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COVID-19

The association between COVID-19-related stressors and mental health outcomes for survivors of past interpersonal and non-interpersonal trauma



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ABSTRACT

The mental health difficulties of trauma survivors during the COVID-19 pandemic have been under-reported. This study explored the moderating role of trauma history and trauma type (interpersonal and non-interpersonal) in the association between COVID-19-related stressors and depression, anxiety, and stress. A sample of $n = 321$ participants ages 19 to 71 ($M = 36.63$, $SD = 10.36$) was recruited from across the United States through MTurk. Participants reported the number of COVID-19-related stressors, trauma history and psychological symptoms. Hierarchical multiple regression analyses, controlling for age, race, ethnicity, gender, education, and income levels, were used to determine (a) whether COVID-19-related stressors are associated with adverse mental health outcomes; (b) whether trauma history and (c) trauma type moderated this association. Results revealed significant interactions; for those with a trauma history, exposure to COVID-19-related stressors was associated with higher levels of depression ($\beta = .21$, $p < .05$) and anxiety ($\beta = .19$, $p < .05$). For those with a history of interpersonal trauma specifically, COVID-19-related stressors were associated with depression ($\beta = .16$, $p < .05$) more so than for those without a trauma history. These findings highlight the vulnerability of trauma survivors to the unprecedented COVID-19-related stress.

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The declaration of the Coronavirus-19 (COVID-19) as a pandemic by the World Health Organization (WHO, 2020), prompted the United States government to implement a shelter-in-place mandate (quarantine) which began March 1, 2020 and ended on May 31, 2020 (Moreland et al., 2020). Biological natural disasters (Chan, 2020) like pandemics are traumatic events as they may involve "actual or threatened violent death, serious injury, or accident" the *Diagnostic and Statistical Manual of Mental Disorders* (5th ed.; DSM-5, American Psychological Association, 2013). Prolonged exposure to disaster stressors characteristic of the pandemic, has been associated with a decline in mental health (Brooks et al., 2020). In the current study, we use the term 'stressors' (Christensen et al., 2019) to refer to factors associated with disasters, and which are "external events" that have the potential to "increase demands" on the individual thereby "necessitating adaptation efforts" (Christensen et al., 2019, p. 2).

During the COVID-19 pandemic, related stressors such as uncertainty, the fear of being/getting infected, self-isolation, difficulty taking care of family members, financial problems, crowded living conditions and low supply of prescription medications precipitated

an increase in poorer mental health outcomes (e.g., anxiety, depression, and stress) (Bhattacharjee & Acharya, 2020; Chatterjee et al., 2020; Karatzias et al., 2020; Keller et al., 2022; Kim et al., 2020; Kirzinger et al., 2020; López-Castro et al., 2021; Smith et al., 2020; Taylor et al., 2020). Depression symptoms surged (Ettman et al., 2020) whilst stress and anxiety were the most reported impacts (Ćosić et al., 2020). In light of this, and given that approximately 83% of the United States population has experienced at least one traumatic event (Benjet et al., 2016), a particularly vulnerable group of individuals are trauma survivors for whom the COVID-19 pandemic can be viewed as traumatogenic, or as a new and continuous traumatic stressor (Bridgland et al., 2021; Estes & Thompson, 2020; Hamam et al., 2021). This study therefore, seeks to understand the psychological effects of pandemic-related stressors for those who have previously experienced trauma.

Trauma survivors and psychological outcomes

Following exposure to trauma (e.g., natural disasters), individuals can be over four times as likely to experience extreme stress compared to individuals who have not been exposed. (Lavenda et al., 2017). Furthermore, trauma history is a critical determinant of

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psychological outcomes after natural disasters (Tang et al., 2014). The stress sensitization theory (Gargano et al., 2019; Hammen et al., 2000; Stroud, 2018) posits that previous exposure to traumatic events 'sensitizes' individuals or lowers their tolerance for stress and increases reactivity. In some cases, however, stress reactivity manifests only in the face of severe levels of stress (e.g., numerous stressors) as suggested by the stress amplification theory (Edmond et al., 2014; Rudolph & Flynn, 2007).

Sensitivity to stressors can be explained by neurobiological factors. Prior traumatic experiences recorded in the brain are reactivated during new stressful events or trauma, resulting in cumulative effects on mental health (Bromet et al., 2017; Gargano et al., 2019; Hammen et al., 2000; Rudolph & Flynn, 2007; Stroud, 2018). Consequently, trauma survivors are more liable to experience subjective stress and reactivity after encountering subsequent mild stressors or stressful events later on in life (Betz et al., 2021). For instance, when faced with stressful events, trauma survivors can be more than twice as likely to experience depressive symptoms compared to individuals with no trauma history (Lily et al., 2011). Higher rates of depression and anxiety disorders, and related symptoms, have both been associated with trauma regardless of the age (childhood or adulthood) of exposure (Zlotnick et al., 2008), and have been found to be prevalent in individuals exposed to traumas such as childhood sexual and physical abuse, intimate partner violence, natural disasters, and accidents (Overstreet et al., 2017; Williams et al., 2019).

