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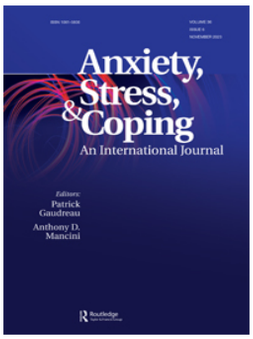

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A stress-is-enhancing mindset is associated with lower traumatic stress symptoms during the COVID-19 pandemic

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ABSTRACT

Background: A stress-is-enhancing mindset is associated with lower perceived stress and better coping. However, work examining the prospective associations of stress mindset on perceived traumatic stress symptoms during a stressful real-world life event is limited. The present prospective study explored whether stress-is-enhancing mindset measured before the onset of the COVID-19 global pandemic was associated with later traumatic stress symptoms in response to the COVID-19 global pandemic.

Methods: University students (N = 179; 68% female; M_{age} = 19.31, SD = 0.79 years) completed the Stress Mindset Measure (SMM) prior to COVID-19 pandemic onset as part of a larger study. The Impact of Event Scale-Revised (IES-R) with respect to the COVID-19 pandemic was completed 1 year into the pandemic.

Results: SMM negatively predicted the IES-R subscales intrusion, avoidance, and hyperarousal such that a more stress-is-enhancing mindset was associated with lower intrusion, avoidance, and hyperarousal following the onset of COVID-19.

Conclusions: Results suggest a more positive stress mindset is associated with fewer traumatic stress symptoms following a traumatic life event. Altering stress mindset may be an avenue for future interventions to cope with stress.

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Introduction

Exposure to stressful events has been associated with negative physical and psychological health outcomes (e.g., Cohen et al., 2007; Epel et al., 2018; McFarlane, 2010; Steptoe & Kivimaki, 2012). University students are consistently exposed to stressors (Beiter et al., 2015; Drake et al., 2016). Entering university is associated with new circumstances regarding living arrangements, relationships, and educational demands which can all contribute to increased stress (Cámara & Calvete, 2012). Students experiencing high levels of repeated stress contributes to and exacerbates poor mental health and well-being. Increased stress in university students has been related to increased mood disorders, posttraumatic stress disorder (PTSD), substance abuse, disordered eating, and even suicidal thoughts (Bewick et al., 2010; Keyes et al., 2012; Kumaraswamy, 2013; Rosiek et al., 2016). Despite the negative

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implications of stressful life events, not every student who experiences stress will have a poor outcome.

One disposition thought to influence how individuals respond to stressful events (and thus the effect the stress has on them) is stress mindset (Huebschmann & Sheets, 2020; Keech et al., 2018). Stress mindset is the extent to which an individual believes stress can have positive benefits or negative benefits on things like performance and productivity, learning and growth, and health and vitality (Crum et al., 2013). Some consider stress mindset to have similarities to challenge and threat appraisals. While challenge and threat appraisals refer to how an individual appraises and copes with a specific stressful scenario (e.g., an individual appraising an exam as a challenge due to perceiving that they have sufficient resources to meet the demands of the situation and appraising a presentation as a threat due to perceiving that they have insufficient resources to meet the demands of the situation), stress mindset refers to the nature of stress more generally in terms of whether or not it has enhancing or debilitating consequences (Crum et al., 2017).

When faced with a stressful situation, those with a more stress-is-enhancing mindset respond more adaptively, perform better, and experience greater positive affect (Casper et al., 2017; Crum et al., 2017). Similarly, a more stress-is-enhancing mindset has also been shown to be associated with lower perceived stress, more proactive behavior, and better general psychological well-being including lower anxiety and depressive symptoms as well as greater resilience, tolerance of uncertainty, energy, and life satisfaction (Crum et al., 2013; Keech et al., 2020; Jiang et al., 2019). For example, in a sample of 218 university students, a more stress-is-enhancing mindset was associated with more proactive coping and less somatic symptoms, which were associated with better physical and psychological well-being and academic performance (Keech et al., 2018). Despite the suggested importance of stress mindset in eliciting more adaptive coping with stress, the majority of the previous research has been limited by primarily focusing on cross-sectional relationships at one time point or by experimentally inducing stress in the lab (e.g., giving a speech; Crum et al., 2017).

