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Child Anxiety and Depression Symptom Trajectories and Predictors over 15 Months of the Coronavirus Pandemic

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Abstract

Repeated measures are required to monitor and map trajectories of mental health symptoms that are sensitive to the changing distal and proximal stressors throughout the coronavirus (COVID-19) pandemic. Understanding symptoms in young children is particularly important given the short- and long-term implications of early-onset internalizing symptoms. This study utilized an intensive longitudinal approach to assess the course and environmental correlates of anxiety and depression symptoms in 133 children, ages 4–11 (M_{age} = 7.35, SD = 1.03), in the United States during the COVID-19 pandemic. Caregivers completed 48 repeated assessments from April 7, 2020, to June 15, 2021, on child and caregiver mental health symptoms, family functioning, and COVID-19-related environmental changes. Results from a series of multilevel growth models demonstrate that child depression symptoms were highest following initial stay-at-home orders (April 2020) and linearly decreased over time, while child anxiety symptoms were variable over the 15-month period. Caregiver depression symptoms and family conflict significantly predicted levels of child depression symptoms. In contrast, caregiver depression symptoms, caregiver anxiety symptoms, and time spent home quarantining significantly predicted levels of child anxiety symptoms. Results suggest that depression and anxiety symptoms in young children may have unique trajectories over the course of the coronavirus pandemic and highlight symptom-specific risk factors for each symptom.

Keywords COVID-19 · Pandemic · Child · Anxiety · Depression · Trajectories

Introduction

Elevated anxiety and depression symptoms have been observed globally during the coronavirus (COVID-19) pandemic resulting from the combined effects of a public health crisis, disrupted routines, and increased social isolation (Robinson et al., 2022). Assessing the longitudinal trajectory of these symptoms is vital to understanding the overall impact of the pandemic, given the phases of increased severity and subsequent recovery that have occurred since initial government responses to the virus. Research indicates that internalizing symptoms spiked for adults immediately following initial stay-at-home orders and decreased over time (e.g., Fancourt et al., 2020), while symptoms spiked and remained elevated for adolescents (Racine et al., 2021). However, less is known about anxiety and depression symptom trajectories in young children during the pandemic. This is an essential population to study, given the strong environmental influence on internalizing symptom etiology in childhood (Patterson et al., 2018), steep increase in anxiety and depression symptoms from early childhood to adolescence (Costello et al., 2011), and long-term consequences of early-onset symptoms (e.g., more severe, chronic, and comorbid psychopathology in adulthood; Kessler et al., 2012). Although anxiety and depression symptoms have been documented in young children following pandemic onset (Oliveira et al., 2022), the majority of this work has been cross-sectional or employed a pre-/post- pandemic design, lacking the data structure necessary to examine the direction and rate of symptom change. Thus, there is a need

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to apply intensive longitudinal designs, which have been utilized in adult populations during the COVID-19 pandemic (e.g., Ebrahimi et al., 2021), to samples of young children. Further, most studies have focused on the impact of COVID-19 on only one internalizing dimension or combined anxiety/depression symptoms. Investigating the course and correlates of anxiety and depression separately within the same sample of children is essential, given each disorder's distinct symptoms, onset patterns, risk factors, and prevalence rates (Polanczyk et al., 2015). The current study addresses these gaps by analyzing depression and anxiety symptom data from 4–11-year-old children via 48 repeated surveys spanning from April 2020 to June 2021.

The bioecological model provides a useful framework to conceptualize potential causes and correlates of child internalizing symptoms (Bronfenbrenner & Morris, 2006; Egan & Pope, 2021). This model emphasizes the importance of understanding how multiple systems (e.g., individuals, families, communities, society) impact child development. Similarly, the concomitant effects of the COVID-19 pandemic on children's internal/home and external environmental systems are likely to impact the development, duration, and presentation of child depression and anxiety symptoms. Possible pandemic-related changes in children's home environment include increases in caregiver mental health symptoms and family conflict. First, parent parents of young children have experienced unique challenges during the COVID-19 pandemic that compound their own psychopathology risk. School and childcare center closures forced many caregivers to juggle childcare, virtual schooling, and working from home, while others, particularly in low socioeconomic status (SES) groups, have had to choose between childcare duties or going to work to maintain income (Yavorsky et al., 2021). For many caregivers, these COVID-19-related stressors manifested in depression and anxiety symptoms (Wu et al., 2020), which in turn may heighten internalizing symptom risk for offspring (Maciejewski et al., 2018). Second, increased caregiver (and family) stress, combined with increased family confinement and decreased access to external social support, has been linked to family conflict and hostility during the COVID-19 pandemic (Campbell, 2020), which represents one of the most notable risk factors for child psychopathology (El-Sheikh & Erath, 2011; Kieling et al., 2011). Although substantial evidence points to the contribution of biological or genetic factors to internalizing disorders (Beardslee et al., 2011), caregiver internalizing symptoms and family conflict in the context of the COVID-19 pandemic may prompt a more immediate presentation of child symptoms through behavioral transmission pathways that are exacerbated and more readily observable due to prolonged home confinement (e.g., modeling, direct communication of anxiety and/or sadness, emotion dysregulation; Fisak & Grills-Taquechel, 2007; Goodman, 2020).

In addition to risk factors within the home, changes in children's broader environmental systems are likely to contribute to variability in their anxiety and depression symptoms, including school/daycare closures, adhering to sheltering-in-place guidelines, and family employment status. School and daycare closures and adherence to stay-at-home orders have resulted in disrupted routines, limited connection with peers, and increased sedentary behaviors for children (Xiang et al., 2020). During past epidemic diseases (e.g., N1H1, SARS, and Asian influenza), a high percentage of children experiencing school closures and social isolation due to physical distancing requirements developed acute adjustment disorders and internalizing problems (Sprang & Silman, 2013). However, the impact of school/daycare disruptions and home quarantining on child depression and anxiety symptoms over time remains unclear in the context of the COVID-19 pandemic, which has surpassed the duration of most epidemic diseases. Social interactions and engagement in pleasurable activities have a stress-buffering effect against depression by increasing general positive affect, providing opportunities to increase coping self-efficacy (e.g., through social support), and providing positive distractions from negative thought processes (Hammen, 2005); thus, quarantining and school closures during the COVID-19 pandemic may be linked to increased depression symptoms in children by decreasing opportunities for positive and social activities. The lack of predictable routines, increased messages of fear and uncertainty from adults and the media, and decreased access to supportive individuals (e.g., teachers, friends) may also lead to increased anxiety symptoms (Behar et al., 2009). Alternatively, although detrimental to long-term adjustment, avoidance behaviors often decrease anxiety symptoms in the short term (Behar et al., 2009), suggesting that avoiding external fear stimuli via home-quarantining could reduce anxiety symptoms in young children, at least during the initial weeks of the pandemic. Last, research has established the substantial impact that the COVID-19 pandemic has had on employment (Bureau of Labor Statistics, 2022), but the impact of job loss on child internalizing symptoms over time has not been established. Caregiver unemployment during the COVID-19 pandemic could serve as a risk factor for young children through its contribution to increased familial stress, or as a protective factor for young children who may not understand the negative implications of unemployment and instead experience increased positive time with caregivers as a result of their job loss (Wang et al., 2021). Further research is necessary to disentangle this association.

