ORIGINAL ARTICLE

Recalling Self-efficacious Memories Reduces COVID-19-Related Fear

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Abstract

Purpose Manipulating perceived self-efficacy can mitigate the negative impact of trauma and increase ability to adapt to stress. It is possible that a similar domain-based manipulation aimed at anxiety around the pandemic might mitigate the negative mental health impact of COVID-19. The current experimental study assessed whether a self-efficacy induction would be effective in reducing COVID-19 distress.

Methods Participants were randomized to a self-efficacy autobiographical memory induction or control condition. We hypothesized that individuals in the self-efficacy group would exhibit lower levels of fear on an implicit measure of emotional states following exposure to COVID-19-related stimuli.

Results A significant increase in general self-efficacy and self-confidence was found in the self-efficacy group from pre- to post-induction. Individuals in the self-efficacy group had significantly lower levels of fear counts on the implicit measure of emotional states than the control group following exposure to COVID-19-related stimuli.

Conclusions Results suggest that (1) self-efficacy can be increased among individuals with high levels of COVID-19-related distress using an autobiographical memory induction and (2) doing so reduces fear processing among these individuals when exposed to COVID-19 stimuli. This is relevant for future intervention as it reveals a possible mechanism for reducing and recovering from COVID-19-related distress.

Keywords COVID-19 · Self-efficacy · Distress · Autobiographical memory · Fear

Introduction

Infectious disease epidemics have led to an increase in prevalence of post-traumatic stress disorder (PTSD) in the past (Mak et al., 2010), and several studies suggest that PTSD and other mental health symptoms have increased due to the ongoing coronavirus pandemic (Liu et al., 2020). As such, there is an urgent need to identify brief psychological interventions that can aid in the mitigations and recovery from COVID-19-related stress. Drawing on known contributors to trauma adaptation and perceived self-efficacy may be a fruitful way to shape interventions.

Perceptions of oneself can be altered in the aftermath of a traumatic incident (Benight & Bandura, 2004). Research has revealed that harmful changes in self-identity are closely connected with the etiology of PTSD (Bryant & Guthrie,

2007) and severity of PTSD symptoms (Berntsen & Rubin, 2007). This may be due in part to the relationship between negative alterations in self-perceptions and decreased ability to engage in self-regulatory mechanisms that aid adaptation to stress and trauma (Titcombe-Parekh et al., 2018). Indeed, the ability to adopt tactics that enhance goal accomplishment and a sense of agency has been proposed as a crucial factor in trauma and stress adaptation (Luszczynska & Schwarzer, 2015).

Self-efficacy, or individuals' beliefs in their capability to influence their own lives and achieve desired outcomes, is one aspect of self-identity that may be affected following a traumatic event (Bandura, 1994). Self-efficacy beliefs are predictive of a wide array of mental health outcomes (e.g., Ritchie et al., 2021) and have been found to be a key factor underlying individuals' response to traumatic events (Benight & Bandura, 2004). For example, low levels of self-efficacy have been associated with the onset and progression of PTSD among a variety of trauma-exposed populations (Benight & Bandura, 2004) and have also been associated with greater risk of poor treatment prognosis (Ehlers &

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Clark, 2000). Conversely, high levels of self-efficacy have been linked with positive health behaviors and a reduction in maladaptive coping mechanisms (Schnurr et al., 2007; Scott & Cervone, 2016).

Perceptions of self-efficacy can be experimentally manipulated, resulting in reduced PTSD symptoms. One method that has been used to increase perceptions of self-efficacy is through autobiographical memory inductions in which individuals are asked to recall memories of overcoming challenges (Brown et al., 2016; Morina et al., 2018). It is anticipated that by recalling these experiences of accomplishment, participants will be reminded of their prior success at completing tasks and achieving goals, and therefore feel more confident in their abilities to do so in the future. Indeed, Brown et al. (2016) found that following the recall of self-efficacy memories, combat veterans with PTSD exhibited higher ratings of self-efficacy and performed better on tasks reflecting adaptive coping. Morina et al. (2018) used a similar strategy for increasing self-efficacy to demonstrate that torture survivors who were instructed to recollect experiences of self-efficacy showed higher distress tolerance.

