Development and Psychopathology (2024), 1–15
doi:10.1017/S0954579424001081

CAMBRIDGE UNIVERSITY PRESS

Regular Article

The role of caregiver emotion regulation in youth mental health during the COVID-19 pandemic: A longitudinal study

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Abstract

The COVID-19 pandemic has presented youth and families with a broad spectrum of unique stressors. Given that adolescents are at increased risk for mental health and emotional difficulties, it is critical to explore family processes that confer resilience for youth in the face of stress. The current study investigated caregiver emotion regulation (ER) as a familial factor contributing to youth ER and risk for psychopathology following stressful life events. In a longitudinal sample of 224 youth (M_{age} = 12.65 years) and their caregivers, we examined whether caregiver and youth engagement in ER strategies early in the pandemic mediated the associations of pandemic-related stress with youth internalizing and externalizing symptoms six months later. Leveraging serial mediation analysis, we demonstrated that caregiver and youth rumination, but not expressive suppression or cognitive reappraisal, mediated the prospective associations of pandemic-related stress with youth internalizing and externalizing symptoms. Greater exposure to pandemic-related stressors was associated with greater caregiver rumination, which, in turn, related to greater rumination in youth, and higher levels of youth internalizing and externalizing symptoms thereafter. Family interventions that target caregiver ER, specifically rumination, may buffer against the consequences of stress on youth engagement in maladaptive ER strategies and risk for psychopathology.

Keywords: adolescence; COVID-19; developmental psychopathology; emotion regulation; family; life events; stress

(Received 1 November 2023; revised 5 April 2024; accepted 15 May 2024)

Adolescence is marked by an elevated risk for psychopathology (Andersen & Teicher, 2008; Hankin et al., 2015; Kessler et al., 2005; Paus et al., 2008; Petersen et al., 2015). Exposure to stressful experiences as well as emotional reactivity to stressors increase during this developmental period, contributing to transdiagnostic risk for psychopathology (Dahl & Gunnar, 2009; Dahl, 2004; Espejo et al., 2007; Grant et al., 2003, 2004; Somerville et al., 2010; Spear, 2009). The COVID-19 pandemic introduced a range of novel stressors for youth and families, likely engendering increased vulnerability for developing psychopathology among youth during the pandemic (McLaughlin et al., 2022; Rosen et al., 2021; Weissman et al., 2021). In the United States, various containment measures were taken in the early phase of the COVID-19 pandemic (March 2020) to prevent the spread of the virus, including the statewide stay-at-home orders, restrictions on gatherings, and economic lockdown (e.g., closures of non-essential businesses). These measures prevented adolescents from attending schools and extracurricular activities, consequently limiting their face-to-face interactions with other adults and peers and disrupting their social support networks (Ellis et al., 2020; Fegert et al., 2020; Gruber et al., 2021). Caregivers also faced financial strain and disruptions in their daily routines as they experienced job insecurity or were forced to work from home, which were compounded by limited access to external resources and support systems (Fegert et al., 2020; Gruber et al., 2021). Indeed, evidence has documented worsening internalizing and externalizing problems during the pandemic among adolescents and adults (Gruber et al., 2021; Holman et al., 2020; Patrick et al., 2020; Racine et al., 2020; Ravens-Sieberer et al., 2022; Robinson et al., 2022; Whittle et al., 2020) and these elevated symptom levels have persisted over time (Von Soest et al., 2022), demonstrating the need for targeted interventions. Difficulties with emotion regulation (ER) are one mechanism that may underlie the development of stress-related psychopathology during adolescence (Herts et al., 2012; McLaughlin et al., 2009; McLaughlin & Hatzenbuehler, 2009; Weissman et al., 2019). Given the limited contact adolescents had with support systems outside the family during the pandemic, caregiver ER may be closely linked to youth ER, potentially increasing vulnerability for psychopathology development following stressful life events (Milojevich et al., 2020; Platt et al., 2016). The current study investigated the role of caregiver ER on youth ER and the emergence of stress-related psychopathology during the COVID-19 pandemic.

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Cite this article: Kim, S. G., Rodman, A. M., Rosen, M. L., Kasparek, S. W., Mayes, M., Lengua, L. J., Meltzoff, A. N., & McLaughlin, K. A. (2024). The role of caregiver emotion regulation in youth mental health during the COVID-19 pandemic: A longitudinal study. *Development and Psychopathology*, 1–15, https://doi.org/10.1017/S0954579424001081

Difficulties with ER have been associated with adolescent psychopathology in response to stress. Engagement in maladaptive ER strategies, such as rumination and suppression, is linked with increased risk for internalizing and externalizing psychopathology in longitudinal studies and meta-analyses (Aldao et al., 2010; Beauchaine, 2015; Eastabrook et al., 2014; Hankin, 2008; McLaughlin et al., 2011, 2014; Schäfer et al., 2017). Greater use of rumination has demonstrated prospective associations with psychopathology development during adolescence following stressful life events (Michl et al., 2013; Skitch & Abela, 2008; Weissman et al., 2019), and adolescents' engagement in expressive suppression prior to the COVID-19 pandemic has been prospectively linked to greater internalizing and externalizing symptoms (Boullion et al., 2023), indicating that the use of maladaptive ER strategies may confer risk for stress-related psychopathology. On the other hand, although less consistently (Aldao et al., 2010; Aldao & Nolen-Hoeksema, 2012), the use of adaptive ER strategies, such as cognitive reappraisal (John & Gross, 2004), has buffered against the emergence of psychopathology symptoms following stressful experiences (Flouri & Mavroveli, 2013; Kuhlman et al., 2021; Rodman et al., 2019). For example, a recent study found that adolescents who reported a greater tendency to engage in cognitive reappraisal were less likely to experience internalizing and externalizing problems in response to pandemic-related stress, suggesting the protective role of cognitive reappraisal in the development of stress-related psychopathology, particularly following stressful life events (Kuhlman et al., 2021).

Caregivers' regulatory abilities have been linked to youth development of ER. A growing body of literature indicates that caregivers play a key role in shaping how youth understand and regulate emotions (Eisenberg et al., 1998; Morris et al., 2007), which continues to be influential throughout adolescence (Balan et al., 2017; Buckholdt et al., 2014; Hilt et al., 2012; Shortt et al., 2010; Stocker et al., 2007; Yap et al., 2008). Adolescence, in particular, can be a developmentally challenging period for caregivers, given the heightened parenting stress (Anderson, 2008), elevated parent-adolescent conflict (Larson et al., 1996; Steinberg, 2001), and worsening parent-child relationships (Crnic & Low, 2002). Caregivers who have limited ability to manage negative emotions during this period may interfere with adolescents' regulatory processes and confer risk for emotional and behavioral problems. Prior studies have demonstrated that caregivers' difficulties in regulating emotions were associated with youth ER difficulties and psychopathology development. For example, parental difficulties with ER were robustly associated with ER difficulties of children who were exposed to early adversity (Milojevich et al., 2020), and youth of parents who reported ER difficulties were at increased risk for developing internalizing symptoms when they showed high levels of emotional inhibition (Han & Shaffer, 2013). Moreover, the association between caregiver and youth ER may be demonstrated in their engagement of similar regulatory approaches. Indeed, youth have employed ER strategies that are comparable to those of their caregivers. For instance, children of parents who suppress their emotional expression were more likely to engage in expressive suppression themselves (Bariola et al., 2012). Similarly, in a study of younger children (Gunzenhauser et al., 2014), parental tendencies to use cognitive reappraisal and expressive suppression were associated with children's use of cognitive reappraisal and expressive suppression, respectively, suggesting the parallel use of ER strategies between caregivers and their children.