Disaster literature offers support for both theories of stress reactivity. Studies conducted on natural disasters, such as hurricanes, corroborate the stress amplification theory, suggesting that severity of exposure to disasters placed trauma survivors at greater risk for depression (Bromet et al., 2017; Jacobs & Harville, 2015). Recent studies conducted during the COVID-19 pandemic support the stress sensitization theory. The studies report that when faced with COVID-19 stressors, trauma-exposed individuals experienced a greater number of depression, anxiety and stress-related symptoms compared to individuals without a trauma history (Amram-Vaknin et al., 2021; Janiri et al., 2021; Kim et al., 2020; Lahav, 2020; Maytles et al., 2021; Shrira et al., 2020). Another COVID-19-related study reported that depression and anxiety were more than twice as high in individuals with a history of childhood abuse than those without (Siegel & Lahav, 2021). Yet, there are few studies exploring the mental health outcomes of trauma survivors in the United States during the COVID-19 pandemic.

Trauma type

Trauma type, which is frequently classified in research literature as either interpersonal or non-interpersonal, has also been implicated in the frequency and severity of psychopathology. Interpersonal trauma (IPT) refers to acts directly affecting the well-being of the individual, and involve a victim and perpetrator (Forbes et al., 2014; Lilly et al., 2011; VanBergen et al., 2020). It is usually experienced (e.g., sexual assault, physical attack), but can also be witnessed (e.g., murder, rape) (Haldane & Nickerson, 2016; VanBergen et al., 2020), whilst non-interpersonal trauma (NIPT), which does not involve a perpetrator (Lilly et al., 2011; VanBergen et al., 2020) often refers to acts related to calamities (e.g., illness and natural disasters) (Forbes et al., 2014; Lilly et al., 2011; VanBergen et al., 2020; Yoo et al., 2018).

Research has consistently demonstrated that IPT is more frequently associated with higher levels of psychopathology, such as depression and anxiety or depressive/anxious symptoms, and stress-related disorders, compared to NIPT. (Ford et al., 2006; Fowler et al., 2013; Haldane & Nickerson, 2016; Hetzel-Riggin, & Roby, 2013; Miu et al., 2017). Mechanisms explaining the relationship between trauma and mental health outcomes vary depending on psychopathology. For instance, insecure attachments, specifically avoidant attachment, can strengthen the relationship between IPT and anxiety

(Huang et al., 2017; Wiltgen et al., 2015). IPT is more likely to cause disturbances in world views than NIPT, thus rendering IPT survivors more prone to developing elevated levels of depression and anxiety compared to NIPT survivors. As a direct threat to the individual, IPT creates uncertainty about trusted others, engendering feelings of betrayal, thereby creating uncertainty in the expectations of safety and stability in their environment (Foa et al., 1989; Forbes et al., 2014; Freyd, 1994; Hetzel-Riggin, & Roby, 2013; Lathan et al., 2021; Martin et al., 2013). Following trauma, IPT survivors are also more likely to engage in increased negative cognitions such as self-blame, thoughts about negative self-worth and the threat of harm, compared to NIPT survivors (Jaffe et al., 2019; Lily et al., 2011; Majeed et al., 2021).

Only one study conducted during the COVID-19 pandemic examined the psychological impacts of the COVID-19-related stressors on trauma survivors differentiated by type. However, trauma type was differentiated by duration (acute vs continuous trauma) (Lahav, 2020). Other studies conducted during the COVID-19 pandemic examined one specific trauma, either IPT (e.g., childhood trauma, Siegel & Lahav, 2021) or NIPT (e.g., war, Jeftić, et al., 2021) and its impacts on psychopathology. Thus far, no study has explored the differential impacts for survivors of IPT and NIPT.

Current study

Despite the COVID-19 pandemic being classified as a non-interpersonal trauma, the unique characteristics of the COVID-19 pandemic, such as a prolonged period of quarantine, uncertainty, and disruption of social networks, suggest the potential for deleterious effects far beyond that of other natural disasters. Previous studies have explained how stressors associated with natural disasters adversely impact mental health. Similarly, research has shown that previous trauma can result in current psychological symptoms. Thus, it is expected that the most vulnerable during the COVID-19 pandemic would be individuals who have a trauma history and specifically IPT. The majority of research on the relationship between trauma type and mental health outcomes focus on PTSD symptoms (Fowler et al., 2013), creating a dearth of research exploring other types of psychopathologies. Another critical gap is the dearth of research comparing the experiences of both IPT survivors to NIPT survivors. The current study extends the literature on environmental stressors and mental health outcomes. It aims to explore the association between exposure to COVID-19-related stressors and mental health outcomes, and to understand the differences according to trauma history and trauma type, specifically IPT and NIPT history. The hypotheses of the current study are as follows:

Hypotheses

- (1) Individuals who have been exposed to a greater number of COVID-19-related stressors will endorse higher levels of depression, anxiety, and stress symptoms.
- (2) The association between exposure to COVID-19-related stressors and each psychological outcome (depression, anxiety and stress), will be moderated by trauma history, such that trauma history will strengthen the positive relationship between COVID-19-related stressors and each outcome, above and beyond demographic characteristics.
- (3) The association between exposure to COVID-19-related stressors and psychological symptoms will be moderated by the type of trauma individuals experience. Individuals with IPT history will endorse higher levels of depression, anxiety, and stress in response to COVID-19-related stressors, than individuals with no trauma history or with NIPT history, above and beyond demographic characteristics.

