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Mindfulness Processes that Mitigate COVID-Related Stressors in Caregivers in the United States

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Abstract

Mitigating the effects of COVID-19 on child development involves understanding the impact of the pandemic on caregiver well-being and factors that protect against stress associated with the virus and measures used to reduce disease transmission. Mindfulness has become popularized in the West, with promising evidence that it may reduce caregiver stress. There is limited research examining the specific elements of mindfulness as it relates to caregiving instead of studying mindfulness as a singular construct. We examined whether the number of COVID-related stressors was related to caregivers' stress, and whether this stress was reduced by their reported level of mindfulness. We examined whether four mindfulness processes: self-compassion, nonreactivity, nonjudging, and acting with awareness – buffered the impact of stressors on caregivers' stress one month later in a sample of caregivers in the United States ($N = 330$). When accounting for other mindfulness processes, acting with awareness was the only significant moderator of COVID-related stressors and caregivers' stress one month later. We discuss implications for recommendations to mitigate the effects of COVID-19 on caregivers' stress through reducing stress and thus promoting well-being in caregivers.

Keywords Parents · Caregivers · Stress · Mindfulness · Covid-19 · Well-being

Highlights

- Experiencing more COVID-related stressors is related to higher caregiver-reported stress one month later.
- Higher levels of acting with awareness buffered the association between COVID-related stressors and stress.
- Different mindfulness processes may have differential effects mitigating COVID-related stress in caregivers.

Introduction

As of April 2023, coronavirus (SARS-COV-2, COVID-19, COVID) infected over 45 million persons and resulted in over 1.1 million COVID-related deaths in the United States (US), with estimates continuing to rise. According to the John Hopkins University COVID-19 map, the US represented 4% of the world's total population, yet it accounted for 20% of COVID cases (COVID-19 Map). The impact of the COVID-19 pandemic goes well beyond just those who have been infected by the virus. Specifically, public health measures deployed to reduce disease transmission have led to increases in anxiety, feelings of helplessness, anger, confusion, and symptoms of post-traumatic stress (e.g., Chatterjee et al., 2020; Pakpour & Griffiths 2020). For children and families, a primary concern is the increase in reports of domestic violence (Usher et al., 2020) as well as the mental health of youth and their caregivers living under lockdown conditions with disruptions to their community support (e.g., family, peers, school).

Concerns about a "mental health pandemic" following COVID-19 were raised early by disaster mental health experts (Pfefferbaum & North, 2020). Families may have experienced home isolation and limited care for children,

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job loss, or other COVID-related stressors including illness, parenting, or loss of a loved one. Such experiences can cause stress for both caregivers and children, and caregivers who are under extreme stress may be less able to meet these increased emotional or health needs of their children (Frosch et al., 2019; Masarik & Conger, 2017). Studies have begun to quantify the indirect effects of the pandemic on the mental health of caregivers. A June 2020 national survey of US parents found that 27% of parents with children under 18 years reported declining mental health, coinciding with worsening child behavioral health in 10% of families (Patrick et al., 2020). While studies examining the impact of COVID-19 have focused on identifying those at increased risk for detrimental outcomes, the literature on protective factors for caregiver emotional well-being during the pandemic is understudied but equally important.

Mitigating the effects of COVID-19 on caregiver stress involves understanding the impact of the pandemic on caregiver well-being and factors that protect against stress associated with the virus itself and the measures used to reduce disease transmission. Individual parent factors such as self-regulation, stress and emotion coping have been identified as shaping parenting capacity and in turn, parent well-being and mental health (e.g., Deater-Deckard & Panneton, 2017; Dix, 2000). National organizations, such as the Center for Disease Control and Prevention, offered resource guides for parents and their families outlining coping strategies and how to manage social-emotional health, including recommendations for meditation. The purpose of the current study is to examine the prevalence of COVID-related stressors and behaviors in the US and whether this impacted caregiver stress early in the pandemic. We aimed to examine factors that may alleviate stress amongst caregivers during the pandemic. Specifically, could mindfulness serve as a mitigating factor for alleviating COVID-related stress in caregivers?

Mindfulness, and the practice of mindfulness known as meditation, have become popularized in the West as processes that can reduce stress (Purser, 2019). The body of research dedicated to building empirical evidence for mindfulness-based interventions use a definition of mindfulness popularized in the West by Kabat-Zinn (2003) that refers to present moment awareness that continues to unfold as one continues to purposefully pay attention in a nonjudgmental manner. Between 2012 and 2017, the number of US adults who reported using meditation tripled, with a nine-fold increase for children (Black et al., 2018; Clarke et al., 2018). Scientific evidence across the past few decades suggests moderate effect sizes for mindfulness meditation interventions and programs for improving a variety of medical and mental health conditions (e.g., Goyal et al., 2014). Yet, it is important not to portray mindfulness and meditation as a panacea, especially as these practices are

becoming part of standard recommendations by health care providers (Van Dam et al., 2018). The ambiguity around the definition of mindfulness and limited evidence on the processes by which mindfulness influences caregiver stress renders it difficult to draw conclusions about which specific mindfulness processes are most relevant for caregivers when it comes to reducing stress and promoting well-being.

Research suggests that mindfulness is best conceptualized as a construct comprised of multiple facets, which represent the processes that underlie mindfulness (Baer et al., 2006). However, of the many studies and meta-analyses conducted demonstrating mindfulness as an effective intervention (e.g., Grossman et al., 2004; Zoogman et al., 2015), few have directly examined the specific facets of mindfulness. Across samples of meditators and non-meditators, three specific facets of mindfulness, known as reactivity, nonjudging, and acting with awareness, are negatively associated with poor mental health outcomes and demonstrate better psychometric properties as compared to observing and describing facets of mindfulness (de Bruin et al., 2012; Lilja et al., 2013).Thus, we focus here on the following facets of mindfulness: nonreactivity, nonjudging, and acting with awareness.

Nonreactivity is defined as letting thoughts and emotions come and go without becoming preoccupied with them. Nonjudging refers to approaching experiences without evaluating or qualifying the experience as positive or negative. Lastly, acting with awareness, reflects the capacity to remain in the present moment. Each mindfulness facet is hypothesized to have its own mechanism of action that might lead to reductions in stress and better well-being. For nonreactivity, studies suggest associations between nonreactivity and emotion regulation strategies like acceptance and reappraisal, which allows for engaging in skills like problem-solving (Desrosiers, Vine, Curtiss, & Klemanski, 2014). Interestingly, nonreactivity is also related to the downregulation of emotions, leading to more avoidant coping styles like suppression which may contribute to poorer health outcomes (Iani, Lauriola, Chiesa, & Cafaro, 2019). In terms of nonjudging, studies indicate it may have the strongest association as compared to the remaining mindfulness facets to reductions in rumination and worry (Barcaccia et al., 2019). Studies suggest that acting with awareness may be particularly important for challenges related to impulse control and externalizing behaviors (e.g., Calvete et al., 2017; Fernandez et al., 2010).

