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# The effects of COVID-19-related stress among parents and children in Ohio child care programs: a mixed-methods study

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**ABSTRACT**

COVID-19-related stress effects on the caregiver and child are largely unexplored. Caregivers (N = 114) of children between the ages of 3 months and 10 years accessing Ohio child care completed a parent survey (fall 2020), and additional caregivers (N = 20) completed an interview. Caregivers reported a mean of 70 (SD = 19; scale 1–100) on COVID-19-related stress. In adjusted regression models, higher caregiver-reported COVID-19-related stress was associated with increased odds of child aggression and poor social skills. Exploratory analyses indicated that these associations may be partly mediated by the caregiver working from home and losing their temper. Qualitative findings reflect caregiver COVID-19 stress and complement quantitative findings. Caregivers and children who experience COVID-19 stress should be monitored for persistent problems.

**KEYWORDS**

Child care; family stress; child behavior; COVID-19; caregivers

## Introduction

The COVID-19 pandemic was declared a public health emergency in the United States on March 13, 2020 and classified as a major catastrophic event affecting individuals and families worldwide (National Institute of Health [NIH], 2020). Ohio officials made a public health decision on March 25, 2020 to close child care centers unless granted a Temporary Pandemic Child Care License (Acton, 2020a). On August 9, 2020, child care centers in Ohio were able to return to normal, pre-pandemic ratios and class sizes; most, if not all, of the disease transmission reduction activities were still in effect at the centers (Acton, 2020b). To date, it is unclear how these reductions and

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reinstatement in child care services in the wake of the COVID-19 pandemic affected COVID-related stress in parents/caregivers, their psychological distress and coping, and the quality of overall child functioning.

Many individuals experienced a significant increase in stress in the wake of the COVID-19 pandemic. A recent survey of 1,500 adults in the United States in May 2020 indicated that increases in emotional distress related to the pandemic were significantly and positively related to reported increases in anxiety and depression (Palsson, Ballou, & Gray, 2020). For parents, these negative emotional effects of the pandemic have been even more complex. A survey by the American Psychological Association (APA) conducted in spring 2020 indicated that on average parents reported their level of pandemic-related stress as 6.7 compared to adults without children who reported their average level of stress as 5.5, with 1 indicating "little or no stress" and 10 indicating "a great deal of stress" (American Psychological Association [APA], 2021). Moreover, a meta-analysis investigating the psychiatric effects of COVID-19 on adults indicated that their stress response can include both anxiety- and depression-related symptomatology (Rajkumar, 2020). Research suggests that caregivers may have a heightened response to catastrophic events as their anxiety and posttraumatic stress may be exacerbated due to the responsibilities of the caregiver role (Cohodes, McCauley, & Gee, 2021; Russell, Hutchison, Tambling, Tomkunas, & Horton, 2020).

Studies demonstrate that parents have used both positive (active coping) and negative (substance use and behavioral disengagement) coping strategies during the pandemic (Park et al., 2020). More specifically, a study from April 2020 that assessed COVID-19-related stress in adults found that the most common coping strategies used were distraction, active coping, and seeking emotional support. Caregivers reported more adaptive strategies for coping including emotion and religious support as well as instrumental social support seeking (Pfefferbaum & North, 2020).

Studies support that children's functioning is not only impacted by external stressors, but by their parents' mental health status and adjustment to external stressors. The family stress theory (Conger & Conger, 2002) posits that acute stressors happen to all families. If the family lacks the necessary support, this can lead to crises that result in physical, emotional, and/or relational trauma. As such, application of the family stress theory (Conger & Conger, 2002) suggests that COVID-19 can be conceptualized as an acute stressor or external factor that impacts the functioning of the family. Specific stressors experienced during the pandemic include parents working from home, being responsible for managing learning, job loss, food insecurity, isolation, securing medical care, and dealing with the uncertainty of an indefinite quarantine (Pfefferbaum & North, 2020). In support of this conceptualization and application of the family stress theory, previous research demonstrates that catastrophic events evoke a series of psychological responses including anxiety and depression in

adults and internalizing symptoms and externalizing behavior in children (Li & Zhou, 2021). Research shows that during the COVID-19 pandemic, children with parents experiencing moderate to severe distress are more likely to have increased health issues (Horiuchi et al., 2020) which would be predicted using the family stress theory. Moreover, a national survey from June 2020 revealed that 27% of parents reported worsening of their mental health during the pandemic and 14% reported worsening mental health in their children (Patrick et al., 2020).

The current literature is somewhat limited in that it does not address the relationship between caregiver COVID-19-related stress and changes in coping or parental interaction, which are important caregiver qualities that can also influence child behavioral functioning. As such, the relationship between parent-related stress and child development and behavioral outcomes is being investigated using the following model, which was informed by the family stress theory. In short, this model posits that caregiver stress can negatively impact parent-child interactions and child development when the caregiver cannot engage in health coping mechanisms (Figure 1).

Little is known about the relationship between parental experience of COVID-19-related stress and child functioning. As such, we conducted a study among parents whose children were participating in child care in the state of Ohio from August-October of 2020. We sought to: 1) describe the types and levels of reported COVID-19-related-stress in parents, 2) record the parents' reactions in terms of psychological distress, coping, and responsiveness to the child, and 3) evaluate the links between these parental features and child functioning. This is the only study to our knowledge to specifically focus on the effects of the pandemic on caregiver stress and several areas of caregiver functioning in this population and age range of children.

