

A growth mindset intervention to improve mental health in adolescents during COVID-19

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Abstract

COVID-19 poses a considerable threat to adolescent mental health. We investigated depression rates in teens from pre to post-COVID. We also explored if leveraging a growth mindset intervention (“Healthy Minds”) could improve adolescent mental health outcomes during the pandemic, especially for adolescents experiencing the most distress. In Study 1, we recruited youth from schools in a rural southern community ($N = 239$) and used a pre-post design. In Study 2, we recruited an online sample ($N = 833$) and used a longitudinal randomized control trial design to test the effectiveness of Healthy Minds. Across both studies, there is evidence of higher rates of depression in youth during COVID-19, relative to pre-pandemic numbers. In Study 1, the intervention effectively changed psychological and behavioral processes related to mental health, especially for adolescents experiencing greater COVID-19 stress. However, in Study 2, the intervention failed to impact depression rates or symptoms at follow-up.

KEYWORDS

adolescents, COVID-19, growth mindsets, interventions, mental health

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1 | INTRODUCTION

Adolescence is a challenging time, particularly with regards to wellbeing (Centers for Disease Control and Prevention, 2013). Depression is one of the most common issues, with an estimated 17% of youth (ages 12–17) in the United States reporting at least one major depressive episode (National Institute of Mental Health, 2020). The onset of COVID-19 accelerated the rising trend in adolescent depression rates (de et al., 2020; Hawes et al., 2021) with some reports of a 25.2% prevalence rate (Racine et al., 2021). The effects of depression are far-reaching, with significant personal and societal costs (e.g., suicide, drug abuse, sense of isolation, medical disability ((Stewart et al., 2003)). Given the prevalence and gravity of depression, we need scalable and effective digital interventions that can be administered easily to youth.

To meet this need, our goals are threefold. First, we explored changes in rates of depression in adolescents pre to post-COVID-19. Past work found higher rates of depression among children and adolescents (de et al., 2020; Hawes et al., 2021; Racine et al., 2021) due, in part, to school closures and the subsequent lack of physical, social, and emotional resources. Second, we sought to respond to these higher depression rates by implementing and evaluating a growth mindset intervention that targeted key psychological constructs linked to enhanced mental health in youth (growth mindsets, self-efficacy, threat appraisals, active coping, and less self-blame). Third, we tested if intervention effectiveness is strongest for those under distress (Burches & Burches, 2020; Burnette et al., 2022). Namely, we investigated if stress (S1) and pre-existing depressive symptoms (S1 and S2) moderated intervention effectiveness.

1.1 | Growth mindset interventions

Growth mindset interventions seek to nurture a belief in the malleable nature of traits, attributes, and experiences as such mindsets are expected to impact motivation, achievement, and health. Early interventions primarily target academic performance (Burnette et al., 2022), although more recent work questions the efficacy of these approaches. For example, two meta-analyses found weak or nonsignificant effects for growth mindset interventions aiming to improve academic achievement (Macnamara & Burgoyne, 2022; Sisk et al., 2018a, 2018b) and other studies failed to replicate growth mindset intervention impact (e.g., Brez et al., 2020a). In extending mindset research beyond academic performance to health-related outcomes, more recent work is starting to explore the link between growth mindsets and wellbeing, with more promising findings (e.g., Calvete et al., 2019; Miu & Yeager, 2015; Schleider et al., 2020; Schleider & Weisz, 2016). For example, a meta-analysis with roughly 6500 youth found that those with stronger growth, relative to fixed, mindsets reported fewer mental health problems (Schleider et al., 2015). A cumulative look at intervention effectiveness on mental health suggested that there are meaningful effects of growth mindset interventions, but this work is in its infancy—there were fewer than 10 studies (Burnette et al., 2023). Furthermore, similar to academic outcomes, effects on mental health are strongest when implemented well and with the right populations.