Similar, yet distinct from mindfulness, self-compassion is defined by Neff (2009, 2012) as the capacity to relate to oneself in an adaptive manner such as treating oneself with kindness in the face of our own shortcomings or inadequacies. There are aspects of self-compassion that rely on mindfulness skills, such as the ability to hold one's painful thoughts and feelings in balanced awareness rather than

over-identifying with these thoughts and feelings (Neff, 2003). Research has suggested that while self-compassion and mindfulness are related, their associations with mental health and well-being are distinct from one another (Woodruff et al., 2014). And while the literature has supported distinctions between these mindfulness facets, most published studies on mindfulness examine the composite score as a unitary construct (Visted et al., 2015). However, to develop appropriate intervention targets and recommendations that are relevant for different contexts such as caregiving, it is critical to examine how these facets function as distinct processes.

Mindfulness research specific to parenting has increased in the last decade with the rise of "mindful parenting" proposed by Duncan et al. (2009) that refers to the application of mindfulness skills such as paying attention fully or nonjudgmentally accepting self and child within the context of the parent-child relationship. The intervention literature related to mindfulness and parenting to date has primarily relied on findings from intervention in clinical samples and single-case studies examining the impact of mindfulness within the family context (Bogels et al., 2008; Cachia et al., 2016; Dumas, 2005). Results from mindfulness-based parenting interventions provide evidence that improvements in parental mindfulness is related to better positive parenting practices, reduced parent stress, enhanced quality of the parent-child relationship, and better youth outcomes (Bögels et al., 2014; Coatsworth et al., 2010).

Despite promising results of mindfulness-based parenting interventions, limited research has examined which distinct facets of mindfulness are most relevant for buffering the resulting caregiver stress following exposure to stressors. A recent study examined associations between elements of mindfulness, parenting efficacy and stress in both mothers and fathers, suggesting that different aspects of mindfulness may be associated differentially with these aspects of parenting (Burke et al., 2020). While nonjudging of inner experiences was unrelated to parenting efficacy and stress, nonreactivity predicted parenting efficacy over and above acting with awareness whereas acting with awareness was a stronger predictor of lower parenting stress. Results also indicated that parent gender moderated these associations such that nonjudging predicted higher parenting efficacy in fathers only. Research also suggests that higher levels of dispositional mindfulness in parents is associated with reduced parenting stress (Gouveia et al., 2016) perhaps due to increased ability to regulate emotions when interacting with their child (Bögels et al., 2014).

In terms of self-compassion, a recent meta-analysis suggested that parenting interventions that included components that targeted increasing parental self-compassion had a positive impact on parenting stress, depression, anxiety, and mindfulness (Jefferson et al., 2020). This is consistent with evidence that self-compassion is linked to healthy interpersonal functioning, higher levels of optimism and positive affect (Neff & Beretvas, 2013; Yarnell & Neff, 2013). Fewer studies have looked at self-compassion in caregivers specifically. However, findings from these studies suggest that self-compassion likely support parents in managing difficult emotions, particularly those related to parenting, and in reducing parenting stress (Gouveia et al., 2016; Moreira et al., 2015, 2016). Self-compassion is thought to not only reduce the degree to which a parent is self-critical about their own parenting skills, but also how critical they are about their child's behaviors. Taken together, these findings indicate that parents' ability to engage in compassion toward themselves could act as a buffer, reducing overall stress within the family context. However, no studies to date have examined different mindfulness processes together as potential moderators of pandemic related stressors and resulting caregiver stress.

Understanding whether and which specific mindfulness processes may mitigate the impact of COVID-related stressors on caregiver stress is a critical step toward understanding how to support caregivers and provide tools to buffer the potential impact of pandemic-related exposures on caregiver well-being. Moreover, we know little about the degree to which families in the United States are impacted by the current crisis. Therefore, the current study had three primary aims to: 1) document the number of COVID-related stressors and frequency of pandemic-related behaviors in the US; 2) examine whether the number of COVID-related stressors was related to caregiver stress; and 3) test the mindfulness processes as moderators of the association between COVID-related stressors and caregiver stress related to such exposure one month later. We examined whether four specific mindfulness-related processes: non-reactivity, nonjudging, acting with awareness, and self-compassion—buffered the impact of stressors on caregiver stress one month later.

Method

Participants

Participants were US adult caregivers with at least one youth between the ages of 0–18 years living in their household ($N = 330$, $M_{age} = 38.36$ years, $SD_{age} = 7.88$). In relation to the children living in their households, 93.6% of the participants were a parent, and the remaining 6.1% were either a stepparent, both a parent and stepparent, grandparents, both a parent and grandparent, siblings, or legal guardians, and $n = 1$ preferred not to answer. The sample included 67.0% who identified as female and 33.0% identified as male. There were 73.9% married participants,

10.0% cohabitating and not married, 7.6% never married, 8.5% either separated, divorced, or widowed. The racial and ethnic identity of the sample included 76.7% White European American, 7.3% Black or African American, 9.1% Asian or Pacific Islander, 2.1% Hispanic and/or Latinx, 0.6% American Indian or Alaska Native, and, and 4.2% biracial or multi-racial. The highest education level achieved by participants included 10.0% who completed some or all of high school or obtained a GED, 27.9% who completed some college or an associate's degree, 40.0% who completed a bachelor's degree, and 22.1% with an advanced degree (e.g., Master's Degree, Ph.D., M.D.). Total household income in 2019 (prior to taxes) that was reported ranged from <$20,000 (6.3%) to >$150,000 (7.6%), with 43.6% of participants reporting a total income between $50,000-$99,999.

The number of children reported living in the household ranged from 1–6 ($M = 1.76$, $SD = 0.88$). The reported children ($n = 581$) were 50.3% female, 49.2% male, 0.2% non-binary, and $n = 2$ preferred not to answer. Children's age was reported in years, between 0–18 years old ($M_{age} = 8.80$ years, $SD_{age} = 4.92$). The total number of adults living in the household ranged from 1–6 ($M = 2.09$, $SD = 0.61$).