Based on the family stress theory, it is hypothesized that caregivers who returned to the work setting and had their children return to child care centers or certified home settings during the 2020 COVID-19 pandemic would report high levels of COVID-19-related stress. It is also hypothesized that increased COVID-related stress in parents would be associated with negative changes in psychological stress, coping, and responsiveness to one's child, and child functioning. Finally, caregiver factors are hypothesized to influence the relationship between COVID-19- related stress and child behavior as potential mediators. It was not hypothesized a priori which domains of caregiver and child functioning would be affected by COVID-19-related stress. Responses to open-ended questions regarding levels of caregiver COVID-related stress, and changes in psychological distress, coping, interaction with the child and child functioning were also explored to better understand whether the lived experiences of caregivers correspond to survey results. It is hypothesized that this

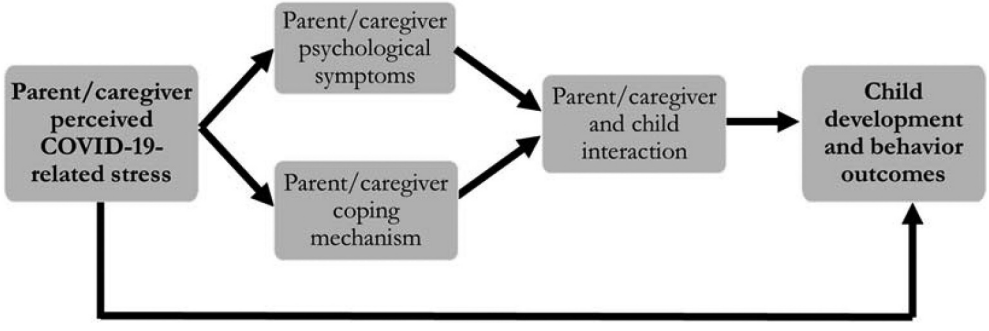


**Figure 1.** COVID-19 – related family stress model.

qualitative analysis will corroborate the quantitative findings and provide rich information on the nature of family stress during the pandemic.

## Methods

### *Participants*

Participants of this study are parents/caregivers, primarily female, who have a child attending an Ohio child care program during the COVID-19 pandemic. Forty-six child care programs representing 10 counties in Ohio with variability in population size, density, demographics, and COVID-19 transmission trends were enrolled in the *Ohio COVID-19 Child Care Study*. This study was funded by the Ohio Bureau of Workers' Compensation and supported by the Ohio Department of Job and Family Services to better understand factors associated with infection and spread of COVID-19 among child care centers and family child care home providers in Ohio. The central goal of this rapid-response study was to identify best practices for lowering the spread of COVID-19 in congregate child care settings. Data were collected during a snapshot in time from August 15 to October 20, 2020. This study data provide information to address a secondary goal of the study, to determine the levels of stress and coping in response to COVID-19.

Ten out of 88 counties in the state of Ohio were selected to participate based on variability in the number of child care programs, total population, sociodemographic characteristics (% Black or African American), COVID-19 severity (number of cases and % of cases with hospitalization), and geographic location (Ohio Department of Health, 2020a, 2020b; U.S. Census Bureau, 2020). These counties included Franklin, Cuyahoga, Hamilton, Summit, Montgomery, Lucas, Butler, Stark, Licking, and Ashtabula. Enrolled child care programs included both child care centers (more than 7 children served at once; which accounted for 86% of the sample) and Type A (care for 7–12 children) and Type B (no more than 6 children; Ohio Department of Job and Family Services, 2020).

Within the 10 selected counties, 407 child care programs out of 3836 invited expressed interest in joining the child care study and 291 were eligible to participate based on the following criteria: licensed as a JFS child care center or family child care home provider, open at the start of the study in August 2020, located in one of the 10 pre-selected counties, had five or more people in total (staff and children included), and had the ability to e-mail both staff and parents given the need for web-based study recruitment due to physical distancing guidelines. In total, 157 interested and eligible child care centers were invited to participate in the study through a purposeful, random sampling method. This sampling method insured inclusion of county

representation with a low number of programs (<20) and limited the number of child care centers concentrated in one zip code for greater geographical representation. Among the enrolled child care programs, there were approximately 1,615 families eligible to participate in the study based on self-report by child care program administrators at the time of site onboarding. All families received information about the study and how to enroll through their child care administrators. Within these programs, 242 caregivers of a child attending one of these child care centers voluntarily consented to this study and completed an initial caregiver enrollment screening form.

Based on this initial caregiver enrollment screening, which was required for participation in all other study activities, eligible caregivers were selected to complete either the survey or interview. Ultimately, 114 eligible caregivers consented and completed the parent/caregiver survey (eligibility to complete the survey was based on enrollment in the study, additional consent, and reported to live with thee child attending the selected child care program at least 50% of the time). After the enrollment survey process, 139 caregivers expressed interest in the interview component of the study. Due to time and staffing constraints, interviews were limited to 20 caregivers. Sampling was designed to achieve diversity of perspectives based on the type of child care program and the Ohio Public Health Advisory System rating used to assess the degree of COVID-19 spread. Based on these categories, interested caregivers were invited from both family child care home providers and child care centers within five counties with purple/red (level 3 and 4 with very high and severe exposure and spread of COVID-19) and five counties with yellow/orange (level 1 and 2 with active or increased exposure and spread of COVID-19) were selected.

### *Procedure*

This study and all procedures were approved by the Case Western University Institutional Review Board (IRB). All caregivers who had children attending the selected child care programs were eligible to voluntarily enroll in the study by completing an online survey that provided background information on participant demographics, household composition, and COVID-19 risk factors. Participating caregivers also had the opportunity to complete a one-time online survey or be interviewed in an effort to learn more about factors driving the spread of COVID-19 and the impact of COVID-19 on families with young children. There was no overlap in individuals who received the survey or those interviewed as the contents were too similar and may have influenced the results due to redundancy. Each survey participant was given a link to a REDCap survey for direct data collection and storage. Survey participants received a $25 Amazon e-gift card for their participation.

For those who accepted the invitation for an interview, 20 total interviews were completed over restricted Zoom and took approximately 60 minutes. They were conducted by two trained research staff. Interview participants received a $50 Amazon e-gift card for their participation. Following each interview, a debriefing form was completed by the interviewer and note taker to capture high-level information about themes related to the main research questions of the study. All interviews were audio-recorded and transcribed verbatim for analysis. Each transcription was quality checked and corrected by a member of the research team, maintaining a first and second pass of the transcription. A codebook was developed by researchers with expertise in major concept areas (e.g., parental stress, child functioning). All interview recordings and transcriptions were stored in Box and accessible to only IRB-approved study staff.

### Measures

Demographic information was collected about the caregiver participant, family COVID-19-related factors, and child characteristics as part of the parent survey. As the parent and child well-being data collection was a secondary goal of this research project, there was limited time to assess parents and children using full versions of reliable scales of mental health symptoms, coping, and child behavior. However, key questions were taken directly from standardized scales whenever possible. Basic respondent characteristics included sex, race, level of education, age, relationship and employment status, income, housing type, and household makeup (ages and grades of children living in the household), county of residence, and health insurance type were provided in forced choice questions (continuous or categorical descriptions). COVID-19 related questions included whether a family member had been diagnosed with COVID-19, had been hospitalized, considered a first responder, and if the respondent had lost employment due to the pandemic.