Methods

Design

A cross-sectional study design was used to evaluate self-reported mental health symptoms in relation to trauma history and exposure to COVID-19-related stressors present during the stay-at-home mandate in the United States. Data were collected from April to May, 2020. All procedures were approved by the authors' institution's IRB.

Participants and Procedure

Participants were recruited from the online platform Mechanical Turk (MTurk), which is considered a viable source of reliable data (Thomas & Clifford, 2017). A total of 453 people participated in the survey. Following validity checks, only 321 participants from across the United States were included in the analyses. Participants were asked to complete a survey, which was 1 hour in duration. The survey included questions about demographics; depression, anxiety and stress; trauma history; and exposure to COVID-19-related stressors. All participants were compensated with \$5.

To ensure validity of responses on MTurk, numerous checks were executed. Participants were excluded for each of the validity checks as follows: incompatible responses on three or more of a series of five questions (e.g., How many sibling do you have?) at the beginning of the survey and again at the end; non-response/incorrect answers on at least one of two numerical checks; two or more failures on two verification matrices; two or more nonsensical responses/non-responses on open-ended questions; failure on captchas; responses of "3" or less on a Likert scale ("1" = extremely unlikely and "6" = extremely likely) of intention to respond honestly and take the survey seriously; duplicates in MTurk identification numbers or internet protocol address. Participants who either resided in the United States for less than a year or resided outside of the United States were excluded from the study. Participants' geographic coordinates (longitude and latitude) were used to verify location. Data were collected during the two months of April and May 2020. Participant gender was coded as 1 = female, 0 = male.

The sample consisted of participants with an average age of 36.63 ($SD = 10.36$; range 19–71). Participants identified as female ($n = 123$, 38.3%), Caucasian ($n = 264$, 82.2%), African American/Black ($n = 30$, 9.3%), Asian ($n = 24$, 7.5%), American Indian or Alaskan Native ($n = 8$, 2.5%), Native Hawaiian or Other Pacific Islander ($n = 1$, 0.3%), Other ($n = 3$, 0.9%), Hispanic ($n = 33$, 10.7%). Approximately 11.2% of participants reported their highest level of education as having some high school or completing high school and/or received a GED ($n = 36$), 28.7% completed some college ($n = 92$); 47.7% a bachelor's degree ($n = 153$); and 12.5% a graduate degree ($n = 40$). Participants reported income as follows: \$0 - \$35,000 ($n = 90$, 28%); \$35,001 - \$65,000 ($n = 110$, 34.3%); and over \$65,000 ($n = 121$, 37.7%). Of the total sample, 63.6% of participants reported experiencing trauma ($n = 204$); 24.3% IPT ($n = 78$) and 39.3% NIPT ($n = 126$).

Measures

Exposure to COVID-19-related stressors

The COVID-19 Objective Stress Measure was developed to capture the external stressors related to COVID-19, to which participants were exposed. The study was conducted in the beginning of the pandemic before standardized measures were available and the research team developed their own. Participants were asked to respond "1" (yes) or "0" (no) to whether they had experienced various scenarios during the COVID-19 pandemic stay-at-home period relating to career/job (e.g. job loss); childcare stress (e.g. working and caring for children simultaneously); personal health stress (e.g. experience of COVID-19 symptoms); family health stress (e.g. housemates experience of COVID-19 symptoms); social stress (e.g. ethnic/racial discrimination because of the pandemic); and access to healthcare stress (e.g. reduced access to healthcare). There was a total of twenty-five items.

Exposure to COVID-19-related stressors was calculated as the sum of all experiences endorsed by a participant. Responses for some items (e.g., Is your family income significantly impacted by the outbreak and if so, what percentage did you lose?) included a range of responses (e.g., 1 = 1–5%; 7 = 81–100%; 8 = no impact at all). In these cases, scores were split so that they corresponded to 0, 1 and 2. For other items (e.g., Do you have childcare during the COVID-19 outbreak?), with responses of "yes", "no" or "sometimes", responses were also coded as 0, 1, or 2. Subsequently, all items for which responses were either "no" or "yes", responses were coded as 0 or 2 respectively. The range of exposure to stressors was 0–41. Cronbach's alpha for the COVID-19 Objective Stressors Scale was .94 ($M = 9.46$, $SD = 5.81$).

History of trauma

The PTSD Scale-Self-Report for DSM-5 (PSS-SR5) (Foa et al., 2016) is a self-report questionnaire. The first part of the measure (Trauma Screen) consists of a checklist of 7 items that allows participants to identify which, if any, potentially traumatic events they have previously experienced, and an eighth item ('Other Trauma') to identify unlisted traumatic events. Traumas include life-threatening illness, physical and sexual, military combat, child abuse, accident, natural disaster, or other trauma. Participants were assigned to the 'No trauma' or 'Trauma' group based on their responses to the 8 questions.

