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Unlocking Emotional Well-Being: Evaluation of a Stress Mindset Intervention With a Metacognitive Approach

Shan Zhao[1], Pujing Chen[2], Ling Jin[3], Cheng Yu[3], Hongfeng Zhang[4], and Danhua Lin[3]
[1] School of Public Health, Shanghai Jiao Tong University School of Medicine
[2] College of Business Administration, Capital University of Economics and Business
[3] Institute of Developmental Psychology, Beijing Normal University
[4] Faculty of Humanities and Social Sciences, Macao Polytechnic University

Although there is a growing body of research on the effects of a stress mindset on health and well-being, knowledge of the effectiveness of stress mindset interventions in real-world situations is limited and primarily supported by evidence from Western cultural contexts. We examined the effects of a stress mindset intervention with a metacognitive approach on emotional well-being (negative affect, positive affect, anxious affect, and life satisfaction) over 4 months (i.e., 1-week postintervention, 1-month follow-up, and 4-month follow-up) among 427 Chinese first-year students undergoing the transitions to university life. The results of repeated measure analyses of variance indicate that there were significant and direct intervention effects on individual stress mindset and affect. Moreover, indirect intervention effects on life satisfaction were found at the 4-month follow-up through an increased stress-is-enhancing mindset. In addition, the positive effects of the intervention were amplified among those with a weaker stress-is-enhancing mindset at baseline. Taken together, these findings provide supportive evidence that a stress mindset intervention with a metacognitive approach is beneficial for stress mindset and emotional well-being among Chinese students confronting transitions and challenges.

Keywords: stress mindset intervention, metacognitive approach, emotional well-being, affect, life satisfaction

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Upon entering university, young adults commonly experience considerable levels of stress and challenges, including academic pressures, interpersonal relationship issues, and financial worries (Bruffaerts et al., 2018; Hudd et al., 2000). Disturbances resulting from COVID-19 in managing these typical developmental challenges might have increased the difficulties at this key stage in shaping adult identity and promoting well-being (Booker et al., 2022). For instance, Zhao et al. (2023) found that the vast majority of first-year students reported experiencing moderate or higher levels of stress. Stress is associated with physical health and may be detrimental to emotional well-being (e.g., anxiety and life satisfaction; Tang & Duan, 2021) as well as performance (e.g., academic achievement; Tormon et al., 2023). Nevertheless, the prevalence of individuals seeking professional assistance to deal with stress is notably low (Dagani et al., 2023), particularly in Eastern countries (Shi et al., 2020). For instance, it has been suggested that Chinese young adults who experience stress and emotional problems exhibit a reluctance to seek professional treatment due to cultural barriers, such as fear of discrimination

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Danhua Lin https://orcid.org/0000-0003-3755-1730
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Correspondence concerning this article should be addressed to Danhua Lin, Institute of Developmental Psychology, Beijing Normal University, No. 19, Xinjiekouwai Street, Haidian District, Beijing 100875, China. Email: danhualin@bnu.edu.cn

(Shi et al., 2020; Wu et al., 2012). Investigating nonclinical intervention targets to help students cope with stress and improve emotional well-being is therefore considered a research priority, with a stress mindset intervention considered one potential approach.

Stress Mindset and Emotional Well-Being

Mindsets, also known as implicit theories, refer to individual beliefs about the nature of personal attributes and the ways that things and processes work in the world (Burnette et al., 2017; Dweck & Yeager, 2019). Although initially concentrated on personal attributes such as intelligence and personality, mindset has been expanded into the field of stress in recent years (Crum et al., 2013). Stress mindset is regarded as a separate concept from other stress-related variables, such as stress appraisal, and can have significant downstream impacts on stress-related outcomes (Crum et al., 2017, 2023). Specifically, stress mindset refers to individual beliefs about the consequences of stress, such as its effects on health and well-being. The belief that stress can have beneficial outcomes refers to a "stress-is-enhancing mindset," and the belief that stress can have debilitating outcomes refers to a "stress-is-debilitating mindset" (Crum et al., 2017, 2021). Studies suggest that individual stress mindsets are significantly associated with performance, health, and particularly with emotional well-being (Crum et al., 2017; Huebschmann & Sheets, 2020; Jiang et al., 2019). For instance, the detrimental effects of stress on depressive symptoms were found to be weaker among college students who held a stronger stress-is-enhancing mindset (Huebschmann & Sheets, 2020). Moreover, individuals with a stress-is-enhancing mindset reported significantly higher levels of positive affect and lower levels of negative affect than those with a stress-is-debilitating mindset (Crum et al., 2021). There is also longitudinal evidence suggesting that students with a stress-is-enhancing mindset are more likely to follow a low-stable stress trajectory (vs. risk patterns) and to report greater life satisfaction and fewer emotional problems during their first year of university (Zhao et al., 2023).

Interventions to Change Mindsets

As the initial evidence was correlational in nature, researchers have subsequently examined the causal links between stress mindset and stress-related outcomes (e.g., affective outcomes). Indeed, there is preliminary evidence through experimental designs that stress-is-enhancing mindsets can be changed, which in turn can have positive impacts on individual affective outcomes (lower negative affect and higher positive affect; Crum et al., 2013, 2017). Consequently, although limited, research has begun to investigate the potential effectiveness of a stress mindset intervention in fostering an adaptable mindset and improving individual well-being or performance in real-world contexts (Maarsingh et al., 2019; Paustian-Underdahl et al., 2022). For instance, a video intervention (adapted from previous experimental research) delivered to business owners significantly increased their stress-is-enhancing mindset, which in turn decreased individual temporal feelings of burnout (Paustian-Underdahl et al., 2022). Nevertheless, there are several limits to this field. First, some studies have incorporated a relatively small sample size (e.g., Baynard-Montague & James, 2023) or narrowed their focus to a specific group (e.g., low-socioeconomic status [SES] students; Goyer et al., 2022), which has hampered the robustness of the findings. Second, there were insufficiently robust experimental designs in the bulk of the investigations, which were exploratory in nature (e.g., only included pre- and posttests or comparisons between groups; Goyer et al., 2022; Maarsingh et al., 2019). More crucially, most of the available studies have concentrated on the temporal or short-term effects (i.e., within 1 month) of a stress mindset intervention (e.g., Keech et al., 2021) and included only one wave of postintervention assessment, the sustainability of the intervention effect over longer time periods remains understudied. More importantly, research on the effectiveness of a stress mindset intervention has mostly taken place in Western cultural settings, making it unclear whether it is pertinent to non-Western cultural contexts, such as Asian. It is important to note that cultural variations might result in different perceptions and coping strategies toward stress. For instance, American undergraduates were more susceptible to noninterpersonal stressors, such as issues related to personal accomplishment, whereas Asian students reported a greater variety of stress from interpersonal relationships because Asians place a greater emphasis on preserving harmony within the social group (H. Lee et al., 2023). Moreover, Asians were less likely than European Americans to seek social support when dealing with stress. Any attempt to seek assistance or bring personal issues to the attention of others runs the risk of disrupting harmonious relations (Kim et al., 2008). Therefore, it is intriguing to investigate whether psychological resources like a stress mindset could yield unique consequences in a non-Western cultural setting, as this would provide insights into cultural nuances influencing the effectiveness of a stress mindset intervention.

A Metacognitive Approach for Shifting Mindset

Most stress mindset interventions have been offered in the form of videos that provide unbalanced information about stress with the aim of shifting the participants' attention bias toward the enhancing nature of stress (e.g., Baynard-Montague & James, 2023), although more novel techniques have been adopted in some recent studies (e.g., virtual reality games; Cnossen et al., 2023). However, with this approach, it might be challenging for individuals to maintain their new mindsets, when they are confronted with evidence and information that contradicts the information they were given on the beneficial effects of stress (Crum et al., 2023). More recent research suggests that a metacognitive approach to changing individual mindsets might have more enduring impacts on individual affect and performance than nonmetacognitive approaches (Crum et al., 2023). Specifically, a metacognitive intervention has three key elements. First, the participants are presented with more balanced information on both the enhancing and debilitating nature of stress. Second, they are presented with evidence demonstrating the power of mindsets and their self-fulfilling impacts on shaping behavior, health, and performance. Third, they are provided with strategies that could be implemented on a daily basis for them to actively adopt a stress-is-enhancing mindset. Overall, the participants learn to be aware of their own mindsets, the ways in which mindsets can have self-fulfilling impacts, and that they are capable of consciously selecting one mindset (e.g., a stress-can-be-enhancing mindset) over another based on their needs, not just the one that is "true." In contrast to traditional methods, metacognitive approaches encourage participants to actively promote the change, facilitating not only autonomy but also belief and behavioral change (Hecht et al., 2021), while they

also require complex cognitive aptitudes for participants (Crum et al., 2023). Nevertheless, the body of research investigating the efficacy of a stress mindset intervention using a metacognitive approach is remarkably thin (Crum et al., 2023; Goyer et al., 2022). Together, the present study investigates the effectiveness of a stress mindset intervention on emotional well-being using a metacognitive approach among Chinese university students, expanding the evidence beyond short-term impacts and Western cultural contexts.

In addition, both empirical research and previous mindset-related intervention studies suggest that positive mindsets could be especially helpful in promoting developmental outcomes among those who are facing challenges (e.g., those facing educational transitions; Burnette et al., 2023; Zhao et al., 2023), as these moments afford opportunities for individuals to test adaptive mindsets. Furthermore, it was suggested that metacognitive abilities increased with age and peaked in late adolescence or emerging adulthood (Weil et al., 2013). In this case, emerging adults have cognitive capacities to learn and understand complex concepts; thus, utilizing metacognitive approaches seems to be a feasible way to cultivate adaptive mindsets for this population. This study therefore aims to investigate the impact of a stress mindset intervention using a metacognitive approach on emotional well-being among university students during such a transitional life stage.

Heterogeneity of Stress Mindset Intervention Effects

The present study is further motivated by prior work on implicit theories and stress mindset that has encouraged the investigation of the key boundaries of the effects of mindset interventions (Burnette et al., 2023; Crum et al., 2023; Hecht et al., 2021) to evaluate who is most likely to benefit. The Mindset × Context framework states that it is unwise to presume that growth mindset interventions have an equal effect on all individuals (Walton & Yeager, 2020). Indeed, the significant heterogeneity of mindset intervention effects is highly meaningful, because it provides opportunities to extend the theories and interventions by clarifying the "who, how, and why" of growth mindset interventions (Burnette et al., 2023). Furthermore, empirical studies have supported the theoretical contention that growth mindset interventions are most effective among individuals who are considered vulnerable or who initially have weaker growth mindsets (Miu & Yeager, 2015; Yeager, Bryan, et al., 2022; Yeager, Carroll, et al., 2022). For instance, college students with a negative baseline mindset were more likely to benefit from a synergistic mindset intervention (which teaches both a growth mindset of intelligence and a stress-is-enhancing mindset) that significantly reduced anxiety symptoms during COVID-19 (Yeager, Bryan, et al., 2022). In instances in which students' socializing environments have not previously furnished them with the psychological "resource" of a growth mindset, a mindset intervention might function as an alternative resource to facilitate growth-oriented interpretations and behaviors when facing challenges (Olson & Dweck, 2008). Research on stress mindset, however, has not yet fully addressed the question of whether certain subgroups might benefit more from interventions, especially in a non-Western cultural context. Drawing from the theoretical framework and empirical investigations on mindsets, it is expected that a stress mindset intervention may be more effective among Chinese students who initially reported a weaker stress-is-enhancing mindset given their greater potential for improvement.