A total of 556 participants completed the pre-screener survey to determine eligibility for the study. Participants were required to answer two attention check questions correctly in the baseline survey and one attention check in the follow-up survey. A total of 19.6% ($n = 109$) participants were not eligible given their responses to pre-screening questions, 0.2% ($n = 1$) failed the attention checks, 1.6% ($n = 9$) completed less than 90% of the survey and were excluded, 3.8% ($n = 21$) qualified for the study but did not complete the baseline survey, and 0.4% ($n = 2$) answered "0" to the number of children they had living in their household and were subsequently excluded. The final sample at baseline and number of participants invited to complete the one-month follow-up survey was 414 caregivers and at one-month follow-up, 80% of the sample was retained ($n = 330$) after data quality checks.

Participants were recruited in May 2020 using Amazon Mechanical Turk (MTurk). MTurk is an online crowdsourcing platform that allows individuals to request the completion of jobs (e.g., completing a questionnaire) for monetary compensation and is widely used by researchers to conduct large-scale studies. When compared to standard online or undergraduate samples, MTurk can produce demographically diverse samples (Buhrmester et al., 2016; Chandler & Shapiro, 2016; Mason & Suri, 2012; Shapiro et al., 2013). Because data quality from MTurk has been called into question, we have taken steps to ensure best practices to reduce biases in this sampling method, specifically when assessing caregivers (Schleider & Weisz,

2015). We used the CloudResearch platform to utilize features that allow for advanced data quality control on MTurk (Rivera et al., 2022). We assessed eligibility for the current study at two levels: (1) meeting requirements using MTurk built-in settings and (2) meeting more detailed requirements assessed using a pre-screener survey. First, participants were asked to participate if they (a) had at least a 95% HIT approval rate (i.e., at least 95% more of their formerly completed tasks were approved for sufficient data quality), (b) completed at least 1,000 HITs, and (c) were responding from an IP address within the US. These first two criteria have been validated as measures of high reputation MTurk workers to ensure high-quality data (Peer et al., 2014). Additionally, MTurk was tested and shown to be a viable tool for conducting longitudinal studies with families in that compared to prior studies using traditional longitudinal methods, the MTurk method was (a) successful in enrolling fathers, (b) comparable in participant attrition and (c) similar in attrition bias, participant race/ethnicity, and enrollment of single parents (Schleider & Weisz, 2015). Participant IDs were also anonymized using CloudResearch to provide additional protection for confidentiality.

Procedure

A university institutional review board approved the procedures and protocol of the present study. Interested participants were asked to complete a 4-item qualifying questionnaire to determine eligibility for the study. Items were adapted from a longitudinal feasibility study on family processes and mental health using MTurk (Schleider & Weisz, 2015), and were as follows: 1) Are you or any of your immediate family members fluent in any languages aside from English? 2) Do you have one or more children (either biological or non-biological) between the ages of 0 and 18? 3) Do you have any siblings (either biological or non-biological) within 4 years of your age? 4) Are you over 18 years of age? Questions 2 and 4 were used to determine participant eligibility while Questions 1 and 3 were filler questions, which were included to reduce the likelihood that participants could guess which items determined eligibility. If participants selected "no" to either Question 2 or 4, the survey ended, and a message displayed informing the participant that they did not qualify for the remainder of the study and thanking them for their participation. They were instructed to enter a unique code known as a dynamic secret code to receive their $0.05 payment.

Participants who qualified to participate in the full survey also received $0.05 with correct entry of the secret dynamic key and were automatically directed to the informed consent message. Participants were informed in this message that by selecting to continue to proceed to the 20–30-min baseline survey, they were consenting to participate in the study

itself. Those who completed at least 90% of the baseline survey and answered attention check questions correctly were compensated $3.00. One month following completion of their baseline survey, these participants were then contacted through CloudResearch notifying them that they were eligible to complete a 10–15-min follow-up survey for $1.65. These rates were comparable the national minimum hourly wage. Participants had up to 7 days to complete the follow-up survey and were sent two reminders to complete the survey during this period. Participants who did not complete the survey within this time frame were considered lost to follow-up.

Measures

Demographic information (e.g., caregiver age, caregiver gender, race/ethnicity, marital status, education level, employment status, total family income, relationship to children, number of adults in the household, number of children in the household and their ages and genders), household chaos, depressive symptoms, and mindfulness measures were collected at baseline. Caregiver mental disorders and medical conditions and child services received were reported at baseline. COVID-19 stressors, caregiver stress, and COVID-related impact behaviors were assessed at one-month follow up.

Mindfulness measures

Self-compassion scale-short form. Participants' ability to be understanding toward oneself during difficult times was assessed using the Self-Compassion Scale—Short Form (Raes et al., 2011) at baseline. Participants answered 12 statements, such as "I try to be understanding and patient towards those aspects of my personality I don't like" or "when I fail at something important to me, I become consumed by feelings of inadequacy," using a 5-point scale (0 = never; 5 = almost always). The six negative subscale items were reverse scored then a total mean score was computed ($\alpha = 0.91$); higher scores reflected more self-compassion.

Five facet mindfulness questionnaire-short form. The tendency to be mindful in daily life was assessed using the Five Facet Mindfulness Questionnaire-Short Form (FFMQ-SF; (FFMQ-SF; Bohlmeijer et al., 2011) at baseline. Of the five facets assessed, the observing and describing subscales of the FFMQ have exhibited weaker psychometric properties in non-meditating or meditation-novice samples (de Bruin et al., 2012; Lilja et al., 2013). Therefore, the remaining three subscales of nonreactivity to inner experience, nonjudging of experience, and acting with awareness were assessed in the current sample. Items were rated on a 5-point scale (1 = never or very rarely true; 5 = very often or always true); a total of 5 items loaded on each subscale, with higher scores reflecting better mindfulness. Items that loaded onto the nonreactivity subscale included statements such as "I watch my feelings without getting carried away by them" and "When I have distressing thoughts or images, I don't let myself be carried away by them". Nonjudging items included statements such as "I tell myself that I shouldn't be feeling the way I'm feeling" and "I make judgments about whether my thoughts are good or bad" (both reverse scored). Acting with awareness items included statements such as "I rush through activities without being really attentive to them" and "I find myself doing things without paying attention (both reverse scored). The internal reliability of the nonreactivity ($\alpha = 0.83$), nonjudging ($\alpha = 0.88$), and acting with awareness ($\alpha = 0.89$) subscales in the present sample were good.