Additionally, the meta-analysis of growth mindset intervention effectiveness outlined the importance of examining not only distal end results such as depression, but also investigating psychological and behavioral outcomes. We adhere to this call. First, most of this work focuses on the importance of mindsets about the potential for emotions to change (e.g., Kneeland et al., 2016) and for people as well as personalities to be developed and to change over time (e.g., Angilella, 2005). Thus, in the current work, we too focus on and investigate mindsets of emotion and people/personality. Second, we also examined if we could enhance self-efficacy while simultaneously reducing self-blame. Third, we investigated if a growth mindset intervention relates to threat appraisals, which are similar to self-efficacy in that they are evaluations regarding the capacity to handle threats and challenges. Threat appraisals have been outlined in past work as a key mechanism linking growth mindsets to psychological wellbeing (Seo et al., 2021). We examined threat appraisals in Study 1. Fourth, in Study 2 we explored if the intervention can encourage active, rather than avoidant coping characterized by attempts to reduce negative outcomes, which can help to decrease psychological distress (e.g., Burnette et al., 2022; Yeager, 2017; Yeager & Dweck, 2023).

In summary, we outline a number of key considerations in the current work. A primary goal is to investigate rates of depression in youth pre- and post-COVID. In addition to this goal, we also explored if the growth mindset intervention could improve psychological and behavioral outcomes related to mental health. First, we sought to foster stronger growth mindsets of emotions, people, and personality (Burnette, Knouse, et al., 2020). That is, we included information to foster stronger beliefs in the potential to change emotions and for personalities and people to change and develop over time. Second, because growth mindsets can foster greater blame in stigmatized context (for a review see Burnette et al., 2017; Hoyt et al., 2019), in implementing these interventions, a compensatory approach that seeks to keep the benefits of growth mindsets and self-efficacy while reducing self-blame is recommended (Hoyt & Burnette, 2020). As such, we directly targeted reduced self-blame and included self-blame at pre- and post-test to assess whether the intervention kept the benefits (i.e., stronger growth mindsets and increased self-efficacy) while minimizing the costs (i.e., blame). Third, in addition to assessing the distal outcome of depression over time (in Study 2), across both studies, we explored if the intervention impacted psychological and behavioral outcomes. Specifically, growth mindsets set in motion threat appraisals, or evaluations that focus on resources rather than deficiencies (Burnette et al., 2013, 2020b; Taylor & Stanton, 2007; Yeager, 2017) and encourage more mastery-oriented and active coping strategies (Hoyt et al., 2019). We explore threat appraisals in Study 1 and coping in Study 2.

In addition to exploring rates of depression and the direct impact of the intervention on a number of relevant outcomes, it is critical to understand heterogeneity, with most theoretical and empirical work outlining how mindsets matter most when stressors arise (Bryan et al., 2021; Miller et al., 2017). Thus, we focus on pre-existing depression in both studies as well as COVID-19 stress in Study 1 as key moderators. Finally, a recent paper (Burnette et al., 2023) highlights key fidelity components of mindset interventions—we use their recommended approach for implementation and their reporting tables (see supplemental Tables ST-11 & ST-12).

1.2 | Study 1 methods

1.2.1 | Participants

Between May and June 2021, we recruited high school adolescents in 9th–12th grades in a rural southern county high school to participate in our study online. Of approximately 2900 eligible students, 239 were interested, provided consent,¹ and completed the study ($M_{age} = 16.05$, age range = 13–19, $SD = 1.24$; 61.5% female; see OSF for more details). Participants were paid \$5 for their participation.

1.2.2 | Procedure

Participants completed a pre-test survey, intervention, and post-test survey on their own personal devices at their own pace. The Healthy Minds (HM) intervention included the recommended implementation strategies (e.g., interactive reading and activities, use of role models) but also included information related to COVID-19 (see supplemental Tables ST-11 & ST-12). We used a pre-post design, with all participants having the opportunity to access the HM intervention.