The few prospective studies examining stress mindset in the real world have evaluated responses to relatively minor stressors (i.e., general stress in university students). More specifically, Park et al. (2018) found that an increased number of life events across a school year was associated with greater perceived distress in adolescents. However, the association between life events and distress was weaker for those who reported a more stress-is-enhancing mindset suggesting adolescents with a more stress-is-enhancing mindset are less likely to feel as distressed when faced with adverse life events compared with those displaying a stress-is-debilitating mindset. Specific to university students, Huebschmann and Sheets (2020) reported that stress mindset moderated the relationship between perceived stress and anxiety and depressive symptoms one month later. Similar to Park et al. (2018) the association between perceived stress and these negative well-being outcomes was weaker for those who reported a more stress-is-enhancing mindset. Collectively these two studies suggest a more stress-is-enhancing mindset can diminish the negative effects brought on by real world stressful life events. However, there was likely great variation between participants in the specific stressful life events experienced in terms of frequency and severity which is a limitation of these studies.

The COVID-19 pandemic and its impact on society provided a unique and real-world opportunity to examine how stress mindset prospectively relates to reported distress and associated traumatic stress symptoms resulting from the stressful life event. COVID-19 was declared a global pandemic on March 11, 2020 and a US national emergency on March 17, 2020. The COVID-19 pandemic and all its restrictions had a huge impact on the stress society experiences. A meta-analysis on the mental health impacts of the pandemic demonstrated high levels of stress (29.6%) within the general population across many countries (Salari et al., 2020). Students are one population who were particularly affected by the lockdown (Farris et al., 2021; Lechner et al., 2020; Zimmermann et al., 2021).

The worst of the pandemic saw the mass closure of colleges and universities with all classes and university events and other activities either initially postponed or canceled and most students were

required to vacate their accommodation and any interactions with individuals outside of one's household were moved to being online. Lockdown and quarantines prevented students being able to experience university life. It negatively impacted not only academic pursuits, but also important relationships students typically make with peers, colleagues, and academic and other university staff (Lee, 2020; Sahu, 2020). Research in student populations around the world demonstrated that students experienced high levels of stress and worry during the COVID-19 pandemic (Cao et al., 2020; Farris et al., 2021; Lechner et al., 2020; Zimmermann et al., 2021; Chen et al., 2020; Lee, 2020; Sahu, 2020).

To date, only one study has examined the association between stress mindset and coping during the pandemic. In this cross-sectional study of healthcare workers, a more stress-is-enhancing mindset was associated with greater posttraumatic growth from the pandemic (Zhang et al., 2023). The aim of the present study was to prospectively examine whether stress mindset measured before the onset of the COVID-19 pandemic was related to traumatic stress symptoms associated with the COVID-19 global pandemic in university students one year into the pandemic. Based on the stress mindset literature, it was hypothesized that stress mindset would be negatively associated with traumatic stress symptoms experienced one year into the COVID-19 pandemic such that those who displayed a greater stress-is-enhancing mindset would report fewer traumatic stress symptoms as a result of the pandemic.

Methods

Participants and procedures

A priori power analysis was used to determine sample size. Previous stress mindset literature has used different analytical techniques and identified stress mindset effect sizes ranging in size from small and medium to large. Due to these mixed findings and no previous studies examining the associations between stress mindset and traumatic stress symptoms we kept our effect size more conservative and based our calculations on a small to medium effect ($f^2 = .06$). A power set at 0.80 and α at .05 suggested a sample size of 133 participants was needed to detect a small to moderate effect.

Participants in the present study were part of a larger study initially taking place between January 2019 and February 2020 (i.e., before the COVID-19 pandemic in the United States) in which stress mindset was assessed. The larger study took place at a University in the southwestern part of the United States of America was advertised on SONA, the University's online recruitment system and included a single in-person laboratory testing session (for example of full protocol of study see O'Riordan et al., 2023). Exclusion criteria for the larger study included having a history of cardiovascular disease or current illness/infection.

