The Effect of Mindfulness Training on Core Self-Evaluation and Academic Burnout

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ARTICLE INFO	ABSTRACT
	Objective: This research aimed to examine the internal mechanism of core self-evaluation between mindfulness and academic burnout, and the effect of mindfulness interventions on reducing academic burnout. **Methods**: The study involved the assessment of 764 high school students using the Five Facet Mindfulness Questionnaire (FFMQ), Core Self-Evaluation Scale (CSES), and Academic Burnout Scale (ABS) to examine the relation between mindfulness, core self-evaluation, and academic burnout. Following this, a randomized controlled experimental design can be employed to evaluate the impact of interventions and conduct subsequent surveys. **Results**: Mindfulness, core self-evaluation, and academic burnout were significantly correlated. Mindfulness negatively predicted academic burnout, with core self-evaluation playing a partial mediation effect, accounting for 15.79% of the total effect. On these three variables, no significant diverse was showed between the mindfulness-based stress reduction (MBSR) experimental group and the control group at pre-test, but significant differences were found between the two groups at post-test, and between pre-test and post-test within the experimental group. Two months after the mindfulness intervention, the difference in the three variables within the experimental and control groups was significant. **Conclusion**: Mindfulness directly affects academic burnout and also impacts it through core self-evaluation as a mediator; mindfulness interventions might be efficacious in reducing the level of academic burnout in high school students and are stable over time. This benefits academic development and psychological health among high school students, as well as can be promoted in schools. **Keywords:** Mindfulness, academic burnout, core self-evaluation, mindfulness intervention

Introduction

The high school stage is a critical period in one's life, marking the golden age for physical and mental development and a key phase for acquiring knowledge. However, research has indicated that high school students are experiencing increased academic pressure, leading to noticeable physical exhaustion, both bodily and mentally, a lack of enthusiasm and vitality, a passive attitude towards learning, diminished motivation, low achievement satisfaction, and an indifferent stance towards academic endeavors. These factors contribute to the emergence of academic apathy and burnout (Bask & Salmela-Aro, 2013). Academic burnout is described as a state of energy depletion due to an overload of academic tasks and prolonged homework pressure, gradually losing zeal for learning and activities, adopting an indifferent attitude towards peers, and becoming

alienated, culminating in subpar academic performance accompanied by a negative disposition (Pines, Aronson, & Kafry, 1981).

Academic burnout is an important metric for measuring students' mental health (Asikainen, Salmela-Aro, Parpala, & Katajavuori, 2020). Research has found that academic burnout negatively affects the physiological, psychological, and behavioral aspects of individuals, such as fatigue, and depression, affecting academic achievement, and interpersonal relationships, and even leading to fighting, dropping out of school, and suicide (Wang, Chow, Hofkens, & Salmela-Aro, 2015). During their high school years, students undergo a crucial stage in their developmental process and academic burnout is a common challenge they face in their learning journey. How to alleviate academic pressure in a highly competitive, overloaded learning environment and maintain a positive and optimistic mindset to reduce academic burnout are crucial issues that researchers must pay special attention to.

With the rise of positive psychology, factors that have a positive impact on academic burnout have gradually gained attention. Mindfulness is a psychological quality that individuals generally possess, regarded as akin to the virtues and strengths in positive psychology (Park, Reilly-Spong, & Gross, 2013). Mindfulness is the ability to consciously and non-judgmentally pay attention to current experiences and thoughts at the moment (Kabat-Zinn, 2003). Under the mindfulness re-perceiving model, mindfulness training may cultivate the ability to appropriately change emotional responses, observe one's current psychological state, perceive the content of psychology and emotions, enhance cognitive, emotional, and behavioral flexibility, and reduce their automaticity (Shapiro, Carlson, Astin, & Freedman, 2005). As a psychological protective factor, mindfulness can effectively improve individual self-esteem, positive affect, and life satisfaction, alleviating negative emotions such as burnout, anxiety, and depression (Calvete, Orue, & Sampedro, 2017). Mindfulness interventions can significantly alleviate individual academic pressure, burnout, anxiety, and depression (Krasner, Epstein, & Beckman, 2009).

