



Child and Adolescent Anxiety and Depression Prior to and During the COVID-19 Pandemic in the United States

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Abstract

Childhood anxiety and depression have been increasing for years, and evidence suggests the COVID-19 pandemic has exacerbated this trend. However, research has examined anxiety and depression primarily as exclusive conditions, overlooking comorbidity. This study examined relationships between the COVID-19 pandemic and anxiety and depression to clarify risk factors for singular and comorbid anxiety and depression in children. Using 2018–2019 and 2020–2021 samples from the National Survey of Children’s Health, a nationally representative survey of children aged 0–17 in the United States, associations between the COVID-19 pandemic and child anxiety and depression were examined via survey-weights’ adjusted bivariate and multiple regression analyses, controlling for demographic characteristics. The COVID-19 pandemic was associated with higher odds of having comorbid anxiety and depression but not singular anxiety or depression. Female sex, older age, having special healthcare needs, more frequent inability to cover basic needs on family income, and poorer caregiver mental health were associated with having been diagnosed with singular and comorbid anxiety and depression. Children that witnessed or were victims of violence in the neighborhood were also more likely to have comorbid anxiety and depression. Implications for prevention, intervention, and policy are discussed.

Keywords Anxiety · Depression · Children · Families · COVID-19

Introduction

Prior to the COVID-19 pandemic, one in six children and adolescents met the criteria to be diagnosed with a mental health disorder, and more than one third were at high risk of developing a mental health disorder [14, 57]. Trend data predating the COVID-19 pandemic suggest that the prevalence of child and adolescent mental health concerns, including internalizing problems such as anxiety and depression, has been increasing over the past 15 years [7, 41]. In the 5 years preceding the pandemic, the prevalence of children

and adolescents ages 3–17 years reported to have ever had anxiety or depression increased by 29 and 27%, respectively [27]. Similarly, the percentage of children and adolescents in the same age range reported to be currently diagnosed with anxiety or depression increased from 8.0% in 2016 to 10.2% in 2020 [31]. Overall, between 2016 and 2019, it was estimated that 9.4% of children and adolescents ages 3–17 had been diagnosed with an anxiety disorder, and 4.4% had been diagnosed with depression [7].

Anxiety and depression have high comorbidity, with nearly 60% of adults with depression also meeting the criteria for an anxiety disorder, and approximately 30% of adults with anxiety having comorbid depression [1]. However, less is known about comorbid anxiety and depression in children, as this comorbidity has been understudied compared to anxiety or depression in isolation and is often an exclusionary criterion in treatment studies [23]. Yet, childhood mental health conditions have notoriously high comorbidity rates, and some research suggests that anxiety-depression comorbidity may be even higher among children than it is for adults [6]. Moreover, children with comorbid anxiety and depression have greater symptom severity [18, 38] and

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treatment resistance [33] than youth with either condition alone, highlighting the importance of examining overlapping childhood anxiety and depression as a distinct outcome.

It has been widely surmised that the COVID-19 pandemic, resulting in school closures that have disrupted critical sources of social support, has exacerbated anxiety and depression amongst children and adolescents [28]. Indeed, preliminary evidence from the early stages of the pandemic suggests declines in mental health, with child and adolescent anxiety and youth substance use on the rise, as well as significant increases in mental-health related emergency department visits and insurance claims for mental health [26, 39, 43]. The findings on depression, however, have been mixed: while some studies have found increasing rates of depression following the onset of the pandemic, others have found no significant changes [43].

Therefore, the purpose of this study is to examine associations between anxiety and depression and the COVID-19 pandemic to clarify risk factors for comorbid anxiety and depression in children and adolescents, using pre-pandemic and peri-pandemic samples from a nationally representative survey of children aged 0–17 in the United States, controlling for familial and individual characteristics. Prior research connecting COVID-19 to child mental health outcomes has neglected to examine relationships with comorbid anxiety and depression. By examining these relationships, the current study advances understanding of the relationships between the COVID-19 pandemic and comorbid anxiety and depression amongst children and adolescents. In turn, clarifying these relationships will offer insights into ways of tailoring current policies, prevention, and intervention efforts to maximize child mental health in the current climate.