COVID-19 family stress screener

COVID-related stressors. The COVID-19 Family Stress Screener (Huth-Bocks, 2020) was used to assess the number of COVID-related stressors one month after baseline [*highlight added to emphasize and clarify the specific construct assessed by this measure, as it was used to assess two key constructs in this study*]. The number of COVID-related stressors was assessed with six yes/no items that included occurrence of pandemic related events and changes. Participants were asked to indicate whether in the past month, they had experienced the following: unable to get food, groceries or household necessities (such as diapers, wipes, toilet paper); had to work in a high-risk environment as an "essential worker" (e.g., healthcare, grocery store, sanitation, delivery person); had to take care of children, including those who are normally in school; became ill myself with COVID-19; had a family member or friend become ill with COVID-19; and lost a family member or friend to COVID-19. The items were scored as 1 if the participant answered "yes" and 0 if "no" and then summed, higher scores indicated higher number of stressors.

Caregiver stress. The COVID-19 Family Stress Screener (Huth-Bocks, 2020) was used to assess caregiver stress associated with COVID-related stressors one month after baseline. Participants were asked about the extent to which they felt increased stress about 18 items that were potentially stressful pandemic-related events, such as "food running out or being unavailable", "loss of or limited childcare", "access to mental healthcare", "tension or conflict between household members". The item stem read, "In the past month, I have felt increased stress about:" Participants used a 5-point Likert scale (1 = strongly disagree; 5 = strongly agree). Total caregiver stress was calculated as

the average of all 18 items and demonstrated good internal reliability in the current sample ($\alpha = 0.91$). Higher scores indicated greater stress.

The COVID-19 Family Stress Screener (Huth-Bocks, 2020) was developed for use specifically during the pandemic and was recently validated in a national study with a large sample of caregivers (Bates et al., 2021), undergraduate students (Goldey et al., 2022), and adults (Alegría et al., 2022), as well as smaller samples of caregivers (Haskett et al., 2022; Miller et al., 2022) and adults (Tzilos Wernette et al., 2021).

Covariates

Caregiver gender, caregiver age, caregiver race/ethnicity, caregiver education level, total family income, and number of children in the household and children's age were collected at baseline and used as covariates in regression analyses. Caregiver gender was assessed using the following options: female, male, non-binary/third gender, and option to self-describe as well as a prefer not to answer. Race/ethnicity options included: White European American, Black or African American, Hispanic and/or Latinx, American Indian or Alaska Native, Asian or Pacific Islander, and option to specify. Given that the final sample was 76.8% White European American, this covariate was dummy coded in regression analyses as White European American and non-White European American. Children's ages were binned into the number of children in the household that were 0–2 years old, 3–5 years old, 6–12 years old, and 13–18 years old.

Household chaos and caregiver depressive symptoms were also collected at baseline and included as covariates given associations with key study variables. These were included as covariates since they were collected one month prior to the COVID-19 Family Stress Screener. Though there could be bidirectional associations among these variables, given the timing of measurement of these constructs in the current study, household chaos and caregiver depressive symptoms could not logically be modelled as mediators for the relationship between COVID-related stressors and resulting stress. The Confusion, Hubbub, and Order Scale (CHAOS; Matheny et al., 1995) was used to measure the level of disorganization and lack of routine in the family environment since the start of COVID-19 related events and changes. The sum of all 15 items was used as the total score with higher scores indicating higher chaos ($\alpha = 0.87$). Caregivers' symptoms of depression were assessed using the Center for Epidemiologic Studies Depression Scale short form (CES-D; Weissman et al., 1977). Participants ranked the frequency they experienced 4 statements like "I felt lonely" during the last week on a scale from "rarely or none of the time (less than 1 day)" to "most or all of the time (5–7 days)." Total score was calculated by summing the responses ($\alpha = 0.84$).

Data analysis

Bivariate analyses were conducted to assess associations between covariates, COVID-related stressors, mindfulness processes, and caregiver stress (see Table 1). Spearman correlations were used for ordinal variables (caregiver education level and income).

Multiple linear regression models were used to test mindfulness processes taken at baseline as moderators of the association between COVID-related stressors and caregiver stress related to such exposure, both taken one month later. Caregiver stress scores were used as the dependent variable. Follow-up simple slope analyses were conducted to probe any significant interactions from these multiple linear regression models. All analyses were conducted in R Core Team (2022) (Version 4.2.1) running through Rstudio Team (2022) (Version 2022.07.2). Caregiver age, gender, race/ethnicity, education level, income, household chaos, caregiver depressive symptoms, and number of children in the household by age group were included as covariates (reported in the Supplementary Materials). Household chaos and depressive symptoms were included as covariates because of known associations, and they were collected at baseline. Self-compassion, nonreactivity, nonjudging, and acting with awareness were tested as moderators in separate models to disentangle which mindfulness processes were strongest in buffering the association between COVID-related stressors and caregiver stress. In other words, interaction terms were tested separately rather than in a step-wise, hierarchical fashion. Using β as an effect size estimator, the following interpretations were used: less than 0.20 is a weak effect size, between 0.20 and 0.50 as a moderate effect size, and greater than 0.50 as a large effect (Acock, 2014).

In terms of multiple linear regression analyses, Model 1 examined the impact of COVID-related stressors on caregiver stress. Model 2 added the impact of mindfulness processes—self-compassion scale, nonreactivity, nonjudging, and acting with awareness. Models 3–6 added the interaction between COVID-related stressors and each of the four mindfulness processes individually (self-compassion, nonreactivity, nonjudging, and acting with awareness). Model 7 included all interactions between COVID-related stressors and the mindfulness processes in addition to the impact of predictors. Table 2 displays results of the regression analysis.

Results

Main Findings

Descriptive analyses indicated that caregivers experienced an average of 1.37 out of 6 possible COVID-related stressors ($SD = 1.07$; range: 0–6). Caregivers somewhat

Table 1 Bivariate Correlations Between Covariates, COVID-related Stressors, Mindfulness Processes, and Caregiver Stress

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Caregiver Age	--														
2. Caregiver Education	0.19***	--													
3. Family Income	0.16**	0.43***	--												
4. #Children 0–2 years in household	−0.33***	0.07	0.01	--											
5. #Children 3–5 years in household	−0.33***	−0.03	0.02	0.00	--										
6. #Children 6–12 years in household	−0.02	0.00	0.03	−0.23***	−0.14**	--									
7. #Children 13–18 years in household	0.45***	−0.04	0.05	−0.25***	−0.28***	−0.20***	--								
8. Household Chaos	−0.14*	−0.07	−0.02	0.02	0.18***	0.18**	−0.13*	--							
9. CES-D	0.00	−0.07	−0.18**	−0.05	0.03	0.01	0.02	0.39***	--						
10. COVID SE	−0.02	−0.03	−0.02	−0.03	−0.07	0.10†	−0.01	0.13*	0.10†	--					
11. SCS	0.02	0.04	0.09†	−0.01	−0.06	0.01	−0.03	−0.38***	−0.52***	0.00	--				
12. FFMQ NR	0.02	0.03	0.05	0.00	−0.12*	0.03	−0.03	−0.22***	−0.30***	0.08	0.65***	--			
13. FFMQ NJ	0.07	0.07	0.05	−0.01	−0.01	−0.01	0.03	−0.36***	−0.42***	−0.07	0.55***	0.26***	--		
14. FFMQ AA	0.06	0.07	0.11†	0.03	−0.07	0.02	0.04	−0.46***	−0.36***	−0.16**	0.55***	0.29***	0.54***	--	
15. Caregiver Stress	−0.09	−0.09†	−0.22***	−0.07	0.02	0.08	−0.06	0.41***	0.50***	0.39***	−0.38***	−0.19***	−0.37***	−0.39***	--
M	38.36	--	--	0.20	0.34	0.75	0.47	3.64	2.32	1.37	3.20	3.16	3.32	3.68	2.26
SD	7.88	--	--	0.43	0.54	0.81	0.74	3.78	2.64	1.07	0.88	0.79	0.90	0.90	0.87