As individual self-awareness develops and independence strengthens, the impact of individual factors becomes increasingly evident. During high school, students experience a critical period in which their core self-evaluation is developed and strengthened. The ability to make clear value judgments about oneself not only significantly affects individual learning concepts but also profoundly influences their learning attitudes and habits. Research has shown that core self-evaluation, as a personality trait resource, is considered a protective factor against academic burnout (Lian, Sun, Ji, Li, & Peng, 2014). Based on the conservation of resources theory, when an individual's core self-evaluation is low, the personality trait resources are lacking, leading to negative emotions or behaviors in response to this deficiency, in the hope of compensating with other resources. However, without an increase in core self-evaluation, psychological resources continue to be threatened by external pressures, resulting in burnout (Alarcon, Edwards, & Menke, 2011). Existing studies show that core self-evaluation may significantly negatively predict academic burnout; the greater the extent of individual core self-evaluation, the lower the degree of academic burnout (Xu, Chen, Yang, & Yuan, 2017). Furthermore, mindfulness is about taking an impartial perspective on one's experiences as they happen, leading to reduced reactivity and increased acceptance of those experiences in the present moment (Calvete, Orue, & Sampedro, 2017). Individuals with a good extent of mindfulness are more able to embrace their thinking, emotions, and circumstances, potentially resulting in a more favorable self-evaluation. Past studies have presented that mindfulness can predict core self-evaluation; people with a great degree of mindfulness also have a good degree of core self-evaluation, and mindfulness is thought to buffer negative views, improving the impact of negative thinking patterns on core self-evaluation, thereby enhancing core self-evaluation levels in individuals (Hou et al., 2013). Mindfulness training, by fostering individual self-awareness and acceptance of the present moment, can significantly reduce negative emotions and thought patterns, and enhance inner positive psychological states, such as resilience, self-esteem, and optimism (Zhang et al., 2021). This process helps to effectively alleviate stress and academic burnout caused by fear of failure and challenges, self-doubt, or low self-efficacy (Gilmartin et al., 2017; Howarth et al., 2019), thereby promoting academic motivation and efficiency. Hence, core self-evaluation may play a mediating effect linking mindfulness and academic burnout.

Given the above research context, this study explored the linking of mindfulness, core self-evaluation, and academic burnout. Subsequently, a randomized controlled trial design is used to assess the impacts of mindfulness interventions (MBSR) in reducing academic burnout, revealing the causal relationships between variables, and also tracking the effects of mindfulness interventions. In Study 1, it is hypothesized that mindfulness significantly negatively predicts academic burnout among high school students (H1), and core self-evaluation may mediate the relation linking mindfulness and academic burnout (H2). The hypothetical model for Study 1 is seen in Figure 1. In Study 2, it is hypothesized that, relative to the control group, students in the experimental group may show notable improvements in their levels of mindfulness and core self-evaluation and a significant reduction in academic burnout following the intervention (H3).
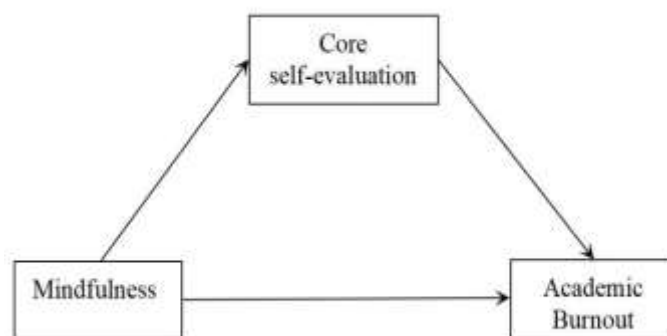
Figure 1: The hypothetical model of study 1

Method

Participants
A multi-stage stratified cluster sampling method was utilized to distribute questionnaires to students in three schools in a province in China, selecting 826 high school students (*M* = 16.87 years, *SD* = 1.37 years) for the survey. After collecting and organizing, 764 useful questionnaires were retrieved, giving an actual response rate of 92.49%. The respondents consisted of 440 boys and 324 girls, with 291 students from grade 10th, 233 students from grade 11th, and 240 students from grade 12th of high school. G*power 3.1.9.7 software was utilized to estimate the sample size for this investigation, requiring at least 193 subjects to achieve 80% statistical test power with α = 0.05 and an effect size (r) of 0.20. The sample size used in this study met the requirements.

