## Title

Young children's traumatic stress reactions to the COVID-19 pandemic: The long reach of mothers' adverse childhood experiences



## Authors

Hagan, Melissa J
Roubinov, Danielle R
Cordeiro, Alana
et al.

## Publication Date

2022-12-01

## DOI

10.1016/j.jad.2022.08.061

Peer reviewed


Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Journal of Affective Disorders 318 (2022) 130–138

Contents lists available at ScienceDirect

Journal of Affective Disorders

journal homepage: www.elsevier.com/locate/jad

# Young children's traumatic stress reactions to the COVID-19 pandemic: The long reach of mothers' adverse childhood experiences

Melissa J. Hagan [*,1], Danielle R. Roubinov [1], Alana Cordeiro, Nadra Lisha, Nicole R. Bush

ARTICLE INFO

*Keywords:*
COVID-19
Adverse childhood events
Traumatic stress
Parent-child relationship

ABSTRACT

*Background:* The COVID-19 pandemic has negatively impacted parental and child mental health; however, it is critical to examine this impact in the context of parental histories of adversity. We hypothesized that maternal adverse childhood experiences (ACEs) and pandemic-related negative life events would predict child traumatic stress symptoms (TSS) and tested potential mediating pathways through maternal pandemic-related TSS and/or poorer maternal sensitivity during the pandemic.

*Methods:* Data were collected from a longitudinal sample of low-income, racially/ethnically diverse mothers and their children. Between May and November 2020, mothers ($n = 111$) of young children (M age = 7.42 years, SD = 0.45) completed questionnaires to assess their own and their child's pandemic-related TSS, exposure to pandemic-related negative events, and parent-child relationship quality. Maternal ACEs, maternal depression, parent-child relationship quality, and child internalizing symptoms had been assessed approximately 1–3 years prior.

*Results:* Structural equation analyses revealed that pandemic negative life events were indirectly associated with child TSS via greater maternal TSS. For mothers, recent pandemic-related negative events were associated with their own TSS, whereas maternal ACEs were not. Maternal ACEs directly predicted greater child TSS, with no evidence of mediation by either maternal TSS or maternal sensitivity.

*Limitations:* All measures were parent report, and pandemic-related measures were collected at the same time point.

*Conclusions:* Findings underscore the long reach of mothers' own adverse childhood experiences, highlighting the negative consequences of these prior traumatic exposures alongside current pandemic-related maternal trauma symptoms for children's adjustment during the pandemic.

## 1. Introduction

The devastating consequences of the COVID-19 pandemic for parental mental health have been widely recognized (Twenge and Joiner, 2020). Less attention has been paid to potential traumatic stress reactions in young children and/or risk factors that might underlie the mental health effects of the pandemic. Persistent threat of illness, uncertainty about what lies ahead, and, for some, severe illness or death of loves ones has created environments ripe for the development of stress disorders. Furthermore, pandemic-related school closures and the cessation of normative peer interactions have caused unprecedented disruption to children's typical developmental context during a critical time for growth in socialization and emotion regulation skills (Blair et al., 2015; Ladd, 1999). Given the prominent role played by parents in supporting children's adaptation to adversity, it is critical to examine child mental health in the context of the family system. Research on the pandemic has yet to consider intergenerational contextual factors, such as parental history of adversity. In addition, although COVID-19 mortality and morbidity has been significantly worse in minoritized groups (i.e., Black and Latinx adults), much of the mental health research has relied on White populations. The current study aims to address these gaps in the literature by leveraging prospectively collected data to examine the unique effects of pandemic-related negative life events and parental history of childhood adversity on child mental health during the COVID-19 pandemic in predominately Black, Latinx/Hispanic, and mixed-race mothers and their 7- year-old children.

* Corresponding author at: Department of Psychology, College of Science and Engineering, San Francisco State University, 1600 Holloway Avenue, EP 239, San Francisco, CA 94132, United States of America.
*E-mail address:* mjhagan@sfsu.edu (M.J. Hagan).
[1] Co-first author.

https://doi.org/10.1016/j.jad.2022.08.061
Received 28 September 2021; Received in revised form 22 April 2022; Accepted 21 August 2022
Available online 27 August 2022

### 1.1. The COVID-19 pandemic as a traumatic stressor

Protecting public health has required aggressive actions that limit person-to-person contact. While necessary, these safety measures have challenged individual and family functioning in a myriad of ways. In addition to the fear, morbidity, and mortality rates associated with the virus itself, many have had to contend with a loss of income or employment, reduction in social supports and access to previously available community resources, lack of child care, increased demands from children for attention and support, and disrupted or virtual schooling. In short, this complex constellation of experiences characterized by uncertainty, loss, and threats to health and basic needs could be expected to contribute to the development of trauma- and stress-related disorders (Gruber et al., 2020). Traumatic stress symptoms (TSS) such as hyperarousal or hypervigilance, avoidance, or intrusive thoughts and feelings, are known to increase in response to health and natural disasters, particularly among children and those facing structural barriers and disparities in resources, such as minoritized groups (Bonanno et al., 2010). Recent cross-sectional studies indicate that many individuals experience COVID-19-related events as traumatic (Bridgland et al., 2021a, 2021b; Forte et al., 2020; Karatzias et al., 2020), with as many as 15 % of youth or young adults endorsing clinically significant TSS in China (Liang et al., 2020; Shek et al., 2021; Tang et al., 2020) and between 13 and 33 % of adults in various western countries reporting clinical TSS (Antičević et al., 2021; Bridgland et al., 2021a, 2021b; Karatzias et al., 2020; Nishimi et al., 2022; Russell et al., 2020).

### 1.2. The COVID-19 pandemic and child mental health

Despite recognition of the COVID-19 pandemic as a potentially traumatic stressor (Forte et al., 2020) and evidence showing that PTSD was the most common long-term psychological disorder following the SARS pandemic (Mak et al., 2009), less is known about the occurrence and predictors of traumatic stress symptoms (TSS) among young children and their caregivers in the context of COVID-19. In the U.S. and the U.K., the focus has been on broad-based categories of child mental health within largely White, non-Hispanic populations (Cohodes et al., 2021; Feinberg et al., 2021; Fosco et al., 2022; Rosen et al., 2021). It was found that 12-year-old children are between 2.5 and 4 times as likely to exhibit clinically significant internalizing and externalizing behaviors, respectively, during the COVID-19 pandemic than before the pandemic began (Feinberg et al., 2021). Additional prospective research showed that disruptive behavior problems, depression, and post-traumatic stress disorder symptoms in older children increased during the first months of the pandemic (Wright et al., 2021). We could locate only two prospective studies that examined psychological responses to the COVID-19 pandemic in younger school-aged children, with one study showing an increase in depression pre-to-post pandemic onset (Bignardi et al., 2020), and another finding a positive association between pandemic-related stressors and child psychopathology increases during the pandemic (Rosen et al., 2021).

### 1.3. Mother's previous trauma exposure and children's responses to adversity

How parents protect and care for their young children during stressful or traumatic circumstances is anchored in parents' own childhood experiences (Lieberman et al., 2011). Early experiences of trauma render mothers vulnerable to the negative consequences of subsequent life stressors (Roubinov et al., 2021), potentially impacting not only their present functioning but their child's mental health as well. Research shows that maternal exposure to adverse childhood experiences (ACEs) significantly increases the odds of depression, anxiety, hyperactivity, or other serious emotional difficulties in their offspring (Folger et al., 2018; Haynes et al., 2020; Schickedanz et al., 2018). Moreover, adversity experienced during a mother's childhood may have more longstanding impacts than trauma exposure that occurs later in her life (Aschbacher et al., 2021; Steine et al., 2020) and may affect offspring outcomes by way of intergenerational biological embedding (i.e., adversity-related epigenetic or physiological alterations to maternal biology that are transmitted to offspring; for a review see Buss et al., 2017). As such, it is important to consider the contributions of maternal history of ACEs as well as more recent pandemic-related negative life events to children's adjustment during the pandemic.