Pearson correlations were run for variables 1, 4–15. Spearman correlations were run for variables 2-3

CES-D Center for Epidemiologic Studies Depression Scale, COVID SE COVID-related Stressors, SCS Self-Compassion Scale, FFMQ Five Facet Mindfulness Questionnaire, NR Nonreactivity, NJ Nonjudging, AA Acting with Awareness

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

Table 2 Linear Regression Analyses for Predictors of Caregiver Stress

	Model 1 β(SE)	p	Model 2 β(SE)	p	Model 3 β(SE)	p	Model 4 β(SE)	p	Model 5 β(SE)	p	Model 6 β(SE)	p	Model 7 β(SE)	p
Constant	1.81 (0.32)	<0.001	2.61 (0.41)	<0.001	2.32 (0.43)	<0.001	2.58 (0.44)	<0.001	2.44 (0.44)	<0.001	2.01 (0.43)	<0.001	1.87 (0.49)	<0.001
COVID SE	0.27 (0.04)	<0.001	0.27 (0.04)	<0.001	0.54 (0.15)	<0.001	0.29 (0.16)	0.065	0.40 (0.13)	0.003	0.73 (0.13)	<0.001	0.83 (0.23)	<0.001
SCS			-0.09 (0.07)	0.233	-0.02 (0.09)	0.845	-0.09 (0.07)	0.233	-0.09 (0.07)	0.205	-0.07 (0.07)	0.339	-0.13 (0.11)	0.228
FFMQ NR			-0.03 (0.06)	0.675	-0.04 (0.06)	0.558	-0.02 (0.09)	0.854	-0.03 (0.06)	0.612	-0.07 (0.06)	0.274	0.02 (0.10)	862
FFMQ NJ			-0.09 (0.05)	0.115	-0.09 (0.05)	0.095	-0.09 (0.06)	0.115	-0.03 (0.08)	0.730	-0.09 (0.05)	0.089	-0.16 (0.09)	0.077
FFMQ AA			-0.02 (0.06)	0.715	-0.02 (0.06)	0.734	-0.02 (0.06)	0.707	-0.02 (0.06)	0.667	-0.15 (0.07)	0.041	0.23 (0.09)	0.015
COVID SE X SCS					-0.08 (0.04)	0.063							0.06 (0.07)	0.376
COVID SE X FFMQ NR							-0.01 (0.05)	0.882					-0.07 (0.06)	0.244
COVID SE X FFMQ NJ									-0.04 (0.04)	0.307			0.04 (0.05)	0.347
COVID SE X FFMQ AA											-0.13 (0.04)	<0.001	-0.19 (0.06)	0.001
Adj R²	0.393		0.408		0.413		0.406		0.408		0.430		0.429	
AIC	695.77		691.24		689.45		693.22		692.10		679.75		683.15	

Covariates (Caregiver Age, Gender, Race/Ethnicity, Education, Income, Number of Children in the Household by Age Group, Household Chaos, and Depressive symptoms) were included in the models (see Supplementary Materials for full models reporting these covariates)

COVID SE COVID-related Stressors, *SCS* Self-Compassion Scale, *FFMQ* Five Facet Mindfulness Questionnaire, *NR* Nonreactivity, *NJ* Nonjudging, *AA* Acting with Awareness

disagreed with being stressed ($M = 2.26$, $SD = 0.87$) in response to the COVID-related stressors, which suggests that on average, caregivers' stress in response to COVID-related stressors was moderate.

Bivariate analyses indicated that at one-month follow-up, experiencing more COVID-related stressors was related to more caregiver stress and lower levels of acting with awareness. Mindfulness processes were inter-related, with some showing stronger associations in magnitude such as the self-compassion scale and its association with non-reactivity. Mindfulness processes were all negatively associated with stress.

Multiple linear regressions

Model 1 showed that experiencing more COVID-related stressors ($\beta = 0.27$), predicted higher caregiver stress. There was a significant difference in the amount of variance of caregiver stress explained by Model 1 over the base model ($\Delta R^2 = 0.100$, $F(1, 306) = 53.94$, $p < 0.001$). When mindfulness processes were added in Model 2, we found this significantly improved the fit of the model, ($\Delta R^2 = 0.021$, $F(4, 302) = 2.93$, $p = 0.021$).

Model 3 included the number of COVID-related stressors X self-compassion interaction term, which significantly improved the fit of the model ($\Delta R^2 = 0.001$, $F(1, 301) = 3.49$, $p = 0.063$). There was a significant main effect of COVID-related stressors ($\beta = 0.54$) on caregiver stress.

Model 4 included the number of COVID-related stressors X nonreactivity interaction term, which did not significantly improve the fit of the model over Model 2 ($\Delta R^2 = 0.00$, $F(1301) = 0.22$, $p = 0.882$). There were no significant main effects on caregiver stress.

Model 5 included the number of COVID-related stressors X non-judgmental interaction term, which did not significantly improve the fit of the model over Model 2 ($\Delta R^2 = 0.002$, $F(1301) = 1.05$, $p = 0.307$). There was a significant main effect of COVID-related stressors ($\beta = 0.40$) on caregiver stress.