Measures
Academic burnout
The Adolescent Academic Burnout Scale designed by Wu et al. (2010) was utilized. This scale is composed of 16 items to measure three components of academic burnout: physical and emotional exhaustion, academic alienation, and reduced achievement, with 4 items for physical and emotional exhaustion, 5 items for academic alienation, and 7 items for reduced achievement. It adopts a 5-point Likert scale for responses, with 1 representing "strongly disagree" and 5 representing "strongly agree," including some items that are reverse-scored. Greater scores indicate a greater degree of academic burnout. In the present research, the reliability coefficient (Cronbach's alpha) for the scale was recorded at 0.88.

Mindfulness
The Five Facet Mindfulness Questionnaire (FFMQ), translated and modified by Deng, Liu, et al. (2011) from the original by Baer et al. (2006), was used as the Chinese adaptation. It contains 39 items across five dimensions: observing, describing, acting with awareness, not judging, and not reacting. The participants are measured using a 5-point Likert scale, where 1 represents "strongly disagree" and 5 represents "strongly agree," with 19 items scored in reverse. Greater scores indicate greater levels of mindfulness. In this survey, the scale had a reliability coefficient (Cronbach's alpha) of 0.86.

Core self-evaluation
The Core Self-Evaluation Scale (CSES), originally formulated by Judge et al. (2003) and later translated and adjusted to the Chinese cultural setting by Du et al. (2007), was used. It is a unidimensional scale consisting of 10 items, utilizing a 5-point Likert scale ranging from 1 ("strongly disagree") to 5 ("strongly agree"), with some items scored in reverse. Better scores indicate a better degree of core self-evaluation. In the current study, the scale had a reliability coefficient (Cronbach's alpha) of 0.80.

Data analysis
The relationships between mindfulness, core self-evaluation, and academic burnout examined with Pearson's product-moment correlation coefficient. Harman's single-factor test was utilized to evaluate common method bias. SPSS 25.0 and PROCESS macro (Model 4 by Hayes, 2022) were utilized for mediation analysis with intentional self-regulation between mindfulness and academic burnout. The indirect effects were examined by using the bootstrap confidence interval (CI) method, setting the bootstrap sample size to 5,000. An effect is deemed to be significant if zero is not included within the 95% confidence interval (CI).

Results

Common method biases
Since the measures for mindfulness, core self-evaluation, and academic burnout were self-reported, there was a potential for common method bias. To minimize errors due to common method bias, questionnaires were designed to vary in response format and statements, and anonymity and confidentiality were ensured.

Harman's single-factor test method was further employed to check for the existence of common method bias. This finding presented that there were 20 factors with eigenvalues higher than 1, and the largest factor accounted for 12.50% of the variance, below the critical criterion of 50%, suggesting no significant common method bias in the collected data (Schwarz et al., 2017).

Descriptive statistics and correlation analysis

The descriptive statistics and correlation matrix of the study variables was present in Table 1. Mindfulness had a significant negative correlation with academic burnout among high school students, core self-evaluation had a

significant negative correlation with academic burnout, and mindfulness had a significant negative correlation with core self-evaluation.

Table 1: Descriptive statistics and correlations for the interested variables

Variables	M	SD	1	2	3
1. Mindfulness	2.93	0.28	1		
2. Core self-evaluation	3.66	0.42	0.28**	1	
3. Academic burnout	2.96	0.55	-0.37**	-0.30**	1

Note: N = 764, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, same below.