Further support for this notion has been shown by looking at changes in neural processing in individuals with PTSD following self-efficacy induction. Participants who received self-efficacy memory inductions showed greater right-lateralized path length and decreased right-lateralized connectivity in the emotional regulation and executive function circuit (Titcombe-Parekh et al., 2018). These findings indicate that improving self-efficacy may aid in the activation of cognitive processes that are beneficial to rehabilitation following traumatic or stressful situations. Recent work has also shown that increasing perceived self-efficacy through verbal persuasion can significantly reduce fear processing, regardless of overall emotional reactivity to fear-inducing stimuli (Zlomuzica et al., 2015). The current study thus examined whether inducing self-efficacy is effective in reducing COVID-19 distress.

We hypothesize that those participants who receive the autobiographical memory self-efficacy induction will (1) subsequently report higher levels of self-efficacy and (2) display reduced fear processing when exposed to COVID-19-related stimuli compared to those participants who did not receive the induction. If supported, these will be the first data demonstrating that inducing self-efficacy memories may be an effective strategy for targeting COVID-19 distress. Given the need for brief and scalable interventions in relation to COVID-19, the use of self-efficacy memories may offer a targeted strategy for helping individuals who are suffering from high levels of fear.

Method

Participants

Individuals were screened using the Coronavirus Anxiety Scale (Lee, 2020). Those who received a score of 9 or above were considered to have "dysfunctional anxiety associated with the COVID-19 crisis" (Lee, 2020) and thus qualified to complete the study.

We gathered 115 responses from Amazon Mechanical Turk in the summer of 2021 during the rise of the COVID-19 Delta variant. 36 responses were discarded after data quality was evaluated. Participants were excluded if they offered one-word memory recollections, if the memories from the control group had terms with a strong emotional valence (e.g., happy, nice, or memorable), or if their qualitative responses were nonsensical in relation to the instructions.

Participants ($N = 79$) aged 18 and older ($M = 33.8$, $SD = 11.0$) were retained for analysis. Individuals received USD \$7 in compensation upon completion of the study. Inclusion criteria required participants to be located in the United States, comfortable reading and writing in English, and to have access to a desktop or laptop computer with a strong Wi-Fi connection. The sample consisted of about equal numbers of males (51.9%) and females (48.1%). The majority of participants were Caucasian (57.0%), with 25.3% reporting Asian ethnicity, and small portions reporting Hispanic or Latino (6.3%), Black or African American (6.3%), and American Indian or Alaska Native (1.3%).

Measures

Coronavirus Anxiety Scale (CAS)

Individuals were screened using the Coronavirus Anxiety Scale (Lee, 2020).This five-item measure asks participants to rate how frequently they experience each anxiety symptom (e.g., "I felt dizzy, lightheaded, or faint, when I read or listened to news about the coronavirus") on a scale from $0 = not\ at\ all$ to $4 = nearly\ every\ day\ over\ the\ last\ 2\ weeks$, yielding a total score between 0 and 20. Each item captures a distinct symptom of this type of anxiety, encompassing cognitive, behavioral, emotional, and psychological manifestations. Those participants who received a score of 9 or above were considered to have "dysfunctional anxiety associated with the COVID-19 crisis" (Lee, 2020) and qualified to complete the study. This CAS cut-off score optimally classifies people with and without related to the coronavirus (90% sensitivity and 85% specificity).

This criterion of symptom severity is congruent with the American Psychiatric Association's system of measuring psychiatric symptoms. The authors also found strong correlations between CAS scores and relevant measures of functional impairment, distress, and coping, supporting the measures construct validity (Lee, 2020).

Demographic Questionnaire

Participants provided self-report information on their age, gender, and ethnicity.

General Self-efficacy Scale (GSES)

All participants completed the GSES (Schwarzer & Jerusalem, 1995) before and after the experimental induction. This ten-item scale measures the belief in one's ability to cope with a wide range of stressful demands. Participants were asked to rate the accuracy of each statement (e.g., "I can always manage to solve difficult problems if I try hard enough") on a scale from 1 = *not at all true* to 4 = *exactly true*, yielding a total score between 10 and 40. The GSES has yielded internal consistencies between $\alpha = 0.75$ and 0.91 (Scholz et al., 2002).

Visual Analogue Scales (VAS)

Visual analogue scales were used to measure mood (happy, afraid, angry, sad) and perceived self-efficacy (self-confident) before and after the experimental induction. Each VAS had anchors ranging from 1 to 10 (e.g., 1 = *not at all self-confident*, 10 = *extremely self-confident*).