In this study, we measure child anxiety and depression symptoms trajectories during the COVID-19 pandemic and examine how symptom patterns are impacted by caregiver mental health symptoms, family conflict, school/daycare closures, families' adherence to stay-at-home orders and

recommendations, and caregiver employment status. These predictors were selected as important components of children's internal (e.g., home) or external (e.g., school) environmental systems that are likely to be impacted by the COVID-19 pandemic and have previously been linked to increased internalizing symptoms in youth. Child age and sex were also included as covariates to account for increased rates of anxiety and depression symptoms observed in older children and females (Gutman & Codiroli McMaster, 2020; Sterba et al., 2007). We use a series of multilevel growth models to identify whether risk factors are differentially or similarly linked with the emergence and course of depression and anxiety symptoms over 15 months (48 assessments) of the COVID-19 pandemic. In addition to examining direct associations with child symptoms, we conduct exploratory analyses to assess whether the effect of each predictor on symptoms changes over time. Notably, families with low SES and minoritized racial or ethnic group membership were recruited for participation in this study. The pandemic has further perpetuated inequity in mental-health risk factors for low SES families and people of color due to restricted opportunity structures that disproportionally affect marginalized groups in the United States (Ali et al., 2019; Golberstein et al., 2020; Tai et al., 2021; Wang et al., 2021), underscoring the importance of investigating mental health symptom trajectories of children in these families.

Method

Participants who were previously enrolled in one of two research studies at the University of North Carolina at Chapel Hill (UNC-CH) and had indicated a willingness to be contacted about future research opportunities were invited to participate in the current study. Both research studies originally recruited families at high risk for being impacted by structural inequality and/or for prior exposure to adverse experiences. This included families identifying as belonging to a minoritized racial or ethnic group, having a primary caregiver who did not attend college, having past experiences of family violence, or having a high risk for future family violence. Past family violence was determined by caregiver-reported involvement with child protective services, self-disclosure of violence history in the family, or endorsements of verbal or physical violence on the Conflict Tactics Scale (Straus, 1979). Risk for future family violence was determined by whether families met or exceeded the clinical cut-off score on the Child Abuse Potential Inventory (Milner, 1994). Caregivers were custodial, with children residing with caregivers at least 50% of the time. Children with major medical conditions, neurological illness, pervasive developmental disorders, or known prenatal substance exposure were not included in the study.

Following statewide stay-at-home orders in North Carolina (issued March 27, 2020), caregivers of 148 children who expressed interest in the current study provided informed consent and were sent surveys via a secure online platform, Qualtrics. Surveys assessing mental health symptoms, family functioning, and lifestyle changes related to COVID-19 were sent from April 7 (Survey 1) to June 15, 2021 (Survey 48). Participants with at least three repeated measures were included in analyses (Curran et al., 2010), yielding a sample of 133 children and their caregivers (n = 113). Power analyses indicated that a sample of 90 survey respondents providing data over the 48 assessment points would allow for the detection of small to medium effects in repeated measure models at $\alpha = 0.01$, adjusting for attrition and within-individual correlations. Thus, this sample size is sufficient to address the study aims. Demographic information on participating families is presented in Table 1. Surveys were distributed approximately weekly (see Table S1 for survey distribution dates). Caregivers were compensated $10 for the completion of each survey. All procedures were approved by the UNC-CH Institutional Review Board.

Measures

Depression symptoms Depression symptoms in children and caregivers were assessed via caregiver-report on four questions on the Mini-International Neuropsychiatric Interview (Sheehan et al., 1998), which assessed the following core features of Major Depressive Disorder: "in the past week, did [you/your child]…" (1) "…feel sad or depressed or down, empty or hopeless?"; (2) "…feel grouchy or annoyed?"; (3) "…feel bored a lot or much less interested in things?"; (4) "…feel like [you/they] could not enjoy things?" A positive endorsement to any question initiated a follow-up question assessing symptom severity: "when [you/your child] felt that [you/they] could not enjoy things, did [you/they] feel this way, most of the day, nearly every day?" A sum score was calculated for children and caregivers for each survey (range: 0–8) to represent total depression symptoms (child: α across timepoints = 0.75, caregiver: α across timepoints = 0.73).

Anxiety symptoms Anxiety symptoms in children and caregivers were assessed via caregiver-report on the Mini-International Neuropsychiatric Interview (MINI; Sheehan et al., 1998), assessing the following core Generalized Anxiety Disorder symptoms: "in the past week [have/has] [you/your child]…" (1) "…worried a lot or been nervous?"; (2) "…worried a lot or been nervous about several things, like school, your health, or something bad happening?"; (3) "…worried most days?"; (4) "…found it hard to stop worrying?"; (5) "did the worries make it hard for [you/your child] to pay attention to what they were doing?" An additional

Table 1 Descriptive statistics

Characteristic	Representation
Child age in years	
Mean (SD)	7.35 (1.03)
Child biological sex	
% Female	49.01%
Child ethnicity	
% Hispanic	10.08%
Child race	
% White	47.42%
% African American	37.11%
% Mixed race	9.28%
% Asian	4.12%
% American Indian or Alaska Native	1.03%
% Other	1.03%
Caregiver biological sex	
% Female	98.29%
% Male	1.71%
Caregiver education and employment	
% High school education or less	31.48%
% Unemployed or underemployed during the COVID-19 pandemic	60.83%
Household income (pre-pandemic)	
% Less than $5,000	2.90%
% $5,000 through $15,999	8.60%
% $16,000 through $24,999	11.50%
% $25,000 through $34,999	5.80%
% $35,000 through $49,999	12.50%
% $50,000 through $74,999	16.30%
% $75,000 through $99,999	7.70%
% $100,000 through $199,999	24.00%
% $200,000 and greater	6.70%

question was presented for caregiver-reported child symptoms to assess anxiety severity: "In the past week, has your child been more worried than others their age?" A sum score was calculated for children (range: 0–6) and caregivers (range: 0–5) on each survey to represent total anxiety symptoms (child: α across timepoints = 0.82, caregiver: α across timepoints = 0.63).

Family Conflict Family conflict was measured through a subset of six items from the Conflict Tactics Scale (CTS), which assesses family conflict within the whole family unit, five items from the CTS Parent–Child (CTS-PC), which assesses conflict within the parent–child relationship, and three items from the CTS-2 which assesses inter-partner violence (Straus, 1979; Straus et al., 1996, 1998). On the CTS, caregivers rated the frequency of the following behaviors within the past week on a 5-point Likert scale from 0 (never) to 4 (very often): (1) "Discussed an issue calmly" (reverse-coded); (2) "Insulted or swore at each other"; (3) "Did or said something to spite each another family member"; (4) "Threatened to hit or throw something at another family member"; (5) "Pushed, grabbed, or shoved another family member"; (6) "Kicked, bit, or hit another family member with a fist." On the CTS-PC, caregivers rated the frequency of the following behaviors within the past week on a 6-point Likert scale from 0 (never) to 5 (more than 20 times): "You or another adult…" (1) "…hit your child on the bottom with something like a belt, hairbrush, stick or some other hard object"; (2) "shouted, yelled, or screamed at your child"; (3) "said they would send your child away or kick him or her out of the house"; (4) "hit your child on some other part of the body besides the bottom with something like a belt, hairbrush, stick, or some other hard object"; (5) "slapped your child on the hand, arm, or leg." On the CTS-2,

caregivers rated the frequency of the following items in the past week on a 7-point scale from 0 (never) to 6 (more than 20 times): "You or your partner…" (1) "…pushed or shoved each other"; (2) "…slapped each other"; (3) "…punched or hit each other with something that could hurt."

The internal consistency and validity of the Conflict Tactic Scales have been well established, yielding alphas up to 0.95 (Straus et al., 1996, 1998), and past studies have supported the selection and combination of subsets of items from these measures (e.g., Calhoun et al., 2019; Teague et al., 2008). This set of items was selected to create a representative composite of conflict within the whole family unit, the parent–child relationship, and the parent-parent or parent-romantic partner relationship. Items were sample normed at each survey time point and summed at each survey time point for each survey data point to create 48 composites of total family conflict. The family conflict composite score demonstrated good reliability in this sample (α across timepoints = 0.82).

Pandemic-Related Environmental Changes Caregivers provided data on home quarantining and school/daycare format via two forced-choice survey questions on each repeated assessment: (1) During the last week, have you been sheltering-in-place/in quarantine (staying in your home almost all the time)? (no = 0, yes = 1), and (2) During the last week, have your children been in your care most of the time, or do they continue to have school/daycare arrangements? (They continue to have school/daycare arrangements = 0; They have been in my care most of the time = 1). This brief, forced-choice question format was selected to maximize participant engagement on repeated assessments.

