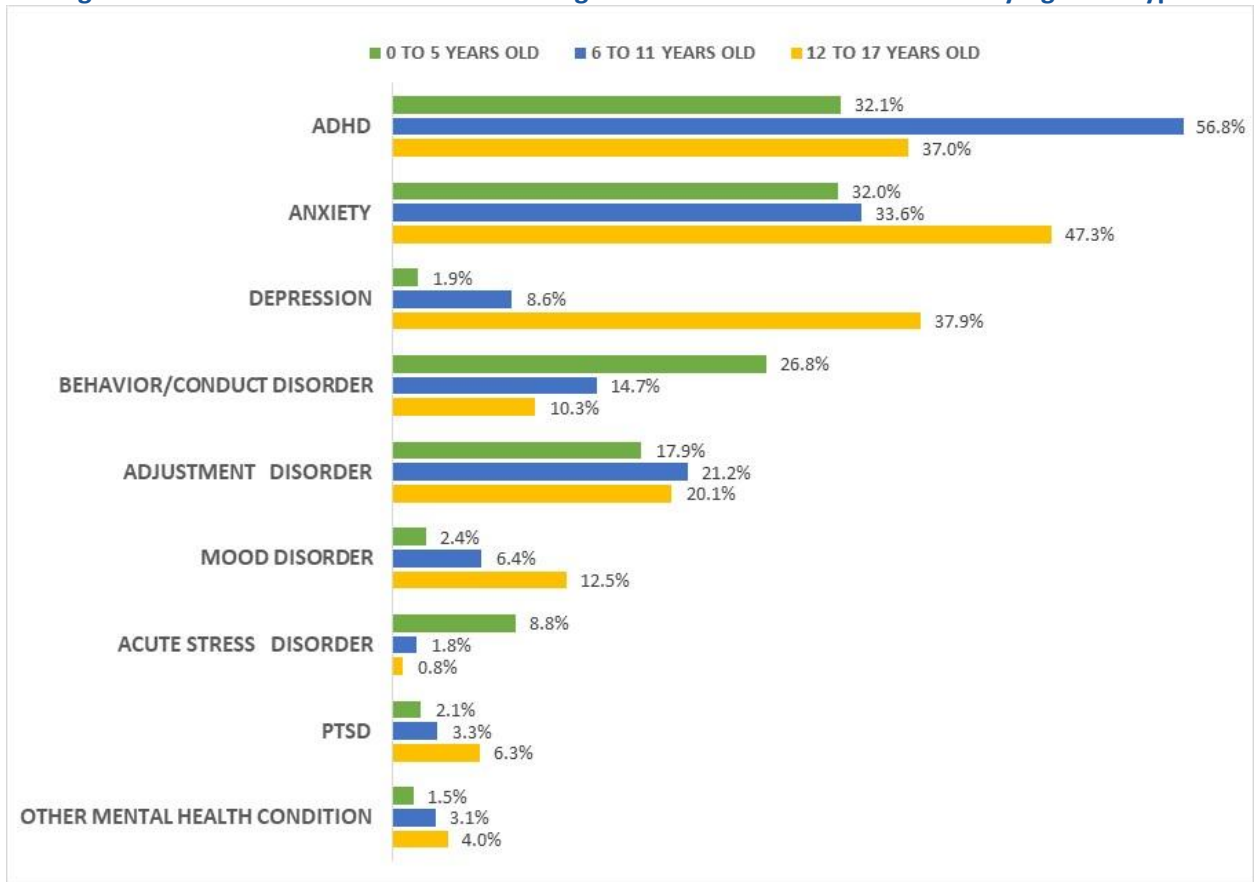
Prolonged loneliness and social isolation have been associated with future mental health problems up to nine years later, which suggests that children and adolescents would be at risk for mental health conditions long after the social restrictions for the pandemic have ended.⁵ Given the extensive and elevated need for mental