Trauma classification

The 7 potentially traumatic events listed in the first part of the PSS-SR5 (Foa et al., 2016) were categorized as either IPT or NIPT, consistent with the descriptions found in previous literature (Forbes et al., 2012; Forbes et al., 2014; VanBergen et al., 2020; Yoo et al., 2018), (see Table 1 for examples). In cases where multiple traumatic events were selected, individuals who endorsed at least one IPT were assigned into the 'Interpersonal Trauma' group ($M = .22$, $SD = .42$) regardless of endorsing additional NIPT. Individuals who reported only NIPT were assigned to the 'Non-interpersonal Trauma' ($M = .41$,

Table 1

A list of interpersonal & non-interpersonal traumas.

Interpersonal trauma
Physical assault (e.g., use of force or violence with/without a weapon against another, robbery, fights)
Sexual assault (e.g., unlawful sexual intercourse/rape, attempted rape, fondling, forcing individual to perform sexual acts.)
Child abuse (e.g., neglect, hitting/beatings, sexual abuse with or without physical contact)
Non-interpersonal trauma
Serious/life threatening illnesses (e.g., cardiac conditions, cancer, infectious disease, HIV/AIDS, chronic illness)
Military combat/lived in a war zone (e.g., Vietnam, Afghanistan, Arabian Peninsula)
Accidents (e.g., serious injury from falls, vehicular accidents, crashes/collisions, drowning, fires, explosions)
Natural disasters (e.g., tornado, hurricane, tsunami, landslides, earthquake, epidemics)

SD = .49). For the participants who endorsed ‘Other’ traumas that were not present on the PSS trauma checklist (e.g., death of a loved one), each in-text response was analyzed and assigned to corresponding groups based on preexisting literature descriptions of IPT and NIPT (Forbes et al., 2012; Forbes et al., 2014; Van Bergen, et al., 2020; Yoo et al., 2018). The remaining participants did not experience any trauma. Another variable, namely, Trauma Tally was created. Trauma Tally (M = .97, SD = 1.03) represents the cumulative number of traumatic events that participants have experienced in the past, and ranged from 0 to 6.

Depression, anxiety, and subjective stress

The Depression Anxiety and Stress Scales (DASS-21) (Lovibond & Lovibond, 1995) is a self-report measure of negative affect. The questionnaire consists of three 7-item self-report scales that measure depression, anxiety and subjective tension/stress on a 4-point Likert scale ranging from 0 “did not apply to me at all” to 3 “applied to me very much or most of the time”. Aggregate scores on each subscale are computed by summing the scores for each item on the subscales and multiplying by a factor 2. Higher scores indicate higher levels of depression, anxiety, and stress. Cronbach’s alpha was 0.97 for the Total Scale; 0.94 for the Depression Scale; 0.92 for the Anxiety Scale and 0.92 for the Stress Scale. Value ranges for each subscale were as follows: 0 to 42 for the Depression Scale (M = 9.36, SD = 11.50); 0 to 34 for the Anxiety Scale (M = 6.06 SD = 9.09); and 0 to 38 for the Stress Scale (M = 10.09, SD = 10.52). Skewness and kurtosis values were as follows: 1.08 and -0.06 respectively, for the Depression Scale; 1.55 and 1.22 respectively, for the Anxiety Scale; and .88 and -0.35 respectively, for the Stress Scale.

Data analysis

Data were analyzed using the IBM SPSS Statistics v. 28. Initial Pearson product-moment correlation analyses were performed to determine bivariate associations between demographic variables, COVID-19-related stressors, trauma history, trauma type, and depression, anxiety, and stress. Next, hierarchical multiple regression analyses were used to test the first hypothesis that COVID-19-related stressors would be associated with each outcome (depression, anxiety, and stress), and the second hypothesis that trauma history moderated this association. Three hierarchical multiple regressions were used, one for each outcome variable of depression, anxiety, and stress. Covariates of gender, age, race, ethnicity, education and

income, mean-centered COVID-19-related stressors, and the moderator (trauma history) were entered in Block 1. Next, the interaction term between the main effect of trauma history and COVID-19-related stressors was entered into Block 2 of the regression model. The interaction term was created by multiplying the centered independent variable (COVID-19-related stressors) by the moderator (trauma history) (Cohen et al., 2003). Data were assessed for multivariate outliers using Mahalanobis Distance Test (Tabachnick & Fidell, 2013).

To test the third hypothesis that trauma type moderated the association between COVID-19-related stressors and mental health outcomes, an additional variable (Trauma Tally), was included in the regressions to control for individuals who had a history of multiple traumas. Three additional hierarchical linear regression analyses were used for each outcome of depression, anxiety, and stress, each controlling for demographic covariates and a history of multiple traumas. Data were assessed for multivariate outliers using Mahalanobis Distance Test (Tabachnick & Fidell, 2013). Covariates, including total trauma, COVID-19-related stressors, and trauma type (IPT and NIPT), were entered in Block 1; and the interaction between COVID-19 related stressors and IPT and COVID-19-related stressors and NIPT in Block 2. Two dummy variables were created to compare three groups, including no trauma history; IPT history as Dummy Code 1 (DC1), and NIPT history as Dummy Code 2 (DC2). The no-trauma group was the control in the dummy codes comparing the role of interpersonal trauma and non-interpersonal trauma exposure. The two dummy variables were multiplied by mean-centered COVID-19-related stressors to create the two interaction terms. In regression analyses, the interaction terms were entered after controls and main effects. Simple slope analysis (the pick-a-point approach) was used to probe all significant interaction effects (Aiken et al., 1991).