### 1.4. Potential mechanisms linking adversity and child responses to the pandemic

Though preventable, once pandemic-related stressors and parental ACEs occur, they are not modifiable. However, the mechanisms through which they contribute to elevated pandemic-related TSS in children may be responsive to prevention or treatment; thus, understanding these pathways is critical for the development of effective interventions to address this ongoing crisis and future similar events. We explore two possible malleable mediators: maternal traumatic stress symptoms and maternal sensitivity during the pandemic. Previous research has shown that ACEs, such as family violence and household dysfunction, predict clinically-significant TSS in adulthood, pregnancy, and early parenthood, which in turn, may increase the risk of TSS in offspring following subsequent adversity (Narayan et al., 2021). In regard to the COVID-19 pandemic, evidence derived from cross-sectional surveys indicated that greater parental anxiety and depression during a national lockdown was associated with greater emotional difficulties in their young children, even when accounting for various COVID-19 hardships (Moulin et al., 2021). There has been scant research on potential TSS levels among parents and young children that occur in the context of pandemic-related negative events and previous histories of mothers' childhood adversity.

Impaired maternal sensitivity is another mechanism through which adversity, whether distal (e.g., maternal ACEs) or proximal (e.g., recent or current toxic stress), may lead to greater TSS in children. Maternal sensitivity reflects both attunement to children's emotions and appropriate responsiveness to children's emotional and behavioral cues (Ainsworth et al., 1978) and is particularly critical for facilitating a child's efforts to seek out and receive comfort and support in the context of stress (Feeney and Woodhouse, 2016). Chronic stressors may impair parents' capacity for engaging in sensitive caregiving behaviors, leading to inaccurate perceptions, neglect of children's signals of distress, and/or inappropriate responses to children's emotional needs (Booth et al., 2018). Although research on the current pandemic has yet to focus specifically upon maternal sensitivity, COVID-19-related stress has been associated with higher levels of harsh parenting practices and lower family cohesion (Brown et al., 2020; Daks et al., 2020). There is also significant evidence indicating that parental ACEs exert long-term negative effects on parenting behaviors associated with maternal sensitivity (Savage et al., 2019). In a recent large-scale longitudinal investigation, greater maternal ACEs were associated with increases in child internalizing symptoms and this association was mediated by poorer parenting quality (Shih et al., 2021).

### 1.5. The current study

Although rapid research has produced clear documentation of the psychological consequences of the COVID-19 pandemic, few investigations have utilized measures of TSS or focused on populations vulnerable to traumatic stress reactions in the wake of disasters (i.e., families with young children). Moreover, given that pre-existing psychiatric vulnerabilities appear to be associated with greater psychological distress during the pandemic (Fernández et al., 2020), longitudinal investigations are required to observe psychological adjustment in the context of the pandemic specifically (Chen and Bonanno, 2020). The present study leverages data collected from a longitudinal study of low-

income, racially/ethnically diverse mothers and their offspring to examine potential predictors of child TSS during the COVID-19 pandemic. Specifically, we tested the direct and indirect effect of pandemic-related negative life events and maternal ACEs on TSS in young children, controlling for pre-pandemic levels of functioning. In addition, because children's responses to stress have been shown to depend upon maternal functioning and that young children's knowledge of the pandemic and its associated consequences would depend upon maternal communication and monitoring of children's pandemic-related information intake, we hypothesized that maternal functioning and sensitivity would be intervening pathways.

## 2. Methods

### 2.1. Participants and procedures

Data was drawn from the Stress, Eating, and Early Development (SEED) study, a longitudinal study of the associations among prenatal stress, weight gain, and children's health in a sample of low-income, ethnically diverse women and their offspring (Bush et al., 2017). Women were recruited during pregnancy, based on the following criteria: 1) 18–45 years of age, 2) 8–23 weeks pregnant with a singleton, 3) body mass index of 25–40 kg/m$^2$, 4) income of 500 % or less of the Federal Poverty Level, and 5) English-speaking. Women with medical conditions that could interfere with baseline body composition or maternal gestational weight gain, or who were taking antidepressants, antipsychotics, opiate drugs, corticosteroids, or medications related to weight loss or diabetes were excluded at enrollment (Epel et al., 2019). Women with live births were invited to participate in the offspring follow-up study, with 162 consenting to participating with their children (Bush et al., 2017). Institutional review boards approved the study protocols at all participating study sites and written informed consent was collected from mothers before the initiation of any study procedures.

The present study used data collected from assessments conducted when children were 3 years old, 4 years old, 5 years old, and 7–8 years old (see Table 1 for an overview of measurements and their timepoints). When children were ages 3, 4, and 5 mothers completed questionnaires online or during an in-person study visit and were compensated with a $60 gift card. The age 7–8 assessment was conducted using an online survey (no in-person contact) following the onset of the COVID-19 pandemic. The data for this timepoint was collected between May 2020 and November 2020 (91 % of surveys were received by August 2020). Notably, this period represented an acute phase of the pandemic: vaccines had not yet been developed and local shelter-in-place guidelines remained in effect; thus, it was a time of heightened stress. Only mothers who provided data during this assessment were included in the current study ($n$ = 111 women and their offspring). Children ($n$ = 57 female, $n$ = 54 male) were racially and ethnically diverse (38 % Black, 25 % Mixed race or other, 18 % White, 5 % Asian, 1 % Native Hawaiian/Pacific Islander, 11 % Missing; 38 % identified as Hispanic/Latinx). Self-reported annual household income ranged from $2500 to $200,000 (*Median* = $42,500), and the majority of women were married or in a committed relationship (70 %), with fewer self-reporting their relationship status as single/unpartnered (23 %) or Other (7 %; separated, divorced, or widowed). Approximately 6 % of women did not complete high school, 19 % completed high school, 53 % attended some college but did not earn a degree, 16 % had a bachelor's degree, and 6 % had a master's degree.

### 2.2. Measures

#### 2.2.1. Maternal adverse childhood experiences

At their child's age 4 and age 5 visits, mothers indicated their exposure to the following eight categories of early adversity (consistent with prior studies of ACEs; Felitti et al., 1998; Merrick et al., 2018): household mental illness; household alcohol, drug, or prescription medication use; incarcerated household member; parental separation, divorce, or extended absence; household domestic violence; physical abuse; emotional abuse; sexual abuse. Mothers also responded to an additional question about financial hardship during childhood (food/housing insecurity) (Braveman et al., 2017). Responses were coded 1 for each adverse event type experienced in childhood (0 if not) and summed with higher scores indicating greater ACEs. To use all available data, an average was computed for women with data at both time points ($n$ = 91), whereas a single indicator was used for women with only one timepoint available ($n$ = 20).

#### 2.2.2. Past maternal depressive symptoms

When children were 5 years old, mothers reported on their own depressive symptoms using the Patient Health Questionnaire-9 (PHQ-9) (Kroenke et al., 2001). The PHQ-9 consists of nine items rated on a 4-point scale ranging from 0 (not at all) to 3 (nearly every day) and summed, with higher scores indicating more severe depressive symptoms (α = 0.91).

#### 2.2.3. Past child internalizing symptoms

Mothers reported on their children's internalizing symptoms when they were 5 years old using the Child Behavior Checklist (CBCL), a well-validated measure of children's behavior problems (Achenbach and Rescorla, 2000). The Internalizing scale of the CBCL includes 36 items rated on a 3-point scale ranging from 0 (not true) to 2 (very true or often true). Scores are summed with higher values indicating more severe internalizing symptoms (α = 0.87).[2]

#### 2.2.4. Past and pandemic-related maternal sensitivity

The general quality of mothers' sensitivity was assessed using parent-report on the 10-item Attachment subscale of the Parenting Relationship Questionnaire (PRQ) (Kamphaus and Reynolds, 2006). The preschool version of the PRQ was completed by mothers when children were age 3 (prior to the onset of the COVID-19 pandemic) and the school-age version of the PRQ was completed by mothers when children were age 7–8 (during the pandemic). The response options are identical across versions, thus precluding the need to create standardized scores. The Attachment subscale of the PRQ evaluates both aspects of caregiving behavior that are captured by the construct maternal sensitivity, including attunement to children's needs (e.g., "I can sense my child's moods") and responsiveness to children's emotions and behavior (e.g., "When my child is upset, I can calm him or her"). Items on are rated on a scale of 1 (never) to 4 (almost always), with higher scores indicating greater maternal sensitivity ($\alpha_{age\ 3}$ = 0.84; $\alpha_{age\ 7–8}$ = 0.91).

#### 2.2.5. Pandemic-related negative life events

Using a measure designed for the current study, mothers were asked about 12 pandemic-related life stressors and challenges, including job loss, reduced work hours, financial hardship, self/family member diagnosis of COVID-19, and housing instability. Responses were coded 1 if endorsed and 0 if not. Scores were summed, with higher scores indicating greater exposure.