Specific questions for the survey were developed by evaluating several newly developed COVID-19 specific measures. These included the COVID-19 Exposure and Family Impact Scale (CEFIS; Kazak et al., 2021), the Household Pulse Survey (U.S. Census Bureau, 2020), and the Parent ABCD COVID-19 Questionnaire. Items were selected from across these questionnaires and specifically generated by the researchers to reflect items that would adequately describe COVID-19-related stress among caregivers of children participating in child care. Caregiver psychological distress was assessed by using select questions related to anxiety (Generalized Anxiety Disorder GAD-7; Spitzer, Kroenke, Williams, & Lowe, 2006) and depressive symptomatology (Patient Health Questionnaire, PHQ-9; Kroenke, Spitzer, Williams, & Lowe, 2010). For psychological distress, a scale of 1 to 4 was used to indicate how often respondents experienced these symptoms (1 = not all, 2 = several days

a week, 3 = more than half the days of the week and 4 = almost every day). A checklist of items related to parental coping mechanisms and relatedness in child interactions was developed by the researchers based on concepts in the child development literature, family stress model, and known behaviors to potentially interfere with parenting and to increase under times of stress. Questions related to caregiver increases in substance use and food intake as well as adaptive coping mechanisms such as increased exercise or socialization were included. Coping strategies were ranked on a 3-point scale; decrease in coping strategy, no change, and an increase in coping strategy. Related to child behavioral outcomes questions about changes in napping at school, toileting skills, eating behaviors, aggressive behaviors, crying and fussiness, separation from caregiver, speech development, motor skills, social skills, and pre-academic skills were assessed. The child development/behavior outcome and caregiver and child interaction variables were ranked on a 5-point scale with "no change" being the center of the continuum (a lot worse, a little worse, no change, a little better and a lot better). All variables were coded on a continuum where the higher end of the scale indicated an increase in the variable being measured. For variables like aggressive behavior and crying/fussiness, a higher scale indicated worsening behavior whereas for variables such as "maintaining even temper" a higher scale represents an improvement in the caregiver's ability to maintain even temper (Table 1). All survey questions were kept as similar as possible to the primary source when one was utilized and only modified to reflect the specific time since the pandemic began.

### *Semi-structured qualitative interview*

After the development of the survey questions, a corresponding semi-structured interview was developed by the researchers that posed open-ended questions on the topics of pandemic- related stress, parent/caregiver self-reported psychological distress, coping, interactions with their children, and child functioning. The family stress theory and corresponding survey questions were utilized to guide the investigators' construction of the qualitative interview.

### *Statistical analyses*

The quantitative analyses were conducted in STATA 16.1 (StataCorp, College Station, TX). Spearman's rank correlation was used to estimate the correlation between the level of caregiver COVID-19-related stress and caregiver psychological symptoms, coping strategies, responsiveness to child, and child

**Table 1.** Sample characteristics of caregivers surveyed and children.

| | Survey Participants | Interview Participants |
|---|---|---|
| **Total participants** | 114 | 20 |
| Female, n (%) | 103 (90.4) | 17 (85.0) |
| Race, n (%) | | |
| White | 104 (91.2) | 16(91.2) |
| Black | 6 (5.3) | 1(5.0) |
| Asian | 2 (1.8) | 1(5.0) |
| Two or more races[a] | 0 (0) | 1(5.0) |
| Chose Not to Respond | 2 (1.8) | 1(5.0) |
| Hispanic, Latino or Spanish Origin, n (%) | 5 (4.4) | 0(0) |
| Highest Level of Education, n (%) | | |
| High School Graduate or Less | 3 (2.6) | 1 (5.0) |
| Some College | 14 (12.3) | 1 (5.0) |
| College Graduate | 46 (40.4) | 10 (50.0) |
| Graduate Degree or Higher | 50 (43.9) | 8 (40.0) |
| No response | 1(0.9) | 0 (0) |
| Age, mean (range) | 36.3 (27– 62) | 35.53 (26–60) |
| Employed, n (%) | 106 (93.0) | 17 (85.0) |
| Place of work, n (%) | | |
| About half at home and half outside of home | | 2 (11.8) |
| Home | | 4 (23.5) |
| Outside of home | | 10(58.8) |
| Chose not to respond | | 1 (5.8) |
| | **Survey Participants** | |
| Occupation, n (%) | | |
| Business Office | 35 (33.0) | |
| Healthcare[b] | 31 (29.2) | |
| Education | 12 (11.3) | |
| Government | 9 (8.5) | |
| Nonprofit | 10 (9.4) | |
| Retail Store (grocery, drug store, clothing) | 1 (0.9) | |
| Library/Sales | 2 (1.9) | |
| Salon (hair, nail, barber) | 1 (0.9) | |
| Other[c] | 4 (3.8) | |
| Income Before Taxes in 2019[d] | | |
| $200K and above | 15 (13.2) | |
| $150–$199K | 12 (10.5) | |
| $100–$149K | 36 (31.6) | |
| $75–$99K | 17 (14.9) | |
| $50–$74K | 19 (16.7) | |
| $35–$49K | 5 (4.4) | |
| $25–$34K | 5 (4.4) | |
| Less than $25K | 1 (0.9) | |
| Chose Not to Respond | 4 (3.5) | |
| **Household Context** | | |
| Household Size, mean (range) | 3.8 (2, 6) | |
| Children Attending K-12 School, n (%) | | |
| Yes | 48 (42.1) | |
| No | 66 (57.9) | |
| Relationship to the Child, N = 114, n (%) | | |
| Mother | 100 (87.8) | |
| Father | 11 (9.6) | |
| Grandparent | 1 (0.9) | |
| Other Relative | 1 (0.9) | |
| Chose Not to Respond/Other | 1 (0.9) | |
| **Ages of Children, N = 114**, n (%) | | |
| 0 to 18 months | 21 (18.4) | |
| 19 months to 35 months | 24(21.1) | |
| 3 to 5 years | 61 (53.5) | |
| 6 to 10 years | 8 (7.0) | |
| Child Gender | | |
| Female | 51(44.7) | |
| Male | 61(53.5) | |
| Chose not to respond | 2(1.8) | |

[a]Two or more races for interview participants include White + Black (1).
[b]Healthcare category includes veterinary care.
[c]Other occupations included: engineer, manufacturing support, groomer, social work, church youth director and procurement.
[d]Income was not asked during the enrollment survey.

functioning. Results from the correlations were used to identify outcome variables and explanatory variables for the multivariate regression models.