The Present Study

Prior research has established the short-term effectiveness of stress mindset interventions in promoting emotional well-being, albeit culturally limited to the Western context. In addition, there is insufficient knowledge regarding the systematic investigation of intervention effects over an extended term and the application of metacognitive approaches. Further, it is also less clear which subgroups are most likely to benefit from such an intervention. To address these research gaps, we systematically examine the effect of a one-session stress mindset intervention with a metacognitive approach on emotional well-being over time among first-year university students in China. Specifically, in comparison to the control group, we examine the effectiveness of the stress mindset intervention at 1-week postintervention, 1-month follow-up, and 4-month follow-up on stress mindset and a list of indicators of emotional well-being (i.e., negative affect, positive affect, anxious affect, and life satisfaction). We further explore who benefitted most from the stress mindset intervention at the 4-month follow-up. First, it was hypothesized that the stress mindset intervention will shift individual stress mindset in a stress-is-enhancing direction over time compared with the control condition (*Hypothesis 1*). Second, the stress mindset intervention (vs. control) will increase individual emotional well-being, including lower levels of negative affect and anxious affect and higher levels of positive affect and life satisfaction, either directly or indirectly via the shift in stress mindset over time (*Hypothesis 2*). Third, the effects of the stress mindset intervention (vs. control) on emotional well-being will be more pronounced among those who report a relatively weaker stress-is-enhancing mindset at baseline (*Hypothesis 3*).

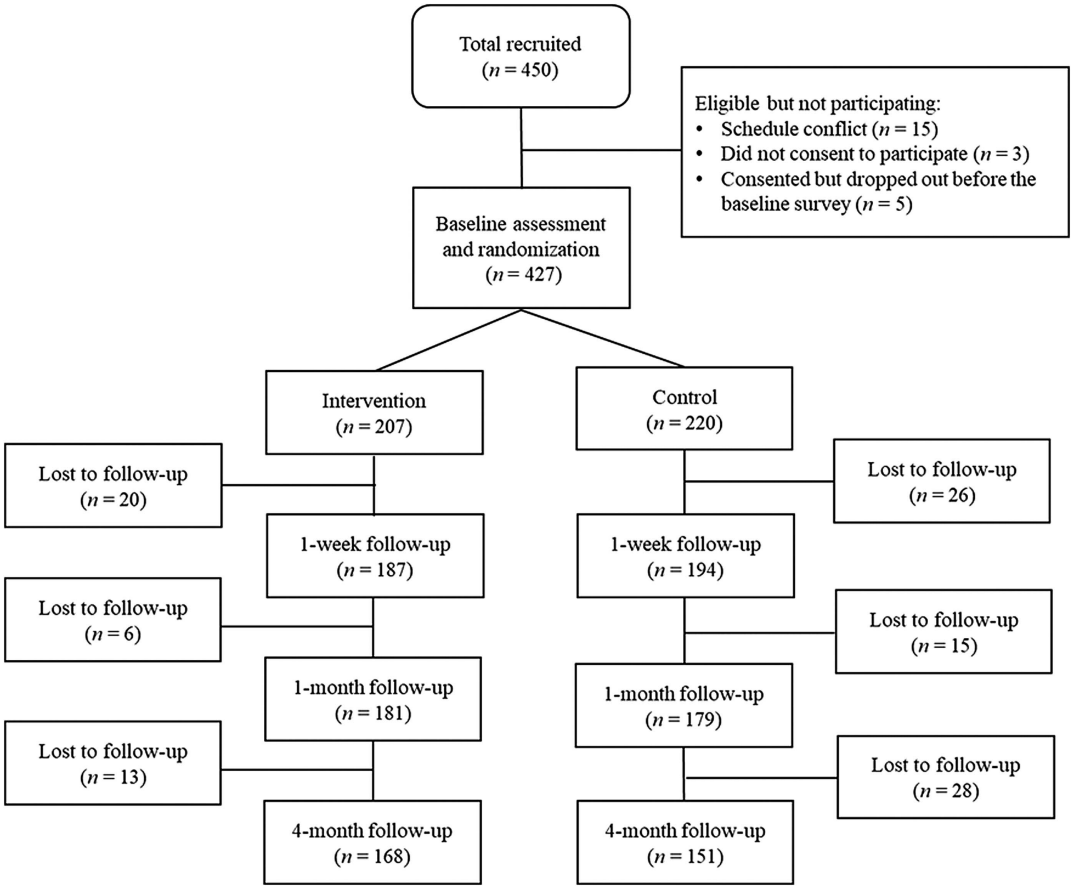
As an exploratory analysis, we further examined whether the stress intervention influenced participants' academic achievement, an important indicator closely linked to and shaped by emotional well-being for college students (Geertshuis, 2019). Some research suggested individuals who attended a stress mindset intervention exhibited improved performance (Crum et al., 2023), while other research did not find similar evidence (Goyer et al., 2022). Given the conflicting findings in the field, no strong prior hypothesis on the impact of stress intervention on academic performance was established.

Method

Participants

An a priori power analysis was used to determine sample size for the present study using G*Power. Previous research suggested a small-to-medium effect size of a stress mindset intervention (Crum et al., 2023; Goyer et al., 2022). Based on a standard medium effect size ($d = 0.5$) and a two-tailed hypothesis, the results indicated that 105 participants in each condition (i.e., 210 total participants) would be necessary to achieve a power level of 0.95 to assess the average intervention effects using frequentist methods. In anticipation of potential data loss in the follow-ups, we implemented 20% oversampling at each wave; thus, a total of 363 participants would be needed to analyze four waves. Finally, considering that the present study was expected to explore the potential moderating role of baseline stress mindset, more participants (i.e., $N = 450$) were recruited. A total of 450 first-year students from one university in Beijing were invited to take part in the study, of whom 427 agreed to participate and completed the baseline evaluation (see Figure 1).

Figure 1
Flowchart of Study Recruitment



The average age of the participants was 18.24 years ($SD = 0.57$), and 58.1% were female students. The participants were randomly assigned to the intervention ($n = 207$) or control group ($n = 220$).

Of the 427 participants, 381 (89%) were retained at the 1-week follow-up assessment, 360 (84%) were retained at the 1-month follow-up assessment, and 319 (75%) attended the 4-month follow-up assessment. An attrition analysis showed that the participants who attended all four waves of assessment did not differ significantly from those who dropped out at one or more follow-ups on age ($F = 1.68$, $p = .17$), gender ($\chi^2 = .91$, $p = .09$), subjective SES ($F = 0.75$, $p = .53$), stress mindset ($F = 0.75$, $p = .52$), negative affect ($F = 0.51$, $p = .68$), positive affect ($F = 2.25$, $p = .08$), anxious affect ($F = 1.31$, $p = .27$), life satisfaction ($F = 0.93$, $p = .43$), or academic achievement ($F = 0.47$, $p = .71$).

Design and Procedure

The study was approved by the institutional review board at the corresponding author's institution. Baseline assessments (T1) were administered approximately 1 month prior to the intervention in January 2023. The participants were then randomly assigned to either a stress mindset intervention session or a control group with a first-year orientation session. Both the intervention session and the orientation session for the control group were administered on campus during regular activity hours by two trained instructors. Each session had an approximate duration of 1.5 hr and utilized comparable instructional constructs and delivery approaches.[1] Follow-up measures were administered 1 week (T2), 1 month (T3), and 4 months (T4) after the intervention. Informed consent and all the assessments were completed online. The participants were awarded course credit for completing the activity and survey.

The implementation fidelity of the intervention was evaluated using an adapted 13-item checklist covering several aspects (J. Lee et al., 2021), including the instructor's adherence to the intervention plan, the quality of content delivery, and observed participant engagement. During each session, two researchers observed the activity delivered by each instructor and completed the fidelity checklist. The results of the fidelity ratings showed that the intervention was delivered as planned by the instructors ($M = 2.87$, $SD = 0.12$ on a 3-point Likert scale). The observed level of student engagement was also high ($M = 3.42$, $SD = 0.14$ on a 4-point Likert scale).

[1] First-year orientation sessions are routinely organized by the participating university. Four key topics were covered at the first-year orientation session: (1) an overview of the university; (2) the transition from high school to university; (3) how to learn as an undergraduate; and (4) campus life and facilities.

Measures

The participants provided demographic information at baseline, specifically their age, gender, and SES. All main variables were assessed at baseline, 1-week postintervention, 1-month follow-up, and 4-month follow-up. The participants were instructed to complete the questionnaires online while being supervised by the research assistants.

Stress Mindset

Stress mindset was assessed using the eight-item Stress Mindset Measure (Crum et al., 2013) at all waves and as a manipulation check. The participants were asked to rate how strongly they agree with statements about stress as enhancing (e.g., "Experiencing stress improves health and vitality") or debilitating (e.g., "The effects of stress are negative and should be avoided"). Responses were given on a 5-point Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). The four items assessing a stress-is-debilitating mindset were reverse-coded, with a higher score representing a stronger stress-is-enhancing mindset. The reliability coefficient for internal consistency of this scale was satisfactory ($\alpha = .78$ at T1, $\alpha = .77$ at T2, $\alpha = .76$ at T3, and $\alpha = .76$ at T4).

Emotional Well-Being

Affect

The Profile of Mood States (McNair et al., 1971) was used to measure positive affect, negative affect, and anxious affect with four items for each. The participants were asked to rate how often they experienced a specific affect, such as "happy," "sad," and "anxious", during the last week on a 5-point Likert scale ranging from 1 (*not at all*) to 5 (*extremely*). Higher scores on each scale indicate greater levels of positive, negative, and anxious affect. The reliabilities were acceptable in the present study (negative affect: $\alpha = .87$–$.91$; positive affect: $\alpha = .87$–$.91$; anxious affect: $\alpha = .91$–$.93$).

Life Satisfaction

The five-item Satisfaction with Life Scale (Diener et al., 1985) was used to measure the participants' judgments of their satisfaction with life. The participants were asked to rate how strongly they agree with each statement (e.g., "In most ways, my life is close to ideal") on a 7-point Likert scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). A higher score reflects greater levels of life satisfaction. Cronbach's α for this scale was adequate in the present study ($\alpha = .93$ at T1, $\alpha = .94$ at T2, $\alpha = .94$ at T3, and $\alpha = .93$ at T4).