Despite the link between caregiver and youth ER, less is known about its association in the context of stressful events. Caregivers' ability to manage emotions may become increasingly vital when families experience stress. Greater exposure to stressors can make it difficult for caregivers to engage in adaptive ER strategies (Li et al., 2019; Michl et al., 2013; Ye et al., 2020), possibly elevating youth vulnerability to stress. It is likely that the role of caregiver ER was highlighted during the COVID-19 pandemic, particularly as lockdown restrictions and social distancing measures limited adolescents' access to their usual social support networks, including interactions with peers and participations in out-of-school activities. Given the well-documented relationship between ER difficulties and psychopathology (Aldao et al., 2010; Lincoln et al., 2022; Sheppes et al., 2015), the extant research on the role of parental psychopathology during stressful times may partially shed light on how caregiver ER difficulties may contribute to heightened emotional vulnerability among youth in response to stress. For instance, youth were more likely to experience anxiety symptoms when their parents demonstrated excessive concerns about their children's safety and well-being following stressful life events (Platt et al., 2016). Maternal anxiety and depressive symptoms also mediated the association between exposure to pandemic-related stressors and youth psychopathology in a recent longitudinal study (Lengua et al., 2022). Overall, these findings suggest that caregivers' ER difficulties may be linked to youth ER in response to stressful events, with important implications for mental health outcomes.

The current longitudinal study investigated the role of caregiver ER in youth ER and psychopathology symptoms in response to pandemic-related stressors. We examined whether caregiver exposure to pandemic-related stressors was associated with caregiver-youth engagement in specific ER strategies – rumination, expressive suppression, and cognitive reappraisal – and whether these associations related to youth internalizing and externalizing problems six months later. We specifically examined the associations of the same strategy pairings between caregivers and youth (e.g., caregiver expressive suppression and youth expressive suppression) to investigate whether caregivers and youth demonstrated similarities in their tendency to use specific strategies. A serial mediation model was tested to explore whether caregiver ER and youth ER sequentially mediated the association between exposure to pandemic-related stressors and youth internalizing and externalizing symptoms. In the proposed model (see Figure 1), we expected that caregiver ER and youth ER early in the pandemic would sequentially mediate the associations between greater exposure to pandemic-related stressors and greater internalizing and externalizing symptoms six months later while controlling for pre-pandemic symptoms. We controlled for symptoms *prior* to the pandemic to investigate changes in psychopathology that occurred during the pandemic and to account for pre-existing symptoms that are unrelated to the pandemic. We hypothesized that greater exposure to pandemic-related stressors would relate to greater caregiver engagement in maladaptive ER strategies (i.e., rumination and expressive suppression) and less frequent engagement in an adaptive ER strategy (i.e., cognitive reappraisal), increasing youth engagement in similar ER strategies, which may, in turn, be associated with higher levels of youth internalizing and externalizing symptoms six months later.

https://doi.org/10.1017/S0954579424001081 Published online by Cambridge University Press

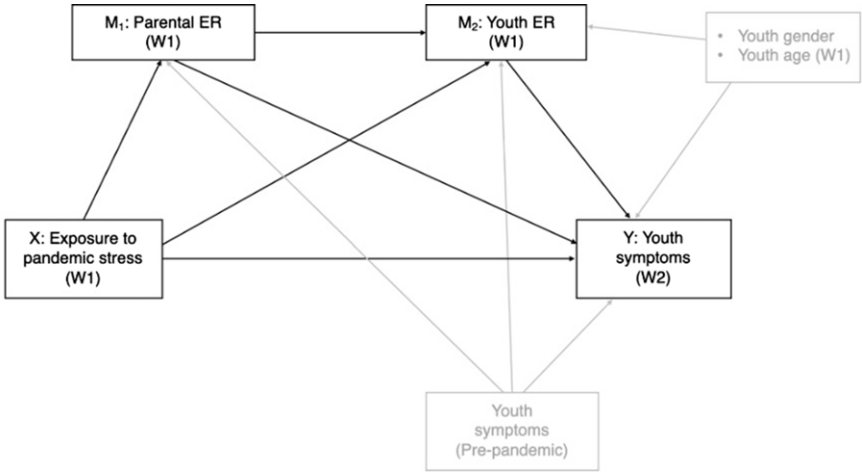

Figure 1. The serial mediation model of caregiver and youth ER. The diagram represents the serial mediation model to test study hypotheses. Covariances were freely estimated. A total of six separate models were tested for each ER strategy (three models: caregiver and youth rumination, caregiver and youth expressive suppression, caregiver and youth cognitive reappraisal) by youth symptoms (two models: youth internalizing symptoms, youth externalizing symptoms). Youth gender, age, and symptoms at the pre-pandemic baseline were included as covariates. W1 = Wave 1; W2 = Wave 2; Pre = Pre-pandemic baseline. M1 = Mediator 1; M2 = Mediator 2.

Method

Participants

A total of 224 youth (aged 7–15 years) and their caregivers participated in the current study. Families were recruited from two ongoing longitudinal studies (Lengua et al., 2015; Rosen et al., 2019, 2020) of children and adolescents in greater Seattle, WA, investigating the associations between environmental experience, cognitive development, and mental health. See Figure 2 for a flowchart illustrating participant recruitment from two separate samples.

Child participants were recruited from a study of younger children ($N = 99$) originally recruited between January 2016 and September 2017 (Rosen et al., 2019, 2020). The subset of the children sample ($N = 90$) participated in a follow-up assessment of mental health between March and November 2018 (pre-pandemic baseline) at the age of 6-8 years. All 90 children were contacted for the current study. Of this sample, 70 children and caregivers participated during the initial stay-at-home order period (wave 1; retention rate: 77% of the pre-pandemic children sample; $M_{age} = 8.88$, range: 7.64–10.21, 51% female), and 55 children and caregivers completed a follow-up assessment six months later (wave 2) after the initial stay-at-home order period was lifted. Mental health assessments from prior to the pandemic in 2018 were used to adjust for the effects of pre-pandemic symptoms. For three participants who had not completed the mental health assessment in 2018, a previous assessment from January 2016–September 2017 at age 5-6 was used as a measure for pre-pandemic symptoms.

Adolescent participants were drawn from a longitudinal study of children ($N = 306$) followed from early childhood to adolescence (Lengua et al., 2015). The subset of the adolescent sample ($N = 227$) that participated in a functional MRI (fMRI) study (Cuartas et al., 2021) had a prior assessment of mental health between June 2017 and October 2018 (pre-pandemic baseline) at the age of 11–12 years. All 227 adolescents were contacted for the current study. Of this sample, 154 adolescents and caregivers participated in the current study during the initial stay-at-home order period (wave 1; retention rate: 68% of the fMRI study sample; $M_{age} = 14.3$, range: 13.12–15.24, 46% female) and 122 adolescents and caregivers completed a follow-up assessment six months later (wave 2) after the initial stay-at-home orders had been lifted. Mental health assessments from prior to the pandemic in 2017-2018 were used to adjust for the effects of pre-pandemic symptoms.

Both the children and adolescent samples came from community-based samples of the same general population – youth in the Seattle area – from a wide range of socioeconomic backgrounds, as indicated by the income-to-needs ratio ($M_{SES} = 3.95$, $SD_{SES} = 1.83$, range: 0.35 – 8.41). The two samples differed in their tendencies to engage in rumination, $t(150.54) = 2.88$, $p = .005$, and expressive suppression, $t(236) = 6.32$, $p < .001$, respectively, but not cognitive reappraisal, $t(236) = -0.38$, $p = .706$. The adolescent sample was more likely to engage in rumination and expressive suppression than the children sample. The two samples also differed in pre-pandemic internalizing symptoms, $t(232) = 5.17$, $p < .001$, but not in pre-pandemic externalizing symptoms, $t(232) = 1.51$, $p = .133$. The adolescent sample reported higher levels of internalizing symptoms compared to the children sample. These differences in their ER tendencies and reported symptoms were expected due to the difference in age across samples and the pattern of increasing use of maladaptive ER strategies (Cracco et al., 2017; Jose & Brown, 2008) and symptoms during adolescence (Brendgen et al., 2010; Dekker et al., 2007; Papachristou & Flouri, 2020). These two samples did not differ in gender, $t(258) = -0.17$, $p = .864$, socioeconomic status, $t(216) = 0.23$, $p = .817$, or in exposure to pandemic-related stressors, $t(248) = -0.01$, $p = .992$.

