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The chain mediating role of resilience and stress perception between mindfulness and PTSD among college students after campus violence

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Abstract

Objective Despite extensive research on mindfulness, there is a dearth of studies exploring its impact on post-traumatic stress disorder (PTSD) through the intermediaries of psychological resilience and perceived stress. In response to a violent campus event, this article investigates the association between mindfulness levels among college students and the presence of PTSD using a sequential mediation model.

Methods We recruited 324 participants from a university following a violent event and collected 314 valid data. All the participants signed the informed consent and completed self-report measures of mindfulness (MASS), stress perception (PSS), resilience (CD-RISC) and PTSD (PCL-5). The SPSS PROCESS model 6 was utilized to investigate the chain mediation model.

Findings.

(1) There exists a notable positive correlation between mindfulness and resilience ($r = 0.45$, $p < 0.01$), while a significant negative correlation is observed between mindfulness and stress perception ($r = -.55$, $p < 0.01$), as well as PTSD ($r = -.51$, $p < 0.01$). (2) Resilience (effect = -0.1109) and stress perception (effect = -0.1359) play a mediating role between mindfulness and PTSD, respectively. (3) Stress perception is predicted by resilience ($\beta = -0.62$, t = -15.96, p < 0.001). (4) Stress perception and resilience play a chain mediating role between mindfulness and PTSD (effect = -0.1301).

Conclusion In the aftermath of the campus violence incident, PTSD experienced by college students can be affected by mindfulness through a chain mediating effect of stress perception and resilience.

Keywords Campus violence, PTSD, Mindfulness, Resilience, Stress perception

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Introduction

The issue of post-traumatic stress disorder (PTSD) is currently a matter of great concern within the psychological community. Following a traumatic event, individuals may suffer psychological harm that can disrupt their everyday lives. The aftermath of a traumatic event can leave a lasting impact on an individual's mental well-being, resulting in a range of psychological injuries that can impede their daily functioning. These injuries may include a decreased capacity for emotional regulation and responsiveness, as well as a reduced ability to cope with stress and pressure [1]. According to a study conducted by Breslau in 1991, 23.6% of the surveyed youth participants met the criteria for PTSD diagnosis [2]. In domestic research, Wang Huanlin and Cui Shu conducted an epidemiological survey on post-traumatic stress disorder in Chinese military personnel in 1994, which showed that the prevalence of PTSD among cadets was 2.27 ‰ [3]. Yang et al. found that 45.87% of Chinese medical students have experienced traumatic events [4]. At present, it is widely acknowledged that the manifestation and progression of PTSD are influenced by various factors. In addition to mindfulness, some studies also show that the perception of stress and psychological resilience participate in the regulation of post-traumatic stress disorder. Nonetheless, it remains uncertain as to how mindfulness, stress perception, and resilience impact PTSD. This study aims to explore these following a severe campus violence incident that resulted in multiple student injuries. In order to deliver successful post-traumatic intervention and treatment on campus, we first explored the theoretical correlation between mindfulness, stress perception, psychological resilience and PTSD, trying to find a more suitable theoretical model. And then, we proceeded to examine the numerical relationship among these variables by analyzing the data.

Mindfulness—PTSD

Posttraumatic stress disorder (PTSD) refers to the physical or psychological harm caused by an individual's experience of violent events, resulting in severe psychological disturbance [5]. The core symptoms of PTSD are divided into three groups. The first is invasive symptoms, which continuously repeat traumatic events, such as repeated memories and painful dream violent events. In fact, it is to avoid symptoms, such as indifference, numbness in response to ordinary things, and avoid discussing topics related to violent events. Finally, there's an increase in alertness, usually manifested in emotional arousal, irritability, and sleep disorders [6]. People with long-term PTSD have been shown to have an increased risk of developing suicidal tendencies, schizophrenia, depression, and other problems [7, 8].

Mindfulness is a set of practice derived from the eastern Buddhism meditation which emphasizes the intentional, non-judgmental and moment-to-moment attention to the present [9]. Sang Hwan Kim found that the implementation of deep breathing and other mindfulness-based therapies can lead to a noteworthy decrease in the incidence of PTSD-like symptoms among those who display subclinical indications of PTSD [10]. Zhang Yi revealed that mindfulness was significantly related to PTSD from the perspective of the impact of professional rescue workers' mindfulness on post-traumatic stress disorder, and also suggested that mindfulness could directly be related to the extent of PTSD [11]. As early as 2010, Thompson and Waltz discovered that mindfulness can mitigate the avoidance symptoms and severity of PTSD [12]. Therefore, research on mindfulness as a predictive variable for PTSD is traceable.