Stimuli Images

Stimuli images were selected based on a brief MTurk survey conducted prior to the study. Individuals ($N = 60$) completed the Coronavirus Anxiety Scale (Lee, 2020). They were then instructed to examine the images in the following screen and rate their emotional reaction from 0 = *not at all* to 10 = *extremely* on four scales: angry, afraid, sad, and happy. Participants were shown 64 neutral and COVID-19-related images. 20 COVID-19-related images which resulted in the highest average "afraid" scores among those participants who met the cut-off on the CAS were selected for use for the current study. 20 neutral images which resulted in the least emotional valence across all participants were selected for the current study.

Implicit Measure of Distinct Emotional States (IMDES)

The Implicit Measure of Distinct Emotional States (Bartoszek & Cervone, 2017) indirectly measures emotional states by asking participants to rate emotions (anger, fear, sadness, and happiness) expressed in a series of 20 abstract images. The implicit emotion scores are computed by summing the number of pictures rated to display a particular emotion. The measure was administered immediately after the stimuli images, which attempt to elicit an emotional response. This measure has been shown to be effective at capturing distinct emotional states in response to stimuli. This method of measuring emotional states is employed to overcome the limitations of explicit self-reports (i.e., the inability to report accurately and honestly), which have been found to be ineffective at distinguishing distinct emotional states (Bartoszek & Cervone, 2017).

Procedures

All measures were completed online anonymously. After providing informed consent, respondents completed the CAS to determine eligibility for participation in the remainder of the survey. Those who were deemed eligible were asked to provide self-report information on their age, gender, and ethnicity. Individuals then completed their pre-intervention measures of self-efficacy and mood.

Participants were randomized to a self-efficacy induction or control group. Those completing the self-efficacy induction were asked to recall three autobiographical memories of success from any point in their lives. The instructions read as follows:

> I would like you to think about **what you have accomplished in your life.** I am asking you to tell me about times where you achieved, made yourself proud, or showed your ability to overcome obstacles. This might be your own achievement, such as finishing your education. It might also be a moment when you were able to conquer a challenge, such as overcoming a fear. I would like you to tell me about **three** of these experiences. Please tell me about them **in detail.**

The participants were also asked to rate the vividness of the memories on a scale from 0 to 10 and to share how the events reflect his or her strength. The control group were asked to recall three neutral autobiographical memories, or common activities, and rate their vividness on a scale from 0 to 10. The instructions read as follows:

> I would like you to think about things you have done as a **common activity**. I do not want you to think about happy or sad things here; instead, think about things that are **neutral** or make you feel just **normal**. For example, it might be having your dinner or catching public transport. I would like you to tell me about three of these experiences. Please tell me about them in **detail**.

Individuals then completed their post-intervention measures of self-efficacy and mood. Participants were subsequently told they would be seeing 20 images on their screen for two second each. They were instructed to pay close attention as they may be asked about the images later in the survey. Individuals were randomly assigned to see 20 COVID-related images or 20 neutral images. Following the stimuli exposure, participants completed the IMDES. Instructions read, "You will now see 24 simple black-and-white paintings of digital abstract expressionism. This is a new style of art, in which artists express their emotions through art using digital media. Your task will be to judge what emotion (if any) the artist tried to express in each painting." Each painting was displayed for five seconds along with five response options (happiness, fear, anger, sadness, and none). Once the participant chose one of the five responses or the 5 s elapsed, the cycle continued until all images were presented. Participants were debriefed and compensated upon completion of the survey. See Fig. 1.

Data Analysis

We conducted a repeated measures ANOVA to analyze the difference of scores on measures of self-efficacy and mood before and after the autobiographical memory induction. Post hoc comparisons were utilized to uncover differences between the control and experimental (i.e., self-efficacy) memory induction groups. A MANCOVA was used to test the significance of the effect of memory induction type and picture group on IMDES scores. Univariate tests were utilized to uncover significance for each variable (happiness count, fear count, anger count, sadness count) separately.

Results

Descriptives

Data were cleaned prior to analyses. To adjust for missing data on the IMDES, the emotion scores for each participant were multiplied by the ratio of the maximum possible number of responses (i.e., 20) to the number of provided responses. Participants who rated fewer than 15 images were not included in analyses, resulting in an analyzed sample of 79. All predictor variables otherwise met assumptions of normality.

Participants who received a score of 9 or above on the CAS qualified to complete the study. Scores of the analyzed sample ranged from 9 to 20 ($M = 13.6$, $SD = 2.92$) and were

not correlated with GSES ($r = -0.03$, $p = 0.83$) or VAS self-confidence scores ($r = -0.16$, $p = 0.15$).