Multivariable adjusted regression models were used to estimate the association between caregiver-perceived COVID-19-related stress (exposure) and changes in aggressive behavior and social skills among children (outcomes). These outcomes were chosen because they were the only two child behaviors that were significantly correlated with caregiver-perceived COVID-19- related stress (at $p$ value < .05). Increased aggressive behavior (2 levels) and social skills (5 levels) were ordinal and modeled with ordinal logistic regression. Variables that were independently correlated with both exposure and outcome (Table S1) were then correlated with each other. For any pair of variables with a correlation coefficient of 0.5 or more, only one was considered in the model building (Table S2). For the child social skills outcome this process yielded two variables: parent's temper and parent working from home. For the child aggression outcome this process identified the same two variables and added four more: parent feels isolated/lonely, down/depressed, fatigued, and has difficulty sleeping.

Two regression models were then constructed for each outcome, and they were followed with exploratory mediation analyses. Model 1 was unadjusted and Model 2 was adjusted for child's age, sex, and the number of children in the household. These variables were selected because they cannot be caused by COVID-19 stress and thus they cannot mediate the relationship between perceived COVID-19 stress and child aggression or social skills. The remainder of the variables could be caused by COVID-19 stress and thus could be mediators (intermediate variables). Because Model 2 is designed to yield a minimally biased estimate of the association between exposure and outcome, it is important to exclude intermediate variables, as these adjustments would introduce rather than reduce bias. Some of the remaining variables may serve as both intermediate variables and confounders, and thus a clear case for including them in Model 2 cannot be made.

In each of the subsequent exploratory models, one of the possible intermediate variables was added to Model 2. When the addition of one of these variables changed the association between exposure and outcome, this was considered to be preliminary evidence consistent with mediation. The data are cross-sectional and formal mediation analysis is not possible, particularly since

preexisting knowledge of the causal structures is limited. However, this simple approach can generate hypotheses about mediating variables for further study.

### *Qualitative analyses*

Qualitative data were analyzed for major themes using NVivo v12 Plus software (QSR International, Burlington, MA). We conducted deductive coding using a priori axial codes based on the survey questionnaire topic areas determined before coding began. Three *a priori* axial codes were identified based on the open-ended interview guides: 1. the impact of COVID-19 on parenting, 2. the impact of COVID-19 on family life, and 3. the impact of COVID-19 on child wellbeing and development. A set of two dyads open coded and analyzed all interview data. The first dyad completed the initial open coding then grouped these codes under axial codes, identifying an emerging theme of "the impact of COVID-19 on adult wellbeing" in addition to the three a priori themes. To ensure inter-coder consensus, the two coders discussed emerging nodes after each interview was coded; coders shared emerging themes and a description of the code with each other throughout the process. In situations in which a coder was uncertain whether open codes aligned with an axial node, this was discussed with the other coder for a consensus. Inductive methods were used to identify any additional emerging axial codes. Emerging themes were included in the codebook after a consensus. The second dyad re-analyzed codes categorized under the four axial themes as well as all other themes in the codebook to check for consistency and accuracy of the initial coding by the first dyad coders. The second dyad coders discussed any discrepancies with each other. Consensus was required for agreement to be achieved. We used the results from the qualitative analysis to augment results from the survey.

## Results

The caregivers who responded to the survey (N = 114) were primarily female (90%), white (91%), college graduates (84%), and employed (93%; Table 2)). The mean age of the participants was 36 years, and the majority of participants (86%) had children who were attending child care centers rather than home care programs. Participants primarily resided in single family homes (89.5%) and the mean household size was 3.8 people (ranging from 2–6). Caregivers had anywhere from 1 to 3 children in child care at the time of data collection (159 children in total). For subsequent analyses, we included data for one child (the youngest child) per caregiver (N = 114) with most children (53.5%) being 3–5 years of age. The youngest child was chosen because most of the child behavioral indicators such as napping, crying or fussiness, and toileting were

**Table 2.** Summary statistics of parental distress, psychological symptoms, coping, responsiveness to child, and child behavior and Development.

| Variable | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|
| Perceived COVID-related stress[a] | 70.83 | 19.59 | 1 | 100 |
| **Psychological Distress**[b] | | | | |
| Feeling nervous, anxious, or on edge? | 2.12 | 0.92 | 1 | 4 |
| Not being able to stop or control worrying? | 1.70 | 0.89 | 1 | 4 |
| Having little interest or pleasure in doing things? | 1.45 | 0.76 | 1 | 4 |
| Feeling down, depressed, or hopeless? | 1.52 | 0.78 | 1 | 4 |
| Feeling isolated or lonely? | 1.63 | 0.80 | 1 | 4 |
| Feeling fatigued or overly tired | 2.40 | 1.10 | 1 | 4 |
| **Coping Strategies**[c] | | | | |
| Exercise or yoga | 1.86 | 0.77 | 1 | 3 |
| Appetite, Eating habits | 2.33 | 0.62 | 1 | 3 |
| Talking to a friend or family member (in person or virtual) | 1.88 | 0.72 | 1 | 3 |
| Alcohol consumption | 2.27 | 0.63 | 1 | 3 |
| Difficulty sleeping (i.e. Falling asleep or staying asleep) | 2.47 | 0.52 | 1 | 3 |
| **Reported Quality of Caregiver-Child Interaction** [d] | | | | |
| Responding positively to your child(ren)'s requests for attention. | 2.65 | 0.88 | 1 | 5 |
| Maintaining an even temper. | 2.32 | 0.79 | 1 | 5 |
| Feeling irritable about your child(ren)'s behavior* | 3.78 | 0.71 | 1 | 5 |
| Disciplining your child(ren)* | 3.30 | 0.64 | 2 | 5 |
| Spending time in rewarding or relaxing activities with your child(ren) | 3.16 | 1.11 | 1 | 5 |
| Participating in learning activities with your child(ren) (i.e., reading, potty training) | 3.37 | 0.98 | 1 | 5 |
| **Child Behavior/Development**[d] | | | | |
| Napping at school | 2.99 | 0.50 | 1 | 5 |
| Bedtime routine | 2.81 | 0.68 | 1 | 5 |
| Toileting skills | 2.92 | 0.66 | 1 | 5 |
| Eating behaviors | 2.89 | 0.51 | 1 | 5 |
| Aggressive behaviors like hitting or biting* | 3.18 | 0.39 | 3 | 4 |
| Crying or fussiness* | 3.34 | 0.55 | 2 | 5 |
| Separation from parent or caregiver* | 3.28 | 0.67 | 1 | 5 |
| Speech development | 3.05 | 0.52 | 2 | 5 |
| Motor skills development (i.e., walking, running) | 3.10 | 0.52 | 1 | 5 |
| Social skills development (i.e., sharing, taking turns) | 2.87 | 0.73 | 1 | 5 |
| Pre-academic skills development (i.e., writing name, identifying letters and numbers) | 2.98 | 0.73 | 1 | 5 |