Mediational analysis

Mediation analysis was performed using the SPSS macro PROCESS (Model 4), controlling for gender, age, and grade level as covariates. The findings revealed that mindfulness might significantly negatively predict academic burnout (β = -0.38, t = -11.34, $p < 0.001$). Furthermore, the inclusion of core self-evaluation into the regression model attenuated the direct predictive impact of mindfulness on academic burnout, yet the predictive significance persisted (β = -0.32, t = -9.32, $p < 0.001$). Mindfulness exerted a notable positive influence on core self-evaluation (β = 0.28, t = 8.17, $p < 0.001$), and core self-evaluation was a significant negative predictor of academic burnout (β = -0.22, t = -6.48, $p < 0.001$). The mediation effect was evaluated through the bias-corrected percentile Bootstrap technique as suggested by Hayes (2022), with a bootstrap sample of 5,000, to analyze the 95% confidence interval for the mediation effect of core self-evaluation in the relation between mindfulness and academic burnout. The analysis revealed a mediation effect (ab = -0.06, Boot SE = 0.01), with neither the upper nor lower bounds of the Bootstrap 95% confidence interval (CI) including zero, indicating that mindfulness could predict academic burnout both directly and indirectly through core self-evaluation, with direct and indirect effects contributing 84.21% and 15.79% to the total effect, respectively. See Tables 2 and 3.

Table 2: Testing the regression analysis of variables

Outcome Variable	Predictive Variable	R	R^2	F	β	t
Academic burnout		0.39	0.16	34.69**		
	Gender				-0.08	-2.34*
	Age				-0.001	-0.03
	Grade				-0.11	-2.02*
	Mindfulness				-0.38	-11.34***
Core self-evaluation		0.31	0.10	20.88*		
	Gender				-0.14	-3.92**
	Age				0.01	0.21
	Grade				0.03	0.57
	Mindfulness				0.28	8.17***
Academic burnout		0.45	0.20	37.64**		
	Gender				-0.11	-3.29**
	Age				0.001	0.02
	Grade				-0.10	-1.94
	Mindfulness				-0.32	-9.32***
	Core self-evaluation				-0.22	-6.48***

Table 3: Testing the mediation effects of variables

Pathway	Effect	Boot SE	Bootstrap 95 % CI		Relative effect size
			Boot LLCI	Boot ULCI	
Total	-0.38	0..03	-0.45	-0.31	—
Mindfulness—Academic burnout	-0.32	0.03	-0.38	-0.25	—
Mindfulness — Core self-evaluation — Academic burnout	-0.06	0.01	-0.09	-0.04	15.79%

Study 2

The correlation analysis in the initial study lent preliminary backing to the hypotheses, illustrating a negative correlation between mindfulness and academic burnout and proposing core self-evaluation as a plausible mediator. It's essential, however, to acknowledge that correlations do not equate to causation. Bearing this constraint in mind, an intervention focusing on mindfulness was administered to high school students dealing with academic burnout to assess changes in academic burnout and core self-evaluation levels after the intervention, aiming to fortify the evidence regarding the causal connection between mindfulness and academic burnout. To overcome some of the limitations observed in Study 1 and to solidify the findings, Study 2 integrates experimental methodologies, striving to bolster the robustness of the results.

Method

Participants

Utilizing G*Power for determining the necessary sample size for a repeated measures ANOVA assessing interaction effects revealed that with a medium effect size of $f = 0.25$, a power of $(1-\beta) = 0.80$, an alpha of $\alpha = 0.05$, two groups, three measurement points, a correlation of 0.5 among the repeated measures, and a non-sphericity correction $\varepsilon = 1$, a sample size of n = 28 was considered suitable. Extending the work of Study 1, 70 students identified with academic burnout scores exceeding one standard deviation (*SD*) higher than the mean (*M*) might be randomly allocated into experimental and control groups, comprising 35 individuals each. Reflecting upon Study 1's findings, which indicated no significant gender-based differences across the three assessed variables, this factor was not prioritized in participant selection. Consequently, the experimental group engaged in a mindfulness intervention program, whereas the control group was assigned to a waitlist. To eliminate confounding variables, the participants chosen were psychologically healthy and had no prior experience with mindfulness practice.