health supports, schools and ECE providers are just one part of a comprehensive, community-based approach to provide necessary services and supports to children, adolescents, and their families. Schools and ECE providers can play a crucial role in connecting children and families to those mental health and wraparound services. In March 2021, the President signed the American Rescue Plan (ARP) Act into law, which allocates substantial funding to children’s mental health services, including funding for pediatric mental health care access³³ and trauma-informed care.³⁴ ECE providers and state and local educational and mental health agencies can braid ARP funding, grant funding and Medicaid reimbursement to provide mental health supports to children that have experienced COVID-19 events, particularly among those with mental health conditions with co-occurring ID/DD or those exposed to ACEs. For ECE providers and K-12 schools, ARP allows the use of funds to support the mental health of children and staff through the provision of evidence-based interventions.^{35,36,37,38} Specifically, the ARP provided additional funding through IDEA for state educational agencies and IDEA Part C Early Intervention state lead agencies to help recover from the impact of the coronavirus pandemic and to safely re-open schools and sustain safe operations. ARP supplemental IDEA funds extend the capacity of states to provide early intervention and special education supports and services, including psychosocial services, to children and adolescents eligible for IDEA services.³⁸ The U.S. Department of Education also published a COVID-19 handbook³⁹ that provides strategies to support the social, emotional, and mental health needs of students. These efforts will bolster the local and state efforts to address children and adolescent mental health needs as schools re-open, particularly among underserved low-income, Black, and Hispanic populations many of whom receive mental health care in school settings.

LIMITATIONS

A particular strength of this study is the use of a large, nationwide, claims database that included more than two years of data from December 2018 through most of the COVID-19 pandemic through April 2021. Since our study was based on claims, it may underestimate the actual rates of mental health conditions in pediatric populations experiencing a COVID-related event, as it does not include children who have not interacted with the health care system. Another limitation of the dataset is the lack of information on race and ethnicity. Future analyses should focus on the mental health diagnoses and access to treatment among minority children and adolescents during and post-COVID given the noted disparities in access to diagnostic and treatment services and in-person learning among Black, Hispanic, and Asian populations.^{40,41} The ACEs estimates in this analysis were based on Z-codes, and differences in the recording of Z-codes by providers may bias the findings. Data in this study were cross-sectional, and we examined the rate of mental health conditions overall during the study period, occurring either before or after COVID-19 related events--our analysis therefore cannot determine whether the increased risk of mental health conditions observed among children experiencing COVID-19 illness is caused by COVID-19 infection, or whether children with pre-existing mental health conditions are more vulnerable to COVID-19 illness. Longitudinal studies that can establish causality between COVID-19 related events and subsequent mental health conditions are needed.

Figure 1. Distribution of Mental Health Diagnosis after COVID-Related Event by Age and Type*



*Chi-square test $p < 0.0001$.

Table 1. Mental Health Condition after COVID-19 Diagnosis and after no COVID-19 Diagnosis (negative COVID-19 test or COVID-19 symptoms) among Children and Adolescents

All Children and Adolescents		
	COVID-19 Diagnosis ¹ (N=2,106,491)	No COVID-19 Diagnosis (negative COVID-19 test ² or COVID-19 symptoms ³) (N=2,270,509)
Any Mental Health Condition*	212,968 (10.1%)	176,223 (7.8%)
Median Days to Mental Health Diagnosis*	32	76
ADHD*	44.3%	43.2%
Anxiety*	41.8%	38.5%
Depression	22.3%	21.8%
Mood Disorder*	8.8%	9.2%
Trauma and Stressor-related Disorders		
Adjustment Disorder	20.2%	20.4%
PTSD	4.4%	4.8%
Acute Stress Disorder*	1.8%	2.4%
Behavior/Conduct Disorder*	14.2%	13.6%
Other Mental Health Condition	3.7%	3.4%

Notes: Mental health diagnoses include: ADHD (F90), Anxiety (F40-42,F44-48,F93), Depression (F32,F33), Behavior/Conduct Disorder (F91,F94,F63), PTSD/Adjustment Disorder (F43), Acute Stress Disorder (F43.0), PTSD (F43.1), Adjustment Disorder (F43.2), Other Mental Health Condition (F30, F31, F34-39, F20-22,F60, F99,F53,F68).