[a]Perceived COVID-related stress ranges from 1 to 100.
[b]Measured on a scale of 1–4, 1 – Not at all, 2 – Several days, 3-More than half days of the week, and 4 – nearly every day.
[c]Measured on a scale of 1–3, 1 – decrease, 2-no change and 3 – increase.
[d]Measured on a scale of 1–5, 1 – a lot worse, 2 – a little worse, 3 – no change, 4 – a little better and 5 – a lot better.
*Indicates variables with reversed polarity; 5 – a lot worse, 4 – a little worse, 3 – no change, 2 – a little better and 1 – a lot better.

not applicable to the older children in our sample. Very few respondents had a family member who had COVID-19 (1.8%) and 17% of respondents had a family member who was considered a healthcare first responder. The interview participants (N = 20) were generally similar to the survey respondents (Table 2).

Caregivers rated their COVID-19-related stress on average as being 70.83 on a scale of 1–100, with 100 representing extreme stress and 1 no stress; 79% reported being moderately or extremely worried about COVID-19 (Table 1). The five psychological distress variables describing how often participants experienced certain psychological symptoms was assessed on a four-point scale (1 = not at all, 2 = several days, 3 = more than half days of the week,

and 4 = nearly every day). The mean for all variables was above 1. On average, caregivers felt nervous, anxious and on edge, and fatigued or overly tired more than several days a week (mean of 2.2 and 2.4 respectively). When asked to compare the pandemic period to the pre-pandemic period respondents noted a number of changes. On a scale of 1 (decrease in behavior) to 3 (an increase in behavior), caregivers reported an increase in mean alcohol consumption (2.27), appetite (2.33) and difficulty sleeping (2.47). On a five-point scale (1 = a lot worse and 5 = a lot better) caregivers noted that they were less likely to respond positively to their child's request for attention (2.65) and maintain an even temper (2.32). On a five-point scale with opposite polarity (1 = a lot better and 5 = a lot worse) caregivers reported feeling more irritable about a child's behavior (3.78) and doing a worse job disciplining their child (3.30). However, they reported improvements in the time spent on rewarding/relaxing activities (3.16) and learning activities (3.37) with their child. Among caregiver-reported child behaviors most were reported as no change or average. However, separation from caregiver (3.28), crying and fussiness (3.34), and aggressive behavior (3.18) were rated on average as worse.

There were significant bivariate correlations ($p < .05$) between level of caregiver COVID-19-related stress and feeling nervous, anxious or on edge (r = 0.32, $p = .0008$), ability to control worry (r = 0.30, $p = .0015$), feeling little interest or pleasure in activities (r = 0.34, $p = .0004$), feeling down, depressed and hopeless (r = 0.35, $p = .0003$) and feeling fatigued or overly tired (r = 0.28, $p = .0037$). Higher caregiver COVID-19 stress ratings were correlated with less involvement in exercise (r = 0.28, $p = .0065$). Increased caregiver COVID-19-related stress was also correlated with less ability to respond positively to their child's request for attention (r = −0.24, $p = .0143$), increased difficulty maintaining an even temper (r = −0.31, $p = .0011$), feeling more irritable about their child's behavior (r = 0.34, $p = .0004$) and having more difficulty with disciplining their child (r = 0.24, $p = .0142$). With regard to child functioning, increased caregiver COVID-19 stress was associated with ratings of more child aggressive behaviors (r = 0.25, $p = .0123$) and poorer social skill development (r = −0.21, $p = .0344$) since returning to child care. Refer to Table 3 for all correlations among caregiver-reported COVID-19-related stress, psychological distress, coping, parent-child interaction and child functioning.

In logistic regression models, higher caregiver-reported COVID-19-related stress was associated with increased odds of aggressive behavior in the child. The OR for increased child aggression associated with a 1 unit increase in reported COVID-19-related stress was 1.049 (95% CI: 1.011, 1.088; Model 1, Table 4). This association remained significant after adjusting for the child's age, the child's sex, and the number of children in the household (OR: 1.048; 95% CI: 1.009, 1.088; Model 2, Table 4). In the exploratory mediation analyses the OR was attenuated by adjustment for parent maintaining an even temper (OR: 1.036; 95% CI 0.995, 1.079) and parent working from home (OR: 1.033;

**Table 3.** Relationship between caregiver perceived COVID-related stress and psychological distress, coping and quality of caregiver child interaction and child behavior/development.