Model 6 included the number of COVID-related stressors X acting with awareness interaction term, which significantly improved the fit of the model over Model 2 ($\Delta R^2 = 0.022$, $F(1, 301) = 12.60$, $p = <0.001$). There was a significant interaction effect between COVID-related stressors X acting with awareness ($\beta = -0.15$), in addition to a main effect of COVID-related stressors ($\beta = 0.73$) on caregiver stress (see Fig. 1). Simple slopes analysis suggested that for caregivers with low levels of acting with awareness, each unit increase in COVID-related stressors resulted in a larger increase in caregiver stress ($b = 0.36$, 95% CI [0.28–0.45]), compared to caregivers with high levels of acting with awareness ($b = 0.13$, 95% CI [0.02–0.24]). The slope of COVID-related stressors on caregiver stress for caregivers with low
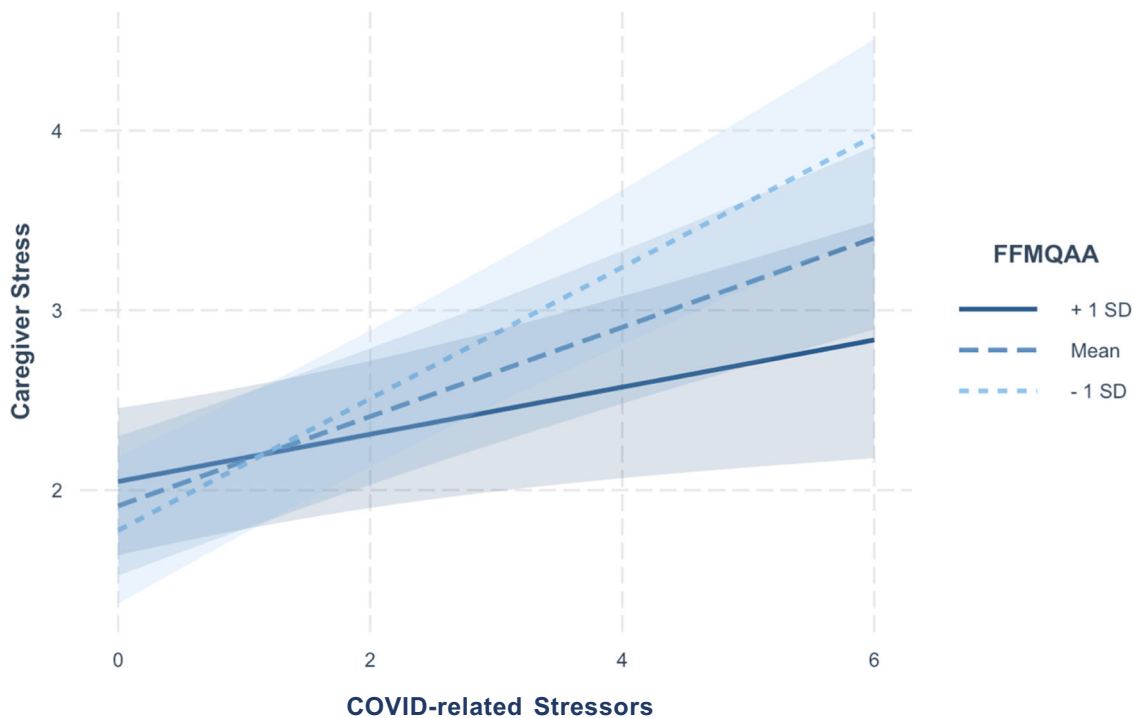
Fig. 1 Acting with Awareness Moderates the Relationship Between Number of COVID-19 Stressors and Caregiver Stress

levels of acting with awareness is significantly larger than for caregivers with high levels of acting with awareness ($\beta = -0.24$, $SE = 0.07$, $t = -3.55$, $p < 0.001$).

Model 7 included all the COVID-related stressors X mindfulness processes interaction terms, which significantly improved the fit of the model over Model 2 ($\Delta R^2 = 0.026$, $F(4, 298) = 3.73$, $p = 0.006$) and over Model 3 ($\Delta R^2 = 0.020$, $F(3, 298) = 3.78$,, $p = 0.011$), but not over Model 6 ($\Delta R^2 = 0.004$, $F(3, 298) = 0.78$, $p = 0.502$). There was a significant interaction effect between COVID-related stressors X acting with awareness ($\beta = -0.19$), in addition to main effects of acting with awareness ($\beta = 0.23$) and COVID-related stressors ($\beta = 0.83$) on caregiver stress. Simple slopes analysis suggested that for caregivers with low levels of acting with awareness, each unit increase in COVID-related stressors resulted in a larger increase in caregiver stress ($b = 0.42$, 95% CI [0.30–0.53]) than for caregivers with high levels of acting with awareness ($b = 0.07$, 95% CI [−0.07–0.21]), which was not significantly related. The slope of COVID-related stressors on caregiver stress for caregivers with low levels of acting with awareness is significantly larger than for caregivers with high levels of acting with awareness ($\beta = -0.35$, $SE = 0.10$, $t = -3.32$, $p = 0.001$).

Comparing models

We compared the eight models using Akaike Information Criterion (AIC). A comparison of model AICs (see Table 2)

revealed Model 6, which included only one interaction term (COVID-related stressors X acting with awareness, $AIC = 679.75$) provided the best fit compared to all other models tested.

Descriptive Statistics

In terms of physical and mental health at baseline, 10.6% of caregivers reported having ever been diagnosed with an anxiety disorder by a healthcare professional, 4.5% with a depressive disorder, 7.3% with a medical condition, and 18.5% with comorbid diagnoses of two of the listed conditions or all three. Caregivers also reported on the types of services if any that their children have received at baseline. A total of 13.6% received educational support, 2.7% received support from social services, 7.3% received mental health services for emotional and/or behavioral challenges, and 7.0% received multiple services.

To address the first aim, we documented COVID-related impact at baseline. Approximately 61.2% were working from home, 5.5% of respondents reported recently lost their job, 6.7% were not currently able to work, 23.0% reported that their job had been downsized or furloughed. For participants with a spouse and/or partner, 17.2% reported that their partner either lost their job or were also furloughed and 39.6% of partners worked from home. In terms of COVID-related behaviors such as purchasing or acquiring goods that would last longer than 2 weeks, participants were asked at

one month follow up to select which of the following six items they had obtained in the last month: personal protective equipment such as gloves or masks, food and/or water, toilet paper, hand sanitizer or cleaning supplies, medication or medical supplies, and firearms. Of the respondents, 41.2% selected 3–6 of these items. A total of 3.3% of the sample had purchased firearms.

In terms of documenting the level of COVID-related stressors, at one-month follow up, 16.9% of respondents reported being unable to obtain food, groceries or household necessities for themselves or their families since the start of COVID-related events and changes. A total of 20.0% reported needing to work in a high-risk environment as an essential worker (e.g., healthcare, grocery store, sanitation, etc.). In terms of contracting the virus themselves, 3.0% reported becoming ill with COVID-19, 15.5% reported having a family member or friend become ill with COVID-19, and 5.2% lost a family member or friend to COVID-19.