Statistical Analysis

Data were prepared and analyzed in SPSS Version 28. Multilevel linear growth models were used to test study hypotheses across 48 longitudinal data points via SPSS MIXED. This modeling approach controls for significant correlations between assessments, is robust to the data dependency that occurs with repeated assessments over time, and is efficient in handling missing data (Laird & Ware, 1982). The trajectory shapes for child depression symptoms and child anxiety symptoms were identified through examining the fit and graphical displays of average- and individual-level trajectories of anxiety and depression and fitting linear and quadratic growth curve models, which were compared using mean and individual trajectory plots, change in -2 restricted log-likelihood, and chi-square difference tests. Two series of growth models were then conducted, with children's levels of anxiety or depression symptoms serving as the dependent variables in each respective model set. Twenty caregivers reported on multiple children. Thus, to allow for nesting of children within families and repeated assessments within children, we analyzed the dependent variables via multilevel mixed models that accounted for family, child, and assessment number. Level 1 (repeated measures) variables were nested within Level 2 variables (participants), who were nested within Level 3 variables (families). Continuous predictors were grand mean-centered prior to analyses to aid in result interpretation. Models included a random slope and intercept to allow for variation in the rate of change for independent variables and initial symptom levels, respectively. All other variables were treated as fixed predictors. Models utilized FIML within SPSS MIXED to account for missingness and include all available data, and modeling for the primary outcomes was conducted using an unstructured repeated measures covariance matrix.

Model 1 was a null model estimating sources of variance in depression symptom and anxiety symptom scores within and between participants. This model is used as a baseline model for deciding model fit for subsequent models that impose more structure on the data, including fixed and random effects. Model 2 was designed to assess symptom patterns over time by modeling the intercept and time (i.e., survey number). Both fixed and random effects of time were modeled. Model 3 included intercept, time, child age, child gender, and all risk factors (i.e., caregiver depression symptoms, caregiver anxiety symptoms, caregiver(s) employment status, family conflict, home quarantining, and school format). Model 4 extended Model 3 to include other child symptom (i.e., anxiety symptoms were controlled for when predicting depression symptoms; depression symptoms were controlled for when predicting anxiety symptoms). Including other child symptom in Model 4 allowed for an assessment of unique associations between risk factors and symptoms. The comparison of Models 3 and 4 establishes whether a variable (e.g., family conflict) has a direct association with a given outcome (e.g., child depression symptoms) or whether that variable's association is nonsignificant when accounting for indirect relations through the other symptom (e.g., child anxiety symptoms). Last, exploratory models were conducted to test whether hypothesized predictors were differentially related to child symptoms over time. Analyses were conducted by entering a time*[risk factor] interaction to Model 4 for each dependent variable (i.e., child depression symptoms, child anxiety symptoms). Interaction terms tested include time*household employment status, time*caregiver depression symptoms, time*caregiver anxiety symptoms, time*family conflict, time*sheltering-in-place, and time*school/daycare closures. Results provide data on change trajectories (i.e., slopes) for each risk factor from assessment 0 to 48.

The overall fit of each progressive model predicting child symptom cluster was evaluated using the −2 restricted

log-likelihood statistics (-2LL), with lower -2LL values indicating a better fit of the model to the data (Hox et al., 2017). A comparison of nested models was conducted by computing the difference in −2LL over the difference in degrees of freedom (i.e., the difference in the number of estimated parameters) using an ordinary chi-square distribution. A significant difference between the two models indicates that the model with the lowest value reflects increased model fit.

Results

Characteristics of this sample are presented in Table 1, and detailed descriptive statistics for study variables across all survey points are presented in a supplemental table (Table S1). Participants completed an average of 32 surveys, yielding a total of 4, 209 of 6,384 possible survey responses and providing a sufficient sample size to detect small to medium effects in repeated measures analyses. Patterns of missingness were assessed as a function of demographic data. No response differences emerged based on caregiver education ($F(7, 113) = 0.50$, $p = 0.830$), income ($F(11,104) = 1.18$, $p = 0.310$), child sex ($t(130) = 1.74$, $p = 0.085$), child age ($F(7, 124) = 0.54$, $p = 0.803$), child ethnicity ($t(130) = 0.70$, $p = 0.249$) or child race ($F(5, 126) = 1.359$, $p = 0.244$).

Figure 1 displays depression and anxiety symptoms trajectories over the 48 survey assessments. Symptoms are displayed as *z*-scores to allow for a standardized presentation of two non-uniformly scaled measures. The correlation between anxiety symptoms and depression symptoms in this sample is $r = 0.49$ ($p < 0.001$) at the aggregate level, with the correlation on a week-to-week basis ranging from $r = 0.17$ ($p = 0.129$) to $r = 0.79$ ($p < 0.001$). These correlations, as well as the divergent symptom patterns observed longitudinally (Fig. 1), suggest that anxiety and depression symptoms represent related but distinct categories of internalizing symptoms and support the use of the specificity analyses conducted.

In determining the trajectory and shape of symptom data, a linear term of time demonstrated the best fit for child depression symptom and child anxiety symptom models; thus, time was included as a linear variable in all analyses. Multilevel growth models are presented in Tables 2 and 3. Intercepts were significant in intercept-only models (Model 1) when child depression symptoms ($b = 0.78$, $p < 0.001$) and child anxiety symptoms ($b = 0.55$, $p < 0.001$) served as the respective independent variables. Model 2 was designed to assess symptom patterns over time by modeling the intercept and time (i.e., survey number). Adding time substantially improved model fit when predicting child depression symptoms (Δ-$2LL = 435.99$***) and child anxiety symptoms (Δ-$2LL = 559.70$***) compared to intercept-only models (i.e., Model 1). Time was significantly negatively related to child depression symptoms ($b = -0.01$, $p < 0.001$). Results indicate that depression symptoms were highest following initial stay-at-home orders in North Carolina and decreased over time (see Fig. 1a). Time was not significantly related to anxiety symptoms ($b = 0.00$, $p = 0.463$). Results indicate a variable pattern of anxiety symptoms over the 48 assessment points (see Fig. 1b).

Model 3 extended Model 2 to include child age, child gender, caregiver depression symptoms, caregiver anxiety symptoms, caregiver(s) employment status, family conflict, home quarantining, and school format. When modeling child depression symptoms as the dependent variable, caregiver depression symptoms ($b = 0.17$, $p < 0.001$), caregiver anxiety symptoms ($b = 0.06$, $p < 0.001$), family conflict ($b = 0.01$, $p = 0.017$), and sheltering-in-place ($b = 0.13$, $p = 0.018$) emerged as significant. The inclusion of these predictors improved the model fit, demonstrated by the large and significant reduction in –2LL compared to Model 2 (Δ-$2LL = 3807.87$, $p < 0.001$). When child anxiety symptoms were included in Model 4 to test specificity, the model fit again demonstrated significant improvement compared to Model 3 (Δ-$2LL = 398.79$, $p < 0.001$). In Model 4, caregiver depression symptoms ($b = 0.16$) and family conflict ($b = 0.01$) remained significantly associated with child depression symptoms at $p < 0.05$, and the association between caregiver anxiety symptoms and child depression symptoms remained marginally significant ($b = 0.03$, $p = 0.055$). The direction of results indicates that higher levels of caregiver depression symptoms, caregiver anxiety symptoms, and family conflict were each related to higher depression symptoms in children over the course of the COVID-19 pandemic. Of note, the association between sheltering-in-place and child depression was no longer significant when accounting for child anxiety symptoms ($b = 0.07$, $p = 0.136$).