| | r | *p* value |
|---|---|---|
| Psychological Distress | | |
| Feeling nervous, anxious, or on edge? | 0.3213*** | .0008 |
| Not being able to stop or control worrying? | 0.3039*** | .0015 |
| Having little interest or pleasure in doing things? | 0.3398*** | .0004 |
| Feeling down, depressed, or hopeless? | 0.3471*** | .0003 |
| Feeling isolated or lonely? | 0.1617* | .0978 |
| Feeling fatigued or overly tired | 0.2797*** | .0037 |
| Coping Strategies | | |
| Exercise or yoga | −0.2774*** | .0065 |
| Appetite, Eating habits | 0.146 | .1372 |
| Talking to a friend or family member (in person or virtual) | −0.0988 | .3159 |
| Alcohol consumption | −0.0265 | .8054 |
| Difficulty sleeping (i.e. Falling asleep or staying asleep) | 0.1757* | .0745 |
| Reported quality of caregiver-child interaction | | |
| Responding positively to your child(ren)'s requests for attention. | −0.2373** | .0143 |
| Maintaining an even temper. | −0.3119*** | .0011 |
| Feeling irritable about your child(ren)'s behavior. | 0.3439*** | .0004 |
| Disciplining your child(ren). | 0.2410** | .0142 |
| Spending time in rewarding or relaxing activities with your child(ren). | 0.003 | .976 |
| Participating in learning activities with your child(ren) (i.e., reading, potty training) | −0.0179 | .8563 |
| Child Behavior/Development | | |
| Napping at school | −0.1913* | .0726 |
| Bedtime routine | −0.0697 | .4774 |
| Toileting skills | −0.0388 | .7041 |
| Eating behaviors | −0.0133 | .8925 |
| Aggressive behaviors like hitting or biting | 0.2534** | .0123 |
| Crying or fussiness | 0.1822* | .0655 |
| Separation from parent or caregiver | 0.1413 | .1506 |
| Speech development | −0.1636 | .1003 |
| Motor skills development (i.e., walking, running) | −0.1182 | .2299 |
| Social skills development (i.e., sharing, taking turns) | −0.2087** | .0344 |
| Pre-academic skills development (i.e., writing name, identifying letters and numbers) | −0.0446 | .6629 |

***$p < .01$, **$p < .05$, *$p < .1$

**Table 4.** Associations between caregiver reported COVID-19-related stress and child functioning outcomes.

| | Odds Ratio | 95% CI | *p*-value |
|---|---|---|---|
| **Child Aggressive Behavior**[a] | | | |
| Model 1 (unadjusted) | 1.049 | 1.011, 1.088 | .012 |
| Model 2 (adjusted)[b] | 1.048 | 1.009, 1.088 | .015 |
| **Child Social Skills**[c] | | | |
| Model 1 (unadjusted) | 0.978 | 0.958, 0.999 | .038 |
| Model 2 (adjusted)[b] | 0.977 | 0.957, 0.998 | .032 |

[a]Logistic regression models indicating the OR for increased child aggressive behavior associated with a 1 unit increase in caregiver reported COVID-19-related stress.
[b]Adjusted for child's age, child's gender, and the number of children in the household.
[c]Ordinal logistic regression models indicating the OR for being one level higher on the social skills scale associated with a 1 unit increase in caregiver reported COVID-19-related stress.

95% CI 0.993, 1.074), but was less affected by adjustment for the other four potential intermediate variables (feeling lonely/isolated, feeling depressed, feeling very tired, or having difficulty sleeping; Table S3).

In ordinal logistic regression models, higher caregiver-reported COVID-19-related stress was associated with ratings of worse child social skills since the start of the pandemic. In other words, a one unit increase in COVID-19 –

**Table 5.** Qualitative interview data characterizing survey findings.

| Survey Concept | Caregiver Quote |
|---|---|
| Worried | "In the beginning, I was definitely stressed to the max as far as it went with worrying about COVID and worrying about the children and working . . . my work is a high stress environment in itself. So, I think doing all of that together, it really was very, very stressful in the beginning. Now that I think that everyone's kind of adjusted to the new way of life and that the daycares are open, it's definitely a lot different than it was in the beginning." |
| | "It's more indirectly through how my kids are doing that weighs on me. I'm very responsive to other people's emotions and feelings and so when they're overwhelmed, it's overwhelming for me. But specifically, COVID-related, other than being nervous about them getting sick even more and then having a baby in this environment, that was kind of the biggest thing, having a new baby during this time." |
| | "If somebody in my son's class got it and he had to be out again, I'd be like, crap, what am I going to do for 10 days? That's my first thought, not 'Oh my God my kid might get sick.' Nope, that is like thought number seven. And it's like I have 10 days at home with my kid, what am I going to do for 10 days? What am I gonna tell work? Then I have to deal with who's gonna watch him if I can't or my husband can't get off of work. Do we have my parents, or my in-laws watch him who are both in their 60s? Are they worried that if they spend time with him, that they have to then also quarantine? It's just this terrifying domino effect where the truth is there is no good answer, there is no good outcome." |
| Moderately worried | "Our only concern would be that if one of us got sick, it would mean there would be nobody else to take care of the children in the family. So therefore, just that the effort in childcare and having everybody stay home and quarantining would be just be a little bit more of a burden." |
| | "We are venturing out a little bit more, but we still are very cautious about what we're doing, looking up where we're going. What are their protocols? Well, what are they doing and kind of making sure that, like where we're going is safe to go. If not, then not going." |
| Not worried | "I'm not really that scared of it. It's just another piece of life that we've got to figure out." |
| Blown out of proportion | "I get that a lot of the people who are passing away are people who were at high risk. They are elderly. They are people who have, you know, major issues . . . now that everything's closed, it's like, how do you entertain your freaking kid on a weekend? There's only so many times you can take them on a hike, especially in northeast Ohio." |
| Psychological Distress | |
| Feeling anxious | "My wife is like a roller coaster. She has her good days and bad days, mainly because she's stuck at home which is hard for her . . . . Emotionally, it's been really hard for her, especially dealing with the kids being at home until he went back to daycare." |
| | "My emotional well-being has just, it has suffered and significantly so, that I'm anxious that I, there does not seem to be relief for it." |
| | "He's (husband) already high strung and has some anxiety issues. So that's definitely increased over the last couple of months, especially when we're out with the kids." |
| | "I think that I'm doing pretty good. You know, I'm managing, I'm getting by. I have no choice but to manage it and get by. We have the things that we need, we're comfortable here at home. So I have to say that we're doing fairly okay . . . . Mental health, I'm fine with the mental health. You know, anxiety is at its all-time high just because the not knowing. But other than that, you know, we're doing pretty good." |
| Depressed | "Anyone who has gone through this, where you had to be stuck in the house for any period of time, you do go through like that little depression of being stuck in the house and not being around people." |
| Coping Strategies | |
| | "Taking a step back and not having work, I was able to work on my house more, getting out for brain walks and working out more and kind of taking time to do devotionals and readings and stuff like that. So, I feel like it actually has helped because it allowed me to take a little bit of a step back." |
| Exercise | "We did decide to buy a Peloton so that we could still kind of work out and at least be able to feel like we were moving even though we were all in lockdown. So, I think that's definitely helped with us as well as far as the mental part of it all goes." |
| | "We've taken walks with the dogs, with the kids just to kind of get out of the house, change of scenery." |
| | "Still pretty good physically, actually better because I have more time to get my workouts in than I did before." |
| Eating and drinking | "Coping for me, I always, it's not the best way, but eating stuff that you enjoy has always been, especially when I was pregnant, getting to have [something] you really like, like getting ice cream more than we probably would on a normal basis." |