1.2.3 | Healthy minds

Healthy Minds is a 30–45-min self-paced online intervention programmed in Qualtrics based on past successful interventions (e.g., Burches & Burches, 2020; Sisk et al., 2018a). A key message is that people and emotions can and do change, with scientific evidence to support the claims. The intervention also explains why people change,

including memorable and relatable stories from adolescents of similar ages. We tailored the intervention to include information related to COVID-19. Specifically, we referred to COVID-19 at several points in the intervention, such as using COVID-19 as an example for why students may be struggling. Throughout the intervention, participants also completed saying-is-believing writing activities that asked them to apply what they were learning to specific scenarios, such as a scenario where students imagined seeing a friend become more distant and withdrawn during the COVID-19 pandemic. These saying-is-believing strategies can help participants adopt the growth mindset (e.g., Good et al., 2003).

1.2.4 | Measures

Unless otherwise noted, participants responded to items on a 6-point Likert scale [1 = strongly disagree, 6 = strongly agree] and unless otherwise noted, we assessed these at pre and post (see Supplement for full measure details).

Mindsets of personality and emotion

We assessed beliefs about the fixed or malleable nature of personality (e.g., "You have a certain personality and it is something that you can't do much about;" (Yeager et al., 2013) and emotion (e.g., "No matter how hard they try, people can NOT really change the emotions they have;" (Tamir et al., 2007) with three items for each scale. Higher scores indicate stronger growth mindsets (Mindsets of Personality pre-test $\alpha = 0.82$, post-test $\alpha = 0.88$; Mindsets of Emotion pre-test $\alpha = 0.77$, post-test $\alpha = 0.85$).

Self-Efficacy

Participants completed an 11-item Self-Efficacy Questionnaire for Depression in Adolescents (Gordon et al., 2012), which measured participants' beliefs about their ability to cope with negative emotions. Participants responded using a 5-point Likert Scale [1 = Really Sure I Couldn't, 5 = Really Sure I Could]. Higher scores indicated greater self-efficacy (pre-test $\alpha = 0.81$, post-test $\alpha = 0.93$).

Blame

Participants completed a four-item adapted self-blame scale (Janoff-Bulman, 1979). Higher scores indicate greater blame for depression (pre-test $\alpha = 0.64$, post-test $\alpha = 0.74$).

Threat appraisals

Participants completed a 2-item questionnaire assessing threat appraisals (Lee et al., 2019; "I feel like I can handle the negative things that happen to me (R)"; "The negative things that happen to me will probably never get better"). Higher scores indicated less confident appraisals regarding the capacity to handle stressors (7-point Likert-type scale, 1 = strongly disagree, 7 = strongly agree) (pre-test $\alpha = 0.55$, post-test $\alpha = 0.63$).

COVID-19 stress

At pre-test only, participants completed a three-item measure asking about the impact of COVID-19 on their lives in the past 2–3 months. A sample item includes: "In the past 2–3 months, COVID-19 has negatively impacted my life." Higher scores indicated higher levels of COVID-19 stress (7-point Likert-type scale, 1 = strongly disagree, 7 = strongly agree) (pre-test $\alpha = 0.85$).

Depressive symptoms

Finally, at pre-test only, participants completed the Short Moods and Feelings Questionnaire (SMFQ, Angold et al., 1995) to measure depressive symptoms (e.g., "I feel miserable or unhappy"). The measure consists of 13 items assessed on a 3-point Likert Scale [0 = not true, 1 = sometimes, 2 = true]. Scores were summed, with higher scores

indicating more symptoms of depression (pre-test $\alpha = 0.91$). A cut-off score of eight on the SMFQ can be used as a predictor of clinical depression (Angold et al., 1995), although this measure and this cut-off score is not intended to be used as a diagnostic tool.

1.3 | Study 1 analytic plan

To test for pre- to post-test changes in emotion and personality mindsets, self-efficacy, blame, and threat appraisals, we estimated one regression model in HLM 7.03 for each of the five outcomes, dummy-coding the predictor (time of assessment). We then ran 10 additional models to test whether pre-test depressive symptoms or, separately, pre-test COVID-19 stress, moderated the effect of time of assessment on outcome (see Supplement).

1.4 | Study 1 results

See Supplement for descriptive statistics and correlations between variables.