Results

Preliminary analysis covariates, COVID-19-related stressors, trauma, and mental health outcomes

Table 2 displays the means, standard deviations, and bivariate correlations of variables of interest in the study. Results indicate that age, ethnicity, education, income, total trauma, trauma history, and IPT were associated with elevated levels of depression, anxiety, and stress. Exposure to COVID-19-related stressors was also significantly

Table 2
Correlations, means and standard deviation of demographic factors, cumulative trauma, COVID-19-related stressors, trauma history, trauma type, depression, anxiety and stress.

	n	M	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1. Gender_f	321	.38	.49	–																
2.Age_1	321	.50	.50	-.18**	–															
3.Age_2	321	.36	.48	.12*	-.76**	–														
4.Race_1	313	.82	.39	.08	-.25**	.13*	–													
5.Race_2	313	.09	.28	-.03	.21**	-.14*	-.65**	–												
6.Ethnicity	319	.11	.32	-.08	.18**	-.11	-.12*	.11	–											
7.Education	321	.60	.49	-.03	.03	.05	-.06	.07	.11	–										
8.Income_1	321	.28	.45	-.08	.08	-.10	-.02	-.01	.09	-.10	–									
9.Income_2	321	.34	.48	.01	.01	-.07	-.06	.09	.06	-.06	-.45**	–								
10.Trauma_t	321	.97	1.03	.11	-.08	-.06	-.06	.09	.06	-.03	.06	-.03	–							
11.COVID	321	9.46	5.81	.11	-.06	.04	-.02	.10	.21**	.09	-.02	-.03	.30**	–						
12.Trauma_h	321	.64	.48	.08	-.06	-.03	-.12*	.09	.15**	.06	-.003	.06	.71**	.31**	–					
13.IPT	321	.22	.42	.15**	-.02	-.02	.01	.11*	.02	-.04	-.003	.07	.53**	.21**	.41**	–				
14.NIPT	321	.41	.49	-.05	-.04	-.02	-.12*	-.007	.13*	.10	-.01	-.003	.24**	.12*	.63**	-.43**	–			
15.Depression	321	9.36	11.50	-.006	.18**	-.12*	-.01	.04	.21**	.17**	.17**	-.04	.14*	.22**	.13*	.13*	.03	–		
16.Anxiety	321	6.06	9.09	.01	.21**	-.12*	-.12*	.14*	.36**	.23**	.13*	.001	.19**	.31**	.25**	.11*	.14*	.77**	–	
17.Stress	321	10.09	10.52	.04	.12*	-.07	-.03	.07	.20**	.16**	.11*	-.01	.25**	.30**	.22**	.16**	.07	.85**	.79**	–

Note: Gender_f = female; Age_1 = young adult; Age_2 = early middle age; Race_1 = Caucasian; Race_2 = African American/Black; Ethnicity = Hispanic; Education = Bachelor’s and above; Income_1 = low; Income_2 = middle; Trauma_t = trauma tally/cumulative trauma; COVID = COVID-19-related stressors; trauma_h = trauma history
*p < .05, **p < .01.

Table 3
The moderating role of trauma history between COVID-19-related stressors and psychological distress (n = 308).

	Depression Symptoms			Anxiety Symptoms			Stress Symptoms		
	β	Part	ΔR^2	β	Part	ΔR^2	β	Part	ΔR^2
Step 1			.14*** ^a			.27*** ^c			.17*** ^e
Gender_female	.03			.04			.04		
Age_young	.22*			.24**			.18*		
Age_early middle	.07			.10			.07		
Race_Caucasian	.08			.01			.07		
Race_African American/Black	.01			.03			.03		
Ethnicity	.12*			.24***			.10		
Education	.16**			.20***			.15**		
Income_low	.19**			.16**			.14*		
Income_middle	.05			.07			.06		
Trauma history	.07	.07		.14*	.13		.12*	.11	
COVID-19-related stressors	.14*	.12		.18**	.16		.24***	.22	
Step2			.01* ^b			.01* ^d			.003 ^f
COVID-19-related stressors X Trauma History	.21*	.11		.19*	.10		.10	.05	

Note: For Depression ^a = ΔR^2 for Step 1, ^b = ΔR^2 for Step 2, For Anxiety ^c = ΔR^2 for Step 1, ^d = ΔR^2 for Step 2, For Stress ^e = ΔR^2 for Step 1, ^f = ΔR^2 for Step 2, * $p < .05$, ** $p < .01$, *** $p < .001$.

and positively associated with all three outcome variables. Race and NIPT were associated with anxiety.

Mental health outcomes when faced with COVID-19-related stressors: the moderating role of trauma history

Table 3 shows the findings of regressions examining the moderating role of trauma history in the association of COVID-19-related stressors with depression, anxiety, stress. Consistent with our second hypothesis, trauma history significantly moderated the relations of COVID-19-related stressors with depression and anxiety with small effects. Probing these interactions revealed that those with a history of trauma fared worse than those without past trauma, which is depicted in Figs. 1 and 2.