Academic Achievement

Academic records were obtained at baseline and at 4-month follow-up from the university. Specifically, participants' grade point average for their most recently completed academic semester was collected. The grade point averages of the participants were standardized within the same major before further analyses.

Stress Mindset Intervention

The materials for the stress mindset intervention were updated from the literature (Crum et al., 2023; Goyer et al., 2022) and tailored to more effectively address the needs of Chinese university students through pilot interviews. Specifically, the intervention aimed to provide the participants with (a) balanced knowledge about the nature and potential impact of stress; (b) an introduction to the power of mindset in determining the impact of stress and stress responses; and (c) a three-step technique to assist them in adopting a stress-is-enhancing mindset. Given prior research indicating that online modules could potentially lead to a decline in student motivation and engagement during COVID-19 (McKenna et al., 2022), the intervention was delivered in traditional classroom settings. Two teachers led the 1.5-hr intervention session with accompanying PowerPoint slides, videos, and a workbook in which participants completed a variety of reflection exercises. Activities were revised and added to facilitate group reflection and discussion.

In the first module, the participants were presented with videos in which peers shared their stress experiences during their first year of university and were provided with scientific evidence that stress can be both detrimental and beneficial to an individual's adjustment outcomes (see Table 1). In light of the Chinese cultural norm that emphasizes self-improvement (e.g., academic achievement) in the face of adversity or stress (Shek, 2005; Shek et al., 2003), the materials were revised to present the beneficial effects of stress on well-being and health rather than performance.

In the second module, the participants were introduced to the concept of "mindset" and the ways in which mindsets influence individual health, well-being, and behavior through psychological and physiological processes. For instance, the participants were presented with scientific evidence indicating that the individual mindset about food consumption influences physiological satiety (i.e., secretion of the gut protein ghrelin; Crum et al., 2011). It is worth noting that only evidence specifically pertinent to college students was included. The participants were then introduced to the concept of stress mindset and how different mindsets (stress-is-enhancing vs. stress-is-debilitating) can have significant impacts on health, well-being, and productivity (Crum et al., 2017). The participants were instructed that mindsets are malleable and that it is possible to choose adaptive mindsets in the face of stress and adversity through a list of strategies.

In the third, fourth, and fifth modules, the participants were instructed to shift to a stress-can-be-enhancing mindset consciously and actively through three steps. In the first step, the participants were invited to *acknowledge stress* rather than deny or fight it. The participants were specifically encouraged to share their emotional, behavioral, and physiological responses to a particular distressing event that had occurred recently on campus using a word cloud in an anonymous way. In the second step, the participants were encouraged to *welcome stress* they were experiencing by recalling the values and goals behind the stress event. In the third step, the participants were instructed to *utilize stress* by reading materials about stress responses as indicators of bodily preparation for stress, identifying the potential opportunities and accomplishments associated with such stressful events, and then shifting their energy and focus to achieving these goals.

Table 1
Stress Mindset Intervention Program

Module	Time	Goal	Content
Module 1: The science of stress	10 min	1. Introduce the topic of stress during first year at university 2. Point out the contradictory feelings about stress 3. Introduce what scientists know about stress by showing both the dark side and the bright side of stress	1. Introduce the topic of stress by showing typical stressful situations during the first year at univeristy with video clips from senior students. 2. Poll results: What is stressing you right now? How stressed are you? 3. Point out the contradictory feelings about stress: We feel bad under stress, but we know it can improve our efficiency. 4. Scientific video clip: What scientists know about stress: the dark side and the bright side of stress.
Module 2: The power of mindset	15 min	1. What is mindset? 2. How mindset affects our health, behavior, learning, and personal growth 3. Mindset determines how we deal with stress	1. Introduce the concept of mindset. 2. Scientific video clip: What is mindset, and how it affects our health, behavior, learning, and personal growth. 3. Teaching content about why mindset is the key factor under stress: It determines how we feel and act under stress, as well as what stress can bring to us.
Module 3: New mindset—Step 1: Acknowledge stress	25 min	1. The scientific nature of human stress responses under stress 2. Acknowledge stress by paying attention to our feelings when under stress	1. Introduce the three steps to adopting a new stress mindset. 2. Scientific contents about how the "fight or flight" response is automatically activated under stress and that is what we usually ignore under stressful situations. 3. Discussion activity: What are your emotional, physical, and behavioral reactions toward stress?
Module 4: New mindset—Step 2: Welcome stress	20 min	1. What is stressing you now? 2. We are stressed because there are valuable things behind stress	1. What is stressing you right now? 2. Video: Senior students talk about the valuable things behind their stress. 3. Writing reflection: What are the goals and values behind your stress? Try to figure them out.
Module 5: New mindset—Step 3: Utilize stress	20 min	1. Are your typical responses to stress helping or harming your pursuit of the values and goals behind the stress? 2. Discover the opportunities and insights that your current stress gives you	1. Scientific contents about how the body mobilizes help when facing stress, and that knowing this is helpful. Support with empirical studies. 2. Writing reflection: Thinking about your typical responses to stress, are they helpful or harmful to your pursuit of the values and goals behind the stress? 3. Video: Senior students share their experiences of the opportunities and benefits they obtained from stressful experiences during their first year at univerity. 4. Discover the "gifts" that stress may give you at this moment. 5. Wrap-up: Quickly revise the three steps of a new mindset and remind students to apply them in their daily life.

All the materials, including the scientific studies, peer stories, and films, were presented as closely relevant to the population (i.e., university students) to assist in the adoption of a stress-can-be-enhancing mindset. During the wrap-up session, the participants were also encouraged to attempt the "new mindset" when confronting potential challenges, such as during exam weeks, and given advice on tools that could be used to implement the three-step process (e.g., note-taking to remind oneself of the goals and values of the stress event).

Data Analytic Plan

First, SPSS (Version 28) was used to conduct independent t tests and χ^2 tests to test whether there were significant differences in demographic characteristics and main variables between the intervention and control groups at baseline. Second, the direct intervention effects on stress mindset and emotional well-being were investigated using two-way repeated measure analyses of variance (ANOVAs) with time (baseline, 1-week postintervention, 1-month follow-up, and 4-month follow-up) as the within-subject factor and group (control vs. intervention) as the between-subject factor. Partial eta-squared (η_p^2) was used as the effect size for the main effects (time and group) and interaction effects (Time × Group), and Cohen's d was used as the effect-size measure for post hoc comparisons between and within groups. All post hoc comparisons were Bonferroni-adjusted with a level of significance set at $p < .05$, two-tailed. Additionally, indirect intervention effects (through changes in stress mindset) were measured using the PROCESS macro (Model 4) when direct intervention effects were not observed (Hayes, 2013). The bootstrap confidence intervals were used to estimate the significance of the effects based on 10,000 random samples. Third, this study adopted a fully Bayesian regression approach called Bayesian casual forest

(BCF; Hahn et al., 2017), to validate the intervention effects at 4-month follow-up and identify the moderating effects of baseline stress mindset, as suggested by recent research (Yeager, Bryan, et al., 2022). The novel and unique aspect of BCF lies in the fact that the treatment effects were estimated using standard Bayesian additive regression trees machine learning methods. These tools comprised a conservative prior distribution, particularly for the moderator function, in order to simplify functions and minimize overfitting (Chipman et al., 2010; Hill et al., 2020). In comparison to the classical method, Bayesian additive regression trees not only offers more accurate estimates of average treatment effects (ATEs) but also helps avoiding the undue influence of researcher degrees of freedom, significantly reducing the likelihood of spurious findings. Instead of using null hypothesis testing, which involves "all-or-nothing" thinking, the BCF provides a more nuanced evaluation of the stress mindset intervention by answering questions about the magnitude of the treatment effect. Therefore, the ATEs and the 10th and 90th percentiles from the posterior distribution were reported (also see figures for the 2.5th and 97.5th percentiles). All BCF approaches were performed in RStudio (Version 4.1.3), and effects were standardized by the pooled standard deviation.

Transparency and Openness

We reported how we determined the sample size, all data exclusions, all measures, and analytic software used in the study. We reported all materials about the intervention used in this study. Although this study was not preregistered, analyses presented here are considered confirmatory analyses since they were driven by empirical and theoretical support and clear study hypotheses. Data and all materials related to measures and interventions are available from the Open Science Framework at https://osf.io/2y9u5/ (Zhao, Chen, et al., 2024).

Results

Preliminary Analysis

The descriptive statistics of the main variables at each wave are presented in Table 2. Before the intervention, the participants in the intervention group did not significantly differ from those in the control group on gender ($\chi^2 = 1.28, p = .26$), age ($F = 2.94, p = .09$), SES ($F = 1.03, p = .31$), stress mindset ($F = 2.59, p = .11$), negative affect ($F = 0.51, p = .47$), positive affect ($F = 0.03, p = .88$), anxious affect ($F = 0.21$, $p = .89$), life satisfaction ($F = 0.02$, $p = .88$), or academic performance ($F = 0.02$ $p = .90$).

Intervention Effects on Stress Mindset and Emotional Well-Being

Stress Mindset

For stress mindset, the ANOVA results showed a significant main effect of time ($F = 16.90$, $p < .001$, $\eta_p^2 = .05$), with participants reporting a significantly improved stress-is-enhancing mindset over time ($ps < .002$). Moreover, a significant Time × Group interaction effect ($F = 9.69$, $p < .001$, $\eta_p^2 = .03$) was found. Post hoc pairwise comparisons indicated a significant increase in stress-is-enhancing mindset from baseline to 1-week postintervention, followed by a slight decrease from 1-week postintervention to 1-month follow-up and remaining stable over time for the intervention group, whereas the control group demonstrated minimal changes in stress mindset over time. In addition, participants in the intervention group reported a significantly higher stress-is-enhancing mindset at all times after the intervention (see Tables 3 and 4).

Affect

For negative affect, the ANOVA results revealed a significant main effect of time ($F = 4.24$, $p = .01$, $\eta_p^2 = .01$) and a significant Time × Group interaction effect ($F = 5.38$, $p = .001$, $\eta_p^2 = .02$). In general, the participants reported significantly decreased negative affect over the 4 months. Pairwise comparisons for the interaction effect showed that participants in the intervention group reported significantly lower levels of negative affect at all postintervention time points compared to the baseline assessment, with no significant differences between postintervention time points. The participants in the control group demonstrated no significant change in negative affect over time. Finally, participants in the intervention group reported significantly lower levels of negative affect than those in the control group at 1-week postintervention, 1-week follow-up, and 4-month follow-up (see Figure 2).

For positive affect, the results indicated a nonsignificant effect of time ($F = 1.07$, $p = .36$) but a significant Time × Group interaction effect ($F = 3.06$, $p = .03$, $\eta_p^2 = .01$). Post hoc comparisons revealed that the intervention group's positive affect did not change significantly over time. In contrast, participants in the control group reported significantly lower levels of positive affect at the 4-month follow-up compared to the baseline. Additionally, at both the 1-month and 4-month follow-ups, participants in the intervention group reported significantly higher levels of positive affect compared to those in the control group.