1.4.1 | Depression scores across samples

In line with our first aim, we compared depression scores in adolescents prior to the pandemic (Lipsey et al., [under review](#)) compared to during the pandemic. Importantly, pre-pandemic rates were taken from the same population of teens as Study 1 in the current work. Although there are complications with comparing different samples, it is clear that participants in our pre-pandemic dataset displayed lower levels of depression overall ($M = 8.46$, $SD = 6.86$) compared to participants in Study 1 ($M = 11.34$, $SD = 6.88$). Further, using a cut-off score of eight on the SMFQ to indicate clinically elevated levels of depression (Angold et al., 1995), we tested for between-sample differences in the proportion of adolescents with clinically elevated rates of depression using a two-proportion z-test (two-tailed, alpha of 0.05). Results indicated that the proportion of adolescents in Study 1 who exhibited clinically elevated depression (69.5%) was significantly higher than the proportion of adolescents who exhibited clinically elevated depression in the pre-pandemic sample (49.1%, $p < 0.001$). Table 1²

1.4.2 | Effect of intervention

In terms of our second aim, testing the efficacy of the intervention, from pre-test to post-test, *mindsets of personality* [$b = 0.95$, $SE = 0.09$, $t(181) = 10.63$, $p < 0.001$, $r = 0.62$] increased, as did *mindsets of emotion* [$b = 0.39$, $SE = 0.08$, t

TABLE 1 Levels of depression across 3 samples and time points.

	Date assessed	Timepoint in COVID-19 pandemic	Pre-test depression score		
			M	SD	% Clinically elevated
Pre-pandemic data	Oct 2019–Nov 2019	Pre-pandemic	8.46	6.86	49.1%
Study 1	May 2021–Jun 2021	1 year into the COVID-19 pandemic. COVID-19 vaccines recently approved for adolescents; delta variant discovered.	11.34	6.88	69.5%
Study 2	Oct–Nov 2021 (pre-post only)	1 ½ years into the COVID-19 pandemic	12.13	6.91	71.8%

Note: Depression scores measured using SMFQ. Percent clinically elevated uses a cut-off score of eight on the SMFQ.

(182) = 5.15, $p < 0.001$, $r = 0.36$], and *self-efficacy* [$b = 0.24$, $SE = 0.05$, $t(179) = 4.99$, $p < 0.001$, $r = 0.35$]. Additionally, *blame* decreased from pre to post-test [$b = -0.32$, $SE = 0.06$, $t(179) = -5.24$, $p < 0.001$, $r = 0.36$], as did negative *threat appraisals* [$b = -0.30$, $SE = 0.09$, $t(177) = -3.43$, $p < 0.001$, $r = -0.25$].

1.4.3 | Moderation

Next, we examined whether participants' pre-existing depressive symptoms or COVID-19 stress moderated effects (see Supplement for full details). Regarding moderation by depression symptoms, growth mindsets of personality [$b = 0.05$, $SE = 0.01$, $t(168) = 3.83$, $p < 0.001$, $r = 0.28$] increased more steeply among participants who were one standard deviation above the mean in depressive symptoms. In other words, participants with more depressive symptoms experienced a stronger increase in beliefs that personality is malleable (growth mindsets of personality) from pre-test to post-test. Participants with more depressive symptoms also experienced a stronger increase in self-efficacy from pre-test to post-test [$b = 0.02$, $SE = 0.01$, $t(167) = 2.03$, $p = 0.044$, $r = 0.16$]. Additionally, threat appraisals [$b = -0.04$, $SE = 0.01$, $t(165) = -2.79$, $p = 0.006$, $r = -0.21$] decreased more steeply among participants with higher depressive symptoms. In other words, participants with higher depressive symptoms experienced a larger decrease in feelings of threat from pre-test to post-test.

Regarding COVID-19 stress moderation, similar to the depression moderation results, both mindsets of personality [$b = 0.13$, $SE = 0.05$, $t(168) = 2.53$, $p = 0.012$, $r = 0.19$] and self-efficacy [$b = 0.08$, $SE = 0.03$, $t(167) = 2.88$, $p = 0.004$, $r = 0.22$] increased more steeply for youth experiencing more stress from COVID-19. In other words, youth experiencing higher levels of COVID-19 stress had larger increases from pre-test to post-test in believing personality to be malleable (growth mindsets of personality) and larger increases in self-efficacy. Although not the case for all outcomes, in line with past work (e.g., Burnette et al., 2022), across most outcomes, intervention effects are stronger for youth experiencing higher levels of distress (also see Yeager et al., 2022).

