Youth Well-being During the COVID-19 Pandemic

Courtney K. Blackwell, PhD, a Maxwell Mansolf, PhD, a Phillip Sherlock, PhD, a Jody Ganiban, PhD, a Julie A. Hofheimer, PhD, a Charles J. Barone, II, MD, a Traci A. Bekelman, PhD, MPH, a Clancy Blair, PhD, MPH, b David Cella, PhD, a Shaina Collazo, MPH, a Lisa A. Croen, PhD, a Sean Deoni, PhD, a Amy J. Elliott, PhD, a Assiamira Ferrara, MD, PhD, a Rebecca C. Fry, PhD, a Richard Gershon, PhD, a Julie B. Herbstman, PhD, ScM, a Margaret R. Karagas, PhD, a Kaja Z. LeWinn, ScD, a Amy Margolis, PhD, a Rachel L. Miller, MD, a T. Michael O’Shea, MD, MPH, a Christina A. Porucznik, PhD, MSPh, a Rosalind J. Wright, MD, MPH, g on behalf of the Environmental influences on Child Health Outcomes Research Program

OBJECTIVES: The family stress model proposes economic hardship results in caregiver distress and relational problems, which negatively impact youth outcomes. We extend this model to evaluate the impact of coronavirus disease 2019 pandemic-related family hardships on caregiver and youth stress, and, in turn, youth’s psychological well-being. We also investigate how social supports moderate this relationship.

METHODS: We used 2 samples of cross-sectional survey data collected between May 2020 and May 2021: children aged 2 to 12 years (n = 977) and adolescents aged 11 to 17 years (n = 669). Variables included pandemic-related family hardships, stress, social support, and youth life satisfaction. Data were analyzed using structural equation modeling.

RESULTS: Experiencing more pandemic-related family hardships was associated with increased caregiver and youth stress (b = 0.04 to 0.21, SE = 0.01–0.02) and, in turn, decreased youth life satisfaction (b = −0.36 to −0.38, SE = 0.04–0.07). Social connectedness (b = 0.11–0.17, SE = 0.04) and family engagement (b = 0.12–0.18, SE = 0.05–0.06) had direct positive associations with life satisfaction; for children aged 2 to 12 years, greater family engagement was associated with decreased effect of child stress on life satisfaction (b = 0.15, SE = 0.05). For adolescents, females had higher levels of stress compared with males (b = 0.40, SE = 0.6), and having anxiety and/or depression was associated with decreased life satisfaction (b = −0.24, SE = 0.11).

CONCLUSIONS: Caregivers and youth who experienced more coronavirus disease 2019 pandemic hardships had higher levels of stress, particularly adolescent females. Although stress negatively impacted life satisfaction across all ages, family engagement was a protective factor for children aged 2 to 12 years, whereas having anxiety and/or depression was a risk factor for adolescents. For all youth, however, being more socially connected and engaged with family promoted life satisfaction.

WHAT’S KNOWN ON THIS SUBJECT: Coronavirus disease 2019 pandemic-related social disruptions changed the environments in which youth grow, play, and learn. Such disruptions resulted in family hardships and associated stress, and increased incidence of mental health problems in pediatric populations across the globe.

WHAT THIS STUDY ADDS: This study evaluates the impact of coronavirus disease 2019 pandemic-related family hardships on youth’s mental health and shifts the dialogue from addressing negative outcomes to identifying promotive and protective factors of positive psychological wellbeing during a time of universal distress.

Public health policies to limit the spread of the severe acute respiratory syndrome coronavirus 2 virus caused sudden and sweeping social disruptions to the environments in which youth learn, play, and grow. Social distancing guidelines and stay-at-home orders restricted face-to-face interactions, and for many families, work and school closures led to new or amplified economic and emotional pressures and health concerns, injecting fear and uncertainty into their day-to-day lives. At the same time, school closures and remote learning disrupted youth’s education, as well as primary social and emotional support networks,1–3 opportunities for play, and recreational activities.4,5

To date, most epidemiologic studies have focused on the negative psychosocial consequences of the pandemic, such as increases in youth depression and anxiety2,6–9 and decreases in emotional well-being,10 with effects amplified for youth with preexisting mental health conditions.11 However, research indicates youth can experience low levels of well-being even in the absence of psychosocial problems.12–14 Thus, inferring youth have well-being if they are not experiencing negative psychosocial impacts of the coronavirus disease 2019 (COVID-19) pandemic is misleading. Alternatively, research suggests youth can have high levels of well-being in the presence of mental health problems,12–14 but there has been limited research on protective processes that have preserved youth’s positive psychological well-being during the pandemic. In other words, few studies have examined factors that helped youth maintain a sense that their lives are satisfying and day-to-day life is rewarding despite the hardships imposed by the pandemic.15,16 Overall, life satisfaction, a core component of subjective well-being,15–18 is positively associated with self-worth,19 prosocial and interpersonal behavior,19,20 and academic achievement.21,22 Moreover, life satisfaction is a prime psychological strength that contributes to resiliency23 and could support youth’s mental health during the COVID-19 pandemic. Therefore, uncovering factors that support versus undermine life satisfaction amid the social and economic upheavals of the COVID-19 pandemic is paramount and can inform future efforts to protect youth’s well-being during and after a pandemic.