Data collection for the follow-up used in the present manuscript occurred between March 21, 2021, and April 11, 2021, one year into the COVID-19 pandemic. At this point of the pandemic, the COVID-19 vaccination was being rolled out across the United States. The university in which data was being collected was conducting classes in person with a mandatory mask mandate and mandatory weekly testing of all campus members. The 467 participants who took part in the larger study were contacted via email and phone (text message) and invited to take part in the COVID-19 2021 follow-up (i.e., the second part of the present study). The follow-up study was not planned in advance (i.e., during the initial data collection period the follow-up was not part of the study protocols). However, all participants had indicated in their written informed consent of the laboratory study that they were interested in being contacted about future research opportunities.

From those contacted, 179 participants were eligible and opted to provide their data for the follow-up, their demographic information is displayed in Table 1. Chi-square and one-way ANOVAs demonstrated that there were no statistically significant differences in gender, ethnicity,

Table 1. Participant demographics (N = 179).

Variable	Mean (SD)
Age (Mean & SD)	19.31 (0.79)
	n
Gender	
Female	121
Male	58
Race and Ethnicity	
Black Non-Hispanic / Black Hispanic	7 / 2
White Non-Hispanic / White Hispanic	96 / 31
Asian Non-Hispanic / Asian Hispanic	35 / 1
Mixed Non-Hispanic / Mixed Hispanic	5 / 1
Native American Non-Hispanic / Native American Hispanic	1 / 0

race, or stress mindset between those who opted to complete the follow-up and those who did not. There was a statistically significant difference in age between those who completed the follow-up study and those who did not. Those who completed the study were a few months younger (M = 19.32, SD = 0.79 years) than those who did not complete the study (M = 19.61, SD = 1.50 years), $F(1,456) = 6.06$, $p = .014$, $\eta_p^2 = .013$.

The original study and the follow-up study were approved by the last author's University Institutional Review Board (1355632-7 for the first study and 1730132-1 for the follow up) and all participants gave written or typed informed consent for both phases of the research. Participants received course credit for completion of the first part of the study and received a $20 gift card via email for their completion of the second part (the COVID-19 2021 follow-up phase).

Measures

Stress mindset measure

Between January 2019 and February 2020 (i.e., prior to the onset of the COVID-19 pandemic) participants completed the Stress Mindset Measure (SMM; Crum et al., 2013). The SMM assesses the extent to which individuals believe stress has enhancing or debilitating qualities. It consists of 8 items; 4 positively worded (e.g., "The effects of stress are positive and should be utilized") and 4 negatively worded (e.g., "Experiencing stress depletes my health and vitality"). Participants rate the extent to which they agree or disagree with each item on a 5-point scale ranging from 0 (strongly disagree) to 4 (strongly agree). The negatively worded items are reversed scored and the 8 items averaged with a higher score reflecting a more stress-is-enhancing mindset. The SMM is a valid and reliable measure of stress mindset and had good internal reliability in the present study with Cronbach alpha's coefficient being .83.

The impact of event scale-revised

A year into the COVID-19 pandemic the Impact of Event Scale-Revised (IES-R; Weiss & Marmar, 1997) was used to assess subjective stress reactions in response to the COVID-19 pandemic. The IES-R asks participants to read each item and indicate during the past seven days how distressing each item has been for them with respect to "(the event)". For the present study, "the COVID-19 pandemic" was listed instead of the words "the event". The items and instructions were not modified in any other way. The 22-items collectively assess three subscales; intrusion (e.g., "I thought about it when I didn't mean to"), avoidance (e.g., "I stayed away from reminders of it"), and hyperarousal (e.g., "I felt watchful and on guard"). Responses to each item were made on a 5-point scale (0 = not at all, to 4 = extremely) and items were averaged for each subscale so that a higher score reflected a greater stress reaction. When completing the questionnaire participants answered all items based on how they felt over the past seven days with regards to the ongoing COVID-19 pandemic. Because the COVID-19 pandemic was ongoing during the data collection (and therefore not

"post" the traumatic event), and answers rated in the past seven days, the IES-R in the present study should be considered an assessment of traumatic stress symptoms rather than an assessment of Post-Traumatic Stress Disorder (American Psychiatric Association, 2013; Asmundson & Taylor, 2021). The IES-R is a valid and reliable measure and in the present study displayed good internal reliability with Cronbach alpha coefficients of .87 or above for all subscales.

Confounding variables

At follow-up, participants were asked to respond "yes" or "no" to the following questions: "Do you have a history of having mental health disorders (e.g., depression, anxiety)?" and "Have you ever had a test that showed you had COVID-19?"