Self-efficacy

The main effect of time on GSE was not significant ($F(1, 77) = 3.42$, $p = 0.068$, $\eta p^2 = 0.04$). There was not a significant interaction between GSE and memory induction type ($F(1, 77) = 1.73$, $p = 0.192$, $\eta p^2 = 0.02$). Post hoc analyses revealed a significant increase in GSE among the experimental group from pre- ($M = 29.2$, $SD = 4.63$) to post-memory induction ($M = 31.2$, $SD = 4.13$, $t(48) = 2.57$, $p = 0.012$, $d = 0.46$). There was not a significant change in GSE scores among the control group from pre ($M = 30.3$, $SD = 5.70$) to post-memory induction ($M = 30.6$, $SD = 5.37$, $t(29) = 0.34$, $p = 0.736$, $d = 0.05$). See Fig. 2. Analyses are presented in Table 1.

The main effect of time on self-confidence was significant ($F(1, 77) = 13.38$, $p < 0.001$, $\eta p^2 = 0.15$). There was not a significant interaction between self-confidence and memory induction type ($F(1, 77) = 1.30$, $p = 0.258$, $\eta p^2 = 0.02$). Post hoc analyses revealed a significant increase in self-confidence among the experimental group from pre- ($M = 7.08$, $SD = 2.65$) to post-memory induction ($M = 8.22$, $SD = 1.97$, $t(48) = 3.89$, $p < 0.001$, $d = 0.49$). There was not a significant change in self-confidence scores among the control group from pre ($M = 7.00$, $SD = 2.29$) to post-memory induction ($M = 7.60$, $SD = 2.19$, $t(29) = 1.60$, $p = 0.114$, $d = 0.27$). See Fig. 3. Analyses, including those for happiness, fear, anger, and sadness, are presented in Table 2.
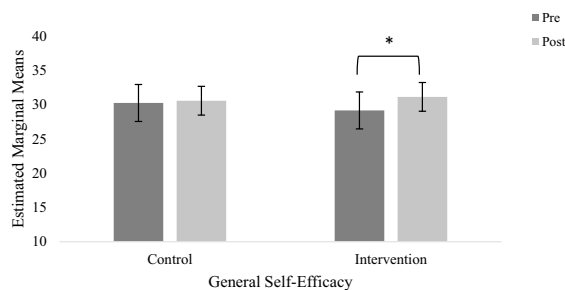
Note. $* p < .05$; $** p < .01$; $*** p < .001$

Fig. 2 Estimated marginal means for GSE pre- to post-memory induction

**Fig. 1** Data collection procedures
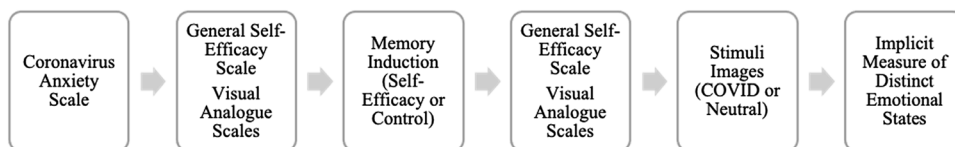
Table 1 Group comparisons on GSE pre- to post-memory induction

GSE	Memory induction		GSE	Memory induction	Mean difference	SE	t
Post	Control	–	Post	Intervention	−0.56	1.08	−0.52
		–	Pre	Control	0.33	0.99	0.34
		–	Pre	Intervention	1.42	1.11	1.27
	Intervention	–	Pre	Control	0.90	1.14	0.79
		–	Pre	Intervention	1.98	0.77	2.57*
Pre	Control	–	Pre	Intervention	1.08	1.17	0.92

Comparison

*$p<0.05$; **$p<0.01$; ***$p<0.001$
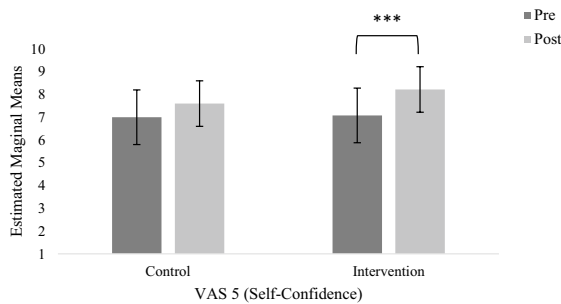
Note. ∗ $p < .05$; ∗∗ $p < .01$; ∗∗∗ $p < .001$

Fig. 3 Estimated marginal means for self-confidence VAS pre- to post-memory induction