(*Continued*)

**Table 5.** (Continued).

| Survey Concept | Caregiver Quote |
|---|---|
| | "Things like having adult beverages at night help as well. Nothing aggressive, but every now and then it doesn't hurt." |
| Social | "Everything but my social well-being is holding up well. You know, not being able to go out and hang out with our friends and stuff like that, that's kind of hard . . . . We have a huge group of friends that we don't, we haven't seen since March, so socially wise, it's been a little rough for us." |
| | "So for my husband, he's more outgoing. So for him, it was hard because he needed an outlet, not just my kids. He plays soccer and they canceled the season when all of this started." |
| Caregiver-Child Interaction | |
| | "We gave her (child) the decision of whether she wanted to go back to school or not. And she wanted to and we weren't going to stop her from doing. I think it's really hard for kids right now. So it's stuff like that where it's not completely out of our control, but do we just tell our child, you have to stay home for the next, who knows how long? But other than that, it's pretty much just stuff that's kind of out of her control that makes it harder. You know, we can only do the best that we can to keep our family and, through them, other people safe." |
| Family time | "Even when everything was pretty much still on lockdown, we took the kids to a wildlife safari in Ohio because you weren't allowed to leave Ohio at the time, but they were still open for drive-through where the animal sticks their heads in. So, we did that, played a lot of games, we built a jungle gym in the back, like a playset in the backyard for the kids. We basically kept busy with a lot of projects." |
| | "We've been having a lot more family movie nights where even when we're stuck inside, it's just doing something . . . just sitting down and doing something together as a family where we're not all doing our own thing was kind of nice." |
| Struggles | "The parents are already dealing with the pandemic and the worries that come along with that, plus their jobs and their financial state. And then you're adding children at home all day long on top of it, and you can't send them anywhere . . . maybe other people like their kids home way more than I did, I don't know. They're just trying to work and have three kids running around was insanity." |
| | "And even the social restrictions that are in place, you know, he asks all the time to go play at our neighbors' house. And, you know, the answer always has to be no. And I'm not sure how that will affect him socially or developmentally later, where it's like it's good to want to go play with your friends, but, you know, in this time in your life, you can't do it." |

related stress was linked to lower odds of being one level higher on the social skills scale (OR = 0.978 0.958, 0.999; Model 1, Table 4). This association remained significant after adjusting for the child's age, the child's sex, and

**Table 6.** Child behavior qualitative interview data characterizing survey findings.

| Survey Concept | Caregiver Quote |
|---|---|
| Child behavior | "When he wasn't in care, like he wasn't listening as well, he wasn't sleeping as well, you know I don't know if it is the ECE program itself or if it's just the routine." (*ID, gender, age*) |
| Sleep behaviors | "They say he has a hard time laying down and being quiet during rest time because he's past the nap. He's done with the nap." (*ID, gender, age*) |
| | "He's much more well behaved again. He sleeps better. So, yeah, I mean, him being in childcare." |
| | I've seen a lot of growth already in the month that she's been there, even with her sleeping and her independence. So, it's been great; |
| | The one thing I will say is he's much more tired, even though it's only a half day program. He seems much more tired. And so we're more likely to have a meltdown at night, which we've been working really hard to help him with or try to prevent or avoid. And so he's also more likely, I think, primarily because he's tired, he's much more likely at night to be more defiant. And so I think that he's in a careful balance of like overall, his person is thriving and he's doing so much better, but the exhaustion of, I think, being in the new environment and social learning skills and all that is for sure taking a night toll." |

the number of children in the household (OR = 0.977; 95% CI: 0.957, 0.998; Model 2, Table 4). Two variables met criteria for inclusion in the exploratory mediation analyses: parent maintaining an even temper and parent working from home. In these analyses, the OR was no longer significant after adjustment for parent maintaining an even temper (OR: 0.982; 95% CI 0.961, 1.003) or parent working from home (OR: 0.983; 95% CI 0.960, 1.005), but the magnitude of the ORs was not greatly attenuated (Table S4).

Qualitative interviews indicate correspondence between survey findings and open-ended interview responses. Caregiver stress was mostly related to three main issues: 1. the task of combining work and taking care of children during the periods when child care programs were closed due to the pandemic, 2. the fear of participants and/or their families becoming infected with COVID-19, and 3. the potential exposure to the virus through the child care setting. One caregiver discussed that combining a high demand job with caring for her children was her major source of stress as reflected in the quote below:

> In the beginning, I was definitely stressed to the max as far as it went with worrying about COVID and worrying about the children and working ... my work is a high stress environment in itself. So, I think doing all of that together, it really was very, very stressful in the beginning. Now that I think that everyone's kind of adjusted to the new way of life and that the daycares are open, it's definitely a lot different than it was in the beginning.

For participants that expressed experiencing physiological symptoms at the time of the interview, the majority discussed feeling anxious and depressed. One participant is noted to have said that:

> My emotional well-being has just, it has suffered and significantly so, that I'm anxious that I, there does not seem to be relief for it.

A wide range of coping mechanisms were reported by participants such as going out for walks, reading and changes in physical exercise, eating habits, alcohol consumption, and spending time with their families as seen in the following quotes by two participants:

> We've been having a lot more family movie nights where even when we're stuck inside, it's just doing something ... just sitting down and doing something together as a family where we're not all doing our own thing was kind of nice.

> Even when everything was pretty much still on lockdown, we took the kids to a wildlife safari in Ohio because you weren't allowed to leave Ohio at the time, but they were still open for drive-through where the animal sticks their heads in. So, we did that, played a lot of games, we built a jungle gym in the back, like a playset in the backyard for the kids. We basically kept busy with a lot of projects.

Child behaviors and development were discussed by caregivers. There was a consensus that the daily routine provided in the child care setting is significant in child behavior and development. Some parents expressed that during the early periods of the pandemic when child care programs were closed, they observed a decline or worsening in children's behavior as expressed in the quote below:

> When he wasn't in child care, like he wasn't listening as well, he wasn't sleeping as well, you know I don't know if it is the ECE program itself or if it's just the routine.