#### 2.2.6. Maternal pandemic-related traumatic stress

Mothers completed the Impact of Events Scale-Revised, a self-report measure of TSS consistent with diagnostic criteria outlined in the DSM-IV (IES-R; Weiss, 2007), modified here to relate to the COVID-19 pandemic. The IES-R consists of 22 items that evaluate symptoms of intrusion, avoidance, and hyperarousal. Responses were summed such that higher scores reflected more severe pandemic-related TSS (α =

[2] Two scores on the CBCL internalizing subscale were identified as outliers due to values that were >3 standard deviations from the sample mean and were not included in our analytic models.

**Table 1**
Descriptive information for primary study variables.

| | Timepoint (N) | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|---|
| 1. Maternal sensitivity prior to COVID | 3-yr assessment (95) | – | −0.146 | −0.137 | −0.124 | 0.053 | 0.562** | −0.100 | −0.055 |
| 2. Maternal adverse childhood experiences (ACEs) | 4- & 5-yr assessment (109) | | – | 0.306** | 0.235** | −0.014 | −0.215* | 0.244** | 0.373** |
| 3. Maternal depressive symptoms prior to COVID | 5-yr assessment (105) | | | – | 0.384** | 0.001*** | −0.210* | 0.215* | 0.257** |
| 4. Child internalizing symptoms prior to COVID | 5-yr assessment (105) | | | | – | 0.061 | −0.191† | 0.300** | 0.450** |
| 5. COVID-related negative life events | 7–8 yr assessment (111) | | | | | – | 0.201* | 0.240* | 0.021 |
| 6. Maternal sensitivity during COVID | 7–8 yr assessment (111) | | | | | | – | −0.139 | −0.268** |
| 7. Maternal COVID-related symptoms of traumatic stress | 7–8 yr assessment (108) | | | | | | | – | 0.403** |
| 8. Child COVID-related symptoms of traumatic stress | 7–8 yr assessment (108) | | | | | | | | – |
| *M (SD)* | | 2.76 (2.48) | 2.89 (1.73) | 20.85 (17.72) | 11.03 (8.26) | 3.42 (0.444) | 3.25 (0.511) | 3.06 (4.72) | 5.78 (5.79) |

† $p < 0.10$.
* $p < 0.05$.
** $p < 0.01$.
*** $p < 0.001$.

0.96).

#### 2.2.7. Child pandemic-related traumatic stress

Children's pandemic-related trauma symptomology was measured using Parent Report of Posttraumatic Symptoms (PROPS) (Greenwald and Rubin, 1999). Mothers completed the 32-item measure, which evaluates a wide range of traumatic stress symptoms consistent with diagnostic criteria outlined in the DSM-IV (e.g., hypervigilance, arousal, irritability). Items are rated on a 0 (not true or rarely true) to 2 (very true or often true), with higher scores reflecting more severe current trauma symptoms (α = 0.91).

### 2.3. Analytic plan

Prior to primary analyses, several variables were evaluated as potential covariates and included in analyses if significantly associated with the independent and/or dependent variables. Specifically, we examined correlations between the primary study variables and the following potential covariates: family income, maternal relationship status, maternal education, child sex, and child race and ethnicity. Children who identified as Hispanic/Latinx ($r = 0.21, p = 0.03$) and from families with lower incomes ($r = -0.24, p = 0.01$) were exposed to more pandemic-related negative life events. There were no other significant correlations. The inclusion of child ethnicity and family income (sample is predominantly low-income) in the primary analyses did not change the pattern of our results; thus, to preserve power given our modest sample size, we present the more parsimonious models.

Primary analyses were conducted in Mplus 8.0 using full information maximum likelihood for missing data to enable the use of all available data points and bootstrap resampling (1000 samples) to account for any potential non-normality. Using a structural equation modeling framework, two path models tested direct and indirect paths from maternal ACEs and pandemic-related negative life events to children's pandemic-related traumatic stress symptom. Model fit was evaluated by examining several fit indices, including RMSEA, SRMR, and CFI (Hu and Bentler, 1999). In Model 1, maternal ACEs and pandemic-related negative life events were hypothesized to predict greater children's TSS via greater maternal TSS. In order to adjust for the effects of prior mental health symptoms, measures of maternal depression and child internalizing symptoms when children were 5 years old were included in this model. Model 2 differed from Model 1 in our hypothesized mediator; here, maternal ACEs and pandemic-related negative life events were hypothesized to predict children's TSS via lower maternal sensitivity during the pandemic. Age 5 maternal sensitivity and child internalizing symptoms were included as covariates. Mediation in both models was tested by examining the statistical significance of the indirect effect using the bootstrap confidence intervals, which offer more optimal statistical properties than *p*-values from normal-theory tests of mediation (MacKinnon et al., 2004).

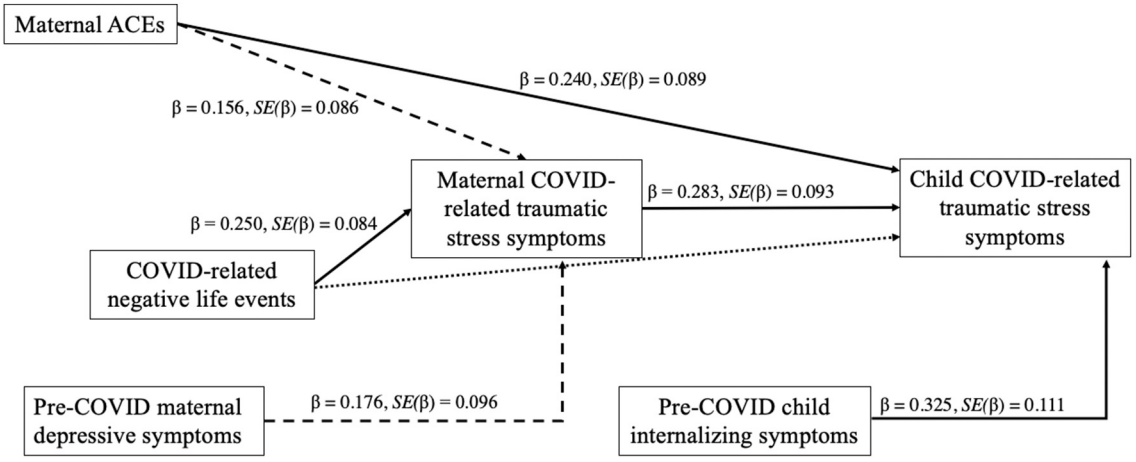
## 3. Results

#### 3.1.1. Preliminary descriptive analyses

Descriptive statistics and zero-order correlations for all study variables are included in Table 1. Mothers reported approximately 3 pandemic-related event types on average ($SD = 1.73$, *Range* = 0–8), the most frequent of which were changes in financial and employment status. Nearly three-quarters of women reported difficulty paying for basic needs (74 %; e.g., housing, food, heat, medical care). A significant proportion indicated reduced work hours (33 %) or job loss (22 %). Many women reported that partners lost employment (22 %) or had reduced work hours (38 %) as well. In regard to early life adversity, mothers experienced approximately three ACEs on average ($SD = 2.48$, *Range* = 0–9). The most frequently endorsed ACE was exposure to emotional abuse (47 %), followed by parental divorce or separation from a caregiver (44 %), and significant financial hardship (39 %). Parent-report of child TSS during the pandemic revealed that 26 % of children were exhibiting clinically significant TSS (>16 on the PROPS; Greenwald and Rubin, 1999), and self-report using the IES-R indicated that 24 % of women experienced clinically significant TSS (>32; Creamer et al., 2003). Maternal-reported sensitivity during the pandemic was significantly higher ($M = 3.42$, $SD = 0.445$) than maternal sensitivity reported when children were 3 years of age ($M = 3.25$, $SD = 0.511$; $t(90) = 3.480$, $p = 0.001$).

#### 3.1.2. Model 1: mothers' COVID-related trauma symptoms as a mediator

Model fit was adequate (RMSEA = 0.113 [90 % CI 0, 0.246]; CFI = 0.948; Chi-square = 4.81, $p = 0.09$; SRMR = 0.037). Statistically significant (bolded), marginal (dashed), and non-significant (dotted) paths are displayed in Fig. 1. A greater number of negative life events during the pandemic was positively associated with mothers' pandemic-related TSS ($p = 0.003$), which in turn, was positively associated with children's TSS ($p = 0.002$). There was no direct effect of pandemic-related negative




*Note.* Bolded lines are significant at $p < .05$. Dashed lines are marginally significant $p < .10$. Dotted lines are not significant and coefficients are not shown. Standardized coefficients reported for significant and marginally significant paths.