In the current study, 224 youth and caregivers (the children sample: $N = 70$; the adolescent sample: $N = 154$) completed a battery of questionnaires online to assess exposure to pandemic-related stressors and the use of specific types of ER strategies during the initial stay-at-home orders of the pandemic (wave 1). After the initial stay-at-home orders were lifted six months later (wave 2), 188 youth and caregivers (the children sample: $N = 55$; the adolescent sample: $N = 122$) completed a questionnaire online to assess youth internalizing and externalizing symptoms. The racial and ethnic composition of youth in the current study reflected the Seattle area, with 66% of youth identifying as White, 11% as Black, 11% as Asian, 8% as Hispanic or Latino, and 3% as another race or ethnicity.

We examined the data on exposure to COVID-19 pandemic-related stressors, caregiver and youth ER, and youth psychopathology symptoms for careless or inconsistent response patterns (Curran, 2016; Ward & Meade, 2023) using the Careless package in R (Yentes & Wilhelm, 2021). Our analyses indicated that the data are of suitable quality. The average number of consecutive identical responses was 1.6. While some participants had over 20 consecutive identical responses, this was likely specific to the nature of the COVID-19 pandemic-related stressors questionnaire, which utilized branching logic to direct respondents based on their previous answers (e.g., "Do you know anybody who has died as a

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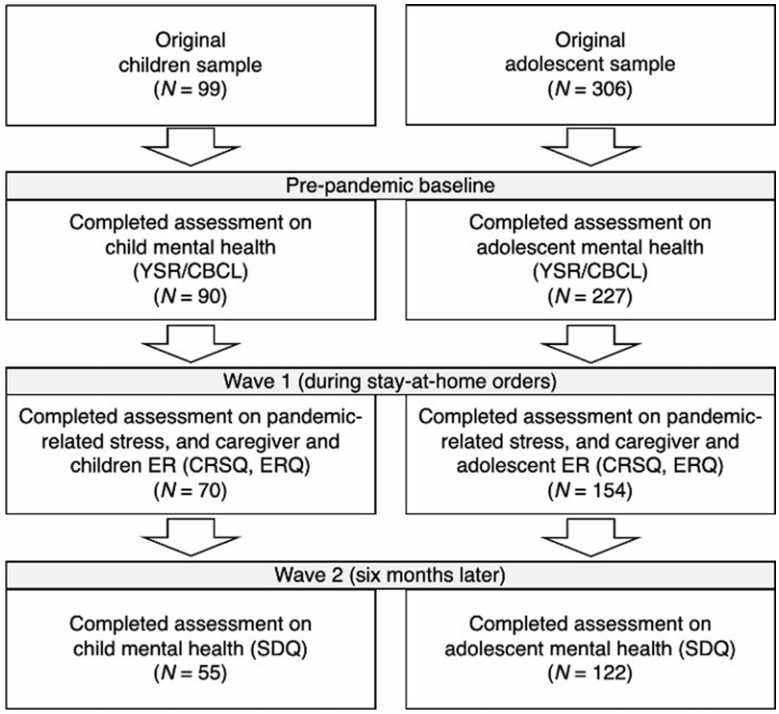

Figure 2. Participant recruitment and assessment flowchart. The children sample refers to the sample originally recruited for Lengua et al. (2015), and the adolescent sample refers to the sample recruited for Rosen et al. (2019, 2020). YSR = Youth Self-Report; CBCL = Child Behavior Checklist; CRSQ = Children's Response Styles Questionnaire; ERQ = Emotion Regulation Questionnaire; SDQ = Strengths and Difficulties Questionnaire.

result of the coronavirus? If so, what is this persons' relationship to you (check all that apply or check Does Not Apply or Prefer Not to Answer)?"). Participants with more than 20 consecutive identical responses were reviewed, and their responses were found to be plausible upon review.

Youth were excluded from the parent studies (Lengua et al., 2015; Rosen et al., 2019, 2020) based on the following criteria: IQ < 80, active substance dependence, psychosis, presence of pervasive developmental disorders (e.g., autism), and psychotropic medication use. For both the children and adolescent samples, legal guardians provided informed consent, and youth provided assent via electronic signature obtained using Qualtrics (Provo, UT). All study procedures were approved by the Institutional Review Board at Harvard University and University of Washington. Youth and their caregivers were each paid $50 for participating in the first wave of the study and $35 for the second wave.

Procedure

After consent was obtained, caregivers and youth completed surveys separately from one another. Data were collected from three time points prior to and during the pandemic: (a) mental health assessments prior to the pandemic (pre-pandemic baseline); (b) exposure to pandemic-related experiences and use of ER strategies during the initial stay-at-home orders between April and May of 2020 (wave 1); and (c) mental health assessments six months later between November 2020 and January 2021, after the initial stay-at-home orders were lifted (wave 2). Stay-at-home orders and public school closures remained in effect throughout the entire data collection period of wave 1.

Measures

Pandemic-related stressors

A questionnaire was developed to assess exposure to COVID-19 pandemic-related stressors (see https://osf.io/drqku/). It was necessary to create a novel measure given the unprecedented nature of the COVID-19 pandemic and the unique stressors it presented. As reported previously (Rodman et al., 2022), it is a widely accepted practice to develop new measures to adequately capture the full extent of specific types of stressful experiences when novel events occur (e.g., Galea et al., 2002, 2007; Mclaughlin, et al., 2009; Pfefferbaum et al., 2000). The questionnaire was administered to caregivers and included an assessment of health, financial, social, school, and physical environment stressors that occurred within the month prior to the first assessment during the COVID-19 pandemic. Seven of the stressors were related to the health of participants or close others (e.g., contracting COVID-19); four were related to financial impacts of COVID-19 (e.g., parent(s) lost a job); four were related to disruptions to social life (e.g., social isolation); and three were related to noise and crowding (e.g., the environment where the adolescent does school work is noisy). We used the caregiver-reported scores to capture the pattern of caregiver engagement in ER strategies specifically in response to caregiver exposure to stressors, although it is likely that youth are being exposed to similar stressors that caregivers have reported. Stressors that were coded as present were summed using a cumulative risk approach (Evans et al., 2013).

Rumination

The use of rumination was assessed using the rumination subscale of the Children's Response Styles Questionnaire (CRSQ; Abela et al., 2002), a 25-item self-report scale that measures one's tendency to engage in rumination, distraction, and problem-solving in response to sadness. The CRSQ items were developed to mirror the adult Response Styles Questionnaire (RSQ; Nolen-Hoeksema & Morrow, 1991). The rumination subscale includes 13 items on self-focused responses to sadness (e.g., "Think about a recent situation wishing it had gone better"). For each item, youth and their caregivers were asked to rate how often they respond in such a way on a 4-point Likert scale (1 = almost never to

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4 = almost always). The use of rumination in the current study was estimated as the sum of an abbreviated 11-item version of this subscale, with higher scores indicating a greater tendency to engage in rumination. The CRSQ has demonstrated adequate reliability and validity (Abela et al., 2002), and here we find good internal consistency for the rumination subscale for both youth (α = .88) and caregivers (α = .89). Given that no prior study, to our knowledge, has tested the measurement invariance during the pandemic for the CRSQ, supplemental confirmatory factor analyses were conducted to ensure that the factor structures fit the data (see supplemental materials for details).