Data reduction and analysis

Data analyses were completed in SPSS version 29 (IBM Corp, USA). Data were first screened and cleaned for any missing data. There were 199 potential participants, but three individuals were no longer students at the time of the second phase of data collection and a further 17 people were missing multiple questionnaire data points (four missing stress mindset data, seven missing data from all IES subscales, and six missing demographic details being controlled for in the main analysis). Little's MCAR test suggested that data was completely missing at random, $\chi^2(96) = 84.94$, $p = .783$. However, these participants with missing data were all missing multiple data points due to electing to skip certain questions or questionnaires in the questionnaire pack. Consequently, rather than using expectation maximization, these participants were excluded from the analysis leaving a final sample of 179 participants. Data were also examined for outliers (3 standard deviations above or below the mean) which revealed no outliers for stress mindset or avoidance, three outliers for intrusion, and one outlier for hyperarousal. The main analysis was conducted both with and without the outliers which made very little difference to the results. As such reported results include the outliers to maximize statistical power while the reported analysis with the outliers removed is reported in the Supplementary materials.

Means and standard deviations were calculated for the variables of interest before Pearson's product-moment correlations run to examine the associations between them. One-way ANOVAs and correlations examined whether there were any differences in all three IES-R subscales and stress mindset due to whether or not participants had a mental health diagnosis or had tested positive for COVID-19. To test the hypothesis, three separate hierarchical linear regression models were run to examine if stress mindset prior to the COVID-19 pandemic was associated with subsequent traumatic stress symptoms arising from the COVID-19 pandemic in the form of: (1) intrusion; (2) avoidance; and (3) hyperarousal. To adjust for gender, age, ethnicity, SES, history of mental health disorders, and whether or not participants had tested positive for COVID-19, these variables were entered into Step 1 of the regression model. Stress mindset was then entered into Step 2. The critical alpha level was set at .05.

Table 2. Means (SD), ranges, and correlations between stress mindset, and perceived stress, intrusion, avoidance, and hyperarousal as a result of the COVID-19 pandemic.

	Intrusion	Avoidance	Hyperarousal	Stress mindset	Means (SD)	Range
Stress Mindset	−.21***	−.18***	−.26***	–	2.01 (0.64)	0.50–3.63
Intrusion		.87***	.47***	–	0.66 (0.81)	0.00–3.50
Avoidance			.73***	–	0.84 (0.82)	0.00–3.75
Hyperarousal				–	0.60 (0.81)	0.00–4.00
Mental health history	−.28***	−.36***	−.32***	.05	–	–
Tested positive for COVID-19	.11	.08	.14	−.06	–	–

Note. * $p < .05$, ** $p < .01$, *** $p < .001$, for having a mental health history: 1 = yes and 2 = no, for testing positive for COVID-19: 1 = yes and 2 = no.

Results

Descriptive statistics and correlations

Means and standard deviations for stress mindset, IES-intrusion, IES-avoidance, and IES-hyperarousal are displayed in Table 2 along with the correlations between the variables. On average, the IES subscale scores were relatively low, however there were a range of scores present for each subscale (see Table 2). Stress mindset was significantly negatively correlated with all other variables (p's $\leq .016$) such that a more stress-is-enhancing mindset was associated with fewer traumatic stress symptoms in the form of intrusion, avoidance, or hyperarousal. Significant positive correlations were also shown between the IES subscales (p's $< .001$). Scatterplots of the associations between stress mindset and each of the IES subscales are presented in Figure 1.

Sixty-one participants reported having a mental health diagnosis and a series of one-way ANOVAs demonstrated statistically significant differences in all three IES-R subscales due to whether or not participants had a mental health diagnosis (p's $< .001$; participants with a reported mental health condition reported higher IES-R subscales), but there was no difference in stress mindset ($p = .183$). Thirty-seven participants reported having tested positive for COVID-19 and one-way ANOVAs indicated no differences in stress mindset or IES-R subscales due to testing positive. Correlations between mental health diagnosis and testing positive for COVID-19 with IES-R subscales and stress mindset are reported in Table 2.