The role of trauma type in the association between COVID-19-related stressors and mental health outcomes

To test our third hypothesis, hierarchical linear regression models were used to explore the moderating role of trauma type in the relationship between COVID-19-related stressors and depression, anxiety, and stress (see Table 4). The interaction between COVID-19-related stressors and IPT, was of small but significant effect, and associated with elevated levels of depression. The NIPT interaction was not significant. Graphs of the interaction revealed that those with a history of IPT exhibited a greater number of depression symptoms when faced with COVID-19-related stressors than those without a trauma history see Fig. 3.

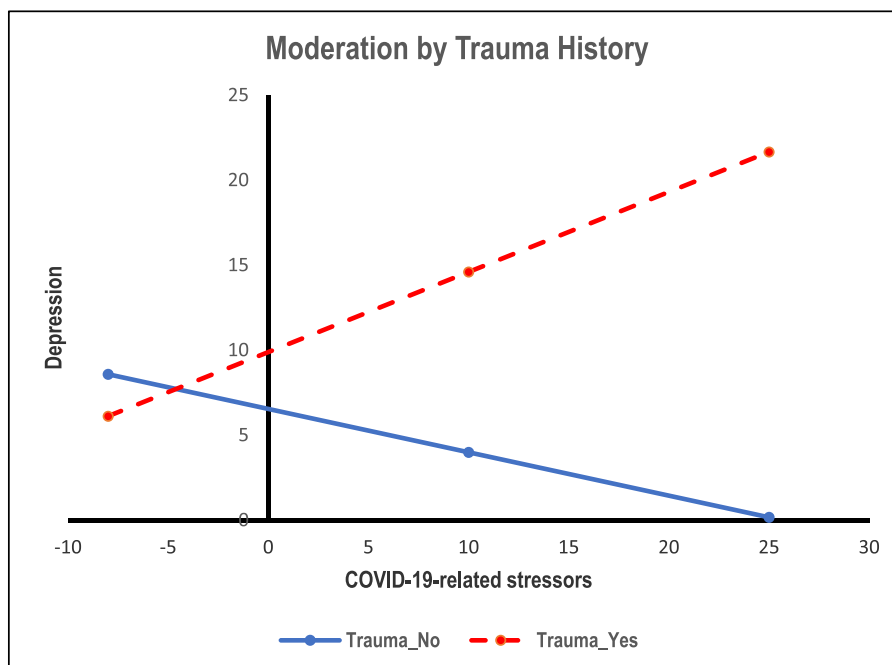


Fig. 1. The moderating role of trauma history in the association between COVID-19-related stressors and depression controlling for demographic characteristics.

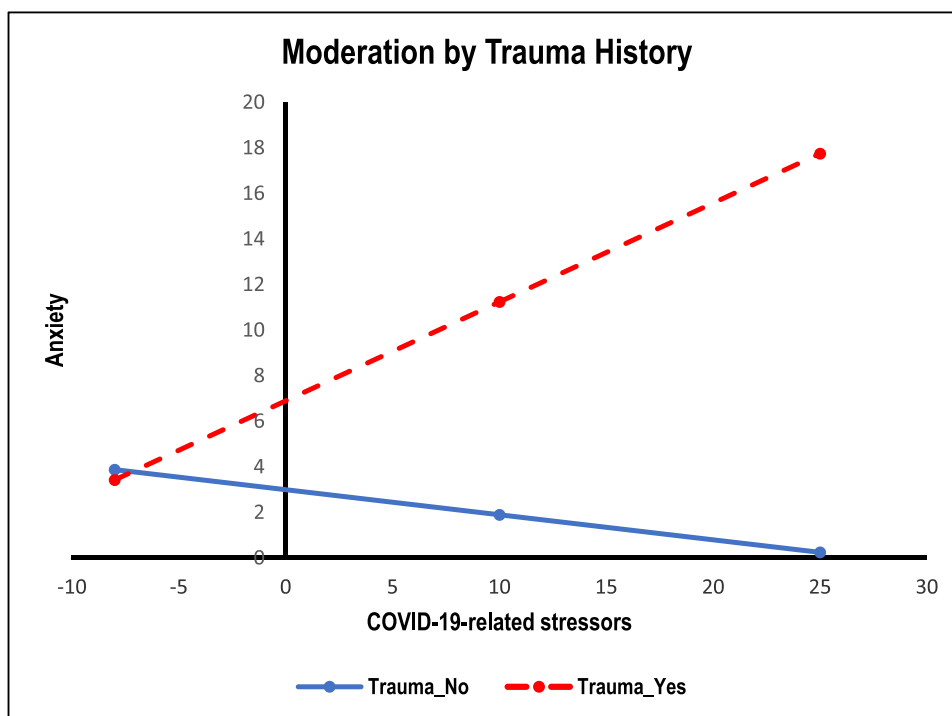


Fig. 2. The moderating role of trauma history in the association between COVID-19-related stressors and anxiety controlling for demographic characteristics.