Method

Sample

Survey Design and Sampling Procedures

The sample for the present study was drawn from the publicly available 2018–2019 and 2020–2021 National Survey of Children’s Health (NSCH). The NSCH is an online and mail survey funded and directed by the Health Resources and Services Administration (HRSA) Maternal and Child Health Bureau (MCHB) [24] and conducted by the United States Census Bureau [51] to assess the health and well-being of children and adolescents. The Census Bureau uses administrative data to identify addresses where children are likely to be living and then randomly selects households to receive mailed survey invitations and instructions. If respondents indicate that there is at least one child aged 0–17 living in the household, they fill out a screener with

demographic information on all children in the household. If multiple children reside within the household, one child is randomly selected to be the subject of the survey. Parents of caregivers then answer questions about their child’s physical and emotional health. The Data Resource Center website offers additional information on NSCH sampling and survey administration procedures [15].

Final Sample and Weighting

A total of 153,632 surveys were completed, including 30,530 surveys in 2018 (response rate: 43.1%), 29,433 surveys in 2019 (response rate: 42.4%), 42,777 surveys in 2020 (response rate: 42.4%), and 50,892 surveys in 2021 (response rate: 40.3%) [15]. Although the NSCH covers children aged 0–17 years, the mental health questions begin at age three; thus, the final sample represents children aged 3–17 years [15]. The sample for the present study was limited to cases with complete responses to the variables of interest. Survey weights for the two single multi-year periods (2018 and 2019: pre-pandemic; 2020 and 2021: during-pandemic) were combined and adjusted accordingly [52], yielding a final sample of 117,399 children, representing 106.2 million children 3–17 years of age, with 53.0 million cases from 2018–2019 and 53.2 million cases from 2020–2021.

Variables

Prevalence

Anxiety and depression were measured through NSCH questions addressing the prevalence of child mental health conditions. The NSCH includes two questions assessing the prevalence of physical and mental health conditions. The survey first asks respondents, “Has a doctor ever told you this child has ... ?” and follows with, “If yes, does this child CURRENTLY have this condition?” The language of the first question assessing anxiety and depression varies slightly by condition. To assess anxiety, respondents were asked, “Has a doctor ever told you this child has anxiety problems?” Depression was assessed by asking respondents, “Has a doctor ever told you this child has depression?” The language of the second question remained consistent across mental health conditions. To examine changes in prevalence from one time period to another, the question pertaining to current experience was utilized as an outcome variable. Focusing on current experience, as opposed to lifetime prevalence, allows for a more direct comparison between time periods, minimizing some of the temporal limitations inherent in the cross-sectional design. Given the wording of the NSCH questions, it should be noted that experiencing anxiety and/or depression refers to having been *diagnosed* with anxiety or depression. This is an important distinction,

considering rates of diagnosis may not reflect true prevalence of conditions due to differential access to clinicians that provide diagnostic services. In the context of this study, any mention of anxiety and/or depression should be interpreted as *diagnosed* anxiety and/or depression, as opposed to definite experience.

Comorbid anxiety and depression was examined by creating a composite variable (*both* anxiety and depression currently). We also created a second composite variable (*either* anxiety or depression currently) to reflect children currently experiencing only one condition. In all analyses, children currently experiencing *both* anxiety and depression and children currently experiencing *either* anxiety or depression were compared with children who have *never* experienced either condition (i.e., children whose caregivers answered, “no” to both NSCH questions), resulting in three mutually exclusive outcomes.

Time Period

Time period was treated as one of the primary predictor variables. Time period was defined as “pre-pandemic” and “during pandemic,” reflecting the two survey administration periods. The 2018–2019 NSCH data were collected between June 2018 and January 2019 and between June 2019 and January 2020, the 2020 NSCH data were collected between July 2020 and January 2021, and the 2021 NSCH data were collected between June 2021 and January 2022 [15]. Thus, the 2018–2019 data represent conditions prior to the COVID-19 pandemic, while the 2020–2021 data reflect the first two years of the COVID-19 pandemic.