2 | STUDY 2

In Study 2, we aimed to better understand how the ongoing pandemic may affect mental health concerns in adolescents. Additionally, we used a randomized control longitudinal design to investigate Healthy Mindsets intervention effects on mindsets, self-efficacy, self-blame, coping, and depression. Study 2 was pre-registered (OSF).

2.1 | Study 2 methods

2.1.1 | Participants

We recruited adolescents in the United States, ages 14–16, using Instagram ads in Fall 2021, an approach used in other recent interventions (Schleider et al., 2022). After screening for invalid responses (Figure 1), we had a total of 833 participants ($M_{\text{age}} = 15.27$, $SD = 0.75$; 53.2% Female; see supplement for additional demographics).

2.1.2 | Procedure

We recruited participants via Instagram asking youth to consider participating in a short online program and directing potential participants to our lab Instagram page via a survey link. This link directed participants to information regarding eligibility requirements (being ages 14–16 in the United States, could not work at the southeastern institution

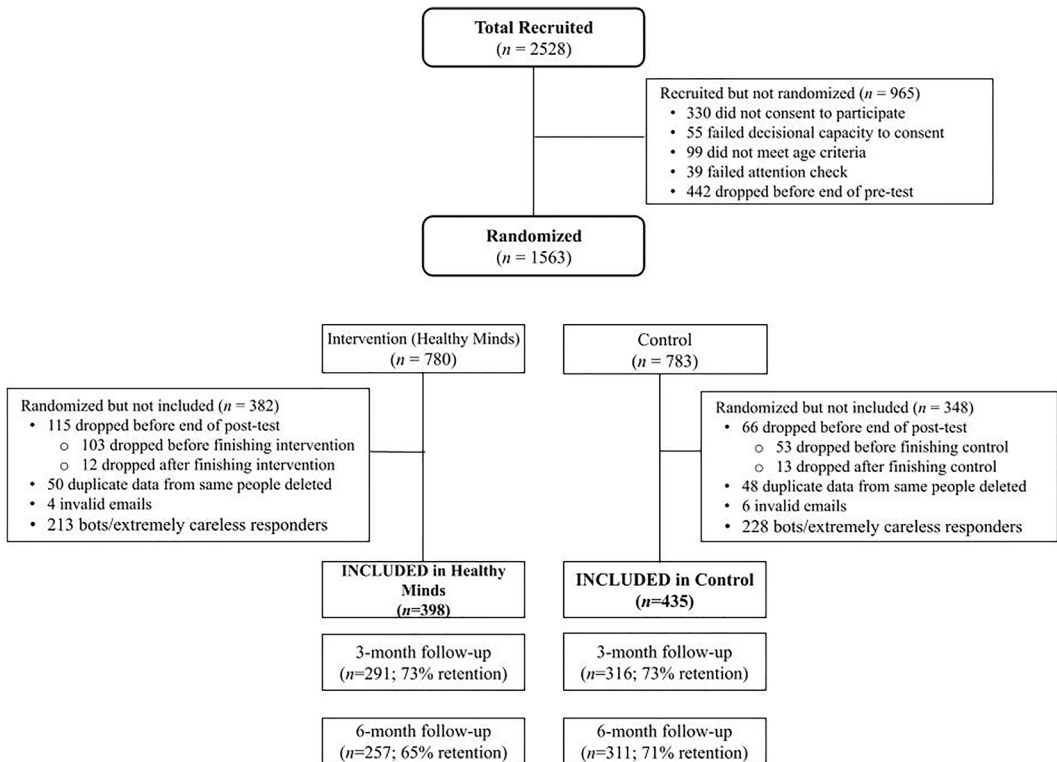


FIGURE 1 Consort diagram Study 2.

that approved the IRB) and the possibility of earning up to a total of \$30 in gift cards for three time periods (\$10 per survey). We received IRB approval to waive parental consent for the study, as previous research indicates that parental consent can be a barrier to youth receiving mental health support and resources (Brown et al., 2016; Samargia et al., 2006; Schleider et al., 2022; Wilson & Deane, 2012). After consenting, participants needed to answer three multiple choice questions to ensure they understood the implications of consenting to participate. For additional detail about recruitment and procedure, see Supplement.