Table 4
The moderating role of trauma type between COVID-19-related stressors and psychological distress (n = 304).

	Depression Symptoms			Anxiety Symptoms			Stress Symptoms		
	β	Part	ΔR^2	β	Part	ΔR^2	β	Part	ΔR^2
Step 1			.14 ^{***a}			.26 ^{***c}			.18 ^{***e}
Gender_female	.04			.06			.05		
Age_young	.22*			.25**			.20*		
Age_early middle	.07			.09			.08		
Race_Caucasian	.07			.01			.06		
Race_African American/Black	.01			.05			.02		
Ethnicity	.12*			.23***			.10		
Education	.17**			.21***			.17**		
Income_low	.20**			.17**			.15*		
Income_middle	.06			.09			.08		
Trauma Tally	.09			.06			.14		
COVID-19-related stressors	.12	.11		.15**	.14		.22***	.20	
IPT	.03	.02		.05	.03		.02	.01	
NIPT	-.01	-.01		.10	.06		-.001	.00	
Step2			.01 ^b			.008 ^d			.002 ^f
COVID-19-related stressors X IPT	.16*	.11		.10	.07		.04	.03	
COVID-19-related stressors X NIPT	.11	.07		.13	.08		.06	.04	

Note: For Depression ^a = ΔR^2 for Step 1, ^b = ΔR^2 for Step 2, For Anxiety ^c = ΔR^2 for Step 1, ^d = ΔR^2 for Step 2, For Stress ^e = ΔR^2 for Step 1, ^f = ΔR^2 for Step 2, * $p < .05$, ** $p < .01$, *** $p < .001$.

Discussion

The current study sought to explore the relationship between exposure to COVID-19-related stressors and psychological symptoms in a diverse sample of individuals from the United States. Although a few studies have highlighted the devastating impacts of the COVID-19 pandemic on mental health (e.g., Ettman et al., 2020; Karatzias et al., 2020; López-Castro et al., 2021; Taylor et al., 2020), the current study is one of the few to present documented evidence of the association between COVID-19-related stressors and mental health outcomes for trauma survivors, and the first study known to the authors

to do so in a diverse sample from the United States. In particular, stress associated with COVID-19 predicted worse depression and anxiety for individuals with prior history of exposure to traumatic events, even after accounting for demographic factors. These findings replicate prior disaster-related research (Bromet et al., 2017; Kim et al., 2020; Lahav, 2020) and support the stress sensitization (Gargano et al., 2019; Hammen et al., 2000; Stroud, 2018) and amplification (Edmond et al., 2014; Rudolph & Flynn, 2007) theories.

Specifically, consistent with the stress sensitization theory (Gargano et al., 2019; Hammen et al., 2000; Stroud, 2018), the burdens of additional stressors further erode the debilitated coping abilities of

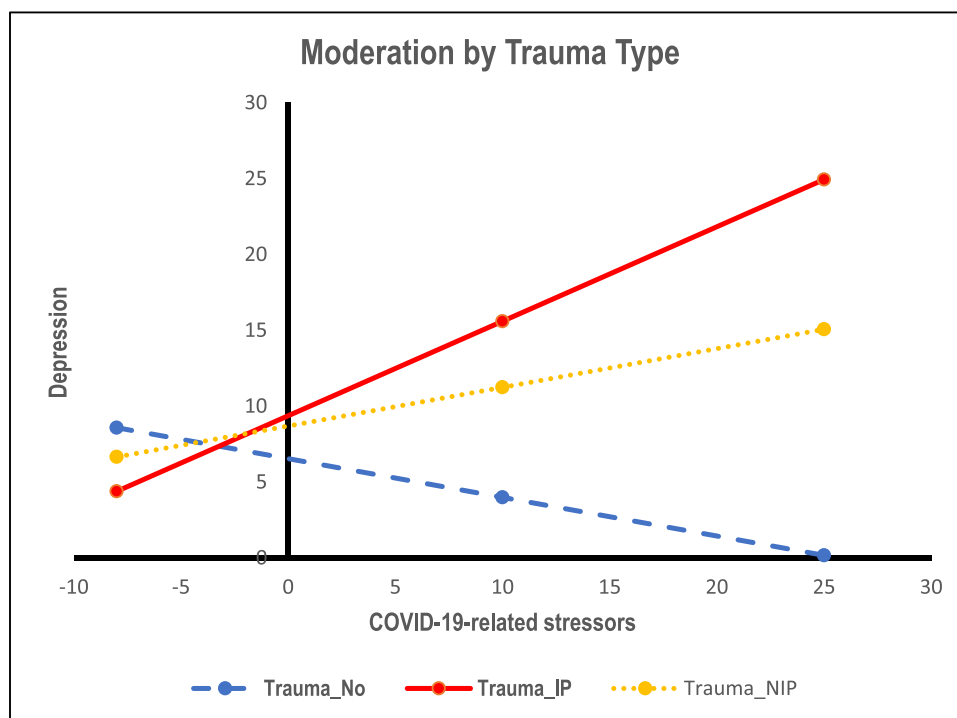


Fig. 3. The moderating role of trauma type in the association between COVID-19-related stressors and depression controlling for demographic characteristics.