Measures

In Study 2, the scales used to measure participants' mindfulness, core self-evaluation, and academic burnout were the same as those used in Study 1.

Experimental procedures

a. **Pre-test**: 70 students, identified as having scores exceeding one standard deviation higher than the mean in academic burnout, would be randomly allocated into different groups: experimental and control. Prior to the intervention, participants were administered the Adolescent Academic Burnout Scale, the Five Facet Mindfulness Questionnaire, and the Core Self-Evaluation Scale. The completed questionnaires were immediately collected for analysis right after they were filled out.

b. **Preparation:** Before the mindfulness training intervention began, each participant in the experimental group was introduced to the basic concepts and mechanisms of mindfulness, allowing them to obtain a simple comprehension of mindfulness and explaining the advantages of mindfulness for physical and mental health without touching on core self-evaluation or academic burnout. The methods of practicing mindfulness and the significance of consistent practice were also discussed.

c. **Experimental implementation:** Due to the high school students' tight study schedules, a short-duration mindfulness training program was used. Excessive mindfulness practice could cause distress, especially for participants without prior mindfulness experience, possibly leading to a "dark night" experience, where excessive mindfulness intervention leads to negative events (Creswell, 2017). The experimental group underwent an eight-week mindfulness training, six days per week, 20 minutes per day. The control group underwent no intervention and continued with their original teaching activity. After all participants understood the content of the mindfulness training, audio from "Mindfulness Meditation—Meeting a Better Self" and "Mindfulness Therapy for Improving Emotions" was played for guided mindfulness practice. Participants would be encouraged to do at least 20 minutes of mindfulness on their own each day, and to share their experiences or confusion after each day's training.

d. **Experimental materials:** Audio from "Mindfulness Meditation—Meeting a Better Self" and "Mindfulness Therapy for Improving Emotions" were used for the mindfulness training intervention. The intervention ran from early May 2020 to early July 2020, lasting eight weeks.

e. **Post-test:** After the eight-week mindfulness training intervention, participants in the experimental and control groups filled out the post-test questionnaires. These were immediately collected for analysis right after they were completed.

Data analysis
To examine whether the experimental and control groups were comparable prior to the intervention, a test for homogeneity focusing on core self-evaluation and academic burnout was performed between the groups. For the analysis of differences both between and within groups, SPSS 25.0 software was utilized: initially conducting an independent samples t-test to compare the experimental and control groups, followed by a paired samples t-test to analyze the various from pre-test to post-test between two different groups.

Results

Pre-test differences between two groups
Two students from the experimental group were excluded from the final data analysis due to missing three sessions without cause, which led to insufficient mindfulness training time. Two individuals from the control group missed the post-test and were therefore not included in the data analysis. Before the mindfulness intervention, an independent samples t-test was performed to analyze pre-test data differences within each group, testing whether the two groups were homogeneous in terms of mindfulness, core self-evaluation, and academic burnout. See Table 4.

Table 4: Test of pre-test differences between two groups

Variables	Experimental group (n = 33)	Control group (n = 33)		
	M ± SD	M ± SD	t	p
Mindfulness	2.67 ± 0.39	2.75 ± 0.43	-0.78	0.44
Core self-evaluation	3.13 ± 0.37	3.16 ± 0.54	-0.27	0.79
Physical and emotional exhaustion	2.98 ± 0.43	3.20 ± 0.69	-1.52	0.13
Academic disengagement	2.79 ± 0.32	2.47 ± 0.87	1.96	0.06
Low sense of accomplishment	3.10 ± 0.28	3.16 ± 0.48	-0.68	0.50
Academic burnout	2.97 ± 0.26	2.96 ± 0.45	0.18	0.86

The independent sample t-test demonstrated there were no meaningful variances in the pre-test scores for mindfulness, core self-evaluation, academic burnout, and its three dimensions: physical and emotional exhaustion, academic disengagement, and low sense of accomplishment between subjects in the experimental and control groups ($p > 0.05$), indicating a certain level of homogeneity between the participants in the experimental and control groups.