The current study builds on the Family Stress Model (FSM)24–26 and Prime and colleagues’ COVID-19 Family Well-Being Risk and Resilience Framework27 to investigate the impact of family-level hardships (eg, unemployment, child care difficulties, and social distancing) on pediatric psychological stress and life satisfaction. The FSM posits economic hardships lead to caregiver psychological distress, interparental relational problems, and lower parenting quality, which, in turn, exacerbate youth’s maladjustment.28,29 Evidence from diverse samples of families and across ages and outcomes suggests the FSM is a robust model to capture the pathway through which family-level financial hardship impacts youth’s health and development.26 The model by Prime et al applies a similar framework to understand the impact of COVID-19 pandemic-related hardships on youth but also proposes that supportive family relationships can buffer the adverse effects of caregiver and pandemic stress on youth outcomes. The current study tests aspects of these models and examines whether social support from family and friends during the COVID-19 pandemic offsets the negative influence of hardships and stress on youth life satisfaction. Specifically, we hypothesize:

1. More COVID-19 pandemic-related family hardships will result in greater caregiver and youth pandemic-related acute stress.
2. Caregiver stress will mediate the relation between pandemic-related family hardships and youth stress.
3. Youth stress will be negatively associated with youth well-being.
4. Family and peer social support will positively moderate the relation between youth stress and well-being.
5. Having preexisting anxiety and/or depression will negatively moderate the relation between youth stress and well-being.

METHODS

This study leverages cross-sectional caregiver and adolescent self-report data from the National Institutes of Health (NIH) Environmental influences on Child Health Outcomes (ECHO) research program. Started in 2016, ECHO brings together 69 existing longitudinal observational pediatric cohorts from >200 sites across 44 US states and Puerto Rico to investigate a broad range of environmental exposures on 5 primary areas of child and adolescent health: pre-, peri-, and postnatal; airways (eg, asthma); neurodevelopment; obesity; and positive health (eg, life satisfaction).30,31 The current study included a subset of ECHO cohorts with participants from 34 states who had complete data collection for parent-report (n = 11 cohorts from 27 states) and/or adolescent self-reports (n = 5 cohorts from 25 states) on the primary variables required for analysis. Cohort descriptions, including recruitment strategies, inclusion/exclusion
criteria, and participant details (Supplemental Table 3; Supplemental Figs 2 and 3) provide state-level geographic distribution of each multicohort sample that includes families from rural, urban, and suburban communities across the United States. Data were collected between May 1, 2020, and May 31, 2021. Given the diversity of ECHO cohorts’ study schedules and capabilities during the COVID-19 pandemic, different strategies were employed to collect these data, including sending an e-mail to all participants at the same time with a link to the online survey, collecting data at the next scheduled visit (whether remote or in-person), and adding a new study visit to collect COVID-19–related data. Cohorts primarily collected data via self-administered remote online survey, with some data collected via self-administered paper/pencil surveys and researcher-administered phone interviews. Local institutional review boards (IRBs) and/or the central ECHO IRB (Western IRB) reviewed all research methods and procedures.

Participants
For analytic purposes, participants were divided into 2 samples on the basis of child age and reporter of the child-level data, given known low correlations between parent-report and child self-report. The first sample included data from 977 caregivers from 11 ECHO cohorts reporting on their own COVID-19 pandemic experiences and that of their children aged 2 to 12 years (mean age = 8.3, SD = 2.3). Parent-reports for child-level data were collected because of limited reporter reliability for younger children, particularly for the outcome variables of child stress and well-being. The second sample was composed of 669 11- to 17-year-olds (mean age = 16.4, SD = 1) and their caregivers from 5 ECHO cohorts. Adolescents self-reported on their stress, life satisfaction, social connections, and family engagement, and their caregivers contributed data on family-level COVID-19 pandemic-related hardships, their own stress, and family engagement. There were no overlapping participants across samples. Table 1 summarizes the demographic characteristics of each group. Separate analyses were conducted for each participant group. For brevity, the 2- to 12-year-old sample is referred to as the “child” sample and the 11- to 17-year-old sample is referred to as the “adolescent” sample.

Measures
Apart from preexisting mental health conditions and sociodemographic variables, all measures came from the ECHO COVID-19 questionnaires, which were developed in April 2020 to capture the physical, mental, and social impact of the COVID-19 pandemic on children and families. A team of ECHO investigators, including measurement scientists, epidemiologists, and clinical psychologists, developed de novo survey items and modified items from existing surveys and source materials (eg, COVID-19 symptom checkers) from leading organizations (eg, Centers for Disease Control and Prevention, World Health Organization). See Supplemental Information for a description of the ECHO COVID-19 Questionnaire development process.