When modeling child anxiety symptoms as the dependent variable in Model 3, caregiver depression symptoms ($b = 0.03$, $p = 0.026$), caregiver anxiety symptoms ($b = 0.11$, $p < 0.001$), and sheltering-in-place ($b = 0.18$, $p = 0.003$) emerged as significant predictors, such that higher caregiver depression and anxiety symptoms and more time spent home quarantining were related to increased anxiety symptoms in children. The inclusion of these predictors improved the model fit from the intercept and time model (Model 2), demonstrated by the large and significant reduction in –2LL (Δ-$2LL = 3136.38$, $p < 0.001$). When child depression symptoms were added in Model 4, model fit was again significantly improved compared to Model 3 (Δ-$2LL = 420.72$, $p < 0.001$), and all associations remained significant.

Exploratory models of time*risk-factor interactions were conducted to better understand how predictors may differentially predict child internalizing symptoms over time. When modeling child depression symptoms as the dependent

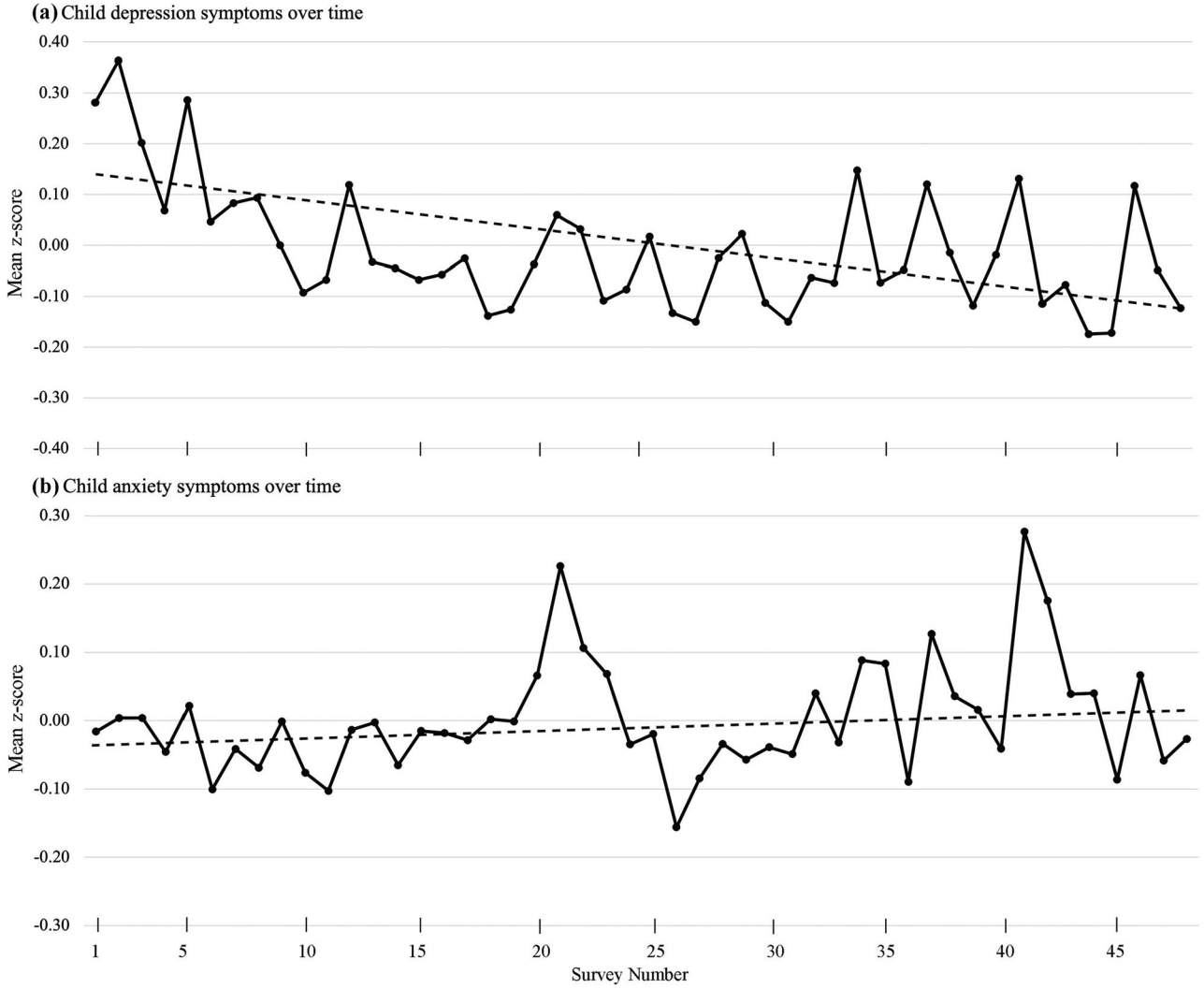

Fig. 1 Trajectories of child depression and anxiety symptoms over 48 repeated assessments (April 7, 2020 to June 15, 2021). Note: Symptoms depicted were transformed to z-scores to allow for a standardized presentation of depression and anxiety symptoms

variable, the interaction between family conflict and time emerged as significant, such that children experiencing high levels of family conflict exhibited significantly higher levels of depression symptoms than children experiencing low levels of family conflict only in the initial weeks following lockdown. This difference diminished over time (b = -0.001, p = 0.002) (Table S2; Fig. S1a). The interaction between sheltering-in-place and time also emerged as significant, such that children sheltering-in-place exhibited significantly higher depression symptoms compared to children *not* sheltering-in-place during earlier, but not later, assessment points (b = -0.01, p = 0.017) (Table S2; Fig. S1b). When modeling child anxiety symptoms as the dependent variable, the interaction of school/daycare closures and time emerged as significant, such that children who attended school or daycare in person exhibited significantly higher anxiety symptoms during initial assessment periods but significantly lower anxiety symptoms during later assessment periods compared to children who did not attend school or daycare in person (b = -0.02, $p < 0.001$) (Table S3; Fig. S1c).

Table 2 Multilevel growth model predicting child depression symptoms

	Estimate	SE	CI (95%)	*p*	*Change in model fit*
Model 1: Null model					
Intercept	0.78	0.02	(0.54, 1.03)	< 0.001	
Model 2: Symptoms over time					*Δ-2LL* = 435.99***
Intercept	0.93	0.12	(0.69, 1.18)	< 0.001	
Time	-0.01	0.00	(-0.01, -0.00)	< 0.001	
Model 3: Final model					*Δ-2LL* = 3807.87***
Intercept	0.58	0.15	(0.28, 0.89)	< 0.001	
Time	-0.01	0.00	(-0.01, -0.00)	0.021	
Child age	0.02	0.03	(-0.05, 0.08)	0.580	
Child sex	-0.15	0.10	(-0.37, 0.07)	0.153	
Caregiver depression symptoms	0.17	0.01	(0.14, 0.20)	< 0.001	
Caregiver anxiety symptoms	0.06	0.01	(0.03, 0.09)	< 0.001	
Household employment	0.18	0.10	(-0.01, 0.37)	0.058	
Family conflict	0.01	0.01	(0.00, 0.03)	0.017	
Sheltering in place	0.13	0.05	(0.02, 0.23)	0.018	
School/Daycare	0.03	0.05	(-0.05, 0.12)	0.444	
Model 4: Final model					*Δ-2LL* = 398.79***
Intercept	0.67	0.15	(0.38, 0.95)	< 0.001	
Time	-0.01	0.00	(-0.01, -0.00)	0.001	
Child age	0.01	0.03	(-0.05, 0.05)	0.970	
Child sex	-0.10	0.09	(-0.26, 0.09)	0.323	
Child anxiety symptoms	0.31	0.01	(0.28, 0.34)	< 0.001	
Caregiver depression symptoms	0.16	0.01	(0.13, 0.19)	< 0.001	
Caregiver anxiety symptoms	0.03	0.01	(-0.00, 0.05)	0.055	
Household employment	0.12	0.09	(-0.05, 0.29)	0.175	
Family conflict	0.01	0.01	(0.00, 0.02)	0.034	
Sheltering in place	0.07	0.05	(-0.02, 0.17)	0.136	
School/daycare closures	0.03	0.04	(-0.05, 0.11)	0.430	