Characteristics of Child

Caregivers supplied all child demographic information, which included child age, sex, race/ethnicity, type of health insurance coverage, whether or not the child receives care from a healthcare professional the caregiver considers to be the child’s personal doctor or nurse, whether or not the child has witnessed or been a victim of neighborhood violence, and whether or not the child has ever lived with someone who was mentally ill, suicidal, severely depressed, or had a problem with alcohol or drugs. All demographic variables were entered as covariates, since a number of the demographic variables, such as child age, sex, race/ethnicity, neighborhood violence exposure, and living with a family member with mental illness are documented predictors of child mental health conditions and others are ostensibly related to child mental health [4], [17, 21, 32, 44, 46]. In addition, type of health insurance coverage bears on the accessibility of mental health services, and whether or not a child has a personal doctor/nurse is indicative of their

familiarity with the child; thus, both likely influence diagnosis of anxiety and depression.

Characteristics of Caregiver/Household

NSCH questions pertaining to caregiver and household characteristics were included as covariates due to their association with child mental health. These characteristics included the primary language spoken in the home (English or not English), caregiver education level (less than high school/high school vs. some college or more), family structure, how often it has been hard to cover basics on the family’s income, and caregiver mental health.

Certain family structures—particularly single parenthood, divorce, and blended families—have been associated with adverse child mental health outcomes, including anxiety and depression [2, 3, 48, 50]. Caregivers reported their marital status, and responses were coded into four categories: two parents who are currently married, two parents living together but not currently married, single parent (e.g., never married, divorced, separated, widowed) and other. In addition to family structure, low socioeconomic status is a well-documented risk factor for childhood mental health and behavioral challenges, including anxiety and depression [20, 34, 36, 45, 58]. To measure socioeconomic status, the caregiver reported how often it has been very hard to cover basics (e.g., food or housing) on the family’s income (never, rarely, somewhat often, or very often). This was determined to be a better indicator of the family’s socioeconomic status than family income, which is estimated through self-reported wages and supplemental assistance. Finally, caregiver mental health was included due to the well-documented relationship between caregiver and child mental health [5, 54, 55]. Caregivers self-reported their mental or emotional health on a five-point scale ranging from poor to excellent.

Analyses

Descriptive statistics, including frequencies and proportions, were calculated for each variable. Bivariate analyses were conducted via chi-square tests to examine unadjusted associations between the outcomes of interest and independent variables. Multivariable logistic regression analyses were then conducted for the two categorical outcome variables: *both* anxiety and depression currently and *either* anxiety or depression currently, to estimate their association with the COVID-19 time period, controlling for family characteristics and the demographic covariates, and state fixed-effects. All analyses were conducted in Stata version 17.0 (StataCorp, College Station, TX). In order to ensure accurate model estimates, the appropriate survey sampling weights, clusters, and strata used by the NSCH were used in all analyses as a single two-period multi-year weight [52]. Weights were

used to generate all estimates. Congruent with the NSCH, findings are reported in terms of the child rather than the caregiver who completed the survey. Finally, this study was approved by the [university concealed for review] institutional review board as exempt.

Results

Descriptive Statistics

Approximately half of the study sample was male (51%) and non-Hispanic white (51%) by parent report (Table 1). Overall, 20% were 3–5 years old, 26% were 6–9 years old, 35% were 10–14 years, and 19% were 15–17 years old. Over one in five children (21%) had special health care needs. About 11% of children had at some point lived with someone who was mentally ill, suicidal, severely depressed or had problems with alcohol or drugs, while 6% had also witnessed or were a victim of violence in their neighborhood. Most children had caregivers with at least some college education (72%) and lived in a household with two parents who were married at the time the survey was completed (66%). About one in every ten children (12%) lived in household which had often (somewhat or very) hardships to cover basic needs, such as food or housing, on family income. English was the primary language spoken in most homes (86%). Private health insurance was the most common type of insurance used (61%), followed by public insurance (28%). About 5% of caregivers also reported fair or poor mental health. The vast majority of children sampled had no history of anxiety or depression (90%). There was significant comorbidity between anxiety and depression, with 3% of children currently experiencing both conditions and 7% of children experiencing either of these two conditions.