Child life satisfaction was measured via a single item derived from the rigorously developed Patient-Reported Outcome Measurement Information System Life Satisfaction Assessment. For the 2- to 12-year-old sample, parents were asked, “Since becoming aware of the COVID-19 outbreak, how often has your child felt happy and satisfied with his/her life?” For the 11- to 17-year-old adolescent sample, adolescents were asked, “Since becoming aware of the COVID-19 outbreak, how often have you felt happy and satisfied with your life?” Each was scored on a 5-point Likert scale from not at all (1) to very often (5).

COVID-19 pandemic-related stress was derived from the ECHO Acute Stress Disorder Scale, which has parallel self-report versions for adults (≥18 years), adolescents (11–17 years), and a parent-report version for children (2–12 years; see Supplemental Table 4 for items by version). This instrument is aligned to the Diagnostic and Statistical Manual of Mental Disorders, fifth edition for acute stress disorder (ie, intrusive thoughts, negative mood, disassociation, and avoidance, arousal). All versions use the same item stem (“Since becoming aware of the COVID-19 outbreak...”). The adult and adolescent versions have 9 items, and the parent-report version has the same 9 items with minor wording modifications for developmental appropriateness (eg, “My child seemed in a daze” for “I felt in a daze”), as well as 1 additional item to capture age-inappropriate behaviors resulting from COVID-19 pandemic-related stress (“My child did things that he/she had outgrown or acted younger than current age”). All items were scored on a 5-point Likert scale from not at all (1) to very often (5), and a total average score was computed (range: 1–5).

COVID-19 pandemic-related family hardships included 24 caregiver-reported hardships, such as unemployment, food insecurity, child care difficulties, health concerns, and worries about the child and family. Items were modified from the COVID-19 Perinatal Experiences Impact Survey.
Social connectedness represented the youth’s current level of social connectedness, or feelings of interpersonal closeness and a sense of belonging to a social group, compared with before the COVID-19 outbreak (“Compared to before the COVID-19 outbreak, does the child seem/do you feel...”). This single-item measure used a 6-point Likert scale anchored by much less socially connected (1) and much more socially connected (6). Parallel items were used for parent-report and adolescent self-report. This item was modified from the Adolescent Social Connection and Coping During COVID-19 Questionnaire.

Family engagement represented how much the family unit interacted as a method of coping with the COVID-19 pandemic. Caregivers were asked whether, to cope with the pandemic, they (a) talked to friends and family, and/or (b) engaged in more family activities, scored as 0 (no) or 1 (yes). The average of both items was used as our measure of family engagement for the 2- to 12-year-old child analyses. Adolescents were also asked item b, and their response, along with their parents’ responses, were included in the family engagement score for the 11- to 17-year-old adolescent analyses. Items were modified from the COVID-19 Perinatal Experiences Impact Survey.

Child preexisting mental health problems were assessed via parent-reports of their child’s previous diagnosis of anxiety, depression, attention-deficit disorder or attention-deficit/hyperactivity disorder, autism spectrum disorder, Asperger syndrome, or pervasive developmental disorder; developmental delay; intellectual disability; and learning disability.

---

**TABLE 1** Demographic Information and Descriptive Statistics for Key Model Variables by 2–12-Year-Old Child and 11–17-Year-Old Adolescent Samples