Participants completed pre-test items before being randomly assigned to either the HM intervention condition or to an attention-matched control condition that focused on sexual health, communication, and consent. As in Study 1, the HM intervention was tailored to the COVID-19 pandemic. Once participants finished the intervention, they immediately completed a post-test survey. We assessed the primary outcome of interest—depression—at 6-month follow-up. At 6-month follow-up, we retained 568 (HM = 257, Control = 311) participants (Figure 1, Tables 2-3 in Supplement).

2.2 | Study 2 measures

For greater detail on Study 2 Measures, please see Supplement. We used the same Mindsets of Emotions, Self-Efficacy, Blame, and Depression measures used in Study 1. Measures listed below were new to Study 2.

2.2.1 | Mindsets of people

We measured participants' beliefs about the malleability of people more generally, rather than personality, using Dweck's "Kind of Person" Scale (Dweck, 1999) (e.g., "No matter what kind of person someone is, they can always

change very much"). Participants answered eight items using a 7-point Likert Scale (1 = strongly disagree, 7 = strongly agree). We reverse-coded fixed mindset items so that a higher score indicates a stronger growth mindset of people (pre-test $\alpha = 0.85$; immediate post-test $\alpha = 0.87$, 3-month $\alpha = 0.87$, 6-month $\alpha = 0.88$).

2.2.2 | Coping

At immediate post-test participants reported on their future coping intentions and at follow-up, we asked participants about their coping behavior over the last 3 months. Participants answered five items asking how often they planned to engage in certain activities in the next month using a 5-point Likert scale [1 = Never, 5 = Very Often]. A higher score indicates more active coping (immediate post-test $\alpha = 0.72$, 3-month $\alpha = 0.69$, 6-month, $\alpha = 0.66$).

2.3 | Study 2 analytic plan

We tested for differences in the proportion of adolescents with clinically elevated rates of depression using a two-proportion z-test (two-tailed, alpha of 0.05) in R. To test for the effect of the intervention (treatment vs. control), we constructed regression models in R—logistic for the dichotomized rates of depression outcome, linear for the continuous symptoms of depression outcome. All regression models controlled for pre-existing depression. To address missing data, we used multiple imputation, implemented via the MICE package in R. See Supplement for details and for reported deviations from the pre-registration plan.

2.4 | Study 2 results

2.4.1 | Depression scores across samples

In Study 2, we again assessed whether depression rates remained higher than pre-pandemic levels. Compared to the same pre-pandemic dataset ($M = 8.46$, $SD = 6.86$), participants in Study 2 reported more symptoms ($M = 12.13$, $SD = 6.91$). Once again, using a cut-off score of eight on the SMFQ to indicate clinically elevated levels of depression (Yeager et al., 2013), we tested for between-sample differences in the proportion of adolescents with clinically elevated rates of depression using a two-proportion z-test (two-tailed, alpha of 0.05). The proportion of adolescents in Study 2 who exhibited clinically elevated depression (71.8%) was significantly higher than the proportion of adolescents who exhibited clinically elevated depression in the pre-pandemic sample (49.1%, $p < 0.001$), Table 1.

2.4.2 | Effect of intervention

Results below used imputed data derived from 20 imputed datasets ($m = 20$), with data imputed using 5 iterations. Continuous variables were predicted using predictive mean matching; binary variables were predicted using logistic regression; nominal variables were predicted using multinomial logistic regression (see OSF for more details).