Model 1 ICC = 0.70; Model 2 ICC = 0.69; Model 3 ICC = 0.56; Model 4 ICC = 0.56

Δ-2LL Change in -2 Restricted Log Likelihood between models

***$p < 0.001$

Discussion

Evidence from sociohistorical events and an emerging body of work suggests that the COVID-19 pandemic may have a short- and long-term impact on children's mental health. The intensive longitudinal structure of this data allowed for an examination of the trajectories and predictors of children's depression and anxiety symptoms throughout 15 months of the COVID-19 pandemic. In this sample, children's depression symptoms were highest immediately following stay-at-home orders in North Carolina and decreased linearly over time, while anxiety symptoms remained variable, demonstrating no significant trend over time. Results demonstrated that caregiver depression symptoms and family conflict uniquely predicted child depression symptoms, while caregiver depression symptoms, caregiver anxiety symptoms, and time spent home quarantining uniquely predicted child anxiety symptoms.

Caregiver anxiety and depression symptoms emerged as the only diffuse predictors when considering these models together, although the association between caregiver anxiety symptoms and child depression symptoms only approached significance. The association parallels patterns commonly observed in the extant literature of caregiver symptoms predicting broadband child internalizing problems (Bayer et al., 2006; Burstein et al., 2010; Colletti et al., 2009; Lewis et al., 2011), but the specific mechanisms underlying these connections in the context of the pandemic remain speculative. Generalized anxiety in caregivers could be influencing child anxiety through many pathways, including (1) increasing the child's perception of threat (e.g., hypervigilance to coronavirus transmission and morbidity); (2) engaging in overcontrolling behaviors that limit opportunities for children to develop skills to cope with unexpected environmental events; or (3) reinforcing or not correcting anxious information processing biases in offspring (Spence & Rapee, 2016;

Table 3 Multilevel growth model predicting child anxiety symptoms

	Estimate	SE	CI	*p*	*Change in model fit*
Model 1: Null model					
Intercept	0.55	0.11	(0.33, 0.77)	< 0.001	
Model 2: Symptoms over time					Δ-*2LL* = 559.70***
Intercept	0.47	0.09	(0.28, 0.65)	< 0.001	
Time	0.00	0.00	(-0.00, 0.01)	0.463	
Model 3: Final model					Δ-*2LL* = 3136.38***
Intercept	0.22	0.19	(-0.16, 0.60)	0.251	
Time	0.00	0.01	(-0.01, 0.01)	0.547	
Child age	0.03	0.06	(-0.10, 0.16)	0.605	
Child sex	-0.13	0.22	(-0.57, 0.31)	0.556	
Caregiver depression symptoms	0.03	0.02	(0.00, 0.07)	0.026	
Caregiver anxiety symptoms	0.11	0.02	(0.07, 0.14)	< 0.001	
Household employment	0.15	0.11	(-0.06, 0.36)	0.157	
Family conflict	0.01	0.01	(-0.00, 0.02)	0.104	
Sheltering in place	0.18	0.06	(0.06, 0.30)	0.003	
School/daycare closures	-0.02	0.05	(-0.13, 0.08)	0.629	
Model 4: Final model					Δ-*2LL* = 420.72***
Intercept	0.24	0.18	(-0.12, 0.59)	0.189	
Time	0.01	0.01	(-0.02, 0.03)	0.676	
Child age	-0.00	0.06	(-0.13, 0.12)	0.958	
Child sex	0.00	0.21	(-0.43, 0.43)	0.999	
Child depression symptoms	0.42	0.02	(0.38, 0.45)	< 0.001	
Caregiver depression symptoms	0.04	0.01	(0.01, 0.06)	0.018	
Caregiver anxiety symptoms	0.08	0.02	(0.05, 0.11)	< 0.001	
Household employment	0.08	0.10	(-0.12, 0.27)	0.452	
Family conflict	0.00	0.01	(-0.01, 0.02)	0.445	
Sheltering in place	0.13	0.06	(0.02, 0.24)	0.021	
School/daycare closures	-0.05	0.05	(-0.14, 0.04)	0.307	

ICC Model 1 = 0.62; ICC Model 2 = 0.55; ICC Model 3 = 0.54; ICC Model 4 = 0.55

Δ-*2LL* = Change in -2 Restricted Log Likelihood between models

***$p < 0.001$

Zinbarg & Barlow, 1996). Increased child anxiety related to parental modeling of anxiety and avoidance may, in turn, increase feelings of sadness and hopelessness in children (i.e., depression symptoms), in line with causal models of comorbid anxiety and depression which posit that anxiety symptoms precede and instigate depression symptoms (Mathew et al., 2011). Alternatively, observed anxiety in caregivers may be more directly linked to child depression symptoms, such that caregiver messages of fear and uncertainty are internalized by offspring as feelings of sadness and hopelessness. Caregiver depression symptoms are often manifested as decreased warmth and increased withdrawal, implicit and explicit modeling of sadness and hopelessness, and a lack of support or encouragement, which may spur similar behaviors and symptoms in children. Child anxiety symptoms could reflect concern about caregiver well-being and external systems or the interference of caregiver depression symptoms on caregivers' ability to mitigate child anxiety symptoms. It is also important to acknowledge that these effects could also be attributable to unmeasured variables (e.g., genetic transmission). Additional research is needed to delineate transmission mechanisms of caregiver depression and anxiety symptoms to child depression and anxiety symptoms within the context of the COVID-19 pandemic.

Family conflict emerged as a unique predictor of child depression symptoms when controlling for child anxiety symptoms. The link between family conflict and child depression has been well-established. Family conflict is theorized to increase depression symptoms via a stressful family environment that undermines children's coping resources (Garber & Weersing, 2010), decreases children's perception that they can safely discuss negative feelings with family members (Stice et al., 2004), and increases negative cognitions and information processing errors (Dozois & Beck, 2008). It is likely that this link became more pronounced during

the COVID-19 pandemic due to increased confinement with family members, increased caregiver stress, and decreased access to typical outlets for stress relief. A significant time by family conflict interaction also emerged in exploratory analyses. Specifically, high levels of family conflict were related to significantly higher levels of child depression symptoms during the initial weeks of the pandemic only, which could be due to the influence of stressors exacerbating the impact of family dynamics on symptoms (e.g., initial disruption of routines) that diminished over time. Notably, past research has also cited links between family conflict and child anxiety symptoms (Drake & Ginsburg, 2012), which was not observed in the current sample. However, to our knowledge, no previous studies have tested the unique pathways from family conflict to child anxiety symptom trajectories while controlling for child depression symptoms, suggesting that the associations between family conflict and child anxiety in previous research could be partly attributable to the strong association between family conflict and co-occurring depressive symptoms.

Sheltering-in-place initially emerged as a predictor of child depression symptoms (Model 3), but the significance of this association diminished when controlling for child anxiety symptoms (Model 4). This suggests that quarantining may influence depression symptoms, in part, through anxiety symptoms. However, a significant interaction of sheltering-in-place by time predicting child depression symptoms emerged, suggesting that time may also explain this association. Interaction analyses revealed that children sheltering-in-place exhibited significantly higher depression symptoms during initial assessments compared to children not sheltering-in-place, but group differences dissipated over time. This time-dependent effect suggests that the disruption in children's routines, which likely resulted in the elimination of typical and expected mood-boosting activities (e.g., interacting with peers), may have prompted depression symptoms initially. However, as children adapted to quarantine (e.g., identified alternate positive activities, developed adaptive coping strategies), the association between sheltering-in-place and depression symptoms was eliminated.