Expressive suppression and cognitive reappraisal

The use of expressive suppression and cognitive reappraisal was assessed by the Emotion Regulation Questionnaire (ERQ; Gross & John, 2003). The ERQ is a 10-item self-report questionnaire, with four items pertaining to expressive suppression (e.g., "I control my emotions by not expressing them") and six items pertaining to cognitive reappraisal (e.g., "I control my emotions by changing the way I think about the situation I'm in"). For each item, youth and their caregivers were asked to provide their responses on a 7-point Likert scale (1 = strongly disagree to 7 = strongly agree). The use of expressive suppression and cognitive reappraisal were estimated as the sum of the corresponding subscale, respectively, with higher scores indicating a greater tendency to engage in that strategy. The expressive suppression subscale demonstrated adequate internal consistency for both youth ($\alpha = .78$) and caregivers ($\alpha = .73$), and cognitive reappraisal subscales demonstrated good consistency for both youth ($\alpha = .80$) and caregivers ($\alpha = .84$) in the current sample. Given the absence of studies, to our knowledge, that have examined the measurement invariance of the ERQ during the pandemic, supplemental confirmatory factor analyses were conducted to ensure that the factor structures fit the current data (see supplemental materials for details).

Internalizing and externalizing symptoms

Internalizing and externalizing symptoms prior to the pandemic were assessed by caregiver and youth report on the Youth Self-Report (YSR) and Child Behavior Checklist (CBCL), respectively (Achenbach et al., 2003; Achenbach, 1991). The YSR and CBCL scales are widely used measures of youth emotional and behavioral problems and use normative data to generate age-standardized estimates of internalizing and externalizing symptoms. We used the Internalizing and Externalizing symptoms subscales from the youth and caregiver report, and the highest scores of the two reporters were used as measures of pre-pandemic symptoms. For children aged 6-8 years at the time of assessment who did not complete the YSR, the CBCL was used to compute their pre-pandemic symptoms at that time point. The use of higher caregiver or child reports for psychopathology is an implementation of the standard "or" rule used in combining caregiver and child report of psychopathology. In this approach, if either a caregiver or child endorses a particular symptom, it is counted with the assumption that it is likely present if a symptom is reported. This is a standard approach in the literature on child psychopathology – for example, it is how mental disorders are diagnosed in population-based studies of psychopathology in children and adolescents (Kessler et al., 2012; Merikangas et al., 2010).

To assess symptoms at wave 2, caregivers and youth completed the Strengths and Difficulties Questionnaire (SDQ; Goodman, 2001), a widely used assessment of youth mental health. The SDQ is a 25-item scale that consists of five subscales, including Internalizing and Externalizing symptoms subscales (Goodman, 2001), with its measurement invariance supported during the COVID-19 pandemic (Foley et al., 2023). The SDQ has good reliability and validity (Dickey & Blumberg, 2004; Goodman et al., 2010) and correlates strongly with the CBCL/YSR (Goodman & Scott, 1999). We chose to use the SDQ to reduce participant burden, as it has substantially fewer items than the CBCL/YSR, given the substantial strain families with children were experiencing during the early phase of the pandemic. The SDQ distinguishes well between low- and high-risk samples of school-aged youth, with a high discriminative ability (AUC = .95), and the subscales of the SDQ demonstrate moderate to strong positive correlations (.59–.87) with parallel CBCL subscales (Goodman & Scott, 1999). We used the Internalizing and Externalizing symptoms subscales from the youth and caregiver report, and the highest scores of the two reporters were used as measures of psychopathology symptoms at wave 2.

Statistical analyses

R-4.0.3 (R Core Team, 2020) was used to perform statistical analyses. Descriptive and correlation analyses were conducted as preliminary analyses. The mediation analyses were conducted using the latent variable analysis (lavaan; Rosseel, 2012) package. A total of six separate models were tested for each ER strategy (three models: caregiver and youth rumination, caregiver and youth expressive suppression, caregiver and youth cognitive reappraisal) by youth psychopathology symptoms (two models: youth internalizing symptoms, youth externalizing symptoms). We first investigated the direct associations among pandemic-related stress at wave 1, youth and caregiver ER at wave 1, and youth internalizing and externalizing symptoms at wave 2, controlling for pre-pandemic symptoms. The coefficients were standardized to compare the magnitudes of different associations. We also examined the indirect effects of pandemic-related stress on youth psychopathology symptoms (internalizing and externalizing symptoms) through caregiver ER (caregiver rumination, suppression, and cognitive reappraisal) and youth ER (youth rumination, suppression, and cognitive reappraisal), independently and in serial, controlling for pre-pandemic symptoms (see Figure 1 for the model). Following recommendations by Yzerbyt et al. (2018), we tested for indirect effects only if all component paths of the serial indirect effect (i.e., $X \rightarrow M_1$, $M_1 \rightarrow M_2$, $M_2 \rightarrow Y$), the main focus of the current study, were significant. Separate models were computed for each ER strategy (e.g., rumination, suppression, cognitive reappraisal) and symptom subtype (e.g., internalizing, externalizing) when the examination of the component paths supported the use of mediation analysis. Youth gender, age at wave 1, and symptoms at the pre-pandemic baseline were included in all six models as covariates. Bias-corrected bootstrap confidence intervals derived from 5,000 bootstrap resamples were used to estimate indirect effects, which were statistically significant if the confidence interval did not include a zero. Completely standardized indirect effect (CSIE) was also computed to estimate the effect size of the significant indirect effects. Covariances were freely estimated, which includes all six covariances among pandemic-related stress at wave 1, pre-pandemic symptoms, youth age, and youth gender.

Little's missing completely at random (MCAR) test, where the null hypothesis is that the data are MCAR (Little & Rubin, 2019), was non-significant, $\chi^2(99) = 107.93$, $p = .253$. Given these results, missing data were handled using full-information

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Table 1. Descriptive statistics and intercorrelations

Demographics						
	N	*M*	*SD*		*N*	%
1. Youth age (W1)	224	12.65	2.59	2. Youth gender (female)	224	47.7

Measures			
	N	*M*	*SD*
3. Caregiver–reported exposure to pandemic stress (W1)	217	2.5	1.9
4. Caregiver rumination (W1)	219	19.7	6.2
5. Caregiver expressive suppression (W1)	219	2.4	0.7
6. Caregiver cognitive reappraisal (W1)	219	3.6	0.7
7. Youth rumination (W1)	216	8.1	6.2
8. Youth expressive suppression (W1)	216	2.6	0.8
9. Youth cognitive reappraisal (W1)	216	3.3	0.7
10. Youth internalizing-CBCL (Pre–pandemic)	224	54.5	9.9
11. Youth internalizing-SDQ (W2)	175	5.5	3.6
12. Youth externalizing-CBCL (Pre–pandemic)	224	52.1	8.6
13. Youth externalizing-SDQ (W2)	177	7.2	3.6

Intercorrelations													
	1	2	3	4	5	6	7	8	9	10	11	12	13
1	–												
2	−.04	–											
3	.11	−.03	–										
4	.05	−.15*	.28**	–									
5	−.10	.07	.03	.00	–								
6	−.05	−.02	− .03	− .20**	.09	–							
7	.15*	.27**	.12	.18**	−.04	− .02	–						
8	.40**	.02	.13	.04	.09	− .00	.23**	–					
9	−.03	.03	− .03	.00	.00	.11	− .09	− .10	–				
10	.34**	−.23**	.28**	.07	−.05	− .07	.04	.18**	−.13*	–			
11	.10	.15*	.19*	.04	−.03	.01	.31**	.30**	−.14	.26**	–		
12	.09	−.10	.25**	.18**	−.11	− .14*	.03	.10	−.05	.47**	.14	–	
13	−.17*	−.10	.31**	.12	−.01	.06	.22**	.05	−.02	.18*	.43**	.30**	–