<table>
<thead>
<tr>
<th>Variable</th>
<th>2–12-Year-Old Child Sample (n = 977)</th>
<th>11–17-Year-Old Adolescent Self-Report (n = 669)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age mean (SD)</td>
<td>8.3 (2.3)</td>
<td>16.4 (4)</td>
</tr>
<tr>
<td>Male, n (%)</td>
<td>507 (51.9)</td>
<td>328 (49.2)</td>
</tr>
<tr>
<td>Race, n (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>American Indian or Alaska Native</td>
<td>58 (6)</td>
<td>&lt;5</td>
</tr>
<tr>
<td>Asian American</td>
<td>21 (2.1)</td>
<td>&lt;10</td>
</tr>
<tr>
<td>Black</td>
<td>58 (5.9)</td>
<td>203 (30.3)</td>
</tr>
<tr>
<td>Multiple race</td>
<td>75 (7.7)</td>
<td>24 (3.6)</td>
</tr>
<tr>
<td>Other race</td>
<td>&lt;10</td>
<td>&lt;5</td>
</tr>
<tr>
<td>Native Hawaiian or other Pacific Islander</td>
<td>0</td>
<td>&lt;5</td>
</tr>
<tr>
<td>White</td>
<td>754 (77.2)</td>
<td>425 (63.5)</td>
</tr>
<tr>
<td>Missing</td>
<td>&lt;5</td>
<td>&lt;10</td>
</tr>
<tr>
<td>Ethnicity, n (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hispanic</td>
<td>105 (10.8)</td>
<td>37 (5.5)</td>
</tr>
<tr>
<td>Non-Hispanic</td>
<td>871 (88.2)</td>
<td>632 (94.5)</td>
</tr>
<tr>
<td>Missing</td>
<td>&lt;5</td>
<td>0</td>
</tr>
<tr>
<td>Caregiver educational attainment, n (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>High school degree or less</td>
<td>108 (10.8)</td>
<td>164 (24.5)</td>
</tr>
<tr>
<td>Some college, associate degree, or trade school</td>
<td>237 (24.3)</td>
<td>213 (31.8)</td>
</tr>
<tr>
<td>Bachelor’s degree</td>
<td>362 (37.1)</td>
<td>161 (24.1)</td>
</tr>
<tr>
<td>Master’s, professional, or doctorate degree</td>
<td>264 (27)</td>
<td>87 (13)</td>
</tr>
<tr>
<td>Missing</td>
<td>&lt;10</td>
<td>44 (6.6)</td>
</tr>
<tr>
<td>Youth mental health condition, n (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anxiety or depression</td>
<td>40 (4.1)</td>
<td>133 (19.9)</td>
</tr>
<tr>
<td>Other mental health conditionα</td>
<td>106 (10.8)</td>
<td>124 (18.5)</td>
</tr>
<tr>
<td>No mental condition</td>
<td>831 (85.1)</td>
<td>412 (61.6)</td>
</tr>
<tr>
<td>Youth psychological well-being, mean (SD)</td>
<td>4.1 (0.8)</td>
<td>3.4 (1)</td>
</tr>
<tr>
<td>Youth acute stress, mean (SD)</td>
<td>1.7 (0.6)</td>
<td>1.9 (0.8)</td>
</tr>
<tr>
<td>Caregiver acute stress, mean (SD)</td>
<td>2.1 (0.7)</td>
<td>1.8 (0.7)</td>
</tr>
<tr>
<td>Youth social connectedness, mean (SD)</td>
<td>4.1 (0.8)</td>
<td>3.4 (1)</td>
</tr>
<tr>
<td>Family engagement, mean (SD)</td>
<td>1.2 (0.8)</td>
<td>1.4 (1)</td>
</tr>
<tr>
<td>Any COVID-19 infection in the home, n (%)β</td>
<td>154 (15.7)</td>
<td>61 (9.1)</td>
</tr>
</tbody>
</table>

α Other mental health conditions included: attention-deficit disorder or attention-deficit/hyperactivity disorder; autism, autism spectrum disorder, Asperger syndrome, or pervasive developmental disorder; developmental delay; intellectual disability; and learning disability.

β This variable represented whether the caregiver and/or index child were infected with COVID-19.
health condition (ie, has at least 1 mental health condition but does not have anxiety or depression).

Covariates included child age (continuous), sex assigned at birth (male or female), primary caregiver educational attainment (high school degree or less, some college, college degree, master’s, professional, or doctorate degree), ECHO cohort in which the child was enrolled, and COVID-19 diagnosis, defined as whether a doctor ever told the child and/or caregiver they had COVID-19 and/or a positive result on a nasal, mouth swab, or blood test. Child race and ethnicity are presented in Table 1. These variables were collected via parent-report or adolescent self-report and were required by the NIH, consistent with its Inclusion of Women, Minorities, and Children policy. Racial and ethnic categories were based on the NIH Policy on Reporting Race and Ethnicity Data. Since we did not have specific hypotheses regarding race and ethnicity, and previous research indicates that family and social supports function as protective factors across racial and ethnic groups,26,29 these variables were not included as covariates.

**Analytical Approach**

We used mega-analysis41–43 by pooling raw data from all cohorts into a larger single sample for each analysis (ie, one for the 2- to 12-year-old child analysis and one for the 11- to 17-year-old adolescent analysis), thus improving power beyond that of any single cohort sample. Also called “meta-analysis of individual participant/patient data,” mega-analysis is often considered superior to traditional meta-analysis, which relies on summary statistics because mega-analysis retains more detailed information (ie, raw data) from the original samples.41–43 Because this technique uses raw data, mega-analysis requires either standard data collection or a way to harmonize data across individual samples. For the current study, all cohorts collected the same COVID-19-related data via the ECHO COVID-19 questionnaires, and all other data (eg, mental health conditions, sociodemographic variables) were harmonized to create standard variables as described above. We selected participants with data on all predictors, outcomes, and effect moderators, while allowing missing data on covariates. As shown in Table 1, all but 1 covariate had missing data from <10 participants; for the adolescent sample, 44 participants (6.6%) had missing caregiver educational attainment data, which is still well within the suggested 5% to 10% missingness.44 We used multiple imputation to account for missing data; specifically, 25 completed data sets were constructed using the mice package45 in R,46 with imputed values on covariates. Aside from Table 1 and the least absolute shrinkage and selection operator (LASSO) regressions (see below), all descriptive and inferential analyses were conducted separately for each imputation, and the results were combined using Rubin’s47 pooling rules.