More time spent sheltering-in-place was uniquely related to increased child anxiety symptoms in final main-effect models. This finding is in line with past studies exploring the effects of pandemic-related isolation (Sprang & Silman, 2013), yet explanations for this association are unclear and may vary between individuals. Fear of virus transmission and uncertainty of the future may be compounded by continued avoidance of external stimuli or exacerbated by exposure to the media. Alternatively, children who are home-quarantining may have difficulty identifying coping methods for emerging anxiety symptoms, especially if typically used methods are inaccessible (e.g., venting with peers, attending extracurricular activities). Exploring novel and safe avenues for anxiety treatment during periods of quarantine to offset the long-term impact of increased isolation is a critical target to promote child well-being (e.g., exposure therapy via video conferencing, positive reappraisal or reframing exercises, writing/imagery exposure work, physical activity, and facilitating the maintenance of social interactions via social media, video conferencing, or social distancing).

Last, although unrelated to child depression or anxiety symptoms in main effect models, school or daycare closures were significantly linked to anxiety in exploratory analyses of risk factors over time. Children who were able to attend school or daycare as usual exhibited significantly higher anxiety symptoms in the initial weeks following lockdown and significantly lower anxiety symptoms at later assessment points compared to children experiencing school or daycare closures. This time-dependent association may reflect the short-term protective influence yet long-term intensifying influence of avoidance on anxiety symptoms.

In addition to elucidating risk factors for depression and anxiety symptoms in children during the COVID-19 pandemic, findings hold broader implications for the potential differences in the etiology, maintenance, and presentation of internalizing symptoms, particularly during periods of increased stress. The extent to which depression and anxiety represent distinct disorders has previously been questioned. Studies with school-age children using parent reports and other diagnostic tools have shown strong relations between anxiety and depression, prompting arguments that anxiety and depression should be understood as a single construct of "distress disorders" in youth (Watson, 2005). However, the current results suggest that anxiety and depression in childhood are distinct constructs. The observed pattern of depression symptoms is in line with trends of improvement and stabilization of depression symptoms observed in other samples experiencing long-term stress and isolation (e.g., incarcerated adults; Porter & DeMarco, 2019). Interestingly, the pattern of anxiety symptoms observed in this sample diverges from the depression symptom trajectory, which could reflect a more immediate impact of acute, proximal stressors on anxiety symptoms in young children.

Limitations and Strengths Results should be interpreted within the limitations of the study. First, participants were recruited from the central region of North Carolina. Preliminary evidence suggests that the coronavirus pandemic differentially impacted people in the United States based on location-related factors (e.g., differences in lifestyle, reliance on public transit systems, disease prevalence, hospital access; Tai et al., 2021; Tan et al., 2020). It is possible that the trajectories and predictors of internalizing symptoms observed in this study were unique to children living in this area of the United States with this set of sample characteristics. Replication is required before generalizability can be assumed.

Second, abbreviated versions of questionnaires assessing anxiety symptoms, depression symptoms, and family conflict were used, as well as forced-choice questions assessing home quarantining and school format. Of note, the questions from the MINI were chosen to capture the core symptoms of Major Depressive Disorder and Generalized Anxiety Disorder while limiting participant burden to maximize response likelihood (e.g., Bech, 2016; Calhoun et al., 2019; Teague et al., 2008). The assessment of core symptoms also avoided possible endorsement of items that may have reflected pandemic-related environmental changes rather than true symptom presentation. For example, changes in routine (e.g., not having a "start-time" for school) have been linked to altered sleeping patterns and fatigue due to the elimination of strict schedules and other influences (e.g., increased screen time), which may lead to inaccurate symptom reporting on caregiver-reported questionnaires (Lim et al., 2021). Nevertheless, it is important to highlight that the assessment of select symptoms negates our ability to draw conclusions on the presence or absence of clinically significant internalizing disorders in our sample.

Regarding study design, it is important to note that the use of caregiver-report for all measures and the repeated assessment design could introduce confounds of shared method variance and participant reactivity. Results should be interpreted with this in mind. However, studies have long since utilized caregiver reports, and this was a necessary design feature to gather at-home surveys given the sample's age range (4–11 years). Regarding participant reactivity, the literature suggests that the assessment of multiple symptoms/behaviors diminishes potential reactivity to repeated assessments (Barta et al., 2012) and further notes that reactivity to repeated assessments is unlikely to account for a substantial amount of variance in symptoms (Maisto et al., 2007); thus, we do not view this as a major concern for the current work.

Finally, many additional variables are likely to impact child internalizing symptoms in the context of the COVID-19 pandemic that were not included in the present study. For example, only pre-pandemic income data was available for our sample, eliminating the possibility of an accurate assessment of how financial status/income impacted child symptoms over time. Pandemic-specific variables were also not included in this study, such as virus exposure, virus transmission, infection rates, or virus mitigating protocols, despite evidence linking these variables to internalizing symptoms in adults (e.g., Ebrahimi et al., 2021). We opted not to include these variables, given that the goal of this work was to examine more proximal environmental stressors. However, examining health-related changes in the external environment (e.g., infection rates) and internal environment (e.g., infection of a family member) in relation to child symptoms represents an important target for future work.

Clinical Implications The need for mental health services, particularly for high-risk families, has increased during the COVID-19 pandemic, but there is a co-occurring shortage of mental health services (Golberstein et al., 2020). School closures furthered this problem for children, as schools are the primary source of mental health services for approximately 57% of children in the United States, particularly for marginalized groups (Ali et al., 2019). Given the mismatch between service availability and need, it is critical to understand risk factors for childhood anxiety and depression symptoms during periods of crisis to (a) identify children in greatest need of receiving mental health services and (b) increase intervention effectiveness. The current study provides a scientific basis for formulating targeted interventions in three primary domains. First, depression and anxiety symptoms in caregivers should be addressed, as they may, in turn, affect child symptom presentation. Second, family-level treatments to decrease conflict and hostility in the parent–child relationship, parent-parent relationship, and whole-family unit may serve as a downstream treatment mechanism for depression symptoms in children during the COVID-19 pandemic. Third, treatments to mitigate the impact of adhering to stay-at-home orders on child symptoms (e.g., cognitive-behavioral therapy and exposure therapy) should be implemented, and the presentation, severity, and chronicity of internalizing symptoms following periods of quarantine should be further explored. Bureau of Labor Statistics (2022).

Conclusion The longitudinal symptom patterns and associated risk factors observed in this study should be used to inform interventions aiming to offset the long-term consequences of the COVID-19 pandemic, particularly for children in families at increased risk for adversity exposure. Future studies should continue to explore the impact of the coronavirus pandemic on the emergence of mental health symptoms as well as clinically significant disorders, paying particular attention to mechanisms that serve to mitigate risk.

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Compliance with Ethical Standards

Ethics Approval This study was performed in line with the principles of the Declaration of Helsinki. Approval was granted by the Institutional

Review Board at the University of North Carolina at Chapel (Date. 04/01/2020/No. 16-1278).

Consent to Participate Informed consent was obtained from all individual participants included in the study.

Consent for Publication The authors affirm that human research participants provided informed consent for the publication of their data.

Conflict of Interest The authors have no conflicts of interest to disclose.

References

Ali, M. M., West, K., Teich, J. L., Lynch, S., Mutter, R., & Dubenitz, J. (2019). Utilization of mental health services in educational setting by adolescents in the United States. *Journal of School Health, 89*(5), 393–401. https://doi.org/10.1111/josh.12753

Barta, W. D., Tennen, H., & Litt, M. D. (2012). Measurement reactivity in diary research. In M. R. Mehl & T. S. Conner (Eds.), *Handbook of research methods for studying daily life* (pp. 108–123). New York, NY: Guilford.