Pre-test and post-test differences in the experimental group
The paired sample t-test found meaningful shifts in the experimental group's levels of mindfulness, core self-evaluation, and academic burnout, along with in the two dimensions of academic disengagement and low sense of accomplishment from before to after the intervention ($p < 0.05$). Post-test scores for mindfulness and core self-evaluation in the experimental group were higher than pre-test scores, while post-test scores for academic burnout and the dimensions of academic disengagement and low sense of accomplishment were lower than pre-test scores. The effect sizes were 0.87, 0.93, 0.95, 0.89, and 1.09, respectively, indicating significant differences in the experimental group's scores from pre-test to post-test. See Table 5.

Table 5: Test of pre-test and post-test differences in the experimental group

Variables	Pre-test (n = 33)	Post-test (n = 33)			
	M ± SD	M ± SD	t	p	d
Mindfulness	2.67 ± 0.39	3.01 ± 0.39	-11.04	<0.001	0.87
Core self-evaluation	3.13 ± 0.37	3.43 ± 0.22	-5.83	<0.001	0.93
Physical and emotional exhaustion	2.98 ± 0.43	2.99 ± 0.25	-0.13	0.90	0.03
Academic disengagement	2.79 ± 0.32	2.40 ± 0.50	5.02	<0.001	0.89
Low sense of accomplishment	3.10 ± 0.28	2.83 ± 0.19	5.49	<0.001	1.09
Academic burnout	2.97 ± 0.26	2.74 ± 0.22	7.18	<0.001	0.95

Pre-test and post-test differences in the control group

The paired sample t-test indicated that for participants in the control group, there were no notable shifts in the scores for mindfulness, core self-evaluation, and academic burnout, as well as their three dimensions when comparing data from before and after the test process ($p > 0.05$). See Table 6 below.

Table 6: Test of pre-test and post-test differences in the control group

Variables	Pre-test (n = 33)	Post-test (n = 33)		
	M ± SD	M ± SD	t	p
Mindfulness	2.75 ± 0.43	2.78 ± 0.45	-0.89	0.38
Core self-evaluation	3.16 ± 0.54	3.18 ± 0.52	-0.29	0.78
Physical and emotional exhaustion	3.20 ± 0.69	3.29 ± 0.73	-0.52	0.61
Academic disengagement	2.47 ± 0.87	2.72 ± 0.70	-1.61	0.12
Low sense of accomplishment	3.16 ± 0.48	3.04 ± 0.52	1.27	0.21
Academic burnout	2.96 ± 0.45	3.00 ± 0.39	-0.51	0.61

Post-test differences between two groups

The independent sample t-test showed that there were meaningful variances in the post-test results between the experimental and control groups regarding mindfulness, core self-evaluation, academic burnout, and its three dimensions ($p < 0.05$). Specifically, post-test results for mindfulness and core self-evaluation were considerably better in the experimental group than in the control group, while the scores for academic burnout and its three components were notably lower in the experimental group. The effect sizes were 0.55, 0.67, 0.82, 0.55, 0.53, and 0.54, respectively, indicating moderate diversity in post-test scoring between the two groups.

Table 7: Test of post-test differences between experimental and control groups

Variables	Experimental group (n = 33)	Control group (n = 33)			
	M ± SD	M ± SD	t	p	d
Mindfulness	3.01 ± 0.39	2.78 ± 0.45	2.29	0.03	0.55
Core self-evaluation	3.43 ± 0.22	3.18 ± 0.52	2.74	0.01	0.67
Physical and emotional exhaustion	2.99 ± 0.25	3.29 ± 0.73	-2.20	0.03	0.55
Academic disengagement	2.40 ± 0.50	2.72 ± 0.70	-2.08	0.04	0.53
Low sense of accomplishment	2.83 ± 0.19	3.04 ± 0.52	-2.15	0.04	0.54
Academic burnout	2.74 ± 0.22	3.00 ± 0.39	-3.34	0.002	0.82