After initial descriptive frequencies analyses, we used the “glmnet”48 package in R to perform 2 separate multivariate LASSO regressions, 1 with child sample and 1 with the adolescent sample, to identify the sets of caregiver-reported hardships that were the strongest predictors of caregiver and child acute stress, conditioned on the other hardships. The LASSO approach removes or “shrinks” the model of the least predictive variables while maximizing prediction precision by retaining the most predictive variables with the least shared covariance. This is achieved by constraining the sum of the absolute values of the model coefficients, which effectively reduces the coefficients for some variables to 0 and results in a subset of predictors with the largest associations.49 LASSO thus enabled us to reduce the large set of correlated hardships to the subset that minimized the prediction error of the parent and child acute stress variables. For children aged 2 to 12 years, the LASSO predicted caregiver reports of their own and their children’s COVID-19 pandemic-related acute stress; for adolescents aged 11 to 17 years, the LASSO predicted caregiver self-reported and adolescent self-reported COVID-19 pandemic-related acute stress.

For the primary analyses, we estimated separate models for the child and adolescent samples using structural equation modeling (Fig 1).50 For the 2- to 12-year-old group, parent-report data were used for all variables. For the 11- to 17-year-old group, analyses included adolescent self-reported stress, life satisfaction, and social connectedness, as well as adolescent-reported family engagement, as described above. To aid in interpretability, youth stress, life satisfaction, social connectedness, and family engagement were standardized within each sample.

To evaluate model fit, we used standard fit indices: \( \chi^2 P > .05; \) ratio of \( \chi^2 \) to degrees of freedom (df) < 5; root mean square error of approximation (RMSEA) < 0.06; comparative fit index (CFI) and Tucker–Lewis Index > 0.95; and standardized root mean squared residual (SRMR) < 0.08.51 Path coefficients were judged to be significant if the associated \( P \) value \( \leq .05. \) To estimate and test mediated effects, we used a Monte-Carlo–based test.52,53 Path models...
were estimated using the lavaan\textsuperscript{54} package in R, with the semTools\textsuperscript{55} package used to aggregate results from multiple imputation and compute mediation statistics.

RESULTS

Sample Descriptives and Preliminary Analyses

The child and adolescent samples included approximately equal numbers of males and females (male: child: 51.9\%, adolescent: 49.2\%). The child sample was predominantly White (77.2\%), with 6\% American Indian or Alaska Native, 5.9\% Black, 2.1\% Asian, and 7.7\% multiracial. This sample also had 10.8\% Hispanic children. The adolescent sample was predominately White (63.5\%) and Black (30.3\%), with 3.6\% multiracial and <10 children from other racial backgrounds; 5.5\% of adolescents were Hispanic. Caregiver educational attainment was higher in the 2- to 12-year-old child sample: 64.1\% had a college degree or higher compared with 37.1\% in the 11- to 17-year-old adolescent sample. Additionally, fewer children aged 2 to 12 years had mental health problems (14.9\%) compared with adolescents (38.4\%; see Table 1 for sample descriptive statistics).

Geographically, the child sample represented 27 states across the continental United States, ranging from <5 participants to 258 participants per state. The adolescent sample included participants from 25 states in the continental United States, with <5 to 211 participants per state. Supplemental Fig 2 (child sample) and Supplemental Fig 3 (adolescent) provide details on the geographic distribution of each multicohort sample.

On average, the child and adolescent groups had similar levels of youth COVID-19 pandemic-related acute stress (child: mean = 1.7, SD = 0.6; adolescent: mean = 1.9, SD = 0.8). Caregivers in the 2- to 12-year-old child sample had slightly higher pandemic-related acute stress (mean = 2.1, SD = 0.7) compared with caregivers in the 11- to 17-year-old sample (mean = 1.8, SD = 0.7). Additionally, child samples had higher life satisfaction (mean = 4.1, SD = 0.8) compared with adolescents (mean = 3.4, SD = 1; see Table 1). See Supplemental Table 5 (child) and Supplemental Table 6 (adolescent) for complete covariance matrices.

Multivariate LASSO regression for the 2- to 12-year-old child sample
examined effect moderation by 2 types of social support, youth social connectedness and family engagement, and by youth preexisting mental health conditions. We controlled for youth and family sociodemographic variables and COVID-19 infection status (covariates) for all outcomes and estimated (residual) covariances between the predictors unique to the youth stress and life satisfaction regression and the 2 upstream predictors (family hardships and caregiver stress), yielding a fully saturated model except for the 2 df.

**2- to 12-Year-Old Child Model**

SEM results indicated excellent fit of the hypothesized model ($\chi^2[2] = 1.61, P = .45; \text{RMSEA} < 0.01; \text{CFI} \approx 1; \text{TFI} \approx 1; \text{SRMR} = 0.002$). As summarized in Fig 1, COVID-19 pandemic-related family hardships had a significant direct association with caregiver and children’s acute stress, where each additional hardship equated to a 0.15 (SE = 0.01, $P < .001$) and 0.04 (SE = 0.01, $P < .001$) SD increase in stress for caregivers and children, respectively. In turn, child stress had a direct negative association with well-being: a 1 SD increase in acute stress was associated with a 0.36 (SE = 0.04, $P < .001$) decrease in life satisfaction. Mediation effects were significant for all mediated paths (Table 2). Of note, the largest indirect association was found for caregiver stress on child life satisfaction via child stress ($\hat{b} = 0.15, 95\% \text{ confidence interval [CI]} = -0.2 \text{ to } -0.11$). COVID-19 pandemic-related family hardships had a total indirect association of $-0.04$ (95% CI = $-0.05 \text{ to } -0.03$), with equal contributions from the hardships/caregiver stress path ($\hat{b} = -0.02, 95\% \text{ CI} = -0.03 \text{ to } -0.02$) and hardships/child stress path ($\hat{b} = -0.02, 95\% \text{ CI} = -0.02 \text{ to } -0.01$).