Additionally, traumatic events may also affect PTSD by reducing mindfulness level. Schaan et al. found that childhood trauma is negatively correlated with interoceptive accuracy following stressors, indicating that early trauma may impact an individual's interoceptive abilities, thereby affecting the development of their mindfulness skills [13]. Interoception refers to the sense of the body's internal states. Dysfunctions in interoception have been found in trauma-related conditions, which may be associated with psychological and physiological disorders, including PTSD [14]. The cultivation of mindfulness skills may increase mindful responses to triggering life events, in contrast to other reactive and defensive responses such as dissociation, thereby reducing the sensitivity to triggers that may cause post-traumatic symptoms [15]. Inquiry-Based Stress Reduction (IBSR) intervention has improved resilience in a sample of Israeli teachers [16]. Yamaguchi, K. et al.'s research results indicate that resilience can mitigate the negative impact of trauma on mental health, thus protecting individuals from the effects of PTSD, depression, and anxiety [17]. Therefore, we can speculate that traumatic events enhance stress and reduce personal resilience, leading to the development of PTSD.

Although many studies have explored the relationship between mindfulness therapy or mindfulness level and PTSD among veterans, nurses, athletes and refugees [7, 8, 18, 19], there are still few studies on college students. At the same time, most of the above articles focus on the correlation between mindfulness and PTSD or whether mindfulness can predict PTSD, but lack exploration of how mindfulness affects PTSD from a mechanistic perspective.

Mindfulness—resilience- PTSD

Resilience is defined as the dynamic ability to adapt successfully in the face of adversity, trauma, or significant threat. Psychological resilience has been found to have a strong association with post-traumatic stress disorder in the study of athletes and nurses [20]. The likelihood of post-traumatic stress disorder development is increased among brain injury patients who demonstrate inadequate psychological resilience [21]. Moreover, professional training that incorporates mindfulness has been found to enhance the level of mental resilience among high-stress workers, such as healthcare professionals and healthcare students [22, 23].

Researches have proposed that resilience has a significant negative correlation with PTSD [24]. Likewise, there are articles that directly explain how the level of resilience is associated with the level of PTSD in ICU patients [25].

The above elaborates on previous studies that have shown that mindfulness can influence resilience which is related to PTSD, while there are also literature indicating that resilience moderates the relationship between mindfulness and perceived PTSD symptoms through rumination as the mediator [26]. In summary, resilience may serve as a mediating factor in the influence of mindfulness on PTSD.

Mindfulness—stress perception-PTSD

Stress perception originates from stress cognitive evaluation theory. This theory suggests that stress is not an isolated phenomenon that solely manifests within individuals or their surroundings, but rather results from the interrelationship between individuals and their environment [27]. The essence of stress is the interplay between individuals and their surroundings, while the mechanism of stress formation is regulated by individual psychology.

The cognitive evaluation theory also highlights the significance of emotional and cognitive regulation as regulatory mechanisms for stress levels [27]. Investigations have been conducted to examine the influence of strategies for regulating cognition and emotions on the severity of PTSD in patients who have been transferred from ICU. They found that disaster and rational analysis played a mediating role in the ICU environmental stressors and PTSD [28]. This also reflects the obvious influence of stress perception on PTSD.

Kabat Zinn proposed mindfulness intervention called Mindfulness-Based Stress Reduction (MBSR) training, which has been proven to have a wide range of positive psychological effects, including reducing stress and improving decision-making, productivity, resilience, interpersonal communication, organizational relationships, perspective-taking, and self-care [29]. At the same time, this therapy has been proven to effectively reduce the symptoms of post-traumatic stress disorder caused by multiple traumatic events [30].

Due to the fact that stress cognition can serve as a theoretical basis for mindfulness therapy, and MBSR is also known to reduce PTSD symptoms, stress cognition may serve as a mediating regulatory factor for mindfulness affecting PTSD.

Resilience-stress perception

Research on the stress perception and resilience of nurses in Turkey during the COVID-19 pandemic showed that psychological resilience is significant in explaining perception of stress, and they propose targeting psychological resilience are needed to reduce nurses'stress perceptions [28]. Nursen Yalcin Siedentopf proposed in his mediation model that resilience plays a role as a moderating variable in the impact of social support perception on stress perception, suggesting resilience can affect stress perception [31]. In other studies, the direct relationship between stress perception and resilience is rarely mentioned. In addition, Kyron pointed out that for medical students, there is no reasonable data to prove that effective psychological resilience training is helpful for stress perception [32], and further research needs better data support. Some articles focus on the relationship between emotional regulation and psychological resilience, which is an important coping style in the theory of stress cognitive evaluation. They emphasize that emotional regulation can affect psychological resilience [33].

Based on the above literature collection and discussion, we have listed 4 hypotheses and demonstrated the chain mediation model (Fig 1).

H1: Mindfulness is related to the symptoms of PTSD.
H2: Resilience mediates the effect of mindfulness on PTSD.
H3: Stress perception plays a mediating role between mindfulness and PTSD.
H4: Resilience and stress perception play a chain mediating role in mindfulness effects of PTSD.