Note. W1 = Wave 1; W2 = Wave 2. All pairwise, Pearson correlations. *$p \leq .05$. ** $p \leq .01$.

maximum likelihood estimation, which has been reported to produce unbiased parameter estimates and standard errors under MCAR (Enders & Bandalos, 2001; Enders, 2022). Model fits for the proposed models were evaluated using a chi-square test, comparative fit index (CFI), root mean squared error of approximation (RMSEA), and standardized root mean square residual (SRMR). All models explained the data well. Chi-square tests of model fit were all non-significant ($p = .067$–$.788$), and other fit indices also demonstrated acceptable to good model fit (CFI = .957–1.000; RMSEA = .000–.087; SRMR = .008–.027; Browne & Cudeck, 1992; Hu & Bentler, 1999; Kline, 2005; MacCallum & Austin, 2000). Data and analysis code have been made publicly available (https://osf.io/fpxn7).

Results

Table 1 provides descriptive statistics for all variables and zero-order correlations among these variables. In bivariate correlations, caregiver rumination was negatively correlated with caregiver cognitive reappraisal ($r = -.20$, $p = .003$) but was unrelated to caregiver suppression ($r = .00$, $p = .984$). Youth engagement in rumination was positively related to youth suppression ($r = .23$, $p = .001$) but was unrelated to youth cognitive reappraisal ($r = -.09$, $p = .184$). Moreover, caregiver engagement in rumination was positively associated with youth rumination ($r = .18$, $p = .010$) but was not related to youth expressive suppression and cognitive reappraisal ($ps > .05$). Caregiver expressive suppression and cognitive reappraisal were unrelated to any of the youth ER strategies ($ps > .05$).

Associations among stress, caregiver and youth ER, and psychopathology

We examined direct associations among caregiver exposure to pandemic-related stressors, caregiver and youth ER, and youth psychopathology symptoms within each model (i.e., rumination-

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internalizing, rumination-externalizing, suppression-internalizing, suppression-externalizing, reappraisal-internalizing, reappraisal-externalizing; see Table 2 for all results).

In rumination models, exposure to pandemic-related stressors at wave 1 was associated with greater caregiver engagement in rumination at wave 1 (internalizing model: $\beta = .29$, $SE = 0.07$, $p < .001$; externalizing model: $\beta = .25$, $SE = 0.07$, $p < .001$). Youth whose caregivers reported more frequent use of rumination early on in the pandemic were more likely to engage in rumination concurrently (internalizing model: $\beta = .20$, $SE = 0.07$, $p = .002$; externalizing model: $\beta = .20$, $SE = 0.07$, $p = .002$), controlling for youth gender and age. Youth engagement in rumination at wave 1 was associated with greater severity of internalizing ($\beta = .26$, $SE = 0.07$, $p = .001$) and externalizing ($\beta = .26$, $SE = 0.07$, $p < .001$) symptoms six months later, controlling for pre-pandemic internalizing and externalizing symptoms, respectively. Exposure to pandemic-related stressors was not associated with youth engagement in rumination (internalizing model: $\beta = .06$, $SE = 0.07$, $p = .401$; externalizing model: $\beta = .07$, $SE = 0.07$, $p = .296$), and caregiver rumination was not directly related to youth internalizing ($\beta = -.01$, $SE = 0.07$, $p = .861$) and externalizing symptoms ($\beta = -.03$, $SE = 0.07$, $p = .696$), respectively. Greater caregiver exposure to pandemic-related stressors was associated with higher levels of youth externalizing symptoms at wave 2 ($\beta = .26$, $SE = 0.07$, $p < .001$), controlling for pre-pandemic externalizing symptoms, but was not related to youth internalizing symptoms at wave 2 ($\beta = .11$, $SE = 0.08$, $p = .155$).

Only a few associations were significant in expressive suppression and cognitive reappraisal models. Caregiver use of expressive suppression at wave 1 was concurrently associated with youth engagement in expressive suppression (internalizing model: $\beta = .12$, $SE = 0.06$, $p = .043$; externalizing model: $\beta = .13$, $SE = 0.06$, $p = .033$), whereas caregiver and youth engagement in cognitive reappraisal were not related ($p = .126$–$.147$). Youth engagement in expressive suppression at wave 1 was also associated with higher levels of internalizing symptoms six months later ($\beta = .27$, $SE = 0.08$, $p < .001$), but youth engagement in cognitive reappraisal was unrelated to internalizing symptoms ($\beta = -.14$, $SE = 0.07$, $p = .050$). Exposure to pandemic-related stressors at wave 1 was associated with externalizing symptoms at wave 2 for both suppression ($\beta = .29$, $SE = 0.07$, $p < .001$) and reappraisal ($\beta = .28$, $SE = 0.07$, $p < .001$) models. All other associations were non-significant ($ps > .05$).

Indirect effect of stress on psychopathology symptoms via caregiver and youth rumination

Given that component paths of the serial indirect effect were significant only when caregiver and youth rumination were mediators, we examined the indirect effects of caregiver-youth rumination on internalizing and externalizing symptoms at wave 2, respectively (see Table 3 for all results). The indirect effect of pandemic-related stress on youth internalizing symptoms at wave 2 was significant for caregiver and youth rumination at wave 1 in sequence ($B = 0.016$, $SE = 0.01$, 95% CI = [0.001, 0.065], CSIE = 008), but not independently (caregiver: $B = 0.004$, $SE = 0.04$, 95% CI = [−0.068, 0.083], CSIE = .002; youth: $B = 0.038$, $SE = 0.04$, 95% CI = [−0.015, 0.135], CSIE = .020), controlling for pre-pandemic internalizing symptoms (see Figure 3a). Similarly, the indirect effect of pandemic stress on youth externalizing symptoms was significant for caregiver rumination and youth rumination at wave 1 in sequence ($B = 0.015$, $SE = 0.01$, 95% CI = [0.001, 0.063], CSIE = .008), but not independently (caregiver: $B = -0.005$, $SE = 0.03$, 95% CI = [−0.070, 0.038], CSIE = −.002; youth: $B = 0.040$, $SE = 0.04$, 95% CI = [−0.019, 0.130], CSIE = .022), controlling for the effect of pre-pandemic externalizing symptoms (see Figure 3b).

Sensitivity analysis

To examine the directionality of caregiver and youth rumination effects, we tested the reverse serial mediation models with youth rumination as the first mediator (M_1) and caregiver rumination as the second mediator (M_2). In reverse rumination models predicting internalizing and externalizing symptoms, youth rumination was significantly associated with caregiver rumination ($\beta = .20$, $SE = 0.07$, $p = .002$), whereas the associations between pandemic stress and youth rumination and caregiver rumination and psychopathology symptoms were both non-significant ($ps > .05$). Moreover, reverse rumination models predicting internalizing and externalizing symptoms both demonstrated poor model fit with the data as indicated by the chi-square tests of model fit ($p < .001$) and other fit indices (CFI = .744–.790, RMSEA = .212–.217, SRMR = .055–.058; Hu & Bentler, 1999). Modification indices indicated that regressing youth rumination on caregiver rumination would improve the overall fit of both models, which is our initially hypothesized directionality of caregiver rumination and youth rumination.