Discussion

This study, grounded in the mindfulness re-perception model and the conservation of resources theory, investigated how mindfulness influences academic burnout in high school students and probed into the underlying mechanisms. Data collection combined questionnaire surveys and experiments, and analyses utilized correlation and mediation models to examine the mediation role of core self-evaluation linking mindfulness and academic burnout among high school students. Findings from Study 1 indicated that mindfulness may positively predict core self-evaluation and negatively predict academic burnout among high school students. Additionally, mediation analysis suggested that mindfulness not only directly impacts academic burnout but is also indirectly influenced by core self-evaluation. Results from Study 2 showed that compared to high school students who did not undergo mindfulness training, those who did exhibited an increase in core self-evaluation scores. This suggest that mindfulness training may help to enhance individual self-awareness and self-esteem, thereby making academic burnout easier to mitigate. On one hand, mindfulness training, by bolstering individuals' self-awareness and emotional regulation capabilities, reduces the sense of pressure and fatigue in the learning process (Finkelstein-Fox, Park, & Riley, 2018). On the other hand, core self-evaluation, as an integral component of individual self-efficacy and self-worth, plays a mediating role between mindfulness and academic burnout. Individuals with high core self-evaluation are better equipped to resist negative external influences, maintaining learning motivation and a positive mindset (Paloş, Samfira, Vîrgă, & Purić, 2023).

In Study 1, the level of mindfulness among high school students negatively predicted academic burnout, with greater degrees of mindfulness associated with lower degrees of burnout, confirming H1. This is consistent with the mindfulness re-perception model (Shapiro et al., 2005) and existing research findings (Kinnunen et al., 2019). Mindfulness is a psychological quality generally possessed by individuals (Park et al., 2013) and is considered akin to the virtues and strengths in positive psychology (Peterson & Seligman, 2004). The mechanism of mindfulness mainly manifests in changing the mode of thought induced by attention processing, which can regulate metacognition and eliminate automated evaluations of negative emotions

(Shapiro et al., 2005; Garland, Gaylord, & Park, 2009; Coffey et al., 2010). Based on the mindfulness re-perception model (Shapiro et al., 2005), mindfulness training can cultivate the ability to appropriately change emotional responses, observe one's current psychological state, perceive the content of psychology and emotions, enhance cognitive, emotional, and behavioral flexibility, and reduce their automaticity. As a psychological protective factor, mindfulness can effectively enhance individual self-esteem, positive affect, and life satisfaction, alleviating negative feelings including burnout, anxiety, and depression (Calvete et al., 2017; MacDonald & Baxter, 2017). Enhancing mindfulness levels is beneficial for alleviating learning anxiety and burnout, has a positive effect on cultivating students' attention stability, and promotes students' self-awareness (Bamber & Schneider, 2016). Mindfulness interventions can significantly alleviate individual academic pressure, burnout, anxiety, and depression (Krasner et al., 2009).

Mindfulness not only directly negatively predicts academic burnout, but also indirectly predicts it via the mediation of core self-evaluation, confirming H2. Mindfulness may trigger core self-evaluation, which may be a personal positive assessment of self-worth, self-capability, and interaction with the environment, thus leading to a reduction in academic burnout, as supported by Liu et al.'s (2019) findings. According to the conservation of resources theory (Alarcon, Edwards, & Menke, 2011), when an individual's core self-evaluation is low, their personality trait resources are lacking, leading to negative emotions or behaviors in response to this deficiency, in hope of compensating with other resources. However, without an increase in core self-evaluation, psychological resources continue to be threatened by external pressures, resulting in burnout. Mindfulness emphasizes not only the ability to be conscious of a person's emotions but also the capacity to observe thoughts and evaluations. This ability to observe can help individuals accurately recognize and evaluate themselves, enhancing attention, acceptance, and cognitive functions, alleviating negative emotions, and focusing non-judgmental attention on the present moment, changing negative thinking patterns, and thereby prompting changes in attitudes and behaviors (Peng & Ju, 2013). Therefore, mindfulness can buffer negative attitudes and viewpoints, mitigating the impact of negative thoughts on core self-evaluation, and thereby enhancing levels of core self-evaluation among high school students. When high school students have a greater degree of core self-evaluation, it follows that they have more positive beliefs, perceive more positive emotions in learning, and thus experience a lower degree of burnout.