Some parents indicated a positive change in child behavior after returning to the child care program. One parent indicated that her child was "much more well-behaved" and even slept better after being back in child care.

Tables 5 and 6 provide a listing of caregiver and child themes and corresponding supportive quotes. Overall, qualitative interviews and quotes indicated high levels of COVID-19 – related stress, parental distress, changes in coping strategies, and more difficult interactions with children. They also revealed specific areas where child functioning had worsened, including child self-regulatory activities such as difficulty with sleep routines and separating from parents.

## Discussion

In this study we observed that caregivers of young children in child care experienced substantial COVID-19-related stress. This study adds to the literature as little is known about how caregivers have experienced stress and the impact that stress has had on their psychological symptoms, coping, quality of interaction with their child, and overall child functioning. The majority of caregivers in this study reported moderate to high stress levels. Nearly half of the caregivers had difficulty managing their worry and reported negative coping strategies. Caregivers also reported a number of key changes that occurred since the pandemic began. On average, caregivers reported worsening interactions with their child including having more difficulty managing their temper, feeling more irritable with their child, and having difficulty with discipline. Caregivers also reported increases in child aggressive behavior, fussiness, and difficulty separating. Moreover, caregiver stress was correlated with higher parent psychological distress, poorer adult coping in specific areas, poorer interactions with their child, and in some instances, worsening child behavior.

The regression models revealed that higher caregiver-reported COVID-19-related stress was associated with increased odds of aggressive behavior in the child. This association was still significant after adjustment for the available potential confounders (child's age, child's sex, and the number of children in household). Exploratory analyses provided evidence that this association may be partially mediated by parent loss of temper. The exploratory models also

indicate that the parent stress-child aggression relationship may partly depend on the parent working from home during the pandemic. Additionally, the regression models revealed that higher caregiver-reported COVID-19-related stress was associated with worse child social skills. This association was still significant after adjustment for the available potential confounders (child's age, child's sex, and the number of children in household). Exploratory analyses found limited evidence of mediation by the other variables assessed (parent temper and working from home). Thus, these caregiver characteristics may play an intervening role in both outcomes, and they could be further investigated as an intervention point. We lack information on the number of caregivers in each child's life, but our findings suggest that future studies should explicitly evaluate if the associations reported here are different in single parent households.

These findings are consistent with other parent-child interaction studies, which demonstrate that stress in parents is strongly related to strain in the parent-child relationship, as well as subsequent child behaviors, as was observed in a recent study of children's pretend play (Zyga & Dimitropoulos, 2020). In other words, research suggests that by managing and alleviating stress in parents, children demonstrate more positive outcomes and behavior (Neece, 2014; Osborne, McHugh, Saunders, & Reed, 2008; Singh et al., 2007). More specifically, a recent review examined studies of the parent-child relationship in the COVID-19 pandemic, and results indicated the importance of providing support and direct interventions to help parents and ultimately help children due to the distress caused by the pandemic (Zadafshar, Kheradmand, & Faramarzi, 2021). Furthermore, this study adds to the current literature by demonstrating that caregivers whose children returned to the child care setting reported decreases in responding to their child and worsened parent-child interactions related to child discipline. Additionally, increased caregiver stress was significantly and positively associated with multiple maladaptive behaviors in their children.

There were several notable limitations from this study. First, the data collection was limited to parents in the state of Ohio, who had sent their children back to child care during the COVID-19 pandemic; therefore results cannot be generalized to the experiences of all parents of young children in the COVID-19 pandemic. In particular, this sample was primarily female, White, and highly educated, and therefore lacking diversity. We note that web-based research studies frequently experience difficulties recruiting Black participants, but in the context of this pandemic we had no other viable options for data collection (e.g. Im & Chee, 2005; Watson, Robinson, Herker, & Jacob Arriola, 2016). Additionally, because we do not know the racial distribution of Ohio child care during our study period we cannot assess if Blacks were truly underrepresented in our study. It remains unclear how the findings may differ if the sample had a greater representation of Black families and other racial/

ethnic minority groups, as well as families that could not afford the expense of child care. Many of the families represented in this sample were essential employees with high income levels.

The effects of differing child ages (infancy, toddler, preschool) and child sex may be important to examine in future studies. This study was not designed to assess these questions directly, but in the adjusted model (Model 2; Tables S3 and S4) we see that child age and child sex were not associated with caregiver-reported changes in social skills or aggressive behavior. Social skills progression during the pandemic was worse among older children in our study, (Table S4), but this relationship was not significant. Future studies may investigate if older children experienced larger impairments to their social skill development during the pandemic. In addition, it is important to note that parent perception was the source of information obtained on exposure and outcome; therefore, it is not possible to rule out that parental stress may have impacted the perception of child functioning. The quantitative measures and subsequent analysis were limited by the adaption of standardized scale questions rather than use of entire scales, with a relatively small number of questions specifically related to the constructs being assessed (i.e. coping). As such, implications of results should be interpreted with caution. Finally, since our data are cross-sectional, formal mediation analysis is not possible. These limitations were effectively unavoidable given the logistics of studying parental stress and child development during a very specific pandemic timeframe which required physical distancing and a limited period for data collection.

It is recommended that additional studies examine the impact the pandemic has had on children who did not have access to child care or who were not in an educational setting. As concerns for young unvaccinated children in school and care settings continue due to the Delta variant, it would be interesting to ascertain whether the patterns of parental stress and child behavior are specific to the pandemic or to general stress or parenting stress. Also, further exploration of mediators and moderators of parental stress using a longitudinal design would be important for future research as this might indicate important targets for intervention.

The impact the pandemic has had on children's social, emotional, behavioral, and pre-academic development will likely be identified as in-person care and learning becomes more common. Results of this study suggest that in response to catastrophic events, future research should focus not only on the impact these events have on the caregiver and child, but also on how the interaction might be affected.

## Implications for Practice

Caregivers experienced moderate to high levels of COVID-19-related stress. Consistent with what would be predicted using the family stress model, increased caregiver stress was associated with worse child functioning. More specifically, higher caregiver-reported COVID-19 stress was associated with increased odds of aggressive child behavior and poor social skills. Results of the present study suggest that by addressing and managing caregiver stress, child behavioral functioning could positively be improved. Families who have experienced significant disruption or clinical impairment in daily functioning as a result of the pandemic should be monitored for recovery and/or problems that may need clinical attention.

## Disclosure statement

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