The primary analysis of interest was a logistic regression with rates of depression at 6-month as the outcome. There was no significant effect of intervention condition on rates of depression at 6-month ($b = 0.04$, $se = 0.19$, $p = 0.847$) and marginal effects at 3-month ($b = -0.36$, $se = 0.20$, $p = 0.073$). Additionally, running a linear regression while controlling for pre-test continuous scores on depression also showed no effect of condition at 6-month follow-up on depressive symptoms, $b = 0.03$, $se = 0.04$, $t(182.1) = -0.92$, $p = 0.358$, but marginal effects at 3-month ($b = 0.06$, $se = 0.03$, $t(384.4) = -1.83$, $p = 0.068$).³

Secondary analyses revealed some effects of condition at immediate post-test on psychological and behavioral processes. Specifically, participants in the intervention, relative to the control, reported stronger growth mindsets of emotion, $b = 0.42$, $se = 0.08$, $t(828.7) = 5.31$, $p < 0.001$, and people, $b = 0.53$, $se = 0.07$, $t(831) = 7.16$, $p < 0.001$ as well as greater self-efficacy $b = 0.23$, $se = 0.06$, $t(830) = 3.87$, $p < 0.001$. There was also an effect on coping intentions at immediate post-test, such that youth in the intervention, relative to the control reported more intentions to engage in active coping strategies, $b = 0.14$, $se = 0.05$, $t(828.5) = 2.75$, $p = 0.006$. However, most of these effects did not hold at 3-month or 6-month and there were no effects on blame at any time periods (see [OSF](#) for more details).

2.4.3 | Moderation

In line with our pre-registered analysis plan, we conducted analyses examining whether participants' pre-existing depressive symptoms moderated condition effects. Pre-test depression did not moderate the effect of condition on 3-month or 6-month depressive symptoms (see supplemental table [ST-10](#)).

In summary, we found increases in rates of depression in youth from pre-pandemic to post. Second, the overall conclusion was that the intervention did not produce reliable effects on depression at follow-ups but did impact immediate post-test psychological and behavioral processes. Third, we found little evidence for moderation by pre-existing levels of depression. Considering the changes in implementation strategies related to COVID-19, that these studies were conducted during the pandemic, as well as recent issues related to online data quality (e.g., Brühlmann et al., 2020; Moss et al., 2021), we do not draw any strong conclusions regarding findings and use the discussion to elaborate on potential reasons for findings.

3 | GENERAL DISCUSSION

In summary, we conducted two studies during the COVID-19 pandemic related to youth mental health. First, we investigated changes in rates of depressive symptoms among adolescents before and during the COVID-19 pandemic. Although the comparison does not provide causal evidence, it supports other empirical evidence of rising trends of depression in youth (i.e., 49.1% of adolescents in pre-pandemic data, 69.5% in Study 1, and 71.8% in Study 2 had clinically elevated depression scores). Overall, the findings reiterate the heavy mental health toll of COVID-19 among adolescents (e.g., de Miranda et al., 2020; Hawes et al., 2021).

Second, we tested if HM, a growth mindset intervention tailored to COVID-19, could improve mental health-related outcomes in youth. Across the studies, HM demonstrated effects at immediate post-test on psychological and behavioral processes. For example, the intervention fostered stronger growth mindsets and improved self-efficacy. Furthermore, youth in the intervention, relative to the control, reported less blame and more effective coping as well as improved belief in their ability to handle stressors (i.e., improved threat appraisals). Further, pre-existing levels of depression correlated significantly and in expected ways with these processes (e.g., Burnette et al., 2017; Endler et al., 2001; O'Leary, 1992; Parto & Besharat, 2011; Moulton et al., 1987). By successfully targeting cognitive processes (mindsets, self-efficacy, self-blame, and coping), the HM intervention aims to change the way adolescents think about and respond to adverse events such as the COVID-19 pandemic, which in turn can positively impact future mental health. However, we failed to affect depression rates or symptoms at 6-month follow-up, with only trending effects at 3-month follow-up. These longitudinal results speak to the difficulty in maintaining effects (Donohoe et al., 2012; Schleider & Weisz, 2018). Future research should test whether follow-up or "booster" sessions can be used in an online scalable mindset intervention context like HM to more effectively maintain intervention effects over time.

Third, we examined if the intervention would be especially effective among adolescents experiencing the most distress, measured using depression in Studies 1 and 2 and using COVID-19 stress in Study 1 (Burnette et al., 2022).