Bivariate Results

A number of characteristics were significantly associated with experiencing either anxiety or depression and/or with experiencing both conditions concurrently (Table 1). Compared to children who have never experienced anxiety or depression, children experiencing either anxiety or depression or comorbid anxiety and depression were more likely to be female (48% never vs. 51% either vs. 59% both, $p < 0.001$). Compared to their peers with no history of anxiety or depression, children with either anxiety or depression or comorbid anxiety and depression were more likely to be 10 years of age or older (54% never vs. 72% either vs. 92% both, $p < 0.001$). Children with either anxiety or depression or comorbid anxiety and depression were more likely than their unaffected peers to speak English as a primary language (86% never vs. 93% either vs. 93% both, $p < 0.001$)

and be non-Hispanic White (50% never vs. 62% either vs. 62% both, $p < 0.001$).

Compared to children who have never experienced anxiety or depression, children with either anxiety or depression or comorbid anxiety and depression were more likely to have special health care needs (16% never vs. 64% either vs. 87% both, $p < 0.001$) and more likely to have more than one personal doctor/nurse (17% never vs. 26% either vs. 30% both, $p < 0.001$). Children with either anxiety or depression or both anxiety and depression were also less likely to have private health insurance coverage (61% never vs. 60% either vs. 50% both, $p < 0.001$), and children with both conditions were more likely to have public coverage (28% never vs. 27% either vs. 37% both, $p < 0.001$). They were also more likely to have lived with someone who was mentally ill, suicidal, severely depressed or had problems with alcohol or drugs (8% never vs. 25% either vs 43% both, $p < 0.001$) and to have witnessed or been a victim of violence in their neighborhood (5% never vs. 11% either vs 20% both, $p < 0.001$).

Compared to their unaffected peers, children with either anxiety or depression or comorbid anxiety and depression were less likely to live with two parents who are currently married (66% never vs. 63% either vs. 53% both, $p < 0.001$) and more likely to live with a single parent (22% never vs. 23% either vs. 29% both, $p < 0.001$). Children with comorbid anxiety and depression were also more likely to reside in a household that had difficulties covering basic needs somewhat or very often (11% never vs. 19% either vs. 26% both, $p < 0.001$). The prevalence of having either anxiety or depression and comorbid anxiety and depression was also higher in the peri-pandemic period compared to the pre-pandemic period ($p = 0.005$).

Multivariable Results

After adjusting for children's and caregivers' sociodemographic and contextual covariates, time period was associated with significantly higher odds of having comorbid anxiety and depression (Table 2). Children had higher odds of having comorbid anxiety and depression (Adjusted Odds Ratio (aOR) = 1.29, 95% Confidence Interval (CI) = 1.04–1.51) during the first two years of the pandemic compared to the two years prior to the pandemic. Children had also higher odds of having either anxiety or depression during the pandemic compared to the period prior to the pandemic but this association was not statistically significant at the $p < 0.05$ level (aOR = 1.11, 95% CI = 0.97–1.28).

Children with caregivers who reported fair or poor mental health had higher odds of having either anxiety or depression and higher odds of having comorbid anxiety and depression compared to caregivers who reported excellent or very good mental health (either: aOR = 2.20, 95% CI: 1.76–2.74; both: aOR = 2.81, 95% CI: 2.20–3.60). Similarly, ever having lived

Table 1 Demographic characteristics of children, stratified by presence of anxiety and depression