Bayer, J. K., Sanson, A. V., & Hemphill, S. A. (2006). Parent influences on early childhood internalizing difficulties. *Journal of Applied Developmental Psychology, 27*(6), 542–559. https://doi.org/10.1016/j.appdev.2006.08.002

Beardslee, W. R., Gladstone, T., & O'Connor, E. (2011). Transmission and prevention of mood disorders among children of affectively ill parents: A review. *Journal of the American Academy of Child & Adolescent Psychiatry, 50*(11), 1098–1109. https://doi.org/10.1016/j.jaac.2011.07.020

Bech, P. (2016). Diagnostic Rating Scales. In P. Bech (Ed.), *Measurement-Based Care in Mental Disorders* (pp. 55–77). Springer International Publishing. https://doi.org/10.1007/978-3-319-46651-4_7

Behar, E., DiMarco, I., Hekler, E., Mohlman, J., & Staples, A. (2009). Current theoretical models of generalized anxiety disorder (GAD): Conceptual review and treatment implications. *Journal of Anxiety Disorders, 23*(8), 1011–1023. https://doi.org/10.1016/j.janxdis.2009.07.006

Bronfenbrenner, U., & Morris, P. A. (2006). The bioecological model of human development. In R. M. Lerner & W. Damon (Eds.), *Handbook of child psychology: Theoretical models of human development* (pp. 793–828). John Wiley & Sons.

Bureau of Labor Statistics. (2022). *Employment situation news release.* https://www.bls.gov/news.release/archives/empsit_04012022.pdf

Burstein, M., Ginsburg, G. S., & Tein, J. Y. (2010). Parental anxiety and child symptomatology: An examination of additive and interactive effects of parent psychopathology. *Journal of Abnormal Child Psychology, 38*(7), 897–909. https://doi.org/10.1007/s10802-010-9415-0

Calhoun, B. H., Ridenour, T. A., & Fishbein, D. H. (2019). Associations between child maltreatment, harsh parenting, and sleep with adolescent mental health. *Journal of Child and Family Studies, 28*(1), 116–130. https://doi.org/10.1007/s10826-018-1261-7

Campbell, A. M. (2020). An increasing risk of family violence during the Covid-19 pandemic: Strengthening community collaborations to save lives. *Forensic Science International: Reports, 2*, 100089. https://doi.org/10.1016/j.fsir.2020.100089

Colletti, C. J., Forehand, R., Garai, E., Rakow, A., McKee, L., Fear, J. M., & Compas, B. E. (2009). Parent depression and child anxiety: an overview of the literature with clinical implications. *Child & Youth Care Forum, 38*(3), 151–160. https://doi.org/10.1007/s10566-009-9074-x

Costello, E. J., Copeland, W., & Angold, A. (2011). Trends in psychopathology across the adolescent years: What changes when children become adolescents, and when adolescents become adults? *Journal of Child Psychology and Psychiatry, 52*(10), 1015–1025.

Curran, P. J., Obeidat, K., & Losardo, D. (2010). Twelve frequently asked questions about growth curve modeling. *Journal of Cognition and Development: Official Journal of the Cognitive Development Society, 11*(2), 121–136. https://doi.org/10.1080/15248371003699969

Dozois, D. J., & Beck, A. T. (2008). Cognitive schemas, beliefs and assumptions. In K. S. Dobson & D. J. A. Dozois (Eds.), *Risk factors in depression* (pp. 119–143). Academic Press. https://doi.org/10.1016/B978-0-08-045078-0.00006-X

Drake, K. L., & Ginsburg, G. S. (2012). Family factors in the development, treatment, and prevention of childhood anxiety disorders. *Clinical Child and Family Psychology Review, 15*(2), 144–162. https://doi.org/10.1007/s10567-011-0109-0

Ebrahimi, O. V., Bauer, D. J., Hoffart, A., & Johnson, S. U. (2021). *The evolution of depressive symptomatology across three waves of the COVID-19 pandemic: A 17-month representative longitudinal study of the adult population*. PsyArXiv.

Egan, S., & Pope, J. (2021). A Bioecological Systems Approach to Understanding the Impact of the COVID-19 Pandemic: Implications for the Education and Care of Young Children. *The Impact of COVID-19 on Early Childhood Education and Care* (pp. 15–31). Cham: Springer. https://doi.org/10.13140/RG.2.2.15231.33440

El-Sheikh, M., & Erath, S. (2011). Family conflict, autonomic nervous system functioning, and child adaptation: State of the science and future directions. *Development and Psychopathology, 23*(2), 703–721. https://doi.org/10.1017/S0954579411000034

Fancourt, D., Steptoe, A., & Bu, F. (2020). Trajectories of anxiety and depressive symptoms during enforced isolation due to COVID-19 in England: A longitudinal observational study. *The Lancet Psychiatry, 8*(2), 141–149. https://doi.org/10.1016/S2215-0366(20)30482-X

Fisak, B., & Grills-Taquechel, A. E. (2007). Parental modeling, reinforcement, and information transfer: Risk factors in the development of child anxiety? *Clinical Child and Family Psychology Review, 10*(3), 213–231. https://doi.org/10.1007/s10567-007-0020-x

Garber, J., & Weersing, V. R. (2010). Comorbidity of anxiety and depression in youth: Implications for treatment and prevention. *Clinical Psychology: Science and Practice, 17*(4), 293. https://doi.org/10.1111/j.1468-2850.2010.01221.x

Golberstein, E., Wen, H., & Miller, B. F. (2020). Coronavirus disease 2019 (COVID-19) and mental health for children and adolescents. *JAMA Pediatrics, 174*(9), 819–820. https://doi.org/10.1001/jamapediatrics.2020.1456

Goodman, S. H. (2020). Intergenerational transmission of depression. *Annual Review of Clinical Psychology, 16*, 213–238. https://doi.org/10.1146/annurev-clinpsy-071519-113915

Gutman, L. M., & Codiroli McMaster, N. (2020). Gendered pathways of internalizing problems from early childhood to adolescence and associated adolescent outcomes. *Journal of Abnormal Child Psychology, 48*(5), 703–718. https://doi.org/10.1007/s10802-020-00623-w

Hox, J. J., Moerbeek, M., & van de Schoot, R. (2017). *Multilevel Analysis: Techniques and Applications* (3rd ed.). Routledge. https://doi.org/10.4324/9781315650982

Hammen, C. (2005). Stress and depression. *Annual Review of Clinical Psychology, 1*, 293–319. https://doi.org/10.1146/annurev.clinpsy.1.102803.143938

Kessler, R. C., Petukhova, M., Sampson, N. A., Zaslavsky, A. M., & Wittchen, H.-U. (2012). Twelve-month and lifetime prevalence and lifetime morbid risk of anxiety and mood disorders in the United States. *International Journal of Methods in Psychiatric Research, 21*(3), 169–184. https://doi.org/10.1002/mpr.1359

Kieling, C., Baker-Henningham, H., Belfer, M., Conti, G., Ertem, I., Omigbodun, O., Rohde, L. A., Srinath, S., Ulkuer, N., & Rahman, A. (2011). Child and adolescent mental health worldwide: Evidence for action. *The Lancet, 378*(9801), 1515–1525. https://doi.org/10.1016/S0140-6736(11)60827-1

Laird, N. M., & Ware, J. H. (1982). Random-effects models for longitudinal data. *Biometrics, 38*(4), 963. https://doi.org/10.2307/2529876

Lewis, G., Rice, F., Harold, G. T., Collishaw, S., & Thapar, A. (2011). Investigating environmental links between parent depression and child depressive/anxiety symptoms using an assisted conception design. *Journal of the American Academy of Child and Adolescent Psychiatry, 50*(5), 451–459. https://doi.org/10.1016/j.jaac.2011.01.015

Lim, M. T. C., Ramamurthy, M. B., Aishworiya, R., Rajgor, D. D., Tran, A. P., Hiriyur, P., Kunaseelan, S., Jabri, M., & Goh, D. Y. T. (2021). School closure during the coronavirus disease 2019 (COVID-19) pandemic – Impact on children's sleep. *Sleep Medicine, 78*, 108–114. https://doi.org/10.1016/j.sleep.2020.12.025