1. B97.29, B34.2, U07.1, U07.2.

2. U0001, U0002, 87635, 86318, 86328, 86769, 87426, 0202U, 0223U, 0224U.

3. Cough (R05), shortness of breath (R06.02), fever(R50), fatigue (R53.83).

* p<0.001.

Table 2. Logistic Regression Model: Mental Health Condition among Children and Adolescents with and without a COVID-19 Diagnosis

All Children and Adolescents				
	Mental Health Condition after COVID-19 Diagnosis ¹ (N=2,106,491)		Mental Health Condition after No COVID-19 Diagnosis (negative COVID-19 test ² or COVID-19 symptoms ³) (N=2,270,509)	
	OR	95% CI	OR	95% CI
Age				
0 - 5 (reference)				
6 - 11	4.82	4.75; 4.89	3.99	3.93; 4.06
12 - 17	6.71	6.62; 6.82	6.37	6.26; 6.48
Gender				
Female	1.11	1.10; 1.12	1.09	1.08; 1.10
Male (reference)				
Intellectual Disability/Developmental Disability				
Any IDD	3.67	3.62; 3.73	4.17	4.10; 4.24
Severe COVID-19				
Hospitalization	1.76	1.74; 1.79		
Asthma	1.77	1.75; 1.79	1.78	1.75; 1.81
Bronchitis	1.48	1.46; 1.51	1.43	1.40; 1.46
Cancer	1.6	1.51; 1.69	1.42	1.32; 1.53
Diabetes	1.31	1.27; 1.35	1.32	1.27; 1.37
Heart	0.94	0.87; 1.01	1.08	0.97; 1.21
Hypertension	1.51	1.46; 1.56	1.51	1.44; 1.58
Kidney Disease	1.11	1.07; 1.16	1.34	1.27; 1.41
Liver Cirrhosis	0.84	0.65; 1.08	1.16	0.81; 1.66
Nicotine Dependence	3.99	3.78; 4.23	6.02	5.66; 6.40
Obesity	1.54	1.52; 1.57	1.56	1.53; 1.58
SDOH and ACEs Measures				
Z55 (Education & Literacy)	5.42	5.18; 5.66	6.02	5.66; 6.40
Z56 (Employment & Unemployment)	1.88	1.19; 2.97	3	1.87; 4.81
Z57 (Occupational Risk)	1.73	1.07; 2.82	1.69	0.89; 3.18
Z59 (Housing & Economic Circumstances)	1.53	1.40; 1.67	1.74	1.57; 1.93
Z60 (Social Environment)	1.72	1.59; 1.86	1.89	1.72; 2.06
Z62 (Childhood Upbringing)	7.25	6.97; 7.54	10.88	10.45; 11.33
Z63 (Primary Support)	3.93	3.79; 4.08	4.81	4.62; 5.02
Z64/Z65 (Psychosocial Event)	2.62	2.42; 2.82	3.65	3.35; 3.97
Notes: Mental health diagnoses include: ADHD (F90), Anxiety (F40-42,F44-48,F93), Depression (F32,F33), Behavior/Conduct Disorder (F91,F94,F63), PTSD/Adjustment Disorder (F43), Acute Stress Disorder (F43.0), PTSD (F43.1), Adjustment Disorder (F43.2), Other Mental Health Condition (F30, F31, F34-39, F20-22,F60, F99,F53,F68).				
1. B97.29, B34.2, U07.1, U07.2.				
2. U0001, U0002, 87635, 86318, 86328, 86769, 87426, 0202U, 0223U, 0224U.				
3. Cough (R05), shortness of breath (R06.02), fever(R50), fatigue (R53.83).				
* p<0.001.				