**Fig. 1.** Maternal traumatic stress symptoms during the COVID-19 pandemic as a mediator of associations between maternal adverse childhood experiences (ACEs)/ pandemic-related negative events and child pandemic-related traumatic stress symptoms.

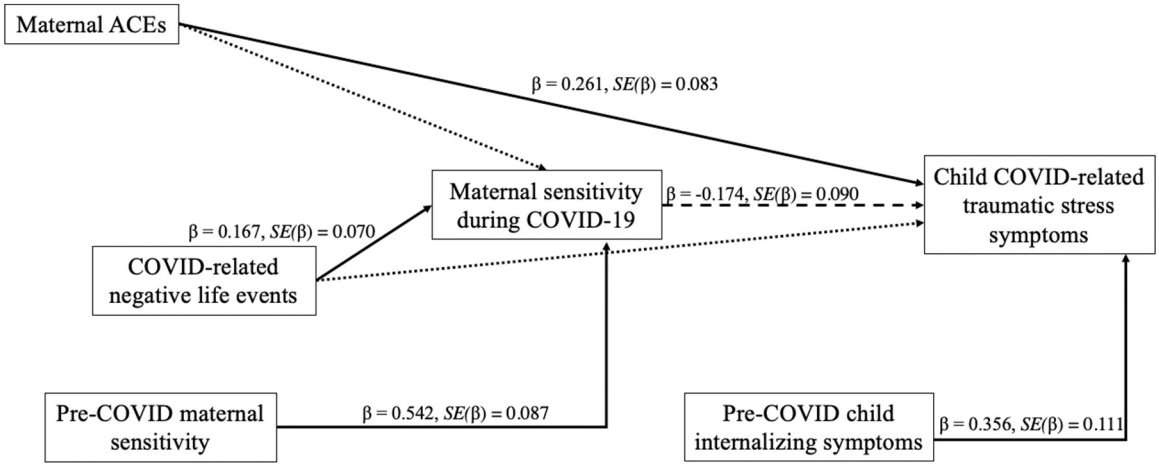
life events on children's TSS ($p = 0.462$), however there was a significant indirect effect via a path of maternal TSS (β = 0.071, 95 % CI 0.020, 0.142), adjusting for prior maternal depressive symptoms and child internalizing symptoms. Finally, maternal ACEs were directly associated with significantly greater child TSS during the pandemic ($p = 0.007$) and marginally positively associated with maternal TSS ($p = 0.070$; see Fig. 1). Maternal TSS did not mediate the effect of maternal ACEs on child TSS (β = 0.044, 95 % CI -0.002, 0.120).

### 3.1.3. Model 2: maternal sensitivity during the pandemic as a mediator

Model fit was adequate (RMSEA = 0.082 [90 % CI 0, 0.222]; CFI = 0.979; Chi-square = 3.51, $p = 0.17$; SRMR = 0.028). Statistically significant (bolded), marginal (dashed), and non-significant (dotted) paths are displayed in Fig. 2. A greater number of pandemic-related negative life events was associated with higher maternal sensitivity during the pandemic ($p = 0.018$), statistically adjusting for maternal sensitivity several years prior. Maternal sensitivity during the pandemic was, in turn, marginally associated with children's lower pandemic-related TSS ($p = 0.054$). However, the direct effect of pandemic negative life events on child TSS was not significant ($p = 0.632$), and there was no indirect effect via maternal sensitivity during the pandemic (β = −0.029, 95 % CI: −0.080, 0.002). Finally, similar to the first model, maternal ACEs were directly associated with TSS ($p = 0.002$). However, maternal ACEs were not associated with parent-reported maternal sensitivity during the pandemic ($p = 0.215$), adjusting for pre-pandemic levels of maternal sensitivity and child internalizing symptoms, and there was also no indirect effect of maternal ACEs on child TSS via maternal sensitivity (β = 0.017, 95 % CI: −0.009, 0.060).

## 4. Discussion

There is growing recognition that COVID-19 represents a traumatic stressor (e.g., Forte et al., 2020) that can result in particularly pernicious forms of PTSD, if previous pandemics are any indication (e.g., Mak et al.,




*Note.* Bolded lines are significant at $p < .05$. Dashed lines are marginally significant $p < .10$. Dotted lines are not significant and coefficients are not shown. Standardized coefficients reported for significant and marginally significant paths.

**Fig. 2.** Maternal sensitivity during the COVID-19 pandemic as a mediator of associations between maternal adverse childhood experiences (ACEs)/pandemic-related negative events and child pandemic-related traumatic stress symptoms.

2009). For many families, the stress associated with the COVID-19 pandemic is superimposed on a pre-existing social ecology of risk. As such, it is critical to examine potential additive contributions of familial histories of early adversity to pandemic-related traumatic stress symptoms (TSS) as well more proximal measures of risk factors associated with the pandemic (i.e., pandemic negative events, maternal mental health, and maternal sensitivity). Leveraging 5 years of data from a prospective longitudinal cohort of predominately low-income, racially/ethnically minoritized mothers and their young children, we examined the differential impact of pandemic-related negative events and maternal history of adverse childhood experiences (ACEs) on pandemic-related child TSS during an acute and highly stressful phase of the pandemic when shelter-in-place guidelines were in effect and vaccines were not yet available. Results demonstrated notable levels of pandemic-related TSS in mothers and children as well as a complex mix of distal risk and proximal protective factors involving the long reach of maternal ACEs on child mental health during the pandemic, and increases in maternal sensitivity. In addition, findings suggested that recent pandemic-related negative events may play a more substantive role in maternal pandemic-related TSS than prior adverse experiences.

### 4.1. Parental and child traumatic stress symptoms during the pandemic

Building upon research showing caregiver distress and child mental health problems in the context of the COVID-19 pandemic, we found that >25 % of children exhibited clinically significant levels of pandemic-related TSS according to maternal report; in addition, approximately one quarter of mothers reported clinically significant levels of TSS related to the pandemic. These rates are in line with recent studies reporting clinically significant pandemic-related TSS in U.S. parents (20 %; Russell et al., 2022), U.S. adults (33 %; Nishimi et al., 2022) and Canadian adolescents (45 %; Craig et al., 2022), but are much higher than COVID-19-related TSS levels observed among adolescents and young adults in China (<15 %; (Liang et al., 2020; Shek et al., 2021; Sun et al., 2021; Tang et al., 2020) or among adults in Ireland (17 %; Karatzias et al., 2020) and the United Kingdom (17 %; Shevlin et al., 2020). Given the potential for TSS to interfere with daily functioning and increase the risk for severe reactions to future traumatic events, these findings highlight the importance of examining pandemic-related TSS specifically rather than only general measures of sadness, distress or depression (Steinberg et al., 2014). Without treatment, TSS in young children can remain elevated (Meiser-Stedman et al., 2008) or increase (Scheeringa et al., 2005).

### 4.2. Pandemic-related negative events and child traumatic stress symptoms

The number and nature of pandemic-related negative events reported is consistent with recent reports among families (Doom et al., 2021), with mothers reporting an average of 3 negative events commonly related to the economic impacts of the pandemic. Emerging research shows that the economic impact of the COVID-19 pandemic is having a more powerful influence on mental health than fear or exposure to the virus itself (Hertz-Palmor et al., 2021), but there has been little exploration of how this economic impact may affect school-age children who are likely to be cognizant of reductions in parental employment hours and family income. In a daily diary study of a primarily African American or Hispanic families, a greater number of COVID-19 hardships (particularly increased caregiving responsibilities and income loss) predicted higher levels of disruptive behaviors in children ages 2–7 years old (Gassman-Pines et al., 2020).

In contrast to the aforementioned study of child behavior problems, our focus on child pandemic-related TSS revealed no direct associations with pandemic-related negative events; instead, there was a significant indirect effect via greater maternal pandemic-related TSS. That is, a greater number of pandemic-related negative events were associated with higher maternal pandemic-related TSS, which was associated with greater parent-reported pandemic-related TSS in children. The prominent role played by maternal TSS is in line with findings from previous pandemics (Sprang and Silman, 2013) as well as the large body of literature documenting the strong coupling of TSS in parents and young children exposed to various forms of adversity (for a review, see Leen-Feldner et al., 2013). Recognition of the severe toll the pandemic is taking on families has resulted in calls for increased caregiver mental health screening during the pandemic (Peris and Ehrenreich-May 2021), and systems are increasingly recognizing the need to provided clinical benefits to the child-caregiver dyad in order to support child wellbeing (Margolis et al., 2020). The current findings support these recommendations.