Social connectedness and family engagement both had positive direct associations with children’s life satisfaction: 1 SD increase in each of these social supports equated to a 0.17 ($P < .001$) and 0.18 ($P = .002$) SD increase in life satisfaction, respectively. Additionally, family engagement significantly moderated the relationship between children’s stress and well-being, where a 1 SD increase in family engagement was associated with a 0.15 (SE = 0.05, $P = .002$) decrease in the effect of child stress on child life satisfaction. No direct association or moderation was found for preexisting mental health conditions. Results also suggested older children had slightly lower parent-reported life satisfaction ($\hat{b} = 0.04, \text{SE} = 0.01, P < .001$) and slightly higher acute stress ($\hat{b} = 0.02, \text{SE} = 0.01, P = .02$) compared with younger children. Compared with children whose caregivers had a high school degree or less, children whose caregivers had a college degree ($\hat{b} = 0.23, \text{SE} = 0.08, P = .001$) or a master’s, professional, or doctorate degree ($\hat{b} = 0.23, \text{SE} = 0.09, P = .001$) had higher life satisfaction. No other covariate paths were statistically significant.

<table>
<thead>
<tr>
<th>TABLE 2 Mediated Effect Estimates and Confidence Intervals</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>2- to 12-Year-Old Child Sample</strong></td>
</tr>
<tr>
<td>Estimate</td>
</tr>
<tr>
<td>----------</td>
</tr>
<tr>
<td>Family hardships to youth stress via caregiver stress</td>
</tr>
<tr>
<td>Caregiver stress to youth well-being via youth stress</td>
</tr>
<tr>
<td>Family hardships to youth well-being total</td>
</tr>
<tr>
<td>Family hardships to youth well-being via youth stress</td>
</tr>
<tr>
<td>Family hardships to youth well-being via caregiver stress</td>
</tr>
<tr>
<td><strong>11- to 17-Year-Old Adolescent Sample</strong></td>
</tr>
<tr>
<td>Estimate</td>
</tr>
<tr>
<td>----------</td>
</tr>
<tr>
<td>0.02</td>
</tr>
<tr>
<td>0.03</td>
</tr>
<tr>
<td>0.03</td>
</tr>
<tr>
<td>0.02</td>
</tr>
<tr>
<td>0.01</td>
</tr>
</tbody>
</table>

All mediated paths were significant at $P < .05$. 

DISCUSSION

Our findings in a diverse multicohort sample of >1600 children and adolescents provide new insights into varied stress-coping adaptations of caregivers, children, and adolescents to the COVID-19 pandemic. We know from previous research that, despite youth having much lower severe acute respiratory syndrome coronavirus 2 infection rates compared with adults during the study period,56 social disruptions resulting from the pandemic have adversely affected their mental health.7,57 Identifying children and adolescents with mental health problems is critical, but a preventative lens toward identifying the underlying mechanisms that promote well-being, and not just the lack of mental health problems, is required to get ahead of the pediatric mental health crisis that is swiftly becoming its own epidemic.

The current study addresses this by testing and expanding the FSM and model by Prime et al. Caregiver stress mediated this relationship in the 2- to 12-year-old sample only, whereas adolescents were directly affected by pandemic-related family hardships. The lack of mediation for adolescents may in part be because of teenagers being more acutely aware of pandemic-related disruptions, particularly regarding family-level hardships because teenagers themselves may have become care providers for younger siblings; engaged in remote schooling longer than elementary school children; or became unemployed58 or were unable to secure summer employment.59

For children and adolescents, social relationships were significant contributors to their life satisfaction, independent of COVID-19 pandemic-related acute stress. In addition, greater family engagement was associated with decreased influence of pandemic-related acute stress for 2- to 12-year-olds, supporting research on the critical nature of child-caregiver relationships, particularly for younger children. Therefore, COVID-19 pandemic-related stress may have an acute impact on children’s lives, but it is important to remember that other youth’s lives, such as connecting with peers and family engagement, contribute to their appraisals of life satisfaction, emphasizing the critical...
nature of relational health to pediatric well-being.\textsuperscript{60} It is also important to consider the COVID-19 pandemic social context, where social distancing and quarantine guidelines made contact with friends challenging, with most social connections likely occurring remotely rather than in-person. Even so, this level of interaction had measurable impact on children’s life satisfaction.