In Study 2, the main focus was on the influence of mindfulness training on the degrees of core self-evaluation and academic burnout in high school students. By applying mindfulness interventions to students experiencing academic burnout, the study found changes in the levels of mindfulness, core self-evaluation, and academic burnout, thus confirming H3. This fully demonstrates that the level of mindfulness affects the levels of core self-evaluation and academic burnout, revealing a causal relationship. The results of this study align with prior some studies (Kong, Wang, & Zhao, 2014; Suleiman-Martos et al., 2020), suggesting that mindfulness had a significant beneficial effect on core self-evaluation and academic burnout. The experimental group's degree of academic burnout was reduced following the mindfulness training intervention, and students' scores on academic burnout and its three dimensions were significantly lower than those of the untreated group. Academic disengagement and low sense of accomplishment, as well as the overall academic burnout score, were the primary indicators where the experimental group's pre-test and post-test scores differed significantly. This could be a result of the fact that mindfulness lessens pessimistic views, which enhances the effect of negative thought patterns on self-evaluation and helps students develop their core self-evaluation (Liu et al., 2019). Core self-evaluation is thought to be a protective factor against academic burnout (Lian et al., 2014). Therefore, mindfulness training can lower the level of academic burnout. Furthermore, a two-month follow-up survey of the experimental and no-experimental groups after the mindfulness intervention still revealed notable differences in the level of academic burnout, showing the stability of mindfulness intervention in improving academic burnout in high school students.

Significance and contributions

The present research, framed within mindfulness re-perception model and the conservation of resources theory, explored the relation between mindfulness and academic burnout among high school students in China, along with the mediation effect of core self-evaluation. The results add to our understanding of what influences academic burnout among high school students and reinforce the principles of both the mindfulness re-perception model and the conservation of resources theory. Furthermore, the outcomes provide theoretical backing for methods aimed at improving academic burnout in high school students by enhancing their core self-evaluation, thereby offering solutions to some of the educational challenges present in China.

Studies 1 and 2 complement each other, jointly validating the hypotheses to ensure the credibility and efficacy of the research. The findings highlight the issue of academic burnout among high school students and provide an effective method to alleviate this problem by enhancing mindfulness and core self-evaluation, which helps students complete high-quality academic work and promotes healthy physical and psychological development. Study 2's mindfulness training intervention, built upon the results of Study 1, applies the findings to practical learning, making the research more practically significant.

Limitations and future directions

The current study provides insights into the influences of mindfulness on academic burnout among high school students and its potential psychological mechanisms. However, there are some limitations. First, the research did not separately assess the five distinct dimensions of mindfulness. Subsequent studies might more accurately measure and analyze these elements to fully understand their impact on academic burnout more comprehensively. Second, the study mainly focused on the effect of core self-evaluation as a mediation variable. Future studies could look into other potential mediators to deepen our comprehension of how mindfulness affects academic burnout. Third, the study examined the effect of mindfulness on academic burnout in high school students and its potential mechanisms. However, it should be noted that these groups may not represent the entire Chinese population. Utilizing census data could provide a more extensive insight into the perspectives of high school students on mindfulness and academic burnout in China, which would be advantageous for future studies.

Conclusions

In summary, mindfulness significantly negatively predicts academic burnout, with core self-evaluation acting as a partial mediator linking mindfulness and academic burnout among high school students. Additionally, mindfulness training may significantly positively affect core self-evaluation and academic burnout in high school students. Mindfulness training can enhance their core self-evaluation levels and alleviate their academic burnout levels. These findings help educators better understand the link between mindfulness, core self-evaluation, and academic burnout. It can be recommended that educators help high school students cultivate mindfulness to bolster their core self-evaluation and, thereby, reduce academic burnout.

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