Regression analyses

All regression standardized and unstandardized beta weightings, standard errors, t values, p values, and 95% confidence intervals are reported in Table 3. The same results with the removal of the outliers for intrusion and hyperarousal are presented in Supplementary Table 1.[1]

Traumatic stress symptoms – intrusion

Step 1 demonstrated a significant overall model, $F(6, 172) = 4.59$, $p < .001$ accounting for 13.8% percentage of the variance. In Step 2, the addition of stress mindset led to a significant change to the overall model, $F(7, 171) = 5.04$, $p < .001$ which accounted for 17.1% of the variance ($R^2\Delta = .033$). Age, mental health history, and stress mindset predicted perceived stress levels such that a more stress-is-enhancing mindset was associated with fewer intrusive thought reactions in response to the COVID-19 pandemic one year following its onset.

Traumatic stress symptoms – avoidance

There was a significant overall model in Step 1, $F(6, 172) = 5.95$, $p < .001$ accounting for 17.2% percentage of the variance. Adding stress mindset in Step 2 led to a significant change to the overall model, $F(7, 171) = 5.79$, $p < .001$ which accounted for 19.2% of the variance ($R^2\Delta = .020$). Mental health history and stress mindset predicted perceived stress levels such that a more stress-is-enhancing mindset was associated with less avoidance behavior in response to the COVID-19 pandemic a year after its onset.

Traumatic stress symptoms – hyperarousal

The model in Step 1 was significant, $F(6, 172) = 5.30$, $p < .001$ accounting for 15.6% percentage of the variance. Step 2 resulted in a significant change to the overall model, $F(7, 171) = 6.43$, $p < .001$ which accounted for 20.8% of the variance ($R^2\Delta = .053$). Mental health history, testing for COVID-19, and stress mindset negatively predicted hyperarousal meaning a more stress-is-enhancing mindset was associated with lower hyperarousal in response to COVID-19 a year into the pandemic.