In contrast to expectations, maternal sensitivity was higher during the pandemic relative to pre-pandemic levels and unexpectedly, a greater number of pandemic-related negative events were associated with *greater* maternal sensitivity during the pandemic. In the current study, the most common negative events did not involve exposure to COVID-19 morbidity or mortality; instead, families primarily experienced events that resulted in mothers spending increased time with their young children (e.g., loss of work hours, school closures, loss of child care). While these negative events undoubtedly posed considerable challenges for parents, in response to children who may have been demonstrating need for additional parental support during this time of heightened stress, mothers are likely to have intentionally increased their engagement with their children in ways that identified and appropriately responded to their emotions and behaviors. In fact, approximately two-thirds of mothers in the current sample reported *feeling a little more connected* (26 %) or *a lot more connected* (41 %) to their child during the pandemic. This increase in maternal sensitivity may represent an important source of resilience or a "silver lining" for families that have otherwise been under considerable duress during the pandemic.

### 4.3. Maternal ACEs and children's psychological response to the pandemic

Findings also underscore the long reach of mother's early life adversity on child functioning. Although the number of ACEs were variable, women in this cohort had considerable exposure to early life adversity on average, with mothers reporting an average of 3 ACEs (of a possible 9), including frequent endorsement of experiences of emotional abuse as children. A higher maternal ACE score was a robust predictor of greater child TSS during the pandemic, even when accounting for children's prior psychological functioning and the effects of pandemic-related negative events, maternal pandemic-related TSS, and sensitivity. Interestingly, although bivariate correlations indicated that maternal ACEs were also significantly associated with greater maternal pandemic-related TSS and lower maternal sensitivity during COVID, these relations did not persist in adjusted path models. Rather, recent pandemic-related negative events appeared to play a more substantive role in pandemic-related maternal TSS than past adversity in the current study. This is consistent with emerging literature showing a direct link between hours spent homeschooling and greater traumatic stress symptoms in parents (Deacon et al., 2021). More research is needed to further explore the manner in which the timing (distal versus proximal) and nature (early childhood versus pandemic-related) of stressors may uniquely influence the emergence of parental and child TSS.

In contrast to expectations, indirect effects of maternal ACEs on child pandemic-related TSS via maternal pandemic-related TSS and sensitivity pathways were not observed. Several alternative pathways not examined in the current study may be worthy of future consideration. First, other aspects of the parent-child relationship may play a more prominent role. For example, the quality of maternal-child communication about negative emotions has been found to predict child post-traumatic stress symptoms in trauma-exposed families (Overbeek

et al., 2021), and maternal ability to stimulate cognitive growth has been shown to mediate the effect of maternal ACEs on child internalizing problems (Shih et al., 2021). As such, the quality and content of parent-child daily conversations about the pandemic, particularly in the context of home-schooling, might mediate effects of maternal ACEs on children's pandemic-related distress. Second, maternal coping strategies may be an important mechanism, given that early childhood adversity is related to greater daily use of avoidant coping in mothers (Hagan et al., 2017), and parental avoidance in turn has been associated with more severe PTSD symptoms in young children (Hagan et al., 2018). Finally, the robust connection between maternal ACEs and child pandemic-related TSS may reflect intervening intergenerational biological embedding processes not observable via self-report (Buss et al., 2017). For example, maternal history of ACEs has been associated with higher levels of stress-related pregnancy hormones that affect fetal development (Steine et al., 2020), which have been linked, in turn, with child internalizing symptoms at 5 years of age (Howland et al., 2016).

### 4.4. Limitations and conclusions

Study findings need to be considered in light of several limitations and the context of data collection. First, all measures were mother-report. Given the age of the children, assessment of child mental health by parent-report is common, and direct assessment of young children during the COVID-19 pandemic was not feasible. In addition, pandemic-related TSS was assessed using instruments that were created under the rubric of a previous edition of the DSM in which post-traumatic symptomatology was characterized by three clusters of symptoms only (hypervigilance, avoidance, and intrusion). Future research should utilize TSS measures that take into account other dimensions of post-traumatic symptomatology articulated in updated diagnostic systems, such as dissociation and cognitive alterations (American Psychiatric Association, 2013). Third, although our longitudinal model included data assessed across three different timepoints, all dependent variables were assessed simultaneously, and multiple assessments of child and maternal functioning throughout the first year of the pandemic would have offered a stronger design for the test of mediation. Pandemic-related variables were intentionally assessed simultaneously as we aimed to capture potential pandemic-related mechanisms while limiting burden on families to one data collection point during an unprecedented time.

Fourth, although we posited maternal symptomatology and maternal sensitivity as drivers of child TSS, bidirectional associations are possible (Roubinov et al., 2022). Interestingly, however, there has been research showing that fathers' responses to stress may be more dependent on how children respond, whereas children's responses seem to be dependent on maternal functioning (Waters et al., 2020). Nevertheless, it will be critical for future research on pandemic effects on parenting to investigate bidirectional associations and to include all primary caregivers (not just mothers). Fifth, as we leveraged active participants in an extant cohort for this time-sensitive work, the sample was fairly small, which prevented us from examining potential moderators of the hypothesized mediation models. It is very plausible that pathways may vary based on structural and community factors (school closures, eviction moratorium policies, supportive resources, etc.), family demographics (e.g., race/ethnicity, income level) and/or pre-existing psychiatric vulnerabilities in mother or child. It is also possible that tests of mediation were not significant due to a lack of statistical power. Finally, the current sample of families was restricted to a particular metro area, primarily Black or Latinx, and reported a low household income on average: as such, findings might not generalize to families of other demographics, but they are particularly important for expanding research that has focused upon White, middle-class samples.

Even after the most acute phase of the pandemic subsides and threats to physical morbidity and mortality decline, psychological sequelae are likely to persist. The lasting negative implications may be pronounced among children and families with prior trauma exposure and who belong to groups that have been particularly impacted by COVID. The current study examined distal and proximal pathways to children's traumatic stress symptoms in a longitudinal sample of low-income, racially and ethnically diverse mothers and their children. In addition to observing high prevalence of traumatic stress symptoms, findings suggest that pandemic-related negative life events may contribute to children's traumatic stress symptoms via greater maternal pandemic-related traumatic stress symptoms. Notably, higher levels of maternal sensitivity during the pandemic compared to pre-pandemic levels highlight a family factor that may operate in a protective or buffering manner against the negative consequences of the pandemic. Understanding pathways of risk and resilience for children's adjustment in a post-pandemic world is necessary to develop and scale empirically-supported interventions, particularly for families who have carried the greatest burden of the pandemic's consequences. More specifically, results highlight the importance of policies that support caregiver well-being (paid family leave, high-quality-childcare programs, home-visiting, etc.), and holistic programs that dually address maternal and child symptoms of traumatic stress, given the mechanistic role of maternal symptomatology in the association between pandemic-related stressors and children's adjustment. Additionally, there may be great utility in programmatic efforts that support women in a manner that facilitates greater sensitivity while parenting, which can be an important protective factor for children as the pandemic endures.

## CRediT authorship contribution statement

MH and DR co-developed the COVID-19 stress assessment, in partnership with SEED study PI, NB, who developed and oversaw all other data collection on this cohort. AC led the COVID time point study implementation and data collection, with NB and DR guidance and oversight. MH developed the specific hypotheses tested here in collaboration with DR and with input from NB. NEL conducted preliminary analyses, and NEL and AC wrote the initial draft of the Methods. MH wrote the original drafts of the Introduction and Discussion sections. DR conducted primary analyses, assembled tables, revised the Methods and Results sections, and provided extensive input and edits on final manuscript. All coauthors contributed to interpretation and provided edits to the manuscript.

## Declaration of competing interest

All authors declare that they have no conflicts of interest.

## Acknowledgements

This work was supported by the National Heart, Lung, and Blood Institute (U01 HL097973; R01 HL116511-02), and the Lisa and John Pritzker Family Fund. Dr. Bush is the Lisa and John Pritzker Distinguished Professor in Developmental and Behavioral Health. Dr. Roubinov received funding from the National Institute of Mental Health (K23MH1137019).