Additionally, having prepandemic anxiety and/or depression placed adolescents, but not children, at increased risk for lower life satisfaction. A significant association between adolescents’ stress and sex indicated that females had higher levels of psychological stress compared with males, a finding corroborating known gender differences in anxiety and depression before\textsuperscript{61} and during the COVID-19 pandemic.\textsuperscript{57,62–65} Addressing children’s preexisting mental health problems, particularly for adolescent girls, may be another strategy to help decrease the negative impact of the COVID-19 pandemic on youth well-being.

**Practical Considerations**

Regardless of age, youth’s COVID-19 pandemic-related acute stress had a large direct impact on their well-being; for every 1 SD increase in acute stress, life satisfaction decreased by more than one-third SD. The moderate magnitude of the stress/life satisfaction association suggests these are related but also separable constructs. Measuring one does not provide a proxy for the other. Future interventions can find ways to target both constructs to decrease psychological stress, as well as improve well-being in and of itself.

In some cases, the intervention may be the same. For example, mindfulness interventions can decrease stress, but they can also promote well-being.\textsuperscript{66} Alternately, the 2 LASSO regressions highlighted 9 hardships that were related to caregiver and youth stress and could be targeted by federal or state agencies. Federal assistance to address caregiver’s financial and work concerns may help alleviate stress for both caregivers and youth. Evidence on the effectiveness of the financial benefits from the federal Coronavirus Aid, Relief, and Economic Security (CARES) Act,\textsuperscript{67} the Consolidated Appropriations Act,\textsuperscript{68} and American Rescue Plan Act\textsuperscript{69} suggests government assistance helped stave off increases in poverty during the pandemic,\textsuperscript{70} with individuals using funds to pay for basic needs (food, rent, mortgage, or utilities) and household or personal supplies\textsuperscript{71}; continuing similar programs for the lowest income families could help continue to decrease poverty rates and reduce financial hardship. In turn, programs such as these could have important downstream influences on youth’s psychological well-being.

Social connectedness and family engagement may also be of prime interest to health care professionals, above and beyond evaluating negative risk factors such as stress. Results presented here support the American Academy of Pediatrics’ revised policy statement regarding childhood toxic stress, which proposes shifting from the deficit-based adversity focus to a strengths-based relational health framework that emphasizes safe, supportive, and nurturing relationships as a solution to both buffering adversities and promoting resilience.\textsuperscript{72} One potential way to address the statement’s call for a public health approach to relational health is through social prescribing, or providing health professionals with nonmedical referral options that support social connection (eg, community arts activities, walking or running clubs, sports teams) and leverage local community assets while promoting social connectedness.\textsuperscript{73–75} With concerns over the spread of the coronavirus through indoor activities, evidence from nature-based social prescribing offers unique outdoor opportunities to enhance youth’s social connectedness.\textsuperscript{75} Additional strategies might include:

1. outdoor learning pods, which emerged as ways for small groups of youth to learn together without losing in-person social connection during school closures;
2. formal programs such as school-based social-emotional learning programs,\textsuperscript{76} positive youth development interventions,\textsuperscript{77–79} organized sports and extracurricular activities,\textsuperscript{80,81}; and
3. informal activities such as recess,\textsuperscript{82} unstructured play, and leisure activities.

Well-child care visits also provide clinicians an opportunity to discuss family engagement, including evidence-based strategies of talking and working together as a family to solve problems, identifying family strengths, and staying hopeful in difficult times.\textsuperscript{60,83} The Well-Visit Planner\textsuperscript{84} tool may be particularly useful to open conversations with families and individuate engagement strategies because the tool places the voice of the family at the center of clinical interactions.\textsuperscript{85–87} Accounting for developmental differences and based on findings presented here, encouraging positive family engagement for children and emphasizing peer connections for adolescents can help differentiate intervention strategies.
Limitations
This study has several limitations. First, these data are not nationally representative and include only youth-caregiver dyads with complete data on the primary variables required for the analysis. This limited which ECHO cohorts were included in the final samples. For the adolescent analysis specifically, ECHO cohorts contributing data were limited to primarily the east coast and western United States, possibly limiting our ability to generalize conclusions to other regions because policy approaches to the pandemic differed across regions of the United States. Compared with the 2- to 12-year-old child sample, the 11- to 17-year-old adolescent sample also had more frequent indicators of socioeconomic disadvantage (mothers without college education and mothers from racial and ethnic minoritized groups). These differences were driven in part by geography (Utah and South Dakota have lower frequencies of the population of racial and ethnic minoritized groups) and inclusion criteria for one of the cohorts (Cohort L only enrolled infants born <28 weeks’ gestation, a condition that is associated with socioeconomic disadvantage). We would anticipate that our model is robust across socioeconomic positions based on the large body of literature on the robustness of the FSM model across diverse samples. Nonetheless, higher socioeconomic status very likely lessens COVID-19 pandemic-related stress experienced by caregivers and youth and might moderate the association with caregiver pandemic-related stress and diminish youth well-being. Both models were conditional on caregiver educational attainment and showed similar results despite differences in samples, adding to the robustness of the model findings and providing the basis for future research with nationally representative samples. Second, data include both parent-reported and adolescent self-reported outcomes, making it impossible to distinguish whether differences in models are because of reporter or child age. Third, the family engagement measure evaluated quantity of engagement rather than quality of the youth-caregiver relationship; however, the framing as coping strategies to deal with pandemic stress, specific-item wording suggesting positive engagement (eg, engaging in more family activities [eg, games or sports]) and positive associations with life satisfaction aligns with work on relationship quality. Finally, data were cross-sectional, making it impossible to control for or evaluate changes from pre- to post-COVID-19 pandemic regarding stress and well-being; however, the reference time point for survey questions was, “Since becoming aware of the COVID-19 pandemic...” which accounts for shifts in the primary constructs evaluated here.