For anxious affect, the results indicated a significant effect of time ($F = 6.64$, $p < .001$), with participants reporting significantly lower levels of anxious affect at 1-month follow-up and 4-month follow-up compared with the baseline ($ps < .01$). Moreover, a marginally significant Time × Group interaction effect ($F = 2.59$, $p = .05$, $\eta_p^2 = .01$) was found. Post hoc comparisons revealed that participants in the intervention group did not demonstrate a difference in anxious affect between baseline and 1 week after the intervention but did report a significant decrease at 1-month and 4-month follow-ups. In addition, participants in the intervention group expressed substantially less anxious affect than those in the control group at both the 1-month and 4-month follow-ups.

Furthermore, as a supplementary investigation, we also investigated whether there were significant intervention effects on anxious affect influenced by changes in stress mindset, as suggested by previous research (Burnette et al., 2018, 2020). In particular, the PROCESS macro was used to test the mediation model (Hayes, 2013) for whether the intervention had significant indirect effects on the outcomes at the 4-month follow-up through the increase in stress-is-enhancing mindset (i.e., condition → change in stress mindset → outcome at 4-month follow-up). By subtracting the baseline stress mindset from the 4-month follow-up, we calculated the degree to which the participants' stress mindset shifted. In the mediation model, the participants' age, gender, SES, and baseline anxious affect were controlled. The results showed that there was a significant total effect of the intervention condition on participants' anxious affect at 4-month follow-up ($\beta = -.25$, $SE = .08$, 95%

Table 2
Descriptive Statistics and Correlations Among Main Variables

Variable	*M*	*SD*	1	2	3	4	5	6	7	8	9	10
1. T1_stress mindset	3.07	0.57	—									
2. T2_stress mindset	3.27	0.51	.48***	—								
3. T3_stress mindset	3.22	0.50	.44***	.67***	—							
4. T4_stress mindset	3.19	0.52	.20***	.39***	.47***	—						
5. T1_positive affect	3.53	0.75	.34***	.35***	.33***	.24***	—					
6. T2_positive affect	3.47	0.74	.28***	.41***	.43***	.33***	.45***	—				
7. T3_positive affect	3.52	0.75	.23***	.35***	.43***	.27***	.37***	.58***	—			
8. T4_positive affect	3.47	0.73	.16**	.27***	.34***	.42***	.34***	.48***	.43***	—		
9. T1_negative affect	2.38	0.93	−.45***	−.37***	−.32***	−.15***	−.38***	−.21***	−.22***	−.24***	—	
10. T2_negative affect	2.25	0.89	−.23***	−.45***	−.40***	−.30***	−.31***	−.33***	−.33***	−.36***	.49***	—
11. T3_negative affect	2.28	0.89	−.21***	−.42***	−.44***	−.26***	−.24***	−.31***	−.40***	−.35***	.48***	.58***
12. T4_negative affect	2.24	0.87	−.13*	−.25***	−.28***	−.43***	−.16***	−.39***	−.33***	−.44***	.21***	.40***
13. T1_anxious affect	2.72	0.79	−.27***	−.34***	−.30***	−.18***	−.32***	−.23***	−.24***	−.20***	.72***	.46***
14. T2_anxious affect	2.64	0.80	−.14**	−.33***	−.34***	−.35***	−.23***	−.26***	−.17**	−.26***	.32***	.69***
15. T3_anxious affect	2.52	0.80	−.19***	−.39***	−.42***	−.26***	−.23***	−.25***	−.30***	−.28***	.45***	.50***
16. T4_anxious affect	2.56	0.83	−.10	−.18**	−.26***	−.45***	−.14**	−.31***	−.27***	−.39***	.15**	.28***
17. T1_life satisfaction	4.39	1.34	.18***	.27***	.29***	.17**	.54***	.36***	.39***	.24***	−.25***	−.22***
18. T2_life satisfaction	4.51	1.14	.20***	.31***	.37***	.29***	.39***	.55***	.42***	.30***	−.21***	−.30***
19. T3_life satisfaction	4.60	1.21	.21***	.33***	.39***	.24***	.40***	.46***	.61***	.32***	−.23***	−.26***
20. T4_life satisfaction	4.49	1.17	.08	.19***	.29***	.29***	.23***	.27***	.27***	.50***	−.31***	−.26***

Variable	*M*	*SD*	11	12	13	14	15	16	17	18	19	20
11. T3_negative affect	2.28	0.89	—									
12. T4_negative affect	2.24	0.87	.37***	—								
13. T1_anxious affect	2.72	0.79	.46***	.22***	—							
14. T2_anxious affect	2.64	0.80	.37***	.32***	.47***	—						
15. T3_anxious affect	2.52	0.80	.85***	.33***	.48***	.47***	—					
16. T4_anxious affect	2.56	0.83	.23***	.80***	.25***	.41***	.29***	—				
17. T1_life satisfaction	4.39	1.34	−.21***	−.23***	−.31***	−.18***	−−.20***	−.26***	—			
18. T2_life satisfaction	4.51	1.14	−.33***	−.35***	−.27***	−.26***	−.32***	−.30***	.48***	—		
19. T3_life satisfaction	4.60	1.21	−.32***	−.31***	−.28***	−.21***	−.30***	−.27***	.51***	.60***	—	
20. T4_life satisfaction	4.49	1.17	−.36***	−.28***	−.28***	−.23***	−.37***	−.26***	.37***	.45***	.41***	—

Note. T1= baseline; T2 = 1-week follow-up; T3 = 1-month follow-up; T4 = 4-month follow-up.
* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 3
Pairwise Comparison Between Groups Over Time (Intervention Group vs. Control Group)

Outcome	Baseline		1-week follow-up		1-month follow-up		4-month follow-up	
	M_{diff} [95% CI]	*d*	M_{diff} [95% CI]	*d*	M_{diff} [95% CI]	*d*	M_{diff} [95% CI]	*d*
Stress mindset	−0.01 [−.16, .10]		**0.24*** [.16, .37]**	**.48**	**0.11** [.07, .27]**	**.22**	**.27*** [.14, .36]**	**.54**
Negative affect	0.06 [−.22, .19]		**−0.27** [−.52, −.13]**	**.30**	**−0.24*** [−.57, −.19]**	**.27**	**−0.42*** [−.55, −.19]**	**.50**
Positive affect	−0.01 [−.08, .24]		0.09 [−.03, .29]		**0.15** [.07, .39]**	**.20**	**0.25*** [.17, .48]**	**.34**
Anxious affect	0.01 [−.18, .16]		−0.01 [−.23, .12]		**−0.22* [−.39, −.05]**	**.28**	**−0.20* [−.38, −.02]**	**.25**

Note. *d* = Cohen's *d*, effect-size measure of post hoc comparisons between groups. Pairwise comparisons are Bonferroni-corrected ($p < .05$, two-tailed). Values in bold indicate significant results. M_{diff} = mean difference; CI = confidence interval.
* $p < .05$. ** $p < .01$. *** $p < .001$.

CI [−.41, −.08]), and a significant indirect effect of the intervention condition on participants' anxious affect at 4-month follow-up through increased stress-is-enhancing mindset (β = −.11, *SE* = .03, 95% CI [−.18, −.05]), despite the lack of significant direct intervention effects on participants' anxious affect (β = −.14, *SE* = .08, 95% CI [−.30, .03]).

Life Satisfaction

The intervention effects on life satisfaction were also examined using the repeated measures ANOVA, with the results indicating that neither the time ($F = 1.89$, $p = .13$) nor interaction ($F = 0.43$, $p = .74$) effects were statistically significant. Consequently, the indirect effects of the intervention were evaluated while controlling for demographic information and life satisfaction at baseline. The results suggested that there was a significant indirect effect of the intervention condition on participants' life satisfaction at the 4-month follow-up through an increased stress-is-enhancing mindset (β = .08, *SE* = .03, 95% CI [.03, .15]), whereas the total intervention effects (β = .01, *SE* = .12, 95% CI [−.22, .24]) and direct intervention effects (β = −.07, *SE* = .12, 95% CI [−.30, .16]) on life satisfaction were nonsignificant.

Table 4
Pairwise Comparisons of Each Time Point Within Groups

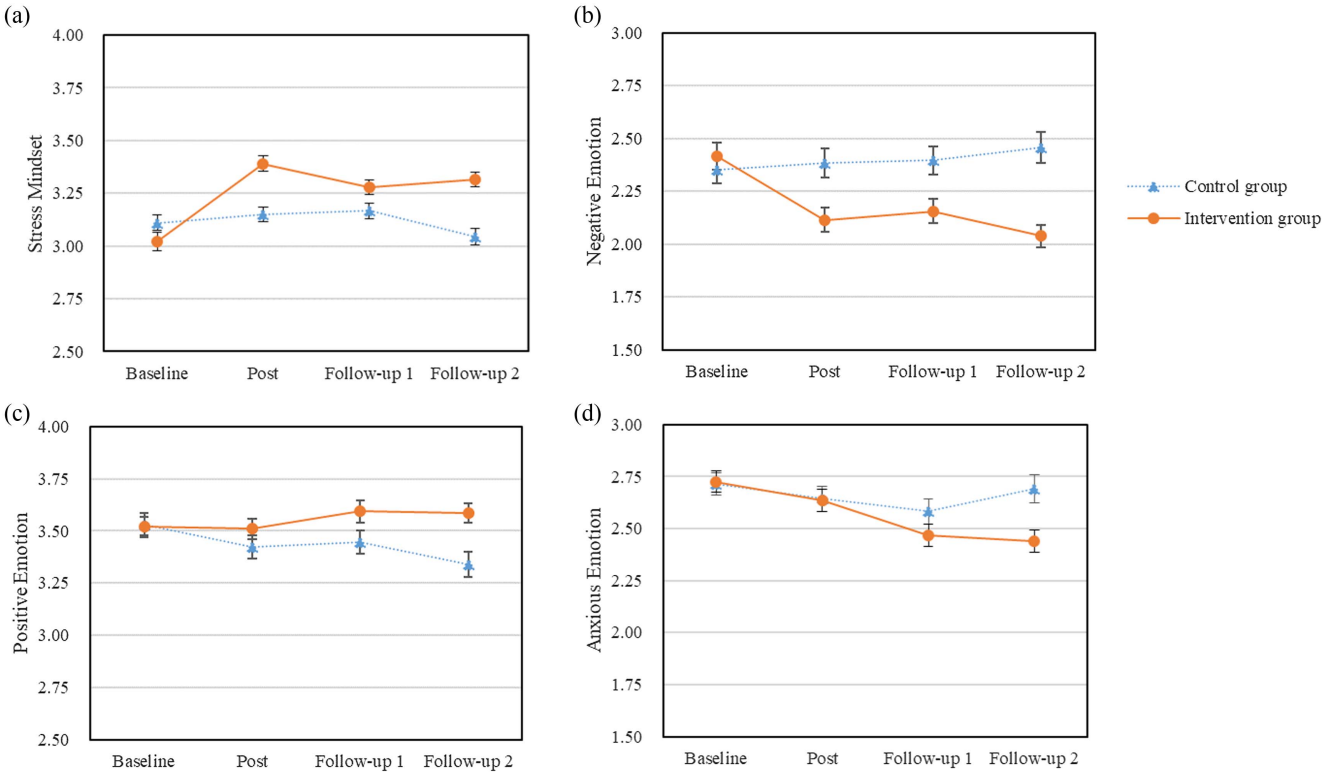
Group	Baseline versus 1-week follow-up		Baseline versus 1-month follow-up		Baseline versus 4-month follow-up	
	M_{diff} [95% CI]	*d*	M_{diff} [95% CI]	*d*	M_{diff} [95% CI]	*d*
Stress mindset						
CON	−0.06 [−.18, .06]		−0.07 [−.19, .06]		0.01 [−.14, .15]	
INT	**−0.35*** [−.46, −.24]**	**.60**	**−0.27*** [−.39, −.15]**	**.42**	**−0.27*** [−.41, −.14]**	**.48**
Negative affect						
CON	−0.04 [−.23, .15]		−0.07 [−.27, .13]		−0.01 [−.23, .24]	
INT	**0.27** [.09, .45]**	**.29**	**0.30*** [.11, .49]**	**.24**	**0.36*** [.14, .59]**	**.39**
Positive affect						
CON	0.07 [−.10, .23]		0.07 [−.11, .25]		**0.18* [.001, .36]**	**.17**
INT	0.02 [−.14, .17]		−0.08 [−.25, .10]		−0.06 [−.23, .11]	
Anxious affect						
CON	0.04 [−.14, .21]		0.08 [−.10, .25]		0.07 [−.14, .27]	
INT	0.10 [−.07, .27]		**0.30*** [.14, .47]**	**.35**	**0.27** [.08, .47]**	**.39**