The authors wish to acknowledge the amazing team of study staff for their assistance with the SEED data collection. We are also thankful to the families for their generous participation in this research. We would also like to thank Drs. Elissa Epel, Nancy Adler, and Barbara Laraia, the principal investigators on the pregnancy study from which the current participant pool was drawn, for providing support for the offspring study and guidance on its design and Michael Coccia for his support in data management, scoring, data set curation.

## References


Achenbach, T.M., Rescorla, L.A., 2000. Manual for the ASEBA Preschool Forms and Profiles, Vol. 30. University of Vermont, Research Center for Children, Youth, & Families, Burlington, VT.

Ainsworth, M.D.S., Blehar, M.C., Waters, E., Wall, S., 1978. Patternsof Attachment: A Psychological Study of the Strange Situation. Lawrence Erlbaum.

American Psychiatric Association, 2013. Diagnostic and Statistical Manual of Mental Disorders, 5th ed. https://doi.org/10.1176/appi.books.9780890425596

Antičević, V., Bubić, A., Britvić, D., 2021. Peritraumatic distress and posttraumatic stress symptoms during the COVID-19 pandemic: the contributions of psychosocial factors and pandemic-related stressors. J. Trauma. Stress. 34, 691–700. https://doi.org/10.1002/jts.22701.

Aschbacher, K., Hagan, M., Steine, I.M., Rivera, L., Cole, S., Baccarella, A., Epel, E.S., Lieberman, A., Bush, N.R., 2021. Adversity in early life and pregnancy are immunologically distinct from total life adversity: macrophage-associated phenotypes in women exposed to interpersonal violence. Transl. Psychiatry 11. https://doi.org/10.1038/s41398-021-01498-1.

Bignardi, G., Dalmaijer, E.S., Anwyl-Irvine, A.L., Smith, T.A., Siugzdaite, R., Uh, S., Astle, D.E., 2020. Longitudinal increases in childhood depression symptoms during the COVID-19 lockdown. Arch. Dis. Child. 106, 1–7. https://doi.org/10.1136/archdischild-2020-320372.

Blair, B.L., Perry, N.B., O'Brien, M., Calkins, S.D., Keane, S.P., Shanahan, L., 2015. Identifying developmental cascades among differentiated dimensions of social competence and emotion regulation. Dev. Psychol. 51, 1062–1073. https://doi.org/10.1037/a0039472.

Bonanno, G.A., Brewin, C.R., Kaniasty, K., La Greca, A.M., 2010. Weighing the costs of disaster: consequences, risks, and resilience in individuals, families, and communities. Psychol. Sci. Public Interes. Suppl. 11, 1–49. https://doi.org/10.1177/1529100610387086.

Booth, A.T., Macdonald, J.A., Youssef, G.J., 2018. Contextual stress and maternal sensitivity: a meta-analytic review of stress associations with the maternal behavior Q-Sort in observational studies. Dev. Rev. 48, 145–177. https://doi.org/10.1016/j.dr.2018.02.002.

Braveman, P., Heck, K., Egerter, S., Rinki, C., Marchi, K., Curtis, M., 2017. Economic hardship in childhood: a neglected issue in ACE studies? Matern. Child Health J. 22 (3), 308–317. https://doi.org/10.1007/S10995-017-2368-Y.

Bridgland, Victoria M.E., Moeck, E.K., Green, D.M., Swain, T.L., Nayda, D.M., Matson, L. A., Hutchison, N.P., Takarangi, M.K.T., 2021. Why the COVID-19 pandemic is a traumatic stressor. PLoS One 16. https://doi.org/10.1371/journal.pone.0240146.

Bridgland, Victoria M.E., Moeck, E.K., Green, D.M., Swain, T.L., Nayda, D.M., Matson, L. A., Hutchison, N.P., Takarangi, M.K.T., 2021. Why the COVID-19 pandemic is a traumatic stressor. PLoS One 16, 1–15. https://doi.org/10.1371/journal.pone.0240146.

Brown, S.M., Doom, J.R., Lechuga-Peña, S., Watamura, S.E., Koppels, T., 2020. Stress and parenting during the global COVID-19 pandemic. Child Abuse Negl. 110 https://doi.org/10.1016/j.chiabu.2020.104699.

Bush, N.R., Jones-Mason, K., Coccia, M., Caron, Z., Alkon, A., Thomas, M., Coleman-Phox, K., Wadhwa, P.D., Laraia, B.A., Adler, N.E., Epel, E.S., 2017. Effects of pre- and postnatal maternal stress on infant temperament and autonomic nervous system reactivity and regulation in a diverse, low-income population. Dev. Psychopathol. 29 (5), 1553–1571. https://doi.org/10.1017/S0954579417001237.

Buss, C., Entringer, S., Moog, N.K., Toepfer, P., Fair, D.A., Simhan, H.N., Heim, C.M., Wadhwa, P.D., 2017. Intergenerational transmission of maternal childhood maltreatment exposure: implications for fetal brain development. J. Am. Acad. Child Adolesc. Psychiatry 56, 373–382. https://doi.org/10.1016/j.jaac.2017.03.001.

Chen, S., Bonanno, G.A., 2020. Psychological adjustment during the global outbreak of COVID-19: a resilience perspective. Psychol. Trauma theory. Res. Pract. Policy 12, S51–S54. https://doi.org/10.1037/tra0000685.

Cohodes, E.M., McCauley, S., Gee, D.G., 2021. Parental buffering of stress in the time of COVID-19: family-level factors may moderate the association between pandemic-related stress and youth symptomatology. Res. Child Adolesc. Psychopathol. 49, 935–948. https://doi.org/10.1007/s10802-020-00732-6.

Craig, S.G., Ames, M.E., Bondi, B.C., Pepler, D.J., Craig, S.G., Ames, M.E., Bondi, B.C., Pepler, D.J., 2022. Canadian adolescents' mental health and substance use during the COVID-19 pandemic : associations with COVID-19 stressors. Can. J. Behav. Sci. https://doi.org/10.1037/cbs0000305.

Creamer, M., Bell, R., Failla, S., 2003. Psychometric properties of the impact of event scale—revised. Behav. Res. Ther. 41 (12), 1489–1496. https://doi.org/10.1016/j.brat.2003.07.010.

Daks, J.S., Peltz, J.S., Rogge, R.D., 2020. Psychological flexibility and inflexibility as sources of resiliency and risk during a pandemic: modeling the cascade of COVID-19 stress on family systems with a contextual behavioral science lens. J. Context. Behav. Sci. 18, 16–27. https://doi.org/10.1016/j.jcbs.2020.08.003.

Deacon, S.H., Rodriguez, L.M., Elgendi, M., King, F.E., Nogueira-Arjona, R., Sherry, S.B., Stewart, S.H., 2021. Parenting through a pandemic: mental health and substance use consequences of mandated homeschooling. Couple Fam. Psychol. Res. Pract. 10, 281–293. https://doi.org/10.1037/cfp0000171.

Doom, J.R., Seok, D., Narayan, A.J., Fox, K.R., 2021. Adverse and benevolent childhood experiences predict mental health during the COVID-19 pandemic. Adv. Res. Sci. 2, 193–204. https://doi.org/10.1007/s42844-021-00038-6.

Epel, E., Laraia, B., Coleman-Phox, K., Leung, C., Vieten, C., Mellin, L., Kristeller, J.L., Thomas, M., Stotland, N., Bush, N., Lustig, R.H., Dallman, M., Hecht, F.M., Adler, N., 2019. Effects of a mindfulness-based intervention on distress, weight gain, and glucose control for pregnant low-income women: a quasi-experimental trial using the ORBIT model. Int. J. Behav. Med. 26, 461–473. https://doi.org/10.1007/s12529-019-09779-2.

Feeney, B.C., Woodhouse, S.S., 2016. Caregiving. In: Cassidy, J., Shaver, P.R. (Eds.), Handbook of Attachment: Theory, Research, and Clinical Applications, 3rd ed. Guilford Press, New York, pp. 827–851.

Feinberg, M.E., Mogle, J., Lee, J., Tornello, S.L., Hostetler, M.L., Cifelli, J.A., Bai, S., Hotez, E., 2021. Impact of the COVID-19 pandemic on parent, child, and family functioning. Fam. Process. https://doi.org/10.1111/famp.12649.