Discussion

The COVID-19 pandemic has introduced unprecedented stressors for families, limiting youth access to external social support while increasing the saliency of caregiver-youth interactions and relationships. Recognizing the potentially enhanced role of caregiver in youth mental health, the present study examined the contributions of caregiver ER to youth ER and psychopathology symptoms during the early stages of the COVID-19 pandemic. We investigated whether caregiver and youth ER – specifically, rumination, expressive suppression, and cognitive reappraisal – serially mediated the associations between caregiver exposure to pandemic-related stressors and youth internalizing and externalizing symptoms six months later, controlling for pre-pandemic symptoms. Consistent with our hypotheses, caregiver and youth rumination sequentially mediated the prospective associations between pandemic-related stress and increases in youth psychopathology symptoms early in the pandemic, compared to pre-pandemic levels. Caregivers with greater exposure to stressors at the beginning of the pandemic were more likely to engage in rumination, which, in turn, was associated with youth tendency to engage in rumination and, ultimately, higher levels of internalizing and externalizing symptoms six months later. Contrary to our hypotheses, caregiver and youth expressive suppression and cognitive reappraisal did not mediate the links between pandemic-related stress and youth psychopathology symptoms independently or sequentially. Overall, these findings indicate that the link between caregiver and youth rumination may serve as a familial factor underlying an increased risk for psychopathology in response to stress.

The association between caregiver and youth rumination, but not suppression or cognitive reappraisal, was linked to increases in youth internalizing and externalizing symptoms during the pandemic. Specifically, pandemic-related stress was associated with greater engagement in rumination but was unrelated to expressive suppression or cognitive reappraisal. The link between

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Table 2. Results of regression analyses from serial mediation models

	Internalizing symptoms				Externalizing symptoms			
	B	*SE*	*p*	*β*	*B*	*SE*	*p*	*β*
Rumination model								
Pandemic stress W1 → Caregiver rumination W1	**0.93**	**0.22**	**.000**	**.29**	**0.82**	**0.22**	**.000**	**.25**
Caregiver rumination W1 → Youth rumination W1	**0.20**	**0.07**	**.003**	**.20**	**0.20**	**0.07**	**.002**	**.20**
Youth rumination W1 → Youth symptoms W2	**0.15**	**0.04**	**.001**	**.26**	**0.15**	**0.04**	**.000**	**.26**
Pandemic stress W1 → Youth rumination W1	0.19	0.22	.401	.06	0.23	0.22	.297	.07
Caregiver rumination W1 → Youth symptoms W2	−0.01	0.04	.860	−.01	−0.02	0.04	.696	−.03
Pandemic stress W1 → Youth symptoms W2	0.20	0.14	.157	.11	**0.49**	**0.13**	**.000**	**.26**
Covariates								
Youth symptoms pre → Youth rumination W1	0.03	0.05	.570	.04	.004	0.05	.937	.01
Youth symptoms pre → Caregiver rumination W1	0.00	0.04	.945	−.01	0.08	0.05	.080	.12
Youth symptoms pre → Youth symptoms W2	**0.10**	**0.03**	**.001**	**.27**	**0.11**	**0.03**	**.000**	**.26**
Youth age → Youth rumination W1	**0.33**	**0.16**	**.039**	**.14**	**0.37**	**0.15**	**.014**	**.15**
Youth age → Youth symptoms W2	−0.04	0.10	.702	−.03	**− 0.38**	**0.09**	**.000**	**− .27**
Youth gender (female) → Youth rumination W1	**3.85**	**0.81**	**.000**	**.31**	**3.79**	**0.79**	**.000**	**.31**
Youth gender (female)→ Youth symptoms W2	0.99	0.54	.066	.14	**− 1.08**	**0.50**	**.030**	**− .15**
Expressive suppression model								
Pandemic stress W1 → Caregiver suppression W1	0.02	0.03	.487	.05	0.02	0.03	.339	.07
Caregiver suppression W1 → Youth suppression W1	**0.14**	**0.07**	**.045**	**.13**	**0.15**	**0.07**	**.035**	**.13**
Youth suppression W1 → Youth symptoms W2	**1.27**	**0.36**	**.000**	**.27**	0.43	0.35	.223	.09
Pandemic stress W1 → Youth suppression W1	0.03	0.03	.224	.08	0.03	0.03	.254	.07
Caregiver suppression W1 → Youth symptoms W2	−0.50	0.37	.171	−.09	−0.26	0.36	.472	−.05
Pandemic stress W1 → Youth symptoms W2	0.25	0.14	.073	.13	**0.55**	**0.14**	**.000**	**.29**
Covariates								
Youth symptoms pre → Youth suppression W1	0.00	0.01	.550	.04	0.01	0.01	.282	.07
Youth symptoms pre → Caregiver suppression W1	0.00	0.01	.400	−.06	−0.01	0.01	.075	−.12
Youth symptoms pre → Youth symptoms W2	**0.09**	**0.03**	**.001**	**.26**	**0.11**	**0.03**	**.000**	**.25**
Youth age → Youth suppression W1	**0.12**	**0.02**	**.000**	**.39**	**0.12**	**0.02**	**.000**	**.41**
Youth age → Youth symptoms W2	−0.15	0.10	.160	−.11	**− 0.39**	**0.10**	**.000**	**− .28**
Youth gender (female) → Youth suppression W1	0.06	0.10	.516	.04	0.07	0.10	.494	.04
Youth gender (female)→ Youth symptoms W2	**1.51**	**0.50**	**.003**	**.21**	−0.51	0.48	.295	−.07
Cognitive reappraisal model								
Pandemic stress W1 → Caregiver reappraisal W1	0.00	0.03	.955	.00	0.01	0.02	.821	.02
Caregiver reappraisal W1 → Youth reappraisal W1	0.10	0.07	.149	.10	0.11	0.07	.128	.10
Youth reappraisal W1 → Youth symptoms W2	−0.76	0.39	.052	−.14	−0.09	0.36	.810	−.02
Pandemic stress W1 → Youth reappraisal W1	0.01	0.03	.834	.02	−0.01	0.03	.821	−.02
Caregiver reappraisal W1 → Youth symptoms W2	0.30	0.38	.434	.05	0.49	0.36	.181	.09
Pandemic stress W1 → Youth symptoms W2	0.26	0.14	.067	.14	**0.54**	**0.13**	**.000**	**.28**
Covariates								
Youth symptoms pre → Youth reappraisal W1	−0.01	0.01	.078	−.14	0.00	0.01	.727	−.03
Youth symptoms pre → Caregiver reappraisal W1	0.00	0.01	.333	−.07	**− 0.01**	**0.01**	**.043**	**− .14**
Youth symptoms pre → Youth symptoms W2	**0.10**	**0.03**	**.001**	**.27**	**0.12**	**0.03**	**.000**	**.28**
Youth age → Youth reappraisal W1	0.01	0.02	.730	.03	0.00	0.02	.803	−.02
Youth age → Youth symptoms W2	0.00	0.10	.983	.00	**− 0.34**	**0.09**	**.000**	**− .24**
Youth gender (female) → Youth reappraisal W1	0.01	0.09	.920	.01	0.05	0.09	.622	.03
Youth gender (female)→ Youth symptoms W2	**1.62**	**0.52**	**.002**	**.22**	−0.45	0.48	.356	−.06

Note. Significant associations are in bold. *B* = Unstandardized coefficient, *SE* = Standard error, *p* = *p*-value, *β* = Standardized coefficient. W1 = Wave 1; W2 = Wave 2; Pre = Pre–pandemic baseline.