Characteristic	Total %	NEVER anxiety or depression %	Current anxiety OR depression %	Current anxiety AND depression %	<i>p</i>
Total sample					
<i>N</i>	117,399	103,198	9,660	4,541	
Representing after weights %	106,190,886	95,866,438	7,197,907	3,126,540	
		90.3	6.8	2.9	
Time Period					0.005
2018–2019	49.9	50.2	47.1	46.9	
2020–2021	50.1	49.8	52.9	53.1	
<i>Characteristics of child</i>					
Sex of Child					<0.001
Male	51.3	51.8	49.1	41.2	
Female	48.7	48.2	50.9	58.8	
Age of child					<0.001
3 to 5 years old	20.0	21.6	5.8	1.0	
6 to 9 years old	26.2	27.2	21.8	7.5	
10 to 14 years old	34.5	33.6	43.5	41.5	
15 to 17 years old	19.3	17.6	28.9	50.0	
Race/ethnicity of child					<0.001
Non-Hispanic White	51.5	50.4	62.4	61.5	
Non-Hispanic Black	12.8	13.2	9.1	10.2	
Hispanic	24.9	25.4	20.1	20.6	
Non-Hispanic Other	10.8	11.0	8.4	7.7	
Special Health Care Needs					<0.001
No	79.1	84.5	35.7	12.9	
Yes	20.9	15.5	64.3	87.1	
Personal doctor/nurse					<0.001
Yes, one person	54.8	55.1	52.8	49.3	
Yes, more than one person	17.7	16.7	25.5	30.3	
No	27.5	28.2	21.7	20.4	
Health Insurance					<0.001
Public	28.1	27.9	27.6	36.7	
Private	60.9	61.3	59.9	50.3	
Public and Private	4.2	3.9	6.5	8.2	
Not Insured/Unspecified	6.8	6.9	6.0	4.8	
Lived with anyone who was mentally ill, suicidal, severely depressed, or had problems with alcohol or drugs					<0.001
No	89.5	91.7	74.6	56.8	
Yes	10.5	8.3	25.4	43.2	
Witnessed/victim of neighborhood violence					<0.001
No	94.5	95.4	88.9	79.6	
Yes	5.5	4.6	11.1	20.4	
<i>Characteristics of Caregiver/Household</i>					
Primary Language					<0.001
English	86.0	85.2	93.1	93.3	
Not English	14.0	14.8	6.9	6.7	
Guardian Education					<0.001
Less than high school or high school	27.6	28.0	23.3	26.5	
Some college or more	72.4	72.0	76.7	73.5	

Table 1 (continued)

Characteristic	Total %	NEVER anxiety or depression %	Current anxiety OR depression %	Current anxiety AND depression %	<i>p</i>
Family Structure					<0.001
Two parents, currently married	65.9	66.5	63.4	53.4	
Two parents, not currently married	7.3	7.2	7.1	7.5	
Single parent	21.9	21.6	23.5	29.2	
Other	4.9	4.7	6.0	9.9	
Hard to cover basics on family income					<0.001
Never	55.3	56.8	44.0	34.0	
Rarely	33.2	32.7	37.0	39.8	
Somewhat or very often	11.5	10.5	19.0	26.2	
Caregiver Mental Health					<0.001
Excellent/Very good	74.6	76.9	56.8	46.9	
Good	20.3	18.8	32.0	37.1	
Fair/Poor	5.1	4.3	11.2	16.0	

The baseline group reflects children who have never had anxiety or depression (i.e., answered "no" to "has your child EVER..."). *P*-values were calculated via Chi-square tests

with someone with mental illness, severe depression, suicidality, or drug/alcohol use problems was associated with higher odds of having anxiety and/or depression (either aOR = 1.92, 95% CI: 1.04–1.31; both aOR = 2.85, 95% CI: 2.36–3.44). Family difficulties in covering basic needs also increased the odds of experiencing anxiety and/or depression overall. Children who had witnessed or been a victim of neighborhood violence had higher odds of having comorbid anxiety and depression only (aOR = 1.42, 95% CI: 1.09–1.87).

Multiple individual and caregiver characteristics were also significant predictors of having anxiety and/or depression. The following characteristics were associated with higher odds of having singular and comorbid anxiety and depression: being female compared to male, being at least 10 years of age or older compared to 3–5 year olds, and having special health care needs. Conversely, identifying as non-Hispanic Black or Hispanic compared to non-Hispanic White were associated with lower odds of having anxiety or depression and having both conditions comorbidly. In general, family structure was not significantly associated with having singular or comorbid anxiety and depression. Finally, having public health insurance coverage compared to all other insurance types was associated with lower odds of having anxiety or depression but was not associated with having comorbid anxiety and depression.