Felitti, V.J., Anda, R.F., Nordenberg, D., Williamson, D.F., Spitz, A.M., Edwards, V., Koss, M.P., Marks, J.S., 1998. Relationship of childhood abuse and household dysfunction to many of the leading causes of death in adults: the adverse childhood experiences (ACE) study. Am. J. Prev. Med. 14 (4), 245–258. https://doi.org/10.1016/S0749-3797(98)00017-8.

Fernández, R.S., Crivelli, L., Guimet, N.M., Allegri, R.F., Pedreira, M.E., 2020. Psychological distress associated with COVID-19 quarantine: latent profile analysis, outcome prediction and mediation analysis. J. Affect. Disord. 277, 75–84. https://doi.org/10.1016/j.jad.2020.07.133.

Folger, A.T., Eismann, E.A., Stephenson, N.B., Shapiro, R.A., MacAluso, M., Brownrigg, M.E., Gillespie, R.J., 2018. Parental adverse childhood experiences and offspring development at 2 years of age. Pediatrics 141. https://doi.org/10.1542/peds.2017-2826.

Forte, G., Favieri, F., Tambelli, R., Casagrande, M., 2020. COVID-19 pandemic in the italian population: validation of a post-traumatics stress disorder questionnaire and prevalence of PTSD symptomatology. Int. J. Environ. Res. Public Health 17, 1–14. https://doi.org/10.3390/ijerph17114151.

Fosco, G.M., Sloan, C.J., Fang, S., Feinberg, M.E., 2022. Family vulnerability and disruption during the COVID-19 pandemic: prospective pathways to child maladjustment. J. Child Psychol. Psychiatry Allied Discip. 63, 47–57. https://doi.org/10.1111/jcpp.13458.

Gassman-Pines, A., Ananat, E.O., Fitz-Henley, J., 2020. COVID-19 and parent-child psychological well-being. Pediatrics 146. https://doi.org/10.1542/peds.2020-007294.

Greenwald, R., Rubin, A., 1999. Assessment of posttraumatic symptoms in children: development and preliminary validation of parent and child scales. Res. Soc. Work Pract. 9 (1), 61–75. https://doi.org/10.1177/104973159900900105.

Gruber, J., Prinstein, M.J., Clark, L.A., Rottenberg, J., Abramowitz, J.S., Albano, A.M., Aldao, A., Borelli, J.L., Chung, T., Davila, J., Forbes, E.E., Gee, D.G., Hall, G.C.N., Hallion, L.S., Hinshaw, S.P., Hofmann, S.G., Hollon, S.D., Joormann, J., Kazdin, A.E., Klein, D.N., La Greca, A.M., Levenson, R.W., MacDonald, A.W., McKay, D., McLaughlin, K.A., Mendle, J., Miller, A.B., Neblett, E.W., Nock, M., Olatunji, B.O., Persons, J.B., Rozek, D.C., Schleider, J.L., Slavich, G.M., Teachman, B.A., Vine, V., Weinstock, L.M., 2020. Mental health and clinical psychological science in the time of COVID-19: challenges, opportunities, and a call to action. Am. Psychol. 76, 409–426. https://doi.org/10.1037/amp0000707.

Hagan, M.J., Bush, N., Mendes, W.B., Arenander, J., Epel, E., Puterman, E., 2017. Associations between childhood adversity and daily suppression and avoidance in response to stress in adulthood: can neurobiological sensitivity help explain this relationship? Anxiety, Stress Coping 30, 163–175. https://doi.org/10.1080/10615806.2016.1259473.

Hagan, M.J., Gentry, M., Ippen, C.G., Lieberman, A., 2018. PTSD with and without dissociation in young children exposed to interpersonal trauma. J. Affect. Disord. 227, 536–541. https://doi.org/10.1016/j.jad.2017.11.070.

Haynes, E., Crouch, E., Probst, J., Radcliff, E., Bennett, K., Glover, S., 2020. Exploring the association between a parent's exposure to adverse childhood experiences (ACEs) and outcomes of depression and anxiety among their children. Child Youth Serv. Rev. 113 https://doi.org/10.1016/j.childyouth.2020.105013.

Hertz-Palmor, N., Moore, T.M., Gothelf, D., DiDomenico, G.E., Dekel, I., Greenberg, D. M., Brown, L.A., Matalon, N., Visoki, E., White, L.K., Himes, M.M., Schwartz-Lifshitz, M., Gross, R., Gur, R.C., Gur, R.E., Pessach, I.M., Barzilay, R., 2021. Association among income loss, financial strain and depressive symptoms during COVID-19: evidence from two longitudinal studies. J. Affect. Disord. 291, 1–8. https://doi.org/10.1016/j.jad.2021.04.054.

Howland, M.A., Sandman, C.A., Glynn, L.M., Crippen, C., Davis, E.P., 2016. Fetal exposure to placental corticotropin-releasing hormone is associated with child self-reported internalizing symptoms. Psychoneuroendocrinology 67, 10–17. https://doi.org/10.1016/j.psyneuen.2016.01.023.

Hu, L.T., Bentler, P.M., 1999. Cutoff criteria for fit indexes in covariance structure analysis: conventional criteria versus new alternatives. Struct. Equ. Model. 6, 1–55. https://doi.org/10.1080/10705519909540118.

Kamphaus, R.W., Reynolds, C.R., 2006. Parenting Relationship Questionnaire. NCS Pearson, Minneapolis, MN.

Karatzias, T., Shevlin, M., Murphy, J., McBride, O., Ben-Ezra, M., Bentall, R.P., Vallières, F., Hyland, P., 2020. Posttraumatic stress symptoms and associated comorbidity during the COVID-19 pandemic in Ireland: a population-based study. J. Trauma. Stress. 33, 365–370. https://doi.org/10.1002/jts.22565.

Kroenke, K., Spitzer, R.L., Williams, J.B.W., 2001. The PHQ-9: validity of a brief depression severity measure. J. Gen. Intern. Med. 16 (9), 606–613. https://doi.org/10.1046/j.1525-1497.2001.016009606.x.

Ladd, G.W., 1999. Peer relationships and social competence in early and middle childhood. Annu. Rev. Psychol. 50, 333–359. https://doi.org/10.1146/annurev.psych.50.1.333.

Leen-Feldner, E.W., Feldner, M.T., Knapp, A., Bunaciu, L., Blumenthal, H., Amstadter, A. B., 2013. Offspring psychological and biological correlates of parental posttraumatic stress: review of the literature and research agenda. Clin. Psychol. Rev. 33, 1106–1133. https://doi.org/10.1016/j.cpr.2013.09.001.

Liang, L., Ren, H., Cao, R., Hu, Y., Qin, Z., Li, C., Mei, S., 2020. The effect of COVID-19 on youth mental health. Psychiatr. Q. 91, 841–852. https://doi.org/10.1007/s11126-020-09744-3.

Lieberman, A.F., Chu, A., Van Horn, P., Harris, W.W., 2011. Trauma in early childhood: empirical evidence and clinical implications. Dev. Psychopathol. 23, 397–410. https://doi.org/10.1017/S0954579411000137.

MacKinnon, D.P., Lockwood, C.M., Williams, J., 2004. Confidence limits for the indirect effect: distribution of the product and resampling methods. Multivar. Behav. Res. 39, 99–128. https://doi.org/10.1207/s15327906mbr3901_4.

Mak, I.W.C., Chu, C.M., Pan, P.C., Yiu, M.G.C., Chan, V.L., 2009. Long-term psychiatric morbidities among SARS survivors. Gen. Hosp. Psychiatry 31, 318–326. https://doi.org/10.1016/j.genhosppsych.2009.03.001.

Margolis, K., Briscoe, A., Tracey, J., 2020. Babies Don't go to the doctor by themselves: innovating a dyadic behavioral health payment model to serve the youngest primary care patients and their families. California Children's Trust. Resour. Libr. https://cachildrenstrust.org/wp-content/uploads/2020/05/Dyadic_final_May2020.pdf.

Meiser-Stedman, R., Smith, P., Glucksman, E., Yule, W., Dalgleish, T., 2008. The posttraumatic stress disorder diagnosis in preschool- and elementary school-age children exposed to motor vehicle accidents. Am. J. Psychiatry 165, 1326–1337.