Group	1-week follow-up versus 1-month follow-up		1-week follow-up versus 4-month follow-up		1-month follow-up versus 4-month follow-up	
	M_{diff} [95% CI]	*d*	M_{diff} [95% CI]	*d*	M_{diff} [95% CI]	*d*
Stress mindset						
CON	−0.01 [−.09, .08]		0.06 [−.06, .18]		0.07 [−.03, .18]	
INT	**0.08* [.002, .16]**	**.20**	0.08 [−.04, .19]		−0.002 [−.10, .10]	
Negative affect						
CON	−0.03 [−.20, .15]		0.05 [−.16, .25]		0.08 [−.13, .28]	
INT	0.03 [−.14, .20]		0.09 [−.10, .29]		0.07 [−.13, .26]	
Positive affect						
CON	0.01 [−.14, .15]		0.12 [−.04, .27]		0.11 [−.06, .28]	
INT	−0.09 [−.23, .05]		0.07 [−.22,. 70]		0.02 [−.14, .18]	
Anxious affect						
CON	−0.04 [−.14, .22]		0.03 [−.16, .22]		0.01 [−.21, .19]	
INT	**−0.20** [.03, .37]**	**.27**	0.17 [−.01, .35]		−0.03 [−.22, .16]	

Note. *d* = Cohen's *d*, effect-size measure of post hoc comparisons within groups; pairwise comparisons are Bonferroni-corrected ($p < .05$, two-tailed). Values in bold indicate significant results. CI = confidence interval; CON = control group; INT = intervention group; M_{diff} = mean difference.
* $p < .05$. ** $p < .01$. *** $p < .001$.

Figure 2

Results of Repeated Measure Analyses of Variance for (a) Stress Mindset, (b) Negative Affect, (c) Positive Affect, and (d) Anxious Affect



Note. Post = 1-week postintervention; Follow-Up 1 = 1-month follow-up; Follow-Up 2 = 4-month follow-up. Values represent mean ± standard error of the mean. See the online article for the color version of this figure.

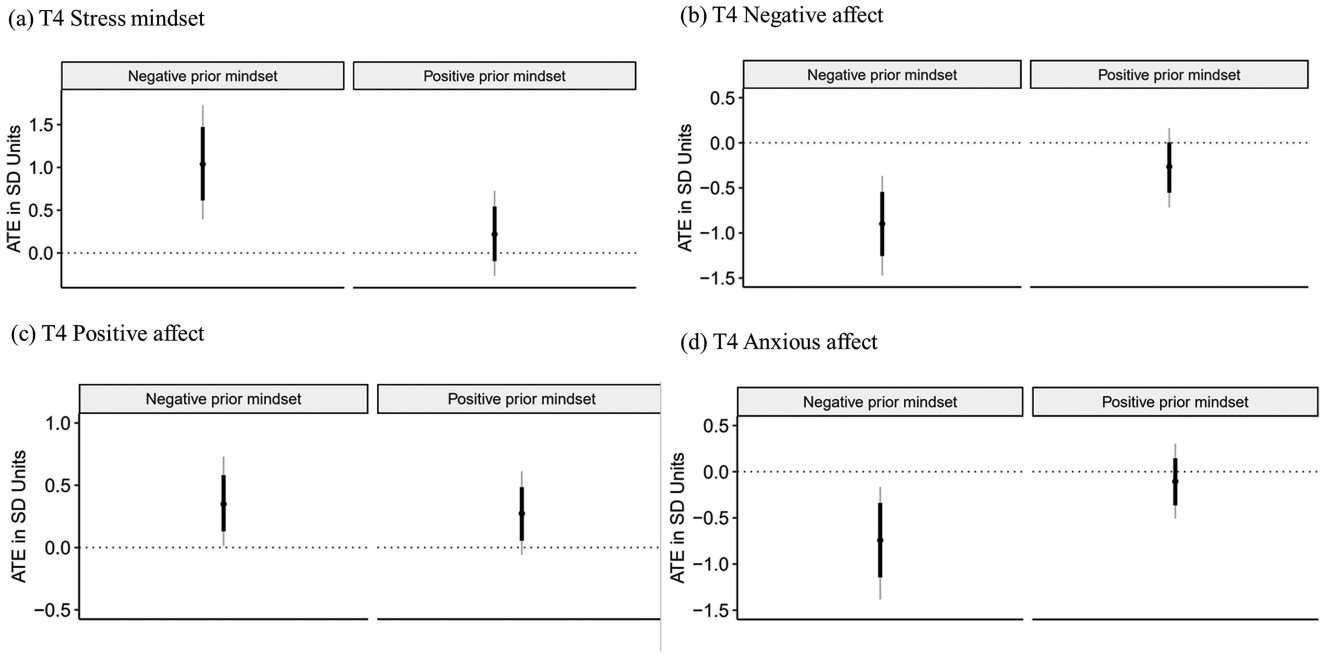
Moderating Role of Baseline Stress Mindset

BCF analyses revealed less negative affect in the intervention condition at 4-month follow-up than those in the control condition, ATE = −0.48 *SD* (10th percentile: −.77, 90th percentile: −.20). The ATE is larger and more reliable among those who hold a stronger negative stress mindset (ATE = −0.90 *SD* [−1.26, −.55]) than among those who hold a weaker negative stress mindset (ATE = −0.27 *SD* [−.55, .00]; see Figure 3 and more information in the Supplemental Material). Second, participants in the intervention condition also reported lower anxious affect at 4-month follow-up than those in the control condition, ATE = −0.32 *SD* [−.63, −.02]. Likewise, the ATE is greater and more reliable among participants with a stronger negative stress mindset (ATE = −0.74 *SD* [−1.15, −.34]) compared to those with a weaker negative stress mindset (ATE = −0.11 *SD* [−.36, .15]). Third, participants in the intervention condition reported higher positive affect at 4-month follow-up than those in the control condition, ATE = 0.30 *SD* [.08, .52]. Again, the ATE is relatively larger among individuals with a stronger negative stress mindset (ATE = 0.35 *SD* [.13, .58]) in comparison to those with a weaker negative stress mindset (ATE = 0.27 *SD* [.05, .48]). Previous research suggested that a treatment effect exceeding 0.30 *SD* can be considered a large effect in a real-world setting (Yeager, Bryan, et al., 2022); therefore, the results showed a promising effect of a stress mindset intervention on emotional well-being, with the effect size being larger among those with a stronger negative stress mindset.

In addition, there was no discernible overall treatment effect for participants in the intervention condition in terms of life satisfaction at 4-month follow-up when compared with those in the control condition (ATE = 0.01 *SD* [−.10, .12]), and no moderation effects of baseline stress mindset were found. We further explored whether baseline stress mindset moderated the indirect intervention effects on life satisfaction at 4-month follow-up using the PROCESS macro (Model 8), as inspired by earlier research (Zhao, Yu, et al., 2024). The results showed that baseline stress mindset significantly moderated the indirect association between condition and life satisfaction at the 4-month follow-up ($p < .001$; see Figure 4). Specifically, the association between condition and shift in stress mindset, which subsequently influenced the participants' life satisfaction at the 4-month follow-up, was significant among those with moderate ($b = .29$, $SE = .05$, $p < .001$, 95% CI [.19, .39]) and lower levels ($b = .59$, $SE = .07$, $p < .001$, 95% CI [.45, .73]) of stress-is-enhancing mindset at baseline, but nonsignificant among those who reported higher levels of stress-is-enhancing mindset at baseline ($b = -.01$, $SE = .07$, $p = .90$, 95% CI [−.15, .13]). Moreover, baseline stress mindset did not significantly moderate the direct effects of the condition on life satisfaction at 4-month follow-up ($b = -.02$, $SE = .21$, $p = .91$, 95% CI [−.44, .39]), which is consistent with findings from BCF.

Figure 3

Intervention Effects on Stress Mindset and Emotional Well-Being at T4 by Baseline Mindset Subgroups



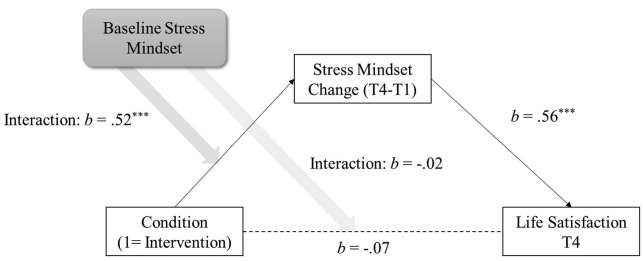
Note. Thick bands indicate the 10th and 90th percentiles of the posterior distribution. The gray lines indicate the 2.5th–97.5th percentile. T4 = 4-month follow-up; ATE = average treatment effects.