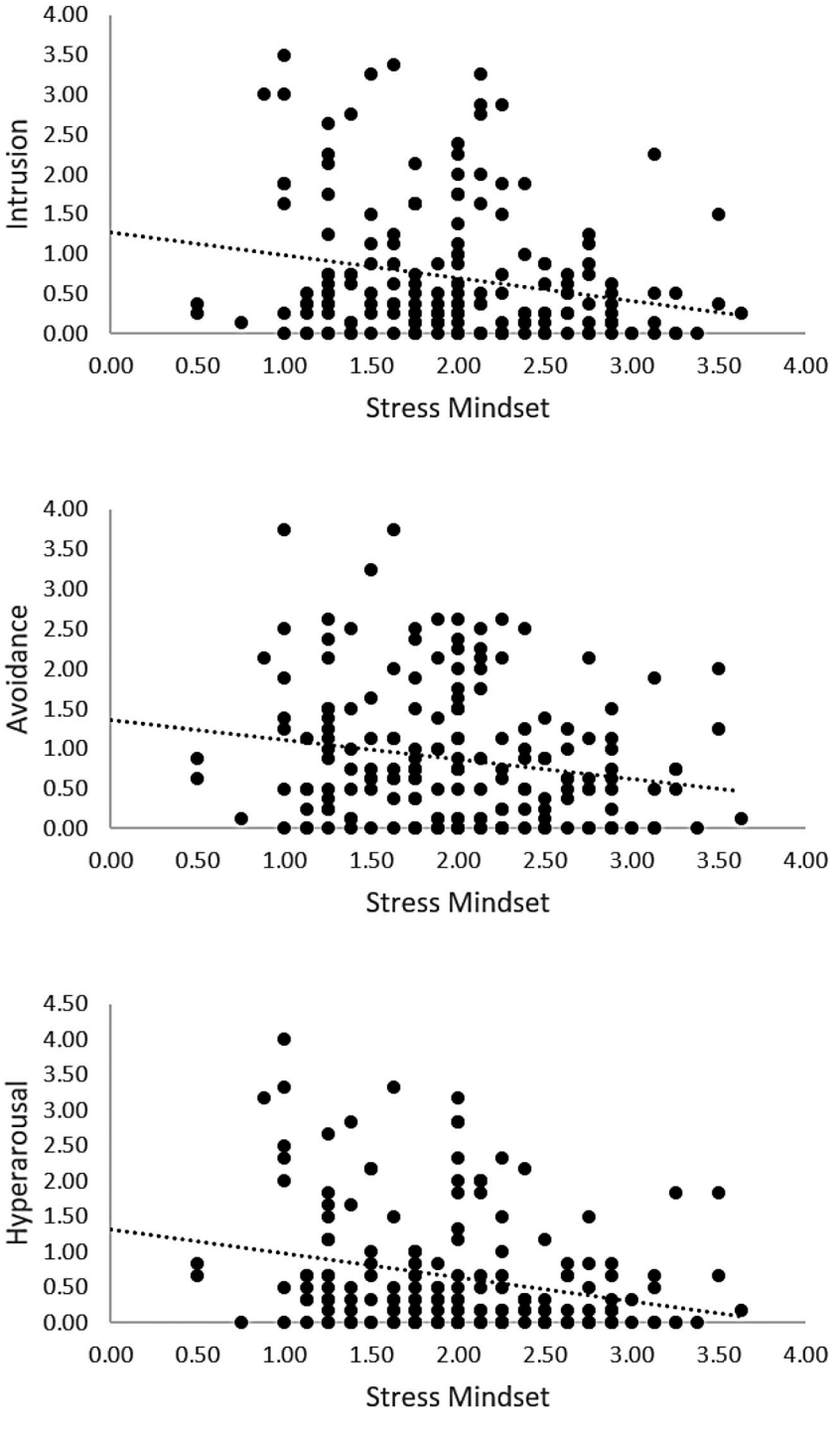

Figure 1. Scatterplots showing the associations between stress mindset and IES subscales.

Due to the number of regressions conducted, the Benjamini- Hochberg (B-H) method was implemented to reduce false discovery rate and prevent the likelihood of a Type I error occurring (Benjamini & Hochberg, 1995). This method conservatively reduces the false discovery rate whilst

Table 3. Standardized and unstandardized beta weightings, standard errors, t values, *p* values, and 95% confidence intervals for stress mindset regressions predicting traumatic stress symptoms intrusion, avoidance, and hyperarousal as a result of the COVID-19 pandemic.

			Intrusion			
Model	*B*	*SE*	*β*	*t*	*p*	95% CI
Step 1						
Gender	0.29	0.13	.17	2.25	.025	0.04, 0.54
Age	0.14	0.08	.13	1.81	.072	−0.01, 0.28
SES	0.07	0.05	.10	1.40	.164	−0.03, 0.16
Mental health history	−0.48	0.13	−.27	−3.76	<.001	−0.73, −0.23
Tested positive for COVID-19	0.25	0.15	.12	1.70	.091	−0.04, 0.54
Ethnicity	−0.07	0.13	−.04	−0.25	.604	−0.33, 0.19
Step 2						
Gender	0.21	0.13	.12	1.63	.105	−0.05, 0.47
Age	0.15	0.07	.15	2.08	.039	0.01, 0.30
SES	0.07	0.05	.12	1.61	.109	−0.02, 0.16
Mental health history	−0.48	0.13	−.27	−3.80	<.001	−0.72, −0.23
Tested positive for COVID-19	0.24	0.14	.12	1.65	.101	−0.05, 0.52
Ethnicity	−0.03	0.13	−.02	−0.24	.813	−0.29, 0.22
Stress mindset	−0.24	0.09	−.19	−2.60	.010	−0.43, −0.06
			Avoidance			
Model	*B*	*SE*	*β*	*t*	*p*	95% CI
Step 1						
Gender	0.23	0.13	.13	1.78	.078	−0.03, 0.47
Age	0.08	0.07	.07	1.02	.309	−0.07, 0.22
SES	0.07	0.05	.11	1.50	.135	0.02, 0.16
Mental health history	−0.64	0.13	−.36	−5.08	<.001	−0.88, −0.39
Tested positive for COVID-19	0.20	0.15	.10	1.35	.177	−0.09, 0.48
Ethnicity	−0.15	0.03	−.08	−1.16	.248	−0.40, 0.11
Step 2						
Gender	0.16	0.13	.09	1.27	.205	−0.09, 0.42
Age	0.09	0.07	.09	1.22	.224	−0.06, 0.24
SES	0.08	0.05	.12	1.66	.098	−0.01, 0.17
Mental health history	−0.63	0.12	−.36	−5.10	<.001	−0.88, −0.39
Tested positive for COVID-19	0.19	0.14	.09	1.30	.194	−0.10, 0.47
Ethnicity	−0.12	0.13	−.07	−0.94	.351	−0.37, 0.13
Stress mindset	−0.19	0.09	−.15	−2.05	.042	−0.37, −0.01
			Hyperarousal			
Model	*B*	*SE*	*β*	*t*	*p*	95% CI
Step 1						
Gender	0.18	0.13	.10	1.39	.165	−0.07, 0.43
Age	0.09	0.07	.09	1.20	.231	−0.06, 0.24
SES	0.06	0.05	.10	1.37	.172	−0.03, 0.15
Mental health history	−0.58	0.13	−.33	−4.57	<.001	−0.82, −0.33
Tested positive for COVID-19	0.32	0.15	.16	2.22	.028	0.04, 0.61
Ethnicity	−0.15	0.13	−.09	−1.17	.243	−0.41, 0.10
Step 2						
Gender	0.08	0.13	.05	0.62	.535	−0.17, 0.33
Age	0.11	0.07	.11	1.55	.123	−0.03, 0.26
SES	0.07	0.05	.12	1.66	.099	−0.01, 0.16
Mental health history	−1.57	0.12	−.33	−4.68	<.001	−0.81, −0.33
Tested positive for COVID-19	0.31	0.14	.15	2.18	.031	0.03, 0.59
Ethnicity	−0.10	0.13	−.06	−0.83	.410	−0.35, 0.15
Stress mindset	−0.31	0.09	−.24	−3.37	<.001	−0.49, −0.13