CONCLUSIONS
As one of the only investigations of child and adolescent positive psychological functioning during the COVID-19 pandemic, this study supports the FSM and Prime and colleagues’ framework during a unique time when the population at large has been “exposed” to a ubiquitous stressor. Findings provide novel insight into upstream mechanisms that can be targets for future interventions to improve pediatric well-being during pandemics and other external stressors. The evidence presented here suggests that youth and caregiver stress have the potential to be reduced and well-being benefited by the systematic creation of routinely available opportunities for family and peer group social engagement, and with programs tailored to community and neighborhood strengths and needs. These findings further emphasize the importance of assessing the presence of positive psychological well-being instead of only the absence of mental health problems as the primary outcome and highlights potential opportunities for future interventions to target both constructs to decrease psychological stress, as well as improve well-being. By measuring COVID-19 pandemic-related family hardships and caregiver stressors that influence youth’s stress and their sense of well-being, we identified varied pathways to outcomes and potential targets for optimizing responses to ongoing COVID-19 pandemic-related challenges.

ACKNOWLEDGMENTS
We thank our ECHO colleagues and the medical, nursing and program staff, as well as the children and families participating in the ECHO cohorts. We also acknowledge the contribution of the following ECHO program collaborators:

ECHO components: Coordinating Center: Duke Clinical Research Institute, Durham, North Carolina: Smith PB, Newby KL, Benjamin DK; Data Analysis Center: Johns Hopkins University Bloomberg School of Public Health, Baltimore, Maryland: Jacobson LP; Research Triangle Institute, Durham, North Carolina: Parker CB; Person-Reported Outcomes Core: Northwestern University, Chicago, Illinois: Gershon R, Cella D.

ECHO awardees and cohorts: Columbia University, New York, New York: Perera FP, Herbstman JB; Dartmouth College, Hanover, North
REFERENCES

Herbstman, Karagas, LeWinn, Margolis, Miller, O’Shea, Porucznik, and Wright collected data and critically reviewed the manuscript; and all authors approved the final manuscript as submitted and agree to be accountable for all aspects of the work.

The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health.

DOI: https://doi.org/10.1542/peds.2021-054754

Accepted for publication Jan 26, 2022

Address correspondence to Courtney K. Blackwell, PhD, Northwestern University, 625 North Michigan Ave, Floor 21, Chicago, IL 60611. E-mail: ckblackwell@northwestern.edu

PEDIATRICS (ISSN Numbers: Print, 0031-4005; Online, 1098-4275).

Copyright © 2022 by the American Academy of Pediatrics

FUNDING: Research reported in this publication was supported by the Environmental influences on Child Health Outcomes program, Office of The Director, National Institutes of Health, under Award Numbers U2C0D023375 (Coordinating Center), U240D0235382 (Data Analysis Center), U240D0235319, with co-funding from the Office of Behavioral and Social Sciences Research (Person Reported Outcomes Core, Gershon, Cella), UH3OD0235380 (Ganiban, Leve, Neiderhiser), UH3OD023271 (Bush, Karr, LeWinn, Mason, Sathyanarayana), UH3OD023548 (O’Shea, Fry), UH3OD023290 (Herbstman, Perera), UH3OD023279 (Elliott), UH3OD023248 (Dabeila), UH3OD023289 (Groen, Ferrara), UH3OD023337 (Wright), UH3OD023249 (Stanford), UH3OD023275 (Karagas), UH3OD023332 (Blair), UH3OD023285 (Deoni), UH3OD023285 (Kerver), and UH3OD023282 (Gern). Funded by the National Institutes of Health (NIH).

CONFLICT OF INTEREST DISCLOSURES: The authors have indicated they have no potential conflicts of interest to disclose.

REFERENCES


30. Gillman MW, Blaisdell CJ. Environmental influences on child health outcomes, a research program of the National Institutes of Health. Curr Opin Pediatr. 2018;30(2):260–262


40. Pfeifer JH. Adolescent social connection and coping during COVID quarantine.
Available at: https://osf.io/jakg5/. 2020. Accessed April 5, 2020


55. semTools: Useful tools for structural equation modeling. R package version 0.5-3. 2020. [Computer program]


59. Desilver D. During the Pandemic, Teen Summer Employment Hit Its Lowest Point Since the Great Recession. Washington, DC: Pew Research Center; 2021


75. Leavell MA, Leiferman JA, Gascon M, Braddock F, Gonzalez JC, Litt JS. Nature-based social prescribing in urban