Exploratory Analysis of Intervention Effects on Academic Achievement

BCF analyses revealed no discernible overall treatment effect for participants in the intervention condition in terms of academic achievement at 4-month follow-up when compared with those in the control condition (ATE = 0.15 *SD* [−.06, .37]). Moreover, the ATE is relatively larger and more reliable among participants with a stronger negative stress mindset (ATE = 0.35 *SD* [.08, .63]) compared to those with a weaker negative stress mindset (ATE = 0.06 *SD* [−.13, .25]) at baseline (see Figure 5).

Figure 4

Moderated Mediation Effects of Baseline Stress Mindset on the Association Between Condition and Life Satisfaction at the 4-Month Follow-Up



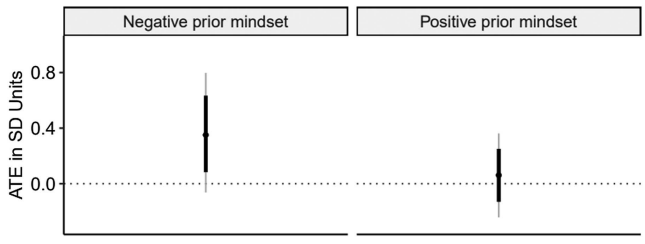
Note. The model was estimated after controlling for gender, age, socioeconomic status, and baseline life satisfaction. Unstandardized coefficients are presented. T4 = 4-month follow-up; T1 = baseline.
*** $p < .001$.

Discussion

The present study fills important gaps in the literature by investigating the effectiveness of a stress mindset intervention with a metacognitive approach on the emotional well-being of Chinese first-year university students confronting challenges and transitions. Through the adoption of a rigorous intervention design, the findings extend the research and theory on stress mindset by providing a more nuanced picture of the changing trajectories of stress mindsets and emotional well-being over a 4-month period after intervention. Overall, the intervention significantly improved the participants' stress-is-enhancing mindset, which persisted over the 4 months following the intervention, supporting Hypothesis 1. Moreover, participating in the intervention significantly improved individual emotional well-being directly (i.e., affect) or indirectly (i.e., life satisfaction), supporting Hypothesis 2. It was also found that baseline stress mindset significantly moderated the effects of the intervention on emotional well-being (i.e., negative affect, anxious affect, and life satisfaction), partially supporting Hypothesis 3. An exploratory analysis revealed that the intervention did not have a noticeable impact on academic achievement on average. The intervention yielded benefits, only for those with a higher negative stress mindset at baseline. The present study offers preliminary evidence that stress-is-enhancing mindsets can be fostered in non-Western cultural contexts through metacognitive approaches, which may improve distinct aspects of the emotional

Figure 5

Intervention Effects on Academic Achievement at the 4-Month Follow-Up by Baseline Mindset Subgroups



Note. Thick bands indicate the 10th and 90th percentiles of the posterior distribution. The gray lines indicate the 2.5th–97.5th percentile. ATE = average treatment effects.

well-being of university students under stress and improve the understanding of the boundary conditions for the effectiveness of such interventions.

Intervention Effects on Stress Mindset

Interestingly, participants had a generally balanced stress mindset before the intervention (i.e., $M = 3.07$ at baseline on a range of 1–5), as opposed to the stress-is-debilitating mindset observed in Western cultural contexts (e.g., means below 1.6 on a range of 0–4 in the U.S. populations; Crum et al., 2023). This may be plausible due to the influence of Confucian thoughts, which place significant emphasis on ultimate goals and purpose (Sullivan et al., 2016). This teleological pattern of thinking could potentially apply to stressful experiences (Ji et al., 2022). Therefore, Chinese may emphasize the meaning of stressful events, such as achievement obtained through perseverance (Shek, 2005), leading to a relatively balanced stress mindset at baseline. The results suggested that a 1.5-hr stress mindset intervention significantly increased participants' stress-is-enhancing mindset (vs. the control) at all time points following the intervention, with relatively medium effect sizes. However, it is worth noting that the beneficial impacts of the intervention decreased at the 1-month follow-up and were then sustained at the 4-month follow-up. The decreased pattern of stress mindset after postintervention is in line with the findings of Crum et al. (2023), which suggested that individuals may show a decline in stress-is-enhancing mindset when faced with conflicting information about stress (e.g., information that supports both the enhancing and debilitating impacts of stress) or when confronted with prominent stressors, such as a global pandemic. In our study, however, the intervention effect on stress mindset persisted even after a slight postintervention decrease, which contrasts with studies using nonmetacognitive approaches that have found the effect fades over time (e.g., Keech et al., 2021). This provides supporting evidence that shifting stress mindsets with metacognitive approaches could have sustainable intervention effects, at least over a 4-month period. By providing balanced information regarding the nature of stress alongside strategies for developing a "stress-can-be-enhancing mindset," the participants were empowered to try new mindsets as additional resources in their daily lives and when confronted with challenges (i.e., shifting learning modes and adjusting to college life). It seems that it is feasible to cultivate an adaptive mindset in Chinese culture; it also aligns well with the cultural tendency to emphasize internal coping and personal resilience.

Intervention Effects on Emotional Well-Being

Consistent with empirical studies showing a positive causal relationship between stress mindset and well-being (Crum et al., 2013, 2017), the stress mindset intervention had a significant impact on participants' emotional well-being over time, with effect sizes ranging from small to medium. However, the intervention effects on different indicators varied. First, participants in the intervention group reported significantly reduced negative affect compared with baseline assessment across all time points following the implementation of the intervention. The intervention appears to have had a strong impact on reducing negative affect, as evidenced by its immediate and sustained intervention effects. Second, a significant intervention effect on anxious affect was found at 1-month follow-up and 4-month follow-up, indicating that the effect of the intervention on reducing anxious affect took longer to manifest. Third, although significant between-group differences were observed in individual positive affect at 1-month follow-up and 4-month follow-up, participants in the intervention group did not show significant fluctuation over time, whereas participants in the control group reported significantly decreased positive affect at 4-month follow-up, approximately 1 week before their final examination. This points to the apparent protective effects of the intervention on maintaining the stability of positive emotions, minimizing the likelihood that individuals' positive emotions will decrease when facing challenging situations. Fourth, only indirect effects of intervention on life satisfaction were found, through an increased stress-is-enhancing mindset. One possible explanation is that life satisfaction is more stable than emotions (Cohn et al., 2009; Turner et al., 2022) and may require a longer period for an intervention to take effect. The present study investigated the impact of the intervention on emotional well-being over a span of 4 months, and further research with a longitudinal design is warranted to validate the current findings and examine the long-term impacts of a stress mindset intervention on relatively stable indicators such as depression and life satisfaction.

It is intriguing to note that the intervention appears to have had a more beneficial impact on negative emotions than on positive ones, which is in contrast with previous findings in the Western context (e.g., Goyer et al., 2022). In particular, a prior study revealed that a stress mindset intervention significantly raised positive emotions among American college students during exam week while observing nonsignificant effects on negative emotions (Goyer et al., 2022). The disparity may be explained by cultural variations in understanding positive emotions between Western and Eastern cultures (Leu et al., 2011; Ma et al., 2018). The cultural narrative in Western countries emphasizes the beneficial characteristics of positive emotions: associating them, for instance, with personal achievement, high self-worth, and good health (Sims et al., 2015). As a reflection of the cultural value of individualism and personal achievement, having positive emotions is therefore encouraged and regarded as an important goal in Western countries (Mauss et al., 2011). In contrast, East Asians with a tendency for a more dialectical way of thinking might be more prone to perceiving positive emotions as temporary and unstable and as having

possibly negative outcomes, as implied in the proverb, "misery hides in happiness" (Spencer-Rodgers et al., 2010). Additionally, Eastern Asians are more likely to perceive negative aspects of positive emotion than Westerners (Joshanloo et al., 2014). For instance, Japanese are more prone than Americans to believe that being happy might cause problems in social connections, such as making people envious (Uchida, 2010). Consequently, the pursuit of positive emotions in Asian cultural contexts like China is characterized by moderation rather than maximization (Chentsova-Dutton et al., 2010; Springstein & English, 2023). In light of this, it is not surprising that the participants reported relatively stable positive emotions, as opposed to the increase in positive emotions observed in the Western context, despite perceiving stress as beneficial. In addition, variations in perceptions of academic stress may influence the effectiveness of stress mindset interventions. Academic excellence is regarded as a social norm in Chinese culture (Zhang & Zheng, 2017); consequently, Chinese college students experience extreme academic pressure, which is significantly associated with negative emotions (Charles et al., 2013). This close association with the primary stressor experienced by the participants might explain why the intervention appears to have had a more pronounced influence on negative emotions. Collectively, the current findings expand stress mindset theory by underscoring the necessity of considering cultural nuances when evaluating and interpreting the effectiveness of a stress intervention on emotional experiences. The stress intervention seems to show a more pronounced effect in reducing negative affect in the Chinese population, given that cultural norms where participants live may play a role in shaping their perceptions of stress and affective experiences. More research is therefore necessary to examine stress mindset interventions in diverse cultural contexts to enrich our understanding of how culture shapes the effectiveness of a stress mindset intervention.

The Moderating Role of Baseline Stress Mindset

Finally, the results suggested that baseline stress mindset is an important moderator of the intervention effects on indicators of emotional well-being. More precisely, the effect size of the intervention was greater or more reliable among those with lower levels of baseline stress mindset and was limited to participants who reported a negative-oriented stress-is-enhancing mindset at baseline. To supplement the BCF results, traditional regression analyses were also performed; comparable results have been observed (see Supplemental Material for further information). These findings support the theoretical contention that a mindset intervention might be more effective in specific focal groups (e.g., disadvantaged or at-risk groups; Burnette et al., 2023; Yeager & Dweck, 2020; Yeager et al., 2016), providing cross-cultural evidence. They are also partially in line with the findings of recent empirical research, which found temporal effects of a stress mindset intervention (i.e., 2-week follow-up) only among those who reported higher levels of perceived distress at baseline (Keech et al., 2021). Indeed, the baseline data supported that individuals who indicated lower levels of a stress-is-enhancing mindset exhibited significantly lower emotional well-being ($ps < .001$), indicating that this particular group was at a disadvantage and, more importantly, had greater potential for improvement. While our findings provide insight into the moderating role of baseline stress mindset, additional research is warranted to discern the nuanced conditions under which mindset interventions are most beneficial, such as SES.

Intervention Effects on Academic Achievement

Findings also suggest that the intervention effects on academic achievement are not noticeable, which is consistent with some of the prior research investigating the impacts of stress mindset interventions within a Western cultural context (Goyer et al., 2022). Indeed, stress mindset is not situation-specific and does not uniquely focus on performance, so it makes sense that its impact on academic achievement would be light (Crum et al., 2013). Aligning with clues provided in previous research, the current findings support the idea that the impact of a stress-enhancing mindset on achievement could be indirect or conditional (Goyer et al., 2022; Keech et al., 2018). Participants with a negative prior stress mindset seem to gain more benefits from the intervention in terms of both emotional well-being and academic achievement. Further investigation is necessary to examine potential subgroups that may obtain greater benefits from stress mindset interventions in terms of distinct or multidimensional outcomes.