Table 2 Group comparisons on self-confidence pre- to post-memory induction

VAS	Memory induction	Mean difference	SE	t
Happy	Control	1.30	0.35	3.67***
	Intervention	0.88	0.28	3.17**
Afraid	Control	−1.83	0.54	−3.38**
	Intervention	−1.91	0.42	−4.53***
Angry	Control	−1.27	0.44	−2.88**
	Intervention	−2.55	0.34	−7.42***
Sad	Control	−1.41	0.51	−2.77**
	Intervention	−2.06	0.40	−5.20***
Self-confident	Control	0.60	0.38	1.60
	Intervention	1.14	0.29	3.89***

*$p<0.05$; **$p<0.01$; ***$p<0.001$

Fear Processing

The main effect of memory induction type in determining fear count on the IMDES across picture groups was not
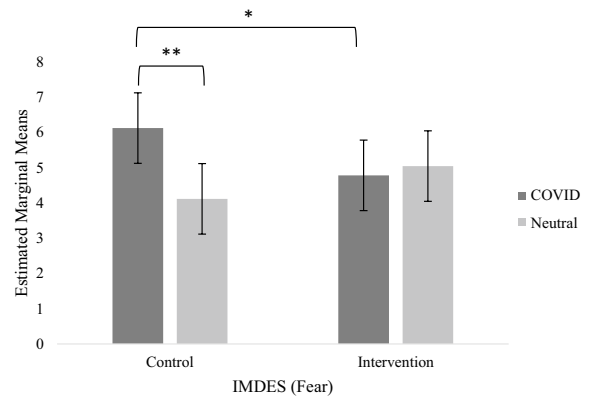
Note. ∗ $p < .05$; ∗∗ $p < .01$; ∗∗∗ $p < .001$

Fig. 4 Estimated Marginal Means for Fear on IMDES After Exposure to COVID or Neutral Stimuli

significant ($F(1, 75)=0.23$, $p=0.636$, $\eta p^2=0.003$). The main effect of picture group on fear count across memory induction types was significant ($F(1, 75)=4.05$, $p=0.048$, $\eta p^2=0.03$). There was a significant interaction effect between memory induction and picture group on fear count ($F(1, 75)=6.85$, $p=0.011$, $\eta p^2=0.08$). Individuals in the control group who were exposed to COVID stimuli ($M=6.12$, $SD=1.94$) had significantly higher fear counts than those who were exposed to neutral stimuli ($M=4.12$, $SD=2.04$, $t(29)=2.94$, $p=0.004$, $d=1.00$). Individuals in the control group who were exposed to COVID stimuli also had significantly higher fear counts than those in the experimental group who were exposed to COVID stimuli ($M=4.78$, $SD=1.42$, $t(36)=2.15$, $p=0.035$, $d=0.79$). Individuals in the experimental group who were exposed to COVID stimuli did not show a significant difference in fear counts than those who were exposed to neutral stimuli ($M=5.04$, $SD=2.04$, $t(48)=-0.49$, $p=0.626$, $d=0.15$). See Fig. 4. Analyses, including those for anger, sadness, and happiness counts, are presented in Table 3.

Table 3 Regression analysis predicting emotion counts on the implicit measure of distinct emotional states

	Dependent variable	Mean square	F
Memory induction	Happiness count	9.71	1.20
	Fear count	0.79	0.23
	Anger count	1.42	0.25
	Sadness count	3.75	1.03
Picture group	Happiness count	17.71	2.18
	Fear count	14.10	4.05*
	Anger count	23.56	4.14*
	Sadness count	0.004	0.001
Memory induction × picture group	Happiness count	21.25	2.61
	Fear count	23.87	6.85**
	Anger count	2.12	0.37
	Sadness count	4.93	1.35
Error	Happiness count	8.13	
	Fear count	3.49	
	Anger count	5.70	
	Sadness count	3.66	

*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$

Discussion

The present study aimed to investigate the effect of autobiographical memory induction on increasing self-efficacy and reducing fear processing among individuals with high levels of COVID-19 anxiety. The findings suggest that the use of self-efficacy memory inductions as a brief and scalable intervention may offer a targeted strategy for helping individuals struggling with COVID-19-related distress.

We found that self-efficacy and self-confidence increased among participants who completed the self-efficacy memory induction indicative of a moderate effect size. Alternatively, control memory induction participants showed no meaningful change in self-efficacy or self-confidence following the induction. This strongly supports our hypotheses that self-efficacy and self-confidence can be increased among individuals with high levels of COVID-19-related distress through autobiographical self-efficacy memory induction.