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Table 3. Indirect and direct effects of pandemic stress on youth psychopathology symptoms via caregiver and youth ER

	Internalizing symptoms (W2)			Externalizing symptoms (W2)		
	B (SE)	95% BC CI	*β*	*B (SE)*	95% BC CI	*β*
Rumination model						
Direct effect	0.215 (0.16)	−0.096, 0.527	.112	**0.491 (0.12)**	**0.263, 0.749**	**.250**
Total indirect effect	0.057 (0.05)	−0.025, 0.168	.030	0.051 (0.05)	−0.027, 0.153	.026
Indirect effect via caregiver–youth rumination	**0.016 (0.01)**	**0.001, 0.065**	**.008**	**0.015 (0.01)**	**0.001, 0.063**	**.008**
Indirect effect via caregiver rumination	0.004 (0.04)	−0.068, 0.083	.002	−0.005 (0.03)	−0.070, 0.038	−.002
Indirect effect via youth rumination	0.038 (0.04)	−0.015, 0.135	.020	0.040 (0.04)	−0.019, 0.130	.022
Total effect	0.272 (0.16)	−0.028, 0.586	.142	**0.542 (0.13)**	**0.301, 0.797**	**.275**

Note. Significant effects are in bold. *B* = Bootstrap unstandardized coefficient, *SE* = Bootstrap standard error, 95% CI = 95% bootstrap bias–corrected confidence intervals, *β* = Bootstrap standardized coefficient.

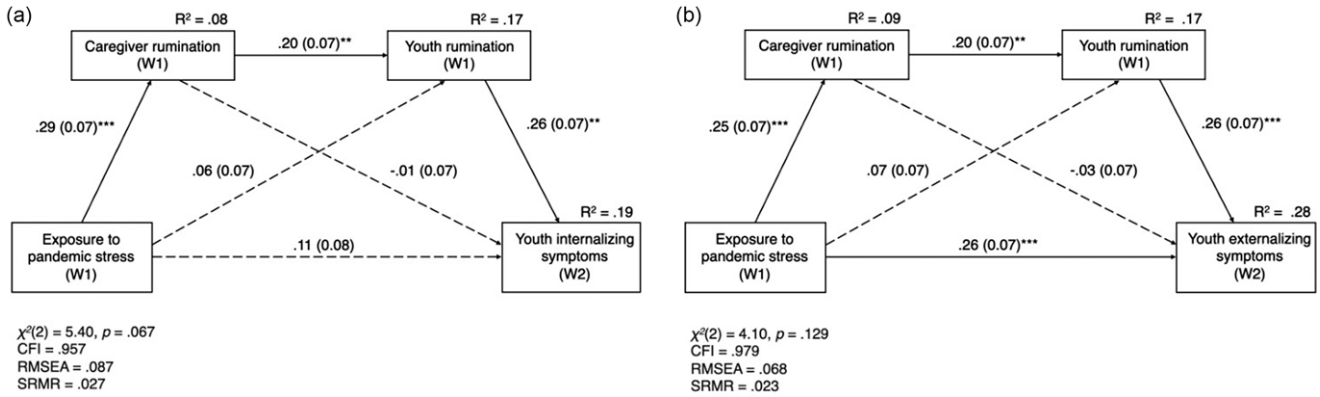

Figure 3. Serial mediation analyses with caregiver-youth rumination and youth psychopathology symptoms. Standardized path coefficients are reported with their standard errors in parentheses. Caregiver and youth rumination serially mediated the association between exposure to COVID-19 pandemic-related stressors and (a) youth internalizing symptoms and (b) youth externalizing symptoms at wave 2, respectively. Covariates have been removed from the figures to ease interpretation. Solid arrows indicate significant paths, and dashed arrows indicate non-significant paths. W1 = Wave 1; W2 = Wave 2. *$p < .05$. **$p < .01$. ***$p < .001$.

exposure to stressful events and rumination has been well-documented in prior research, which has shown tendencies to ruminate following chronic and uncontrollable stressful life events in adolescents and adults (McLaughlin & Hatzenbuehler, 2009; Michl et al., 2013; Shaw et al., 2019). Whereas the current findings do not demonstrate the robust role of rumination as we did not account for the other types of ER strategies simultaneously, the association between pandemic-related stress and ER was unique to rumination, suggesting that rumination in particular may be a common pattern of ER in the context of stressful events. Indeed, in a study of adolescents (Flouri & Mavroveli, 2013), negative automatic thoughts, one of the main features of rumination (Nolen-Hoeksema et al., 2008), mediated the positive link between stressful life events and emotional and behavioral problems in youth, whereas expressive suppression and cognitive reappraisal did not. Moreover, compared to other ER strategies, such as expressive suppression and cognitive reappraisal, rumination consistently served as the strongest mechanism underlying the positive associations of chronic stress with negative psychological health outcomes, including depression and anxiety, among adults (Zawadzki, 2015). This highlights the need for further research investigating within-individual or dyad (i.e., caregiver and youth) variations in the use of ER strategies.

Greater tendencies to ruminate following COVID-19 stress is in line with the appraisal theory of ER (Nowak et al., 2021), which suggests that individuals' selection of an ER strategy is shaped by their evaluation of (a) the harmfulness of their emotional state and (b) their ability to modify that emotion. Specifically, when individuals perceive their emotional state as both threatening and difficult to manage, they are more likely to employ maladaptive ER strategies, such as rumination and expressive suppression. During the lockdown period of the COVID-19 pandemic, parents experienced an increase in negative affect (Janssen et al., 2020), aligning with prior research demonstrating the association between exposure to stressful events and heightened negative affect (Bolger et al., 1989; Larson & Ham, 1993; Larson et al., 2002; Larson & Asmussen, 1991; Mroczek & Almeida, 2004). Given limited access to resources and support systems at the beginning of the pandemic due to government restrictions and elevated health concerns (Fegert et al., 2020), caregivers likely had reduced capacity to engage in adaptive strategies (e.g., problem-solving, instrumental behaviors) in response to increased stress and negative affect (Achterberg et al., 2021; Adams et al., 2021; Johnson et al., 2022), leading them to resort to rumination as a means of coping with negative emotions and thoughts. Caregivers' tendency to ruminate may further exacerbate their own negative affect (Nolen-Hoeksema et al., 1993) and interfere with effective problem-solving (Lyubomirsky & Nolen-Hoeksema, 1995; Nolen-Hoeksema et al., 2008), creating a cyclic pattern that promotes further

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rumination. This increased caregivers' negative affect may serve as a source of negative affect for adolescents (Larson & Almeida, 1999; Larson & Gillman, 1999), and caregivers may also be less likely to provide concrete solutions or guidance in response to stressors, leaving youth with limited tools for managing intrusive and intense negative thoughts and emotions. Thus, youth whose caregivers engage in rumination may be more prone to ruminate themselves.

Another potential mechanism that may account for the association between caregiver and youth rumination is co-rumination, an interpersonal process that involves extensive and frequent discussions focusing on the causes and consequences of negative emotions (Rose, 2002). Co-ruminating with peers during adolescence has been prospectively associated with increases in individual rumination, which was further related to greater depressive symptoms (Stone & Gibb, 2015). Similarly, adolescents who co-ruminated more often with their mothers exhibited greater internalizing symptoms than those who engaged in less co-rumination (Waller & Rose, 2010). The role of co-rumination also emerged during the pandemic, as co-ruminating about the pandemic was associated with greater internalizing symptoms following exposure to pandemic-related stressors in an adult sample (Starr et al., 2021). Although there is limited literature specifically focusing on caregiver-youth co-rumination, it is possible that co-ruminative conversations between caregivers and youth about the pandemic may have increased adolescents' stress and negative affect (Rose et al., 2017; Zelic et al., 2017), interfering with their engagement in adaptive coping. Taken together, further exploration of familial processes that underlie the link between caregiver and youth rumination in response to stress and risk for psychopathology is critical.