Correlations between Covariates, Predictors, and Outcomes

Spearman correlations indicated that higher family income was negatively associated with caregiver stress and symptoms of depression and positively associated with caregiver age and education level. Of the continuous covariates, caregiver symptoms of depression and household chaos assessed at baseline were strongly associated with predictors and outcome of interest. Specifically, more symptoms of depression were associated with lower levels of self-compassion, nonreactivity, nonjudging, and acting with awareness, and positively associated with higher levels of household chaos and higher caregiver stress assessed one month later. The same pattern was observed with higher levels of household chaos, which was also associated with more COVID-related stressors, and higher numbers of children aged 3–5 and 6–12 years in the household and negatively associated with numbers of children aged 13–18 years in the household and caregiver age.

Results from t-tests on covariates coded as binary in regression analyses indicated significant differences in predictor variables. Caregivers who identified as female reported were less likely to have depressive symptoms ($t(244.81) = -2.69$, $p = 0.008$), more COVID-related stressors ($t(156.54) = 2.13$, $p = 0.035$), higher levels of self-compassion ($t(236.75) = 2.40$, $p = 0.017$) and nonreactivity ($t(231.85) = 3.42$, $p < 0.001$) as compared to caregivers who identified as male. Caregivers who identified as White European American also reported lower levels of non-reactivity ($t(120.42) = -2.30$, $p = 0.023$) compared to non-White participants. Given associations and group differences in covariates, these were included in the regression models.

Discussion

The COVID-19 pandemic has presented challenges that families have never encountered before. These stressors have unfolded within a short period of time, with some families experiencing multiple stress events across various domains of life (e.g., work, home, extended family, friends, and children). With mindfulness being commonly recommended for adults, it is critical that these recommendations are not only supported by research (Van Dam et al., 2018), but also tailored for caregivers and the stress they may experience due to the pandemic (Coyne et al., 2020). To our knowledge, the current study is the first to report on specific mindfulness processes that may mitigate the effects of COVID-related stressors on caregiver stress. When examined in separate models, regression analyses suggested that acting with awareness significantly moderated the association between the number of COVID-related stressors and caregiver stress such that the association was weaker in caregivers with higher levels of acting with awareness. When accounting for all four mindfulness processes and interaction effects, only acting with awareness was a significant moderator of the association between COVID-related stressors and caregiver stress. Results are discussed and synthesized below with regards to implications of findings for understanding the impact of the pandemic on caregiver stress and mitigating negative effects on well-being during the pandemic for caregivers and their families.

COVID-related Stressors and Stress in Caregivers

To address the first aim documenting the number of COVID-related stressors and frequency of pandemic-related behaviors in the US, we found COVID-related stressors in the present sample indicated that nearly half of participants needed to take over childcare duties at one-month follow-up, likely increasing the amount of interaction caregivers were having with their children. At one month after baseline, nearly 17% reported inability to obtain food or household necessities for themselves, and 20% reported working in a high-risk environment as an essential worker. Several caregivers reported contracting COVID themselves, nearly 16% reported having a family member or friend become ill with COVID, and 5% reported having lost a family member or friend to COVID. Taken together, these results indicate a range of different stressors related to the pandemic and changes due to following the public health measures implemented to slow the spread of the virus. Additionally, COVID-related behaviors of purchasing additional protective equipment, medical needs, and sanitation goods were typical in this sample, with a percentage of respondents reporting having purchased firearms (6%;

$n = 18$) since the beginning of COVID-related events and changes.

To address the second aim, we found that overall the magnitude of association between COVID-related stressors and resulting stress that caregivers experienced was high, suggesting (as have other studies) that the COVID-19 pandemic was strongly associated with caregiver stress (Brown et al., 2020; Coyne et al., 2020). Although many of the strategies to remediate the stressors associated with COVID-19 (e.g., eviction, food insecurity) should be implemented at a structural level through policy initiatives, particularly in light of racial and ethnic disparities that the current study could not address (Tai et al., 2020), results from the current study suggest that there may be also individual practices that could mitigate or buffer the impact of COVID-19-related stressors on caregiver stress.

Mindfulness Processes Mitigating Stressors

Finally, to address the third aim of testing the mindfulness processes as moderators of the association between COVID-related stressors and caregiver stress related to such exposure one month later, we found different mindfulness processes may have differential effects mitigating COVID-related stress in caregivers. Self-compassion and dispositional mindfulness are components increasingly targeted in parenting prevention and intervention programs given evidence that these mindfulness processes may reduce caregiver stress, and in turn, enhance the parent-child relationship to improve child outcomes. Consistent with previous research, mindfulness processes examined in the current study were moderately or strongly associated with one another (de Bruin et al., 2012; Gouveia et al., 2016). Variations with magnitude of association among these measures indicated that they likely capture distinct aspects of mindfulness, which is often studied as a singular construct. Higher levels of mindfulness across all four processes were related to lower caregiver stress, which is also consistent with research from parenting interventions that included mindfulness as an active component of treatment.

Importantly, analyzing the mindfulness processes together within the same regression model highlighted which distinct facets of mindfulness are most relevant for buffering the resulting caregiver stress following COVID-related stressors. Our data support that acting with awareness individually mitigate the impact of COVID-related stressors on caregiver stress. Relative to the other mindfulness processes, acting with awareness appeared to have the strongest moderating effect on the link between COVID-related stressors and caregiver stress. Of the limited research conducted in this area, evidence suggests that higher acting with awareness is associated with higher parenting efficacy and lower levels of parenting stress (Burke et al., 2020). It's

possible that within the context of a pandemic, when there are high levels of uncertainty and anxiety, remaining present by bringing awareness to the present moment is effective. Indeed, studies in adults with panic symptoms have also reported that acting with awareness is particularly effective for managing negative physical symptoms and panic (Kraemer et al., 2015).

Results also suggested that the level of chaos in the household environment and depressive symptoms are associated with higher caregiver stress. These findings are consistent with existing literature on the impact of family environment on overall functioning and emotional well-being. It's possible there could be bidirectional associations among these constructs. However, given the timing of measurement of these constructs in the current study, household chaos and depressive symptoms could not logically be modeled as mediators for the relationship between COVID-related stressors and associated caregiver stress. Due to the known associations, we considered these variables as confounders that could bias the results unless they were covaried and accounted for in the analyses. Future work could assess household chaos and depression as mediators by timing the measurement of these variables so that they could logically be modeled as mediators. Additionally, future studies may examine whether caregiver stress related to stressors might lead to increases in household chaos and depressive symptoms in a longitudinal analysis. Overall, findings from the current study provided insight into how specific mindfulness processes may contribute uniquely to the association between COVID-related stressors and caregiver stress.