APPENDIX A. STUDY DESIGN

The data for the study were selected from December 2018-April 2021 IQVIA US Open Source Claims, a multi-payer pre-adjudicated health insurance claims database covering all 50 states and Washington, D.C. using the IQVIA E360TM Platform. IQVIA US Open Source Claims includes professional claims generated by office-based physicians (CMS-1500), institutional claims generated by hospitals and other institutions (UB-04), and prescription claims. The version of the data accessible to the Office of the Assistant Secretary for Planning and Evaluation at the U.S. Department of Health and Human Services contains information only on children and adolescents age 0-17 who were diagnosed with COVID-19, had a test for COVID-19, or exhibited COVID-19 symptoms such as fever, fatigue, shortness of breath, or cough. Three distinct cohorts based on age distribution in the National Survey for Children's Health were formed corresponding to early childhood/preschool (age 0-5), middle childhood/elementary school (age 6-11) and adolescence/middle and high school (ages 12-17). Descriptive statistics and logistic regression models were used to estimate the probability of, and risk factors for, having a visit where either a new or chronic mental health condition was recorded following a COVID-19 related event. The sample used for analysis includes 14,870,194 individuals diagnosed with COVID-19, had a test for COVID-19, or exhibited COVID-19 symptoms. Children and adolescents with both pre-existing mental health diagnoses or without prior mental health diagnosis were included in the sample. The sample was categorized into two cohorts since the primary outcome of interest for this analysis was the rate of mental health conditions after COVID-19 diagnosis and to enable comparison to the rate of mental health conditions of patients who were not diagnosed with COVID-19. The first cohort was comprised of children/adolescents who were diagnosed with COVID-19 (COVID-19 diagnosis cohort) and the second (comparison) cohort included children/adolescents who either tested negative for COVID-19 or who exhibited COVID-19 symptoms without COVID-19 diagnosis or test (No COVID-19 diagnosis cohort).

Psychiatric conditions were measured by whether the child/adolescent had any of the following mental health-related diagnoses after either their COVID-19 diagnosis or COVID-19 test or COVID-19 related symptoms: ADHD, anxiety and related disorders, trauma and stressor related disorders, depression, behavioral/conduct disorder, mood disorder, psychotic disorder, major depression, other mood disorder, Tourette/Tic disorder, psychotic disorder and other mental health conditions. ID/DD related conditions were categorized based on a methodology described elsewhere³⁹ and included ICD-10 codes on ASD, intellectual disabilities, and developmental delays (including learning disabilities, cerebral palsy and others). The primary variable of interest related to whether children and adolescents had any ACEs indicators and was measured by the International Classification of Diseases, 10th Revision, Clinical Modification (ICD-10-CM) Z-codes. The SDOH indicators relevant for the analysis included the following codes: whether persons indicated to have problems related to education and literacy (Z55), employment and unemployment (Z56), occupational risk (Z57), social environment (Z60), childhood upbringing (Z62), primary support including family (Z63), and psychosocial environment (Z64/Z65). Other variables controlled for in the analysis include indicators of hospitalization due to COVID-19; underlying medical conditions associated with higher risk of illness from COVID-19 among children and adolescents (asthma, bronchitis, cancer, diabetes, heart disease, hypertension, kidney disease, liver cirrhosis, obesity, and adolescent nicotine dependence); and demographic characteristics (age and gender).

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SUGGESTED CITATION

West, K.D., Ali, M.M., Schreier, A., & Plourde, E. Child and Adolescent Mental Health During COVID-19: Considerations for Schools and Early Childhood Providers (Issue Brief). Washington, DC: Office of the Assistant Secretary for Planning and Evaluation, U.S. Department of Health and Human Services. September 22, 2021.

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