We did not find a significant association between pandemic-related stress and expressive suppression and cognitive reappraisal. This absence of association may be attributed to the context-sensitive nature of employing expressive suppression and cognitive reappraisal (Cheng, 2001; Kobylińska & Kusev, 2019; Troy et al., 2013). For instance, the role of expressive flexibility, which involves the flexible adjustment of emotional expression (i.e., enhancing expression vs. suppressing expression) based on situational demands, may be more profound than expressive suppression in the context of stressful events (Bonanno et al., 2004; Chen et al., 2018; Lenzo et al., 2021; Westphal et al., 2010). Particularly for caregivers, it might be more adaptive to inhibit the expression of negative emotions when families are already experiencing heightened negative affect rather than expressing them, while expressing positive emotions may be beneficial in such situations. Moreover, regarding cognitive reappraisal, previous research has shown that individuals' preference for reappraisal is often influenced by various context-specific factors. These factors include the intensity of affective stimuli (Doré et al., 2017; Opitz et al., 2015; Sheppes et al., 2011, 2014), anticipatory information about the emotional events (Shafir & Sheppes, 2020), cognitive demand in implementing the strategy (Sheppes et al., 2014), and possibilities for re-interpretation of an emotional stimulus (Suri et al., 2018). Families with greater access to resources or information during the pandemic may have been better equipped to engage in reappraisal as they could more effectively anticipate potential outcomes or possess a greater cognitive capacity to reinterpret their situations. In contrast, those facing limited access, compounded by heightened and prolonged uncertainty and difficulties, may have found it more challenging to reappraise their emotions or situations.

Although we did not find any mediation effect for caregiver-youth expressive suppression and cognitive reappraisal, it is important to note that the *concurrent* link between caregiver and youth expressive suppression, but not cognitive reappraisal, was positive and significant. This suggests that youth tended to use expressive suppression more when their caregivers also showed a greater tendency to engage in expressive suppression. These findings align with a prior study demonstrating a positive association between parental and youth expressive suppression and a non-significant link between parental and youth cognitive reappraisal (Bariola et al., 2012). Bariola et al. (2012) proposed that it is likely for youth to adopt expressive suppression as they can observe the discrepancy between the experience of emotionally salient events and the absence of emotional response. In contrast, the implementation or consequence of cognitive reappraisal may be less observable than expressive suppression, making it challenging for youth to adopt the strategy. These explanations may, at least partially, account for the associations we found.

Moreover, the contribution of non-familial factors may be more strongly tied to adolescent engagement in cognitive reappraisal. For example, an adult twin study (McRae et al., 2017) demonstrated that the use of cognitive reappraisal, compared to suppression, was less heritable and more dependent on non-shared environmental influences. This suggests that factors potentially related to unique family experiences or individual differences in temperament (e.g., Liu et al., 2022) or executive functions (e.g., Pe et al., 2013) may have a stronger influence on the use of reappraisal than family factors. In addition, adolescents are more likely to engage in emotional processing with their peers than with adults, as friendships increasingly become venues for emotional sharing and disclosure (Hartup, 1993; von Salisch, 2001). Considering that adolescents maintained active digital interactions with their peers (e.g., texting, phone calls, and social media) to a similar extent as they did before the pandemic (Rodman et al., 2022), it is likely that they turned to their friends for emotional processing and were more readily inclined to learn ER strategies from their peers rather than from their caregivers during the pandemic.

The current study examined the role of caregiver and youth ER in the link between pandemic-related stress and youth psychopathology symptoms during the pandemic in a prospective design. This study contributes to the existing literature by demonstrating caregiver ER as a potential family factor that can confer risk for youth regulatory processes and psychopathology in the face of stress. However, there are several limitations to consider for the interpretability of the findings. First, we only used self-report measures to assess the use of ER strategies among youth and caregivers, which may be limited in identifying mechanisms underpinning the parallel use of ER strategies between caregivers and youth. Future studies should utilize observational or real-time data sampling methods (e.g., daily diary, ecological momentary assessment) to better capture micro-level, dynamic interpersonal processes, such as co-rumination, or other psychological or cognitive processes that may underlie the link between caregiver and youth rumination and other ER strategies. The reliance on self-report measures also allowed us to assess only one's self-perceived tendency to use specific strategies rather than the actual implementation or effectiveness of these strategies. Incorporating experimental methods can be beneficial in understanding how regulatory processes unfold or how effective the strategies are. Second, the present study focused on stressors specific to the COVID-19 pandemic. Whereas the COVID-19 pandemic shares similarities with other types of stressful events due to its chronicity

https://doi.org/10.1017/S0954579424001081 Published online by Cambridge University Press

and unpredictability, it has presented families with unique challenges (e.g., social distancing, lockdowns) and unprecedented circumstances (e.g., increased amounts of time shared among family members). It is important to replicate the current results in relation to other stressors to generalize the role of caregiver ER in youth ER and psychopathology development. Third, caregiver and youth ER were assessed at a single time point, which limits the inference for causality due to the cross-sectional nature of the assessment. Additionally, our assumption of a unidirectional association, in which caregiver ER shapes youth ER without considering the possibility of reciprocal influence, may oversimply the dynamics between these processes. Exploring longitudinal models or those that account for bidirectionality, such as a cross-lagged panel model (e.g., Van Lissa et al., 2019), could offer greater insights into the roles of caregiver ER strategies in youth regulatory processes. The sensitivity analysis conducted in the current study examined the reverse direction of youth rumination on caregiver rumination, and the reverse models predicting internalizing and externalizing symptoms demonstrated poor model fit, respectively. This may suggest a caregiver-youth directionality in the association with rumination, although further exploration is warranted. Fourth, we used different measures of psychopathology symptoms before (CBCL/YSR; Achenbach et al., 2003; Achenbach, 1991) and after the onset of the pandemic (SDQ; Goodman, 2001). While employing the same measure consistently across all assessments would have been ideal, we recognized the significant distress families were experiencing during the pandemic and opted for the SDQ due to its brevity compared to the CBCL/YSR (113 items vs. 25 items) and its strong correlation with the CBCL/YSR (Goodman & Scott, 1999; Goodman, 2001; Klasen et al., 2000; Van Roy et al., 2008). Fifth, we did not assess demographic characteristics of the caregivers as we aimed to minimize caregivers' assessment burden during the pandemic. However, given that demographic factors are linked with exposure to stressors and psychopathology during the pandemic (e.g., Ben Brik et al., 2022; Cheah et al., 2020), future work should explore the moderating role of geographic location, racial/ethnic background, caregiver marital and employment status, and educational level. Lastly, the current study was not pre-registered. While we have endeavored to maintain transparency and rigor in our analyses, the absence of pre-registration leaves open the possibility of selective reporting or post-hoc hypothesizing. Future studies should consider pre-registering their hypotheses to mitigate this risk.

Caregiver engagement in specific ER strategies following stressful life events may contribute to how adolescents regulate their emotions and, consequently, shape their risk for psychopathology. The current study demonstrated that caregiver rumination was linked to a greater tendency to ruminate among youth during the early stages of the pandemic, which led to increases in internalizing and externalizing symptoms during the pandemic. Caregivers' engagement in rumination, in particular, may be a modifiable process that can be targeted to help youth develop adaptive ER strategies and reduce their risk for psychopathology in the face of stress.

Supplementary material. The supplementary material for this article can be found at https://doi.org/10.1017/S0954579424001081.

Funding statement. This research was funded by the Bezos Family Foundation for the collection of data. This research was also supported by the National Institute of Child Health and Human Development (F32 HD089514 and K99 HD099203 to MLR), the National Institute of Mental Health (R01 MH106482 to KAM and K99 MH126163 to AMR), and the National Science Foundation Graduate Research Fellowship (DGE1745303 to SWK).

Competing interests. None.

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