Discussion

The current study examined associations between anxiety and depression in children and adolescents and the COVID-19 pandemic, individual, and family characteristics. We

found that the COVID-19 pandemic was positively and significantly associated mostly with comorbid anxiety and depression. This extends previous findings on the adverse effect of COVID-19 on child mental health [26, 39, 43] by indicating that child anxiety and depression are not simply becoming more prevalent as stand-alone conditions, but they are co-occurring with increasing frequency. This is an important distinction, because comorbid anxiety and depression is associated with poorer prognosis than either condition in isolation and requires different treatment approaches [13]. Thus, conflating increasing comorbidity with increases in non-comorbid anxiety or depression may lead to inaccurate forecasting and misinformed prevention and intervention programming.

Our findings on caregiver mental health and living with individuals with mental illness align with prior research indicating that parental mental illness is associated with child and adolescent mental health concerns [5, 54, 55]. While these two variables were associated with higher odds of being diagnosed with singular and comorbid anxiety and depression, the strength of this relationship was stronger for comorbid anxiety and depression, suggesting parental and/or family member mental illness may contribute to more significant mental health concerns in children. Interestingly, we observed that exposure to neighborhood violence was only significantly associated with comorbid anxiety and depression, not having anxiety or depression in isolation. This adds to prior research indicating a modest relationship between community violence exposure and internalizing problems like anxiety and depression [17] and suggests that exposure to community violence may contribute to more complex presentations of child and adolescent internalizing

Table 2 Adjusted odds ratios and 95% wald confidence intervals predicting current anxiety and/or depression

Variable	Current anxiety OR depression			Current anxiety AND depression		
	aOR	95% CI	<i>p</i>	aOR	95% CI	<i>p</i>
Time Period						
Pre-Pandemic (2018–2019)	<i>Referent</i>			<i>Referent</i>		
During Pandemic (2020–2021)	1.11	0.97–1.28	0.144	1.29	1.04–1.58	0.021
<i>Characteristics of Child</i>						
Sex of Child						
Male	<i>Referent</i>			<i>Referent</i>		
Female	1.37	1.24–1.52	< 0.001	2.12	1.80–2.48	< 0.001
Age of Child						
3 to 5 years old	<i>Referent</i>			<i>Referent</i>		
6 to 9 years old	2.51	2.03–3.11	< 0.001	3.55	1.19–10.62	0.024
10 to 14 years old	3.91	3.20–4.77	< 0.001	15.17	5.13–44.88	< 0.001
15 to 17 years old	5.33	4.35–6.53	< 0.001	39.60	13.59–115.41	< 0.001
Race/Ethnicity of Child						
Non-Hispanic White	<i>Referent</i>			<i>Referent</i>		
Non-Hispanic Black	0.46	0.37–0.56	< 0.001	0.42	0.32–0.56	< 0.001
Hispanic	0.82	0.69–0.96	0.016	0.63	0.49–0.82	0.001
Non-Hispanic Other	0.71	0.59–0.84	< 0.001	0.77	0.59–1.01	0.058
Special Health Care Needs						
No	<i>Referent</i>			<i>Referent</i>		
Yes	8.30	7.49–9.21	< 0.001	26.81	21.90–32.80	< 0.001
Personal doctor/nurse						
Yes, one person	<i>Referent</i>			<i>Referent</i>		
Yes, more than one person	1.09	0.97–1.23	0.154	1.16	0.97–1.39	0.105
No	0.92	0.80–1.06	0.252	0.83	0.66–1.03	0.096
Health Insurance						
Public	<i>Referent</i>			<i>Referent</i>		
Private	1.18	1.02–1.38	0.022	0.89	0.73–1.08	0.243
Public and Private	1.30	1.03–1.65	0.030	1.16	0.83–1.61	0.386
Not Insured/Unspecified	1.47	1.03–2.08	0.032	1.01	0.59–1.72	0.964
Ever lived with anyone who was mentally ill, suicidal, severely depressed, or had problems with alcohol or drugs						
No	<i>Referent</i>			<i>Referent</i>		
Yes	1.92	1.04–1.31	0.008	2.85	2.36–3.44	< 0.001
Witnessed/victim of neighborhood violence						
No	<i>Referent</i>			<i>Referent</i>		
Yes	1.16	0.92–1.49	0.217	1.42	1.09–1.87	0.010
<i>Characteristics of Caregiver/Household</i>						
Caregiver Mental Health						
Excellent/ Very good	<i>Referent</i>			<i>Referent</i>		
Good	1.82	1.61–2.06	< 0.001	2.13	1.77–2.56	< 0.001
Fair/Poor	2.20	1.76–2.74	< 0.001	2.81	2.20–3.60	< 0.001
Primary Language						
English	<i>Referent</i>			<i>Referent</i>		
Not English	0.71	0.52–0.98	0.035	0.78	0.47–1.28	0.326
Guardian Education						
Less than high school or high school	<i>Referent</i>			<i>Referent</i>		
Some college or more	1.17	1.00–1.37	0.044	1.24	1.00–1.52	0.046
Family Structure						