Limitations and Directions for Further Research

The present study has several limitations that should be addressed in future research. First, the main variables of emotional well-being were measured using self-reported measures, providing preliminary evidence for the efficacy of a stress mindset intervention. As there may be biases involved in self-reporting, future investigations could incorporate objective indicators, such as physiological measurements and health records, to validate and extend the current findings. Second, the present study was conducted among Chinese university students, providing supportive evidence that a stress mindset intervention could be effective in promoting emotional well-being in a non-Western cultural context. Assessing the generalizability of the findings to other populations and cultural contexts is a crucial next step. Such research has the potential to identify population- or cultural-level moderators of the intervention effects, which could help inform optimal ways to scale the intervention more effectively. Third, although a systematic exploration was conducted to test the effectiveness of a stress mindset intervention over 4 months, the long-term impacts remain understudied. Additional insights into the sustainability of the beneficial impacts of a stress mindset intervention can be gained from longer-term evaluations (e.g., 12 months or more).

Implications

Together, the findings of the present study have important implications for future research and intervention programs. Theoretically, the current findings lend credence to implicit theories and present evidence that stress mindset interventions may be beneficial across cultural boundaries. Practically, promoting a stress-is-enhancing mindset through interventions alone or in conjunction with stress management interventions may possibly serve as a feasible approach to helping students cope with inevitable stressful events, especially for those who are experiencing transition periods. Furthermore, future research may benefit from exploring stress mindset interventions in shorter forms or with a synergistic

mindset; these approaches may yield comparable results while remaining cost-effective as well as scalable.

Conclusion

The present study investigated the effectiveness of a stress mindset intervention designed with a metacognitive approach on emotional well-being among first-year university students in a non-Western cultural context like China. Our research results indicate that a one-session intervention can yield positive effects on emotional well-being over a 4-month period and that such an intervention is especially suited to those who report a weaker stress-is-enhancing mindset at baseline. Moreover, the impact of the intervention on academic achievement is not noticeable on average, while those with a weaker prior stress-is-enhancing mindset obtained limited benefit. In light of the escalating levels of stress and uncertainty in modern society, further investigations of when and for whom stress mindset interventions can be beneficial have the potential to make a significant positive public health impact.

References

Baynard-Montague, J., & James, L. E. (2023). A stress mindset manipulation can affect speakers' articulation rate. *Anxiety, Stress, & Coping*, *36*(5), 543–554. https://doi.org/10.1080/10615806.2023.2179621

Booker, J. A., Ell, M., Fivush, R., Greenhoot, A. F., McLean, K. C., Wainryb, C., & Pasupathi, M. (2022). Early impacts of college, interrupted: Considering first-year students' narratives about COVID and reports of adjustment during college shutdowns. *Psychological Science*, *33*(11), 1928–1946. https://doi.org/10.1177/09567976221108941

Bruffaerts, R., Mortier, P., Kiekens, G., Auerbach, R. P., Cuijpers, P., Demyttenaere, K., Green, J. G., Nock, M. K., & Kessler, R. C. (2018). Mental health problems in college freshmen: Prevalence and academic functioning. *Journal of Affective Disorders*, *225*, 97–103. https://doi.org/10.1016/j.jad.2017.07.044

Burnette, J. L., Billingsley, J., Banks, G. C., Knouse, L. E., Hoyt, C. L., Pollack, J. M., & Simon, S. (2023). A systematic review and meta-analysis of growth mindset interventions: For whom, how, and why might such interventions work? *Psychological Bulletin*, *149*(3–4), 174–205. https://doi.org/10.1037/bul0000368

Burnette, J. L., Hoyt, C. L., & Orvidas, K. (2017). Mindsets of body weight. In C. M. Zedelius, B. C. N. Müller, & J. W. Schooler (Eds.), *The science of lay theories: How beliefs shape our cognition, behavior, and health* (pp. 319–339). Springer International Publishing. https://doi.org/10.1007/978-3-319-57306-9_13

Burnette, J. L., Hoyt, C. L., Russell, V. M., Lawson, B., Dweck, C. S., & Finkel, E. (2020). A growth mind-set intervention improves interest but not academic performance in the field of computer science. *Social Psychological and Personality Science*, *11*(1), 107–116. https://doi.org/10.1177/1948550619841631

Burnette, J. L., Russell, M. V., Hoyt, C. L., Orvidas, K., & Widman, L. (2018). An online growth mindset intervention in a sample of rural adolescent girls. *British Journal of Educational Psychology*, *88*(3), 428–445. https://doi.org/10.1111/bjep.12192

Charles, S. T., Piazza, J. R., Mogle, J., Sliwinski, M. J., & Almeida, D. M. (2013). The wear and tear of daily stressors on mental health. *Psychological Science*, *24*(5), 733–741. https://doi.org/10.1177/0956797612462222

Chentsova-Dutton, Y. E., Tsai, J. L., & Gotlib, I. H. (2010). Further evidence for the cultural norm hypothesis: Positive emotion in depressed and control European American and Asian American women. *Cultural Diversity & Ethnic Minority Psychology*, *16*(2), 284–295. https://doi.org/10.1037/a0017562

Chipman, H. A., George, E. I., & McCulloch, R. E. (2010). BART: Bayesian additive regression trees. *The Annals of Applied Statistics*, *4*(1), 266–298. https://doi.org/10.1214/09-AOAS285

Cnossen, A. M., Maarsingh, B. M., Jerčić, P., & Rosier, I. (2023). The effects of stress mindset, manipulated through serious game intervention, on performance and situation awareness of elite female football players in the context of a match: An experimental study. *Games for Health Journal*, *12*(2), 158–167. https://doi.org/10.1089/g4h.2022.0209

Cohn, M. A., Fredrickson, B. L., Brown, S. L., Mikels, J. A., & Conway, A. M. (2009). Happiness unpacked: Positive emotions increase life satisfaction by building resilience. *Emotion*, *9*(3), 361–368. https://doi.org/10.1037/a0015952

Crum, A. J., Akinola, M., Martin, A., & Fath, S. (2017). The role of stress mindset in shaping cognitive, emotional, and physiological responses to challenging and threatening stress. *Anxiety, Stress, & Coping*, *30*(4), 379–395. https://doi.org/10.1080/10615806.2016.1275585

Crum, A. J., Corbin, W. R., Brownell, K. D., & Salovey, P. (2011). Mind over milkshakes: Mindsets, not just nutrients, determine ghrelin response. *Health Psychology*, *30*(4), 424–429. https://doi.org/10.1037/a0023467

Crum, A. J., Handley-Miner, I. J., & Smith, E. N. (2021). The stress-mindset intervention. In G. M. Walton & A. J. Crum (Eds.), *Handbook of wise interventions: How social psychology can help people change* (pp. 217–238). Guilford Press.

Crum, A. J., Salovey, P., & Achor, S. (2013). Rethinking stress: The role of mindsets in determining the stress response. *Journal of Personality and Social Psychology*, *104*(4), 716–733. https://doi.org/10.1037/a0031201

Crum, A. J., Santoro, E., Handley-Miner, I., Smith, E. N., Evans, K., Moraveji, N., Achor, S., & Salovey, P. (2023). Evaluation of the "rethink stress" mindset intervention: A metacognitive approach to changing mindsets. *Journal of Experimental Psychology: General*, *152*(9), 2603–2622. https://doi.org/10.1037/xge0001396

Dagani, J., Buizza, C., Ferrari, C., & Ghilardi, A. (2023). The role of psychological distress, stigma and coping strategies on help-seeking intentions in a sample of Italian college students. *BMC Psychology*, *11*(1), Article 177. https://doi.org/10.1186/s40359-023-01171-w

Diener, E., Emmons, R. A., Larsen, R. J., & Griffin, S. (1985). The Satisfaction With Life Scale. *Journal of Personality Assessment*, *49*(1), 71–75. https://doi.org/10.1207/s15327752jpa4901_13

Dweck, C. S., & Yeager, D. S. (2019). Mindsets: A view from two eras. *Perspectives on Psychological Science*, *14*(3), 481–496. https://doi.org/10.1177/1745691618804166

Geertshuis, S. A. (2019). Slaves to our emotions: Examining the predictive relationship between emotional well-being and academic outcomes. *Active Learning in Higher Education*, *20*(2), 153–166. https://doi.org/10.1177/1469787418808932

Goyer, J. P., Akinola, M., Grunberg, R., & Crum, A. J. (2022). Thriving under pressure: The effects of stress-related wise interventions on affect, sleep, and exam performance for college students from disadvantaged backgrounds. *Emotion*, *22*(8), 1755–1772. https://doi.org/10.1037/emo0001026

Hahn, P. R., Murray, J. S., & Carvalho, C. M. (2017). Bayesian Regression Tree Models for causal inference: Regularization, confounding, and heterogeneous effects. *Bayesian Analysis*, *15*(3), 965–1056. https://doi.org/10.1214/19-BA1195

Hayes, A. (2013). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach*. Guilford Press.

Hecht, C., Yeager, D., Dweck, C., & Murphy, M. (2021). Beliefs, affordances, and adolescent development: Lessons from a decade of growth mindset interventions. In J. J. Lockman (Ed.), *Advances in child development and behavior* (Vol. 61, pp. 169–197). Elsevier. https://doi.org/10.1016/bs.acdb.2021.04.004

Hill, J., Linero, A., & Murray, J. (2020). Bayesian additive regression trees: A review and look forward. In N. Reid, S. M. Stigler, & T. A. Louis (Eds.),

Annual review of statistics and its application (Vol. 7, pp. 251–278). Annual Reviews. https://doi.org/10.1146/annurev-statistics-031219-041110

Hudd, S., Dumlao, J., Erdmann-Sager, D., Murray, D., Phan, E., Soukas, N., & Yokozuka, N. (2000). Stress at college: Effects on health habits, health status and self-esteem. *College Student Journal*, *34*(2), 217–227.