Note. B = unstandardized, β = standardized. For gender: 1 = males and 2 = females, for ethnicity: 1 = non-white and 2 = white, for having a mental health history: 1 = yes and 2 = no, for testing positive for COVID-19: 1 = yes and 2 = no.

Maintaining power, thus effectively correcting for multiple comparisons (Benjamini & Hochberg, 1995; Thissen et al., 2002). The *p* values from each regression were ranked (k) and compared to computed B-H critical values (calculated based on the number of tests run with a false discovery rate set at 0.05: [k/3]*α; Benjamini & Hochberg, 1995). Findings are significant when regression *p* values are less than B-H critical values. In the present study, stress mindset still statistically significantly

predicted all three IES subscales when applying the B-H method (hyperarousal: $p = .017$; intrusion: $p = .033$; avoidance: $p = .050$).

Discussion

The present study examined whether stress mindset, measured before the onset of the COVID-19 pandemic, was associated with COVID-19 traumatic stress symptoms. This is the first study, to our knowledge, to examine the prospective relationship between stress mindset and traumatic stress symptoms in a group of individuals all exposed to the same stressful life event. A more stress-is-enhancing mindset was associated with fewer traumatic stress symptoms one year following the onset of the COVID-19 pandemic. This applied to all IES subscales meaning individuals with a more positive stress mindset typically weren't affected as much with intrusive thoughts or worries about COVID-19, nor were they trying to avoid reminders or discussions about it. They were also less agitated and on guard about it.

Previous prospective work demonstrates that stress mindset can reduce the associations between stress and negative outcomes such as distress, anxiety, and depressive symptoms (Huebschmann & Sheets, 2020; Park et al., 2018). Huebschmann and Sheets (2020) found higher levels of perceived stress were associated with greater mental health concerns and that this relationship was exasperated in individuals with a stress-is-debilitating mindset. However, the study only included measures of perceived stress and did not consider actual life events. In a sample of over 1,000 adolescents Park et al. (2018) demonstrated that a more stress-is-enhancing mindset attenuated the association between life adverse life events and distress. Additionally, stress mindset was directly associated with perceived stress, but not associated with life events. Life events were measured using a checklist where participants selected if an event occurred or not. More severe life events received the same weight as less severe life events, which may possibly explain the lack of relationship between stress mindset and life events. The present study addressed limitations of previous prospective work by measuring traumatic stress symptoms in response to a single traumatic life event experienced by all participants.