Table 2 (continued)

Variable	Current anxiety OR depression			Current anxiety AND depression		
	aOR	95% CI	<i>p</i>	aOR	95% CI	<i>p</i>
Two parents, currently married	<i>Referent</i>			<i>Referent</i>		
Two parents, not currently married	0.98	0.77–1.26	0.886	1.00	0.69–1.46	0.986
Single parent	0.96	0.83–1.10	0.536	1.12	0.92–1.37	0.244
Other	1.16	0.92–1.47	0.208	1.56	1.14–2.14	0.005
Hard to cover basics on family income	<i>Referent</i>			<i>Referent</i>		
Never	<i>Referent</i>			<i>Referent</i>		
Rarely	1.17	1.04–1.31	0.008	1.24	1.04–1.47	0.019
Somewhat/Very often	1.50	1.27–1.77	<0.001	1.83	1.43–2.36	<0.001

Bold values indicate statistical significance at $p < 0.05$

problems. Our findings also extend previous research on the link between poverty and child mental health problems [20, 34, 36, 45, 58], as we found that the odds of comorbid anxiety and depression, compared to having only one condition, was more strongly associated with families having difficulty covering basic needs.

Congruent with past research, we found that child age and sex were significant predictors of anxiety and/or depression, such that older children/adolescents and females were associated with higher odds of having particularly comorbid anxiety and depression [7, 38, 41]. In addition, children of color had lower odds of having one or both disorders than did white children. These findings are somewhat surprising, given documented racial disparities in stressors and hardships, which have disproportionately affected Black and Hispanic/Latinx communities, during the COVID-19 pandemic [22, 40]. Prior research has suggested that people of color have not only suffered poorer physical health and healthcare access during the COVID-19 pandemic [35] but also greater increases in anxiety and depression than white individuals [49]. Although it has been surmised that children of color are at greater risk of adverse mental health outcomes due to an uptick in stressors experienced during the pandemic [53], similar disparities in mental health outcomes have not yet been demonstrated amongst youth [47]. Given that the present study focused on *diagnosed* anxiety and/or depression, it is quite possible that lower prevalence among Black and Hispanic children reflect well-documented discrepancies in access to mental health services, which ostensibly limits diagnosis in certain groups, as opposed to truly lower odds of experiencing these conditions [8, 11, 16, 19].

Understanding the risk factors for having anxiety or depression, and having comorbid anxiety and depression, has important implications for identifying children in need of mental health treatment. Considering the challenges and costs of implementing widespread mental health screening [9, 56], individual and familial characteristics can serve as important identifiers, allowing screening efforts to be

targeted toward those at greatest risk for adverse mental health outcomes. It is important, however, to recognize that these risk factors are merely correlated with adverse mental health outcomes and do not speak to the mechanisms by which mental disorders develop. For instance, although single parenthood is a risk factor for depression, research suggests that the reduced parenting support, diminished social support, and increased stress associated with single parenthood may be responsible for adverse psychological outcomes [10, 12]. Thus, parenting and family interventions that reduce stress, build parenting skills and social networks, and foster family resilience may alleviate the risk for adverse child mental health outcomes. Given the complexity of known risk factors (individual and familial), additional research on pathways to comorbid anxiety and depression is critical to informing effective treatment approaches [29].