When incorporating specific stimuli into our model, we found that after completing the self-efficacy memory induction, participants experienced fear similarly regardless of whether they were exposed to neutral or COVID-19-related stimuli. Those who did not complete the self-efficacy memory induction, on the other hand, demonstrated markedly higher levels of fear when presented with COVID-19-related stimuli than when presented with neutral stimuli. Furthermore, when exposed to COVID-19-related stimuli, individuals who completed the control memory induction showed higher levels of fear processing than those who

completed the self-efficacy memory induction. Both analyses revealed a large effect size.

Thus, our results suggest that (1) self-efficacy can be increased among individuals with high levels of COVID-19-related distress using an autobiographical memory induction and (2) doing so reduces fear processing among these individuals when exposed to COVID-19 stimuli. These findings add to the growing literature on the role of self-efficacy in the context of trauma and stress. As noted in the introduction, prior research has shown that low levels of self-efficacy are associated with increased risk of PTSD and poorer treatment outcomes. In contrast, higher levels of self-efficacy have been linked with positive health behaviors and better coping mechanisms.

The current study extends these findings by demonstrating that self-efficacy can be effectively increased through a brief intervention involving autobiographical self-efficacy memory induction. This is consistent with prior research indicating that self-efficacy beliefs can be experimentally manipulated and that doing so can lead to reduced PTSD symptoms (Brown et al., 2016; Morina et al., 2018). The moderate effect size observed in the current study suggests that self-efficacy induction may have a practical utility in clinical and public health settings. Moreover, out findings underscore the value of using self-efficacy interventions in the context of the ongoing COVID-19 pandemic, providing a useful strategy for helping individuals cope with the associated fear and uncertainty.

The results of this study have implications for the development of interventions aimed at reducing COVID-19-related distress and promoting mental health and well-being. Future research should continue to explore the potential of self-efficacy induction as a targeted strategy for reducing distress and promoting recovery in individuals experiencing a range of traumatic and stressful events. Our study provides valuable insights for practitioners and policymakers in designing and implementing effective interventions to support individuals affected by the COVID-19 pandemic.

Limitations and Future Directions

While our study provides promising results for the use of autobiographical self-efficacy memory inductions as a potential intervention for individuals experiencing COVID-19-related distress, there are several limitations to consider. One limitation of our study is the relatively low sample size due to a high percentage of invalid data collected from MTurk. Invalid responses accounted for approximately 30% of the total responses, resulting in limited statistical power to detect significant effects. Unfortunately, due to the unique circumstances surrounding the time in which the data was collected, it is not feasible

to gather additional data that would be relevant to our research questions. Specifically, our data was collected during the emergency of the Delta variant during the COVID-19 pandemic. Despite this limitation, we remain confident that our findings are specific and meaningful enough to make a valuable contribution to the literature on COVID-19 mental health impacts and recovery.

Moreover, our study only measured the immediate effects of the self-efficacy memory induction. Given that the current study used a cross-sectional design, causation cannot be inferred (Winer et al., 2016). Future research is needed to determine the long-term effectiveness of this intervention and whether its effects are sustained over time.

In addition, future research should focus on determining whether other factors played a role in these outcomes. For example, personality factors, such as neuroticism or optimism, may have played a role in how individuals respond to the induction. Exploring these potential mediating factors could provide a more comprehensive understanding of the effects of autobiographical self-efficacy memory induction on perceived self-efficacy. Furthermore, in the current study, data was not collected regarding participants' personal exposure to COVID-19. Examining this context in future work could provide valuable information relevant to the research questions at hand.

Although the self-efficacy induction showed promising results in our sample, further investigation is necessary to determine its generalizability across diverse cultures. While our study was conducted on participants residing in the United States, the COVID-19 pandemic has impacted individuals worldwide. Therefore, future studies should examine the efficacy of self-efficacy interventions in reducing COVID-19-related distress in other countries significantly affected by the pandemic. The relevance of these data to clinical populations are also limited until analogous research with clinical populations is conducted.

Lastly, the lack of preregistration for this study is a limitation. Future similar work should incorporate preregistration to ensure the transparency and rigor of the study design, methods, and analysis.

In summary, our findings offer preliminary evidence for the efficacy of autobiographical self-efficacy inductions as a promising intervention for COVID-19-related distress. However, further research is necessary to comprehensively evaluated its potential benefits and limitations.

Supplementary Information The online version contains supplementary material available at https://doi.org/10.1007/s10608-023-10377-6.

Declarations

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