The present study also adds to the cross-sectional work conducted on stress mindset and COVID-19. Zhang et al. (2023) demonstrated that during the earlier stages of the onset pandemic (July 2020), health care professionals in China reporting a more stress-is-enhancing mindset also reported more proactive coping which in turn was associated with greater posttraumatic growth approximately 3 months after lifting the Wuhan lockdown. The present study demonstrated stress mindset's relationship with less traumatic stress symptoms in American College students approximately one year following the declaration of the pandemic. The timing of the present study coincided with the role out of vaccinations. However, students were still impacted by the COVID-19 pandemic through social distancing in classrooms, mask mandates, weekly COVID-19 testing mandates, etc. Therefore, the outcome measure in this study should not be considered post-traumatic given the fact that the COVID-19 pandemic was still ongoing during the time of the data collection. Numerous other COVID-19 studies have referred to COVID-19 inducing traumatic stress symptoms as posttraumatic stress disorder (PTSD) symptoms – something that has received criticism in the literature (Asmundson & Taylor, 2021). For example, an epidemiological study stated that 17% of the general population of Ireland experienced PTSD symptoms during the early stage of the COVID-19 pandemic (Karatzias et al., 2020). Additionally, Zhang et al. (2023) refer to post-traumatic growth in their study despite data being collected only 7 months after the virus was first identified and while the pandemic was still ongoing. Similar to other research using the IES-R during the COVID-19 pandemic, we refer to the IES-R subscales as measuring traumatic symptoms (e.g., Asmundson & Taylor, 2021; Tyra et al., 2021). Future work should examine if stress mindset relates to PTSD symptoms following a traumatic life event which had a clearer endpoint.

Limitations and future research directions

The present study is not without limitations. First, the prospective design consists of only one wave and the analysis is still correlational meaning causation cannot be inferred. The results may have been influenced by other unmeasured outcomes that were not adjusted for in the models or by an unintended general response bias (Christenfeld et al., 2004). Only 43% of the sample from the original study took part. The original study was designed to be a one-visit laboratory study; we never anticipated contacting participants for a follow-up study. Therefore, a large portion of the sample was lost to follow-up. It is possible that some of the sample may have been lost due to experiencing a disproportionate amount of hardship during COVID-19. Similarly, while the participants in the present study were all exposed to the COVID-19 pandemic which standardizes the life event, the participants are not likely to have had a consistent level of exposure to the various distressing aspects of the COVID-19 pandemic (e.g., loss of jobs, loved ones becoming ill from COVID-19, state/city wide regulations). However, the study design does not allow us to assess what specific hardships participants faced during the pandemic. Some exposures may not have met the DSM-5 definition of Criterion A regarding the experiencing, witnessing, or learning of the traumatic experience (American Psychiatric Association, 2013; Asmundson & Taylor, 2021). Indeed, the mean scores were relatively low in the sample. However, there was a range of scores with some participants reporting relatively high scores. Nevertheless, most of the scores are in the sub-clinical range suggesting the sample had mild to moderate stress reactions to the pandemic. Therefore, the results of this study should be interpreted as applicable to such ranges and not necessarily applicable to clinical populations. Some may argue that the applicability of a stress-is-enhancing attitude to populations beyond university students is questionable. Future research should aim to examine the benefits of a stress-is-enhancing mindset in more diverse populations that may have faced higher levels of stress during the pandemic (e.g., marginalized communities). Lastly, the effect size was relatively small, but remained statistically significant when adjusting for multiple confounding variables and adjusting for false discovery rate. Despite limitations of the present study, the results suggest the importance of stress mindset in being associated with lower traumatic stressful life events. Future research should examine whether effective interventions at eliciting a greater stress-is-enhancing mindset (e.g., Keech et al., 2021; Crum et al., 2023) can reduce the traumatic stress symptoms experienced when someone is exposed to an adverse life event.

Conclusion

In conclusion, the present study aimed to prospectively examine whether university students' stress mindset was associated with their traumatic stress symptoms caused by COVID-19 one year into the global pandemic. Stress mindset, measured before the onset of the COVID-19 pandemic, was negatively associated with traumatic stress symptoms such that those who displayed a greater stress-is-enhancing mindset reported fewer traumatic stress symptoms in the form of intrusion, avoidance, and hyperarousal one year into the COVID-19 pandemic. Findings add to the growing body of literature highlighting the importance of stress mindset being associated with less negative consequences of stress in response to adverse life events.

Note

1. Stress mindset remained a significant predictor but the stress mindset beta weights become slightly smaller.

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