trauma survivors. Previous trauma can alter neurobiological stress response mechanisms which are mediated through the hypothalamus-pituitary-adrenal (HPA) axis, and increase cortisol reactivity in the face of subsequent stressors (Gargano et al., 2019; Hammen et al., 2000; Stroud, 2018). The COVID-19 pandemic has had alarming and disastrous effects on individuals, families, societies, and nations due to: 1) the threat to life that has marked COVID-19 as one of the deadliest and most virulent diseases in history (Morens et al., 2020), 2) the austere measures implemented to contain the spread of the virus (Ceylan et al., 2020; Chiesa et al., 2021; Shah et al., 2020), and 3) the high levels of uncertainty that surrounded every aspect of the pandemic (Altig et al., 2020). Consequently, lower thresholds of tolerance to new stressors (e.g., job loss and reduced access to health care) render trauma survivors more vulnerable to psychological distress (e.g., depression and anxiety) compared to individuals without a history of trauma.

Moreover, the findings of the current study are consistent with the stress amplification theory (Edmond et al., 2014; Rudolph & Flynn, 2007) which suggests that trauma survivors tend to experience higher levels of depression in the face of a severe stressful event or multiple stressors. In the current study, trauma history was associated with depression in bivariate analyses, and when faced with the cascade of stressors of COVID-19, trauma survivors were more likely to report a higher number of depressive symptoms. The sensitization and stress amplification theories suggest mechanisms of action that can be tested with future research to uncover underlying pathways that contribute to the vulnerability seen here.

Additionally, research shows that demographic characteristics, such as early adulthood, ethnicity and lower socio-economic standing, are predictors of worse pandemic-related outcomes (Lee et al., 2021; Perry et al., 2021; Placzek & Madoff, 2014; Singu et al., 2020; Vahia et al., 2020). The analyses in the current study controlled for demographics, and the findings highlight that those individuals exposed to trauma in the past, comprise another vulnerable group.

Study results also showed that after taking into consideration history of multiple traumas, it is the individuals who had experienced

an interpersonal trauma (regardless of past NIPT history) who reported a greater number of symptoms of depression when faced with COVID-19-related stressors. Interpersonal trauma is marked by profound violations of trust in others and attachment disturbances (Foa et al., 1989; Forbes et al., 2014; Freyd, 1994; Hetzel-Riggin, & Roby, 2013; Huang et al., 2017; Lathan et al., 2021; Martin et al., 2013; Wiltgen et al., 2015). In the face of unprecedented events, it is possible that these individuals did not feel that they had trusted others in their lives to help navigate the stress, and were more likely to develop the sense of hopelessness and helplessness which marks depression. They may also be lacking social support, in general, and pandemic-related stressors may have exacerbated a sense of loneliness in the face of stress (Benke et al., 2020; Kao et al., 2014). Although an examination of these mechanisms is outside of the scope of this study, the findings suggest that IPT survivors may be particularly vulnerable to depression when faced with COVID-19-related stressors. Further, this interpersonal vulnerability was not associated with higher stress levels and anxiety. Mechanisms associated with a depressed state for those who have been interpersonally violated may be unique and different for other types of mental difficulties. Replication of these results in other studies would be an important step towards strengthening and further understanding their significance.

This study contributes to the existing literature by providing insight into the experiences of individuals who might be vulnerable during disasters, particularly disasters that develop slowly and persist over time. There are public health implications suggesting that screening for prior trauma history may be important when considering the mental health status of those highly impacted by pandemic-related stressors. Findings from this study can guide clinicians and health providers to establish a hierarchy of mental health treatment and services and to develop targeted intervention efforts. Currently, there is a dearth of research examining the experience of trauma survivors during COVID-19 in the United States. Future research should continue to explore the experiences of individuals with IPT history and individuals with NIPT history at varying times throughout the pandemic.

Several limitations of the present study should be noted. First, there was an under representation of females and People of Color in the study, which could result in a lower number of IPT traumas reported, as women are more prone to IPT than men (Haldane & Nickerson, 2016; Lilly & Valdez, 2012). Second, the study used a limited checklist of trauma types, and the checklist did not identify the age of trauma exposure for participants. It is therefore possible that variations in the proximity of trauma exposure to the COVID-19 pandemic could have differential effects on the severity of psychological distress experienced. Third, the cross-sectional design of the study limits the interpretation of the findings, as causal relationships cannot be established and the effects of the pandemic over its entirety cannot be determined. For instance, it cannot be predicted whether psychological symptoms of depression and anxiety will remit after the pandemic is over, or whether preexisting symptoms of depression and anxiety contributed to the observations of this study. A longitudinal design would be better suited to exploring the experiences of individuals with trauma history throughout the duration of the pandemic, as it would more likely capture the variations in restrictions and guidelines related to the pandemic. Lastly, this study relied on self-report measures which may be prone to response biases, and the findings do not generalize to those without internet access or online proficiency.

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Author Contribution

Conceptualization, R.M.; writing—original draft preparation, R. M.; writing—review and editing, R.M., K.T., M.F.O., D.A.C., A.I., R.L. and V.N.; supervision, V.N.; project administration, R.M. All authors have read and agreed to the published version of the manuscript.

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