Beyond mental health screening, evidence-based treatment for anxiety and depression, and family-based interventions to reduce vulnerability to mental illness, the findings on family adversity highlight the importance of policy and systems-level prevention and intervention programming. Mental health treatment is often limited or even remains inaccessible for many children and families, and access barriers may be particularly acute for those encountering specific family adversities (e.g., families living in poverty), exacerbating mental health disparities [25]. As our findings indicate, public health insurance coverage was associated with lower odds of being diagnosed with anxiety or depression, compared to other types of insurance coverage. This may reflect lesser access to diagnostic services for individuals on public insurance. Hence, beyond the pressing need to expand the mental health workforce [37], policies and practices to provide more comprehensive coverage of mental health services for at-risk populations, increase the capacity of providers to address social determinants of health, develop the clinical infrastructure to address specific barriers (e.g., service hours, financial constraints, and cross-agency collaboration), and promote multidisciplinary teaming and

home-school-community connections are promising strategies for meeting the mental health needs of vulnerable children and families [25].

Strengths and Limitations

Our study is not without limitations that should be considered when interpreting the findings included herein. First, the NSCH relies on caregiver report of a child's mental health diagnoses, as opposed to direct symptom ratings or clinician-provided data, and these different methods of data collection have been known to yield discrepant prevalence estimates [42], which may explain some of the differences between our findings and those presented in other studies. In addition, the cross-sectional nature of this study precludes the establishment of temporal precedence or causal relationships between the COVID-19 pandemic, family adversity, and mental health outcomes. Finally, although this study advanced knowledge of individual and contextual risk factors of singular and comorbid anxiety and depression in the context of the COVID-19 pandemic, exploring interactions between risk factors was beyond the scope of this study. Given the particularly deleterious effect of the pandemic on female adolescents' mental health [30], future research should explore interactions between other individual and contextual risk factors.

Limitations aside, our study offers important contributions to the knowledge base on child and adolescent mental health in the era of COVID-19. By considering comorbidity, as opposed to only considering anxiety and depression as exclusive outcomes, alongside a suite of familial and individual characteristics, our findings advance the scientific literature on risk factors for childhood anxiety and depression. Relatedly, these findings have important implications for the screening of children and families at risk for significant mental health challenges. Additionally, by utilizing the NSCH data set, these findings have the advantage of being nationally representative of the children and families in the United States.

Summary

Childhood internalizing disorders like anxiety and depression have been increasing for years, and evidence suggests the COVID-19 pandemic has exacerbated this trend. However, existing research on the COVID-19 pandemic and childhood anxiety and depression has treated these disorders as separate entities, overlooking comorbidity. Using nationally representative samples from pre-pandemic (2018–2019) and during the first year of the pandemic (2020–2021), this study examined relationships between the COVID-19 pandemic and anxiety and depression to differentiate individual

and contextual risk factors for comorbid versus singular anxiety and depression in children and adolescents. A multivariate regression indicated that the pandemic was associated with increases in comorbid, but not singular, anxiety and depression among children and adolescents. Additionally, while many of the same individual and caregiver/household characteristics were associated with having singular versus comorbid anxiety and depression, most of these characteristics were more strongly associated with comorbid anxiety and depression, and some, such as exposure to neighborhood violence, were only associated with comorbid anxiety and depression. This study advances understanding of how the COVID-19 pandemic relates to childhood anxiety and depression and conveys nuance that has been overlooked by prior studies that neglected to consider comorbidity, in addition to clarifying differences in risk factors between comorbid and non-comorbid anxiety and depression. This has important implications for identifying children most in need of mental health services and tailoring prevention and intervention efforts.

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Data Availability The data that support the findings of this study are publicly available and accessible via the U.S. Census Bureau (U.S. Census Bureau, n.d.).

Declarations

Competing interests The authors declare that they have no conflict of interest.

Ethical Approval The Institutional Review Board at the [university concealed for review] declared this research non-human subjects and exempt. All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. For this type of study formal consent is not required.

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