Huebschmann, N. A., & Sheets, E. S. (2020). The right mindset: Stress mindset moderates the association between perceived stress and depressive symptoms. *Anxiety, Stress, & Coping*, *33*(3), 248–255. https://doi.org/10.1080/10615806.2020.1736900

Ji, L., Yap, S., Khei, Z. A. M., Wang, X., Chang, B., Shang, S. X., & Cai, H. (2022). Meaning in stressful experiences and coping across cultures. *Journal of Cross-Cultural Psychology*, *53*(9), 1015–1032. https://doi.org/10.1177/00220221221109552

Jiang, Y., Zhang, J., Ming, H., Huang, S., & Lin, D. (2019). Stressful life events and well-being among rural-to-urban migrant adolescents: The moderating role of the stress mindset and differences between genders. *Journal of Adolescence*, *74*(1), 24–32. https://doi.org/10.1016/j.adolescence.2019.05.005

Joshanloo, M., Lepshokova, Z. K., Panyusheva, T., Natalia, A., Poon, W.-C., Yeung, V. W., Sundaram, S., Achoui, M., Asano, R., Igarashi, T., Tsukamoto, S., Rizwan, M., Khilji, I. A., Ferreira, M. C., Pang, J. S., Ho, L. S., Han, G., Bae, J., & Jiang, D.-Y. (2014). Cross-Cultural Validation of Fear of Happiness Scale across 14 national groups. *Journal of Cross-Cultural Psychology*, *45*(2), 246–264. https://doi.org/10.1177/0022022113505357

Keech, J. J., Hagger, M. S., & Hamilton, K. (2021). Changing stress mindsets with a novel imagery intervention: A randomized controlled trial. *Emotion*, *21*(1), 123–136. https://doi.org/10.1037/emo0000678

Keech, J. J., Hagger, M. S., O'Callaghan, F. V., & Hamilton, K. (2018). The influence of university students' stress mindsets on health and performance outcomes. *Annals of Behavioral Medicine*, *52*(12), 1046–1059. https://doi.org/10.1093/abm/kay008

Kim, H. S., Sherman, D. K., & Taylor, S. E. (2008). Culture and social support. *American Psychologist*, *63*(6), 518–526. https://doi.org/10.1037/0003-066X

Lee, H., Masuda, T., Ishii, K., Yasuda, Y., & Ohtsubo, Y. (2023). Cultural differences in the perception of daily stress between European Canadian and Japanese undergraduate students. *Personality and Social Psychology Bulletin*, *49*(4), 571–584. https://doi.org/10.1177/01461672211070360

Lee, J., Lee, H. J., Song, J., & Bong, M. (2021). Enhancing children's math motivation with a joint intervention on mindset and gender stereotypes. *Learning and Instruction*, *73*, Article 101416. https://doi.org/10.1016/j.learninstruc.2020.101416

Leu, J., Wang, J., & Koo, K. (2011). Are positive emotions just as "positive" across cultures? *Emotion*, *11*(4), 994–999. https://doi.org/10.1037/a0021332

Ma, X., Tamir, M., & Miyamoto, Y. (2018). A socio-cultural instrumental approach to emotion regulation: Culture and the regulation of positive emotions. *Emotion*, *18*(1), 138–152. https://doi.org/10.1037/emo0000315

Maarsingh, B. M., Bos, J., Van Tuijn, C. F. J., & Renard, S. B. (2019). Changing stress mindset through Stressjam: A virtual reality game using biofeedback. *Games for Health Journal*, *8*(5), 326–331. https://doi.org/10.1089/g4h.2018.0145

Mauss, I. B., Tamir, M., Anderson, C. L., & Savino, N. S. (2011). Can seeking happiness make people unhappy? Paradoxical effects of valuing happiness. *Emotion*, *11*(4), 807–815. https://doi.org/10.1037/a0022010

McKenna, B. A., Horton, C., & Kopittke, P. M. (2022). Online engagement during COVID-19: Comparing a course previously delivered traditionally with emergency online delivery. *Human Behavior and Emerging Technologies*, *2022*(1), Article 6813033. https://doi.org/10.1155/2022/6813033

McNair, D. M., Lorr, M., & Droppleman, L. F. (1971). *Manual profile of mood states*. Educational and Industrial Testing Service.

Miu, A. S., & Yeager, D. S. (2015). Preventing symptoms of depression by teaching adolescents that people can change: Effects of a brief incremental theory of personality intervention at 9-month follow-up. *Clinical Psychological Science*, *3*(5), 726–743. https://doi.org/10.1177/2167702614548317

Olson, K. R., & Dweck, C. S. (2008). A blueprint for social cognitive development. *Perspectives on Psychological Science*, *3*(3), 193–202. https://doi.org/10.1111/j.1745-6924.2008.00074.x

Paustian-Underdahl, S. C., Palmer, J. C., Halliday, C. S., & Blass, F. R. (2022). The role of stress mindsets and coping in improving the personal growth, engagement, and health of small business owners. *Journal of Organizational Behavior*, *43*(8), 1310–1329. https://doi.org/10.1002/job.2650

Shek, D. T. L. (2005). A longitudinal study of Chinese cultural beliefs about adversity, psychological well-being, delinquency and substance abuse in Chinese adolescents with economic disadvantage. *Social Indicators Research*, *71*(1), 385–409. https://doi.org/10.1007/s11205-004-8029-8

Shek, D. T. L., Tang, V., Lam, C. M., Lam, M. C., Tsoi, K. W., & Tsang, K. M. (2003). The relationship between Chinese cultural beliefs about adversity and psychological adjustment in Chinese families with economic disadvantage. *The American Journal of Family Therapy*, *31*(5), 427–443. https://doi.org/10.1080/01926180390228955

Shi, W., Shen, Z., Wang, S., & Hall, B. J. (2020). Barriers to professional mental health help-seeking among Chinese adults: A systematic review. *Frontiers in Psychiatry*, *11*, Article 442. https://doi.org/10.3389/fpsyt.2020.00442

Sims, T., Tsai, J. L., Jiang, D., Wang, Y., Fung, H. H., & Zhang, X. (2015). Wanting to maximize the positive and minimize the negative: Implications for mixed affective experience in American and Chinese contexts. *Journal of Personality and Social Psychology*, *109*(2), 292–315. https://doi.org/10.1037/a0039276

Spencer-Rodgers, J., Williams, M. J., & Peng, K. (2010). Cultural differences in expectations of change and tolerance for contradiction: A decade of empirical research. *Personality and Social Psychology Review*, *14*(3), 296–312. https://doi.org/10.1177/1088868310362982

Springstein, T., & English, T. (2023). Studying emotion regulation success in daily life: Distinctions from maladaptive regulation and dysregulation. *Personality and Social Psychology Review*, *28*(2), 209–224. https://doi.org/10.1177/10888683231199140

Sullivan, D., Stewart, S. A., Landau, M. J., Liu, S., Yang, Q., & Diefendorf, J. (2016). Exploring repressive suffering construal as a function of collectivism and social morality. *Journal of Cross-Cultural Psychology*, *47*(7), 903–917. https://doi.org/10.1177/0022022116655963

Tang, X., & Duan, W. (2021). Cyber-ostracism mediates the relationship between perceived stress and emotional well-being among college students. *Journal of American College Health*, *71*(2), 355–362. https://doi.org/10.1080/07448481.2021.1891914

Tormon, R., Lindsay, B. L., Paul, R. M., Boyce, M. A., & Johnston, K. (2023). Predicting academic performance in first-year engineering students: The role of stress, resiliency, student engagement, and growth mindset. *Learning and Individual Differences*, *108*, Article 102383. https://doi.org/10.1016/j.lindif.2023.102383

Turner, J. R., Mogle, J., Hill, N., Bhargava, S., & Rabin, L. (2022). Daily memory lapses and affect: Mediation effects on life satisfaction. *Journal of Happiness Studies*, *23*(5), 1991–2008. https://doi.org/10.1007/s10902-021-00481-3

Uchida, Y. (2010). A holistic view of happiness: Belief in the negative side of happiness is more prevalent in Japan than in the United States. *Psychologia*, *53*(4), 236–245. https://doi.org/10.2117/psysoc.2010.236

Walton, G. M., & Yeager, D. S. (2020). Seed and soil: Psychological affordances in contexts help to explain where wise interventions succeed or fail. *Current Directions in Psychological Science*, *29*(3), 219–226. https://doi.org/10.1177/0963721420904453

Weil, L. G., Fleming, S. M., Dumontheil, I., Kilford, E. J., Weil, R. S., Rees, G., Dolan, R. J., & Blakemore, S. J. (2013). The development of metacognitive ability in adolescence. *Consciousness and Cognition*, *22*(1), 264–271. https://doi.org/10.1016/j.concog.2013.01.004

Wu, P., Li, L.-P., Jin, J., Yuan, X.-H., Liu, X., Fan, B., Fuller, C., Yao-Gui, L., & Hoven, C. W. (2012). Need for mental health services and service use among high school students in China. *Psychiatric Services*, *63*(10), 1026–1031. https://doi.org/10.1176/appi.ps.201200090

Yeager, D. S., Bryan, C. J., Gross, J. J., Murray, J. S., Krettek Cobb, D., Santos, P. H. F., Gravelding, H., Johnson, M., & Jamieson, J. P. (2022). A synergistic mindsets intervention protects adolescents from stress. *Nature*, *607*(7919), 512–520. https://doi.org/10.1038/s41586-022-04907-7

Yeager, D. S., Carroll, J. M., Buontempo, J., Cimpian, A., Woody, S., Crosnoe, R., Muller, C., Murray, J., Mhatre, P., Kersting, N., Hulleman, C., Kudym, M., Murphy, M., Duckworth, A. L., Walton, G. M., & Dweck, C. S. (2022). Teacher mindsets help explain where a growth-mindset intervention does and doesn't work. *Psychological Science*, *33*(1), 18–32. https://doi.org/10.1177/09567976211028984

Yeager, D. S., & Dweck, C. S. (2020). What can be learned from growth mindset controversies? *American Psychologist*, *75*(9), 1269–1284. https://doi.org/10.1037/amp0000794

Yeager, D. S., Romero, C., Paunesku, D., Hulleman, C. S., Schneider, B., Hinojosa, C., Lee, H. Y., O'Brien, J., Flint, K., Roberts, A., Trott, J., Greene, D., Walton, G. M., & Dweck, C. S. (2016). Using design thinking to improve psychological interventions: The case of the growth mindset during the transition to high school. *Journal of Educational Psychology*, *108*(3), 374–391. https://doi.org/10.1037/edu0000098

Zhang, J., & Zheng, Y. (2017). How do academic stress and leisure activities influence college students' emotional well-being? A daily diary investigation. *Journal of Adolescence*, *60*(1), 114–118. https://doi.org/10.1016/j.adolescence.2017.08.003

Zhao, S., Chen, P., Jin, L., Yu, C., Zhang, H., & Lin, D. (2024, May 16). *Unlocking emotional well-being: Evaluation of a stress mindset intervention with a metacognitive approach*. https://osf.io/2y9u5/

Zhao, S., Yu, C., Jin, L., & Lin, D. (2024). Helping students to face academic failures: Evaluation of a growth mindset intervention among primary school students in China. *Applied Psychology: Health and Well-Being*, *16*(2), 397–420. https://doi.org/10.1111/aphw.12496

Zhao, S., Zhang, Y., Yu, C., Zhang, H., Xie, M., Chen, P., & Lin, D. (2023). Trajectories of perceived stress among students in transition to college: Mindset antecedents and adjustment outcomes. *Journal of Youth and Adolescence*, *52*(9), 1873–1886. https://doi.org/10.1007/s10964-023-01788-5

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