Understanding how different distinct components of mindfulness may buffer the impact of a major social-contextual stressor such as the COVID-19 pandemic on caregiver stress is important not only for developing supports for caregivers who are experiencing such stressors, but also for informing theoretical models that seek to integrate mindful parenting as a construct. For example, consistently measuring these different mindfulness processes in caregiving studies could inform the field regarding how each process relates to caregiver mental health and well-being, and in turn to caregiving capacities. Articulating such associations could yield new information regarding targets for interventions with caregiver-child dyads who are experiencing challenges, as well as targets for prevention in caregivers and perhaps children as well.

Strengths and Limitations

Strengths of the current study include the relatively large sample, use of standard (in the case of the FFMQ) and psychometrically robust measures to assess facets of mindfulness, as well as the use of multiple screening and

attention checks in our MTurk data collection protocol to address data quality concerns. An additional strength was the longitudinal design of the study, allowing us to examine associations of mindfulness processes and COVID-related stress across time. Unlike prior work, we examined different mindfulness processes as moderators of the COVID-related stressor-caregiver stress association. Despite these strengths, the current investigation also had some limitations. While beneficial to access timely data collection with caregivers during COVID-19, data collected online through the MTurk survey platform presents limitations. The sample may not be as generalizable to populations that may not have access to this platform. As a result, the current sample may under-represent populations who are particularly impacted by the COVID-19 pandemic. Although some respondents endorsed being essential workers, for example, the sample was relatively limited in terms of racial and ethnic diversity. Additionally, despite screening and attention checks, the online and remote nature of the data collection limited our ability to ensure participants understood all the questions. New methodologies were necessary to assess novel constructs such as COVID-related stressors and caregiver stress on account of such stressors during the pandemic. The development of the COVID Family Stress Screener (Huth-Bocks, 2020) was grounded in theory, and has been used in other peer-reviewed published studies that indicated good internal reliability (see Alegría et al., 2022; Bates et al., 2021; Bock et al., 2021; DeLuca et al., 2020; Haskett et al., 2022; Miller et al., 2022; Tzilos Wernette et al., 2021). Additionally, given the rapidly changing landscape of the pandemic including new COVID variants and reinstitution of public health measures, future research will need to address other aspects of the pandemic that were not fully captured by the COVID Family Stress Screener. Specifically, the COVID-related stressors were assessed by six yes/no items, which is limited given the breadth of how families have been impacted during this time. It should be noted that though expected given the nature of the individual items, the mean number of COVID-related stressors was relatively low, and there could be a potential floor effect in our sample. Finally, we had a single informant on whether caregiver self-compassion impacts caregiver response style on child behavior rating scales. We were unable to assess child outcomes in the current report, which will be important to examine in future work.

Future Directions

The COVID-19 pandemic has co-occurred alongside national social unrest for racial injustice. These intersecting events have been coined the "twin pandemics" of racism and COVID-19 and are joined by natural disasters linked to ongoing climate change. Work from disaster mental health experts have highlighted the impact of these types of tragedies on emotional and physical health, but there are few times in history where quantifying the effects of cumulative stress events in this manner have occurred. Indeed, research has suggested that the impact of structural and systemic inequities on communities of color such as racism (Bailey et al., 2017), housing challenges (Zimmerman & Anderson, 2019), mass incarceration (Wildeman & Wang, 2017), and police brutality (Edwards et al., 2019) contribute to higher stress and exacerbates existing physical and mental health disparities. Of course, within communities of color and across different identities of marginalized groups, the impact of structural and systemic inequities will vary and therefore differ in terms of its effect on stress. Recent research also highlights intergenerational transmission of chronic stress through physiological markers of early-life stress on infants of color (see Conradt et al., 2020). Given that much of developmental science may shift to conducting research studies using online platforms such as MTurk and CloudResearch during COVID-19, the current investigation may be useful in providing recommendations for the future directions of the field.

The racial and ethnic makeup of the present sample collected from CloudResearch will be important for future investigations to consider. Specifically, online data collection through this platform yielded a 77.3% White European American sample of caregivers, a limitation we discuss above. Moving forward, in line with calls for developmental science to better reflect the changing demographics of the US (Causadias et al., 2018; Coll et al., 1996; Raver & Blair, 2020), future studies may need to oversample for caregivers of the global majority (Black, Indigenous, People of Color) conducted using these platforms. While there may be advanced options to collect a sample that is representative of the US racial demographics, this too is insufficient given problems with the U.S. Census subsuming racial and ethnic categories under "White" (Strmic-Pawl et al., 2018). The result is overrepresentation of White non-Hispanic and non-Latinx participants in the field of developmental psychology as we see today.

Moreover, as reviewed above, higher stress and poorer health outcomes stemming from systemic and structural inequities have contributed to disparities in incidence rates, hospitalizations, and deaths among communities of color (Tai et al., 2020) impact participants in all investigations. Thus, future studies should include measures of racial discrimination, healthcare access and utilization, acculturation, and other social determinants of health. Even if they are not a primary construct of interest, future studies investigating the impact of either of the twin pandemics on well-being should consider including these constructs since they are critical to our understanding of emotional health and functioning. And while identifying risk factors is important,

examining protective factors such as cultural affiliation and connection that contribute to positive outcomes is equally essential to accurately depicting the strength and resilience of communities of color (Wexler et al., 2009). Examining mindfulness processes as protective against caregiver stress in caregivers of the global majority is vital not only because this population is underrepresented in mindfulness research, but also because the types of stressors and caregiver stress experienced on account of the twin pandemics is likely different (Gravlee, 2020). Emerging work on mindfulness-based interventions and their effectiveness for people of color suggests that mindfulness may be effective at reducing stress and increasing well-being (Sun et al., 2022). However, given that the first and only meta-analysis on mindfulness-based interventions among people of color was published in 2022, there is much more work to be done in this area. There remains a dearth of literature looking at specific racial and ethnic identity groups, and therefore it is unknown whether the impact of mindfulness on buffering the effect stressors is the same across different groups.

Conclusion

Our findings provide unique insights into the impact of COVID-19 as it relates to the exposure of stress for US caregivers and their families, associated stress, and subsequent behaviors related to adjusting to the public health measures implemented to slow down spread of the virus. We provide evidence that specific facets of mindfulness, notably acting with awareness, may be useful in mitigating negative effects of the pandemic on caregiver stress. This highlights the importance of examining protective factors, in addition to risk factors, when understanding the impact of crises on family functioning.

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Compliance with Ethical Standards

Conflict of interest The authors declare no competing interests.

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