In Study 1, adolescents at higher levels of distress experienced the greatest improvement in variables such as self-efficacy and mindsets of people. However, in Study 2 higher levels of distress did not moderate intervention effects. Overall, growth mindset interventions are not one-size-fits-all (Foliano et al., 2019; Yeager et al., 2019) and targeted interventions may show stronger effects than non-targeted interventions, although more work is needed to understand which populations may benefit most in the context of mental health (Sisk et al., 2018b).

3.1 | Limitations

Although our goal was to target adolescent mental health during a turbulent COVID-19 pandemic, many of the methodological limitations and constraints came from complications related to the COVID-19 pandemic. We could not recruit and collect data in-person, likely impacting fidelity, a critical component of potential intervention impact (Burnette et al., 2022). Interventions such as this may work best in contexts that encourage greater attention and fewer distractions. Additionally, and relatedly, recent work has illustrated a rise in low-quality online data due to fraudulent users and careless responders (Brühlmann et al., 2020; Moss et al., 2021). These issues can result in inflated or diminished effect sizes (Brühlmann et al., 2020; Niessen et al., 2016). It is also worth noting that while we chose a health-focused attention-matched control in Study 2 to help minimize demand characteristics, in line with best practices (Boot et al., 2013), it is difficult to eliminate these characteristics entirely. Additionally, growth mindset messaging alone may be ineffective when dealing with mounting adolescent mental health concerns. Thus, we encourage more work on the needed psychological affordances to reiterate and espouse the growth mindset message. We know that structural support is critical (Dee, 2015; Walton & Yeager, 2020; Yeager et al., 2022) and thus conducting these studies online without the necessary affordances can limit impact. Schools may provide better soil for a growth mindset seed to take root. Overall, to alter distal results like adolescent mental health will require more work to understand for whom, how, and where these interventions work.

3.2 | Conclusions

In line with our primary aim, we replicate work finding a mental health toll of COVID-19. Namely, results from two studies demonstrated that depression rates among adolescents were elevated during two different stages of the COVID-19 pandemic. In terms of intervention testing, we found effects for outcomes (mindsets, self-efficacy, self-blame, threat appraisals, and coping) that are correlated significantly and in expected ways with mental health, but we failed to directly affect depression rates or symptoms. There are many potential explanations for this lack of finding. For example, it could be that these interventions have small to negligible effects on distal outcomes (e.g., Brez et al., 2020b). However, in past work, small effects are more often found for academic performance, with more promising cumulative impact on mental health-related outcomes when implemented well and with the right populations (Burnette et al., 2022; Yeager & Dweck, 2023). Alternatively, or additionally, it could be that this sample was not as amenable to change due to the online nature and/or the cumulation of COVID-related stressors. Furthermore, we tailored this intervention to COVID-19 and such additions impacted the implementation strategy. Moreover, although in Study 1 findings were stronger for those struggling the most, this pattern did not emerge in Study 2. Thus, more research is needed in the mental health context that outlines for whom these interventions may work. Finally, it is possible that alternative and more powerful implementation practices are required to impact distal outcomes such as depression. For example, it could be that more synergetic interventions—those that target multiple facets of mindsets—are needed for teens (Yeager & Dweck, 2023). Another option may be implementation practices that use attitude change tactics such as meta-cognitive approaches aimed at helping participants adopt a more adaptive mindset even in the face of conflicting ideas (Crum et al., 2023). We encourage future empirical inquiries to continue to explore the potential to leverage growth mindsets to improve youth mental health. We hope this initial work in the context of the COVID-19 pandemic helps to provide a platform for such future research.

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CONFLICT OF INTEREST STATEMENT

The authors report there are no competing interests to declare.

DATA AVAILABILITY STATEMENT

Data available upon request.

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ENDNOTES

- ¹ We received IRB approval to waive parental consent to reduce burden on teachers and school support staff
- ² As a limitation of this analysis, we note that it is possible that a few students in the pre-pandemic data are also represented in Study 1, constituting a slight violation of the assumption of independence.
- ³ We found no significant interaction by pre-existing depression scores

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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