Merrick, M.T., Ford, D.C., Ports, K.A., Guinn, A.S., 2018. Prevalence of adverse childhood experiences from the 2011-2014 behavioral risk factor surveillances system in 23 states. JAMA Pediatr. 172 (11), 1038–1044. https://doi.org/10.1001/jamapediatrics.2018.2537.

Moulin, F., El-Aarbaoui, T., Bustamante, J.J.H., Héron, M., Mary-Krause, M., Rouquette, A., Galéra, C., Melchior, M., 2021. Risk and protective factors related to children's symptoms of emotional difficulties and hyperactivity/inattention during the COVID-19-related lockdown in France: results from a community sample. Eur. Child Adolesc. Psychiatry 1–12. https://doi.org/10.1007/s00787-021-01752-3.

Narayan, A.J., Lieberman, A.F., Masten, A.S., 2021. Intergenerational transmission and prevention of adverse childhood experiences (ACEs). Clin. Psychol. Rev. 85 https://doi.org/10.1016/j.cpr.2021.101997.

Nishimi, K., Borsari, B., Marx, B.P., Tripp, P., Woodward, E., Rosen, R.C., Cohen, B.E., Maven, D., Jiha, A., Woolley, J.D., Neylan, T.C., O'Donovan, A., 2022. Posttraumatic stress disorder symptoms associated with protective and risky behaviors for coronavirus disease 2019. Health Psychol. 41, 104–114. https://doi.org/10.1037/hea0001157.

Overbeek, M.M., Koren-Karie, N., de Schipper, J.C., van Delft, I., Schuengel, C., 2021. Quality of mother–child dialogue about emotional events, coping and posttraumatic stress symptoms among children exposed to interpersonal trauma. J. Child Adolesc. Trauma. https://doi.org/10.1007/s40653-021-00381-x.

Peris, T.S., Ehrenreich-May, J., 2021. The parents are not alright: a call for caregiver mental health screening during the COVID-19 pandemic. J. Am. Acad. Child Adolesc. Psychiatry 1–3. https://doi.org/10.1016/j.jaac.2021.02.007.

Rosen, M.L., Rodman, A.M., Kasparek, S.W., Mayes, M., Freeman, M.M., Lengua, L.J., Meltzoff, A.N., McLaughlin, K.A., 2021. Promoting youth mental health during the COVID-19 pandemic: a longitudinal study. PLoS One 16, 1–21. https://doi.org/10.1371/journal.pone.0255294.

Roubinov, D.S., Luecken, L.J., Curci, S.G., Somers, J.A., Winstone, L.K., 2021. A prenatal programming perspective on the intergenerational transmission of maternal adverse childhood experiences to offspring health problems. Am. Psychol. 76 (2), 337–349. https://doi.org/10.1037/amp0000762.

Roubinov, D.S., Epel, E.S., Adler, N.E., Laraia, B.A., Bush, N.R., 2022. Transactions between maternal and child depressive symptoms emerge early in life. J. Clin. Child Adolesc. Psychol. 51 (1), 61–72. https://doi.org/10.1080/15374416.2019.1644649.

Russell, B.S., Hutchison, M., Tambling, R., Tomkunas, A.J., Horton, A.L., 2020. Initial challenges of caregiving during COVID-19: caregiver burden, mental health, and the parent–child relationship. Child Psychiatry Hum. Dev. 51, 671–682. https://doi.org/10.1007/s10578-020-01037-x.

Russell, B.S., Hutchison, M., Park, C.L., Fendrich, M., Finkelstein-Fox, L., 2022. Short-term impacts of COVID-19 on family caregivers: Emotion regulation, coping, and mental health. J. Clin. Psychol. 78 https://doi.org/10.1002/jclp.23228, 357–354.

Savage, L.É., Tarabulsy, G.M., Pearson, J., Collin-Vézina, D., Gagné, L.M., 2019. Maternal history of childhood maltreatment and later parenting behavior: a meta-analysis. Dev. Psychopathol. 31, 9–21. https://doi.org/10.1017/S0954579418001542.

Scheeringa, M.S., Zeanah, C.H., Myers, L., Putnam, F.W., 2005. Predictive validity in a prospective follow-up of PTSD in preschool children. J. Am. Acad. Child Adolesc. Psychiatry 44, 899–906. https://doi.org/10.1097/01.chi.0000169013.81536.71.

Schickedanz, A., Halfon, N., Sastry, N., Chung, P.J., 2018. Parents' adverse childhood experiences and their children's behavioral health problems. Pediatrics 142. https://doi.org/10.1542/peds.2018-0023.

Shek, D.T.L., Zhao, L., Dou, D., Zhu, X., Xiao, C., 2021. The impact of positive youth development attributes on posttraumatic stress disorder symptoms among Chinese adolescents under COVID-19. J. Adolesc. Health 68, 676–682. https://doi.org/10.1016/j.jadohealth.2021.01.011.

Shevlin, M., McBride, O., Murphy, J., Miller, J.G., Hartman, T.K., Levita, L., Mason, L., Martinez, A.P., McKay, R., Stocks, T.V.A., Bennett, K.M., Hyland, P., Karatzias, T., Bentall, R.P., 2020. Anxiety, depression, traumatic stress and COVID-19-related anxiety in the UK general population during the COVID-19 pandemic. BJPsych Open 6 (6), 1–9. https://doi.org/10.1192/bjo.2020.109.

Shih, E.W., Ahmad, S.I., Bush, N.R., Roubinov, D., Tylavsky, F., Graff, C., Karr, C.J., Sathyanarayana, S., LeWinn, K.Z., 2021. A path model examination: maternal anxiety and parenting mediate the association between maternal adverse childhood experiences and children's internalizing behaviors. Psychol. Med. 1–11 https://doi.org/10.1017/S0033291721001203.

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

Steinberg, A.M., Pynoos, R.S., Briggs, E.C., Gerrity, E.T., Layne, C.M., Vivrette, R.L., Beyerlein, B., Fairbank, J.A., 2014. The National Child Traumatic Stress Network Core Data set: emerging findings, future directions, and implications for theory, research, practice, and policy. Psychol. Trauma theory. Res. Pract. Policy 6, S50–S57. https://doi.org/10.1037/a0037798.

Steine, I.M., LeWinn, K.Z., Lisha, N., Tylavsky, F., Smith, R., Bowman, M., Sathyanarayana, S., Karr, C.J., Smith, A.K., Kobor, M., Bush, N.R., 2020. Maternal exposure to childhood traumatic events, but not multi-domain psychosocial stressors, predict placental corticotrophin releasing hormone across pregnancy. Soc. Sci. Med. 266, 1–10. https://doi.org/10.1016/j.socscimed.2020.113461.

Sun, L., Sun, Z., Wu, L., Zhu, Z., Zhang, F., Shang, Z., Jia, Y., Gu, J., Zhou, Y., Wang, Y., Liu, N., Liu, W., 2021. Prevalence and risk factors for acute posttraumatic stress disorder during the COVID-19 outbreak. J. Affect. Disord. 283, 123–129. https://doi.org/10.1016/j.jad.2021.01.050.

Tang, W., Hu, T., Hu, B., Jin, C., Wang, G., Xie, C., Chen, S., Xu, J., 2020. Prevalence and correlates of PTSD and depressive symptoms one month after the outbreak of the COVID-19 epidemic in a sample of home-quarantined chinese university students. J. Affect. Disord. 274, 1–7. https://doi.org/10.1016/j.jad.2020.05.009.

Twenge, J.M., Joiner, T.E., 2020. Mental distress among U.S. Adults during the COVID-19 pandemic. J. Clin. Psychol. 76, 2170–2182. https://doi.org/10.1002/jclp.23064.

Waters, S.F., Karnilowicz, H.R., West, T.V., Mendes, W.B., 2020. Keep it to yourself? Parent emotion suppression influences physiological linkage and interaction behavior. J. Fam. Psychol. 34 (7), 784–793. https://doi.org/10.1037/fam0000664.

Weiss, D.S., 2007. The impact of event scale: revised. In: Wilson, J.P., Tang, C.S.-k. (Eds.), Cross-Cultural Assessment of Psychological Trauma and PTSD. Springer Science + Business Media, pp. 219–238. https://doi.org/10.1007/978-0-387-70990-1_10.

Wright, N., Hill, J., Sharp, H., Pickles, A., 2021. Interplay between long-term vulnerability and new risk: young adolescent and maternal mental health immediately before and during the COVID-19 pandemic. JCPP Adv. 1–9 https://doi.org/10.1111/jcv2.12008.