Maciejewski, D., Hillegers, M., & Penninx, B. (2018). Offspring of parents with mood disorders: Time for more transgenerational research, screening and preventive intervention for this high-risk population. *Current Opinion in Psychiatry, 31*(4), 349–357. https://doi.org/10.1097/yco.0000000000000423

Maisto, S. A., Clifford, P. R., & Davis, C. M. (2007). Alcohol treatment research assessment exposure subject reactivity effects: Part II. Treatment engagement and involvement. *Journal of Studies on Alcohol and Drugs, 68*(4), 529–533. https://doi.org/10.15288/jsad.2007.68.529

Mathew, A. R., Pettit, J. W., Lewinsohn, P. M., Seeley, J. R., & Roberts, R. E. (2011). Co-morbidity between major depressive disorder and anxiety disorders: Shared etiology or direct causation? *Psychological Medicine, 41*(10), 2023–2034. https://doi.org/10.1017/S0033291711000407

Milner, J. S. (1994). Assessing physical child abuse risk: The child abuse potential inventory. *Clinical Psychology Review, 14*(6), 547–583. https://doi.org/10.1016/0272-7358(94)90017-5

Oliveira, J. M. D. D., Butini, L., Pauletto, P., Lehmkuhl, K. M., Stefani, C. M., Bolan, M., & Massignan, C. (2022). Mental health effects prevalence in children and adolescents during the COVID-19 pandemic: A systematic review. *Worldviews on Evidence-Based Nursing, 19*(2), 130–137. https://doi.org/10.1111/wvn.12566

Patterson, M. W., Mann, F. D., Grotzinger, A. D., Tackett, J. L., Tucker-Drob, E. M., & Harden, K. P. (2018). Genetic and environmental influences on internalizing psychopathology across age and pubertal development. *Developmental Psychology, 54*(10), 1928–1939. https://doi.org/10.1037/dev0000578

Polanczyk, G. V., Salum, G. A., Sugaya, L. S., Caye, A., & Rohde, L. A. (2015). Annual Research Review: A meta-analysis of the worldwide prevalence of mental disorders in children and adolescents. *Journal of Child Psychology and Psychiatry, 56*(3), 345–365. https://doi.org/10.1111/jcpp.12381

Porter, L. C., & DeMarco, L. M. (2019). Beyond the dichotomy: Incarceration dosage and mental health. *Criminology, 57*(1), 136–156. https://doi.org/10.1111/1745-9125.12199

Racine, N., McArthur, B. A., Cooke, J. E., Eirich, R., Zhu, J., & Madigan, S. (2021). Global prevalence of depressive and anxiety symptoms in children and adolescents during COVID-19: A meta-analysis. *JAMA Pediatrics, 175*(11), 1142–1150. https://doi.org/10.1001/jamapediatrics.2021.2482

Robinson, E., Sutin, A. R., Daly, M., & Jones, A. (2022). A systematic review and meta-analysis of longitudinal cohort studies comparing mental health before versus during the COVID-19 pandemic in 2020. *Journal of Affective Disorders, 296*, 567–576. https://doi.org/10.1101/2021.03.04.21252921

Sheehan, D. V., Lecrubier, Y., Sheehan, K. H., Amorim, P., Janavs, J., Weiller, E., & Dunbar, G. C. (1998). The Mini-International Neuropsychiatric Interview (MINI): The development and validation of a structured diagnostic psychiatric interview for DSM-IV and ICD-10. *Journal of Clinical Psychiatry, 59*(20), 22–33.

Spence, S. H., & Rapee, R. M. (2016). The etiology of social anxiety disorder: An evidence-based model. *Behaviour Research and Therapy, 86*, 50–67. https://doi.org/10.1016/j.brat.2016.06.007

Sprang, G., & Silman, M. (2013). Posttraumatic stress disorder in parents and youth after health-related disasters. *Disaster Medicine and Public Health Preparedness, 7*(1), 105–110. https://doi.org/10.1017/dmp.2013.22

Sterba, S. K., Prinstein, M. J., & Cox, M. J. (2007). Trajectories of internalizing problems across childhood: Heterogeneity, external validity, and gender differences. *Development and Psychopathology, 19*(2), 345–366. https://doi.org/10.1017/S0954579407070174

Stice, E., Ragan, J., & Randall, P. (2004). Prospective relations between social support and depression: Differential direction of effects for parent and peer support? *Journal of Abnormal Psychology, 113*(1), 155. https://doi.org/10.1037/0021-843X.113.1.155

Straus, M. A. (1979). Measuring intrafamily conflict and violence: The conflict tactics (CT) scales. *Physical violence in American families* (pp. 29–48). Routledge. https://doi.org/10.2307/351733

Straus, M. A., Hamby, S. L., Boney-McCoy, S. U. E., & Sugarman, D. B. (1996). The revised conflict tactics scales (CTS2) development and preliminary psychometric data. *Journal of Family Issues, 17*(3), 283–316. https://doi.org/10.1177/019251396017003001

Straus, M. A., Hamby, S. L., Finkelhor, D., Moore, D. W., & Runyan, D. (1998). Identification of child maltreatment with the Parent-Child Conflict Tactics Scales: Development and psychometric data for a national sample of American parents. *Child Abuse & Neglect, 22*(4), 249–270. https://doi.org/10.1016/S0145-2134(97)00174-9

Tai, D. B. G., Shah, A., Doubeni, C. A., Sia, I. G., & Wieland, M. L. (2021). The Disproportionate Impact of COVID-19 on Racial and Ethnic Minorities in the United States. *Clinical Infectious Diseases, 72*(4), 703–706. https://doi.org/10.1093/cid/ciaa815

Tan, T. Q., Kullar, R., Swartz, T. H., Mathew, T. A., Piggott, D. A., & Berthaud, V. (2020). Location matters: Geographic disparities and impact of coronavirus disease 2019. *The Journal of Infectious Diseases, 222*(12), 1951–1954. https://doi.org/10.1093/infdis/jiaa583

Teague, R., Mazerolle, P., Legosz, M., & Sanderson, J. (2008). Linking childhood exposure to physical abuse and adult offending: Examining mediating factors and gendered relationships. *Justice Quarterly, 25*(2), 313–348. https://doi.org/10.1080/07418820802024689

Watson, D. (2005). Rethinking the mood and anxiety disorders: A quantitative hierarchical model for DSM-V. *Journal of Abnormal Psychology, 114*(4), 522. https://doi.org/10.1037/0021-843X.114.4.522

Wang, M. T., Henry, D. A., Del Toro, J., Scanlon, C. L., & Schall, J. D. (2021). COVID-19 employment status, dyadic family relationships, and child psychological well-being. *Journal of Adolescent Health, 69*(5), 705–712. https://doi.org/10.1016/j.jadohealth.2021.07.016

Wu, M., Xu, W., Yao, Y., Zhang, L., Guo, L., Fan, J., & Chen, J. (2020). Mental health status of students' parents during COVID-19 pandemic and its influence factors. *General Psychiatry, 33*(4), e100250. https://doi.org/10.1136/gpsych-2020-100250

Xiang, M., Zhang, Z., & Kuwahara, K. (2020). Impact of COVID-19 pandemic on children and adolescents' lifestyle behavior larger than expected. *Progress in Cardiovascular Diseases, 63*(4), 531. https://doi.org/10.1016/j.pcad.2020.04.013

Yavorsky, J. E., Qian, Y., & Sargent, A. C. (2021). The gendered pandemic: The implications of COVID-19 for work and family. *Sociology Compass, 15*(6), e12881. https://doi.org/10.1111/soc4.12881

Zinbarg, R. E., & Barlow, D. H. (1996). Structure of anxiety and the anxiety disorders: A hierarchical model. *Journal of Abnormal Psychology, 105*(2), 181–193. https://doi.org/10.1037/0021-843X.105.2.181