Method

Participants and recruitment

Based on the occurrence of a violent event in a university, a questionnaire survey was conducted to the main event experience population on campus. The data were collected in April 2023, all participants completed the survey within one week after the violent event. Cluster sampling was used in this study and questionnaires were delivered to students who were in the core area where the traumatic event occurred. The main inclusion criteria were: no disability, normal mental status, fair reading

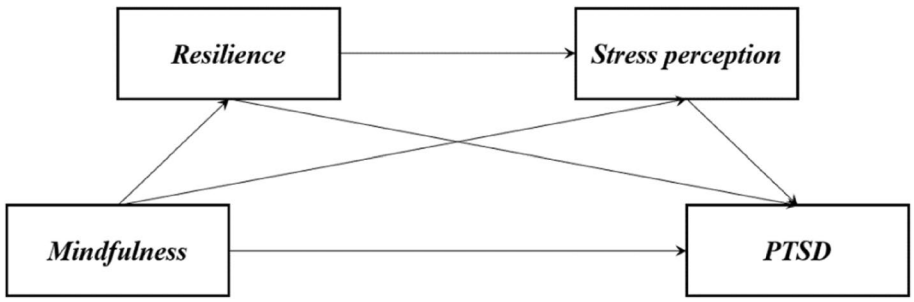

Fig. 1 Conceptual framework

and comprehension skills and located nearby at the time of the traumatic event. The main exclusion criteria were: unawareness of the traumatic event and absence from school at the time of the traumatic event. To ensure participants' awareness of the event, researchers confirmed with each participant whether they had heard about it prior to starting the survey.

A total of 512 questionnaires were distributed, and 324 were returned, resulting in a response rate of 63.28%. All case data were independently reviewed by two professionals, WLK and JZL, who identified 8 questionnaires with missing or incorrect information. Additionally, we utilized SPSS's built-in function to identify and exclude duplicate cases, finding a total of 2 individuals who had completed the questionnaire repeatedly. After removing invalid, missing, and incorrect questionnaire data, a total of 314 participants were enrolled in this study. All the participants have completed Sociodemographic Information Form (SIF), PTSD Checklist for DSM-5 (PCL-5), Perceived Stress Scale (PSS), 10-item Connor-Davidson Resilience Scale (CD-RISC-10) and Mindful Attention Awareness Scale (MASS). The participants consented to this study and were not ordered to participate, they were informed about the purpose of the study, and the present study was conducted in accordance with the Declaration of Helsinki.

Measures

Sociodemographic Information Form (SIF)

Participants' sociodemographic information including gender, age, grade, marital status and educational level were collected through SIF. Participants chose the option in the form that best suited their situation.

Post-traumatic stress disorder (PTSD)

The symptoms of PTSD were measured by a 20-item Post-Traumatic Stress Disorder Checklist for DSM-5 (PCL-5) [34]. Respondents rate the degree to which they are bothered by each of the 20 criteria B-E symptoms during the past month on a 5-point scale ranging from 0= not at all to 4= extremely. PCL-5 total scores have evidenced strong test–retest reliability, diagnostic utility, and construct validity among veterans [35]. In this article, the internal consistency of scales was good (Cronbach's $\alpha = 0.96$).

Stress perception

We adopted the Chinese version of Perceived Stress Scale (PSS) prepared by Cohen et al. and revised by Yang Tingzhong to measure stress perception [36]. The scale is composed of 14 items, each item is divided into 5 grades from 1 (never) to 5 (always). A high score indicated a high level of the perceived stress. The PSS has been shown to be reliable in undergraduate college samples [37]. In this study, the alpha coefficient is 0.87, which demonstrates good internal consistency.

Resilience

Psychological resilience was assessed through Connor-Davidson Resilience Scale (CD-RISC) developed by Connor and Davidson [38], which is applicable to domestic college students and can be used to measure individual stress coping ability. Campbell-shills and others extracted 10 items from CD-RISC after a large sample test [39], forming a simplified version of the psychological resilience scale (CD-RISC-10). Each item is divided into 0 (not at all) to 4 (almost always), and the total score is the sum of all items (0 to 40). A high score indicated a high level of the resilience. It has shown good reliability and validity in many aspects, such as trauma exposure population and tumor patient [40, 41]. In this study, the internal consistency of the scale was good (Cronbach's $\alpha = 0.90$).

Mindfulness

Mindfulness was measured by Mindful Attention Awareness Scale (MASS). The scale was developed by Brown and Ryan [42], including 15 topics, involving individual cognition, emotion, physiology and other aspects in daily life. The Chinese version of this scale has been revised

by Chinese scholars taking college students as subjects. Each item has a score from level 1 to level 6. The high score of the scale reflects the individual's high awareness and attention to the present in daily life. The previous research shows that the scale has good psychometric indicators [43]. In this article, its Cronbach's alpha is 0.95.

Statistical analyses

After completion of data collection, initial collation was first carried out using SPSS 26.0. Descriptive statistics were then analyzed for demographic variables and the four main variables involved in the study (Mindfulness, PTSD, Resilience and Perceived Stress). Mindfulness, PTSD, Resilience and Perceived Stress were standardized separately and standardized Z-scores were calculated for subsequent analyses. Then Pearson's bivariate correlation analysis and multiple regression analysis were used to explore the relationships between the four main variables in the study. Then we used model 6 of the SPSS plug-in PROCESS 4.1 provided by Hayes to test the mediating role of resilience and stress perception [44].

Results

Common method biases tests

There may be a risk of common method biases in collecting survey data by questionnaire method. In order to test the common method biases, Harman's single-factor test method was used. The results show that there are 8 factors with eigenvalue greater than 1, and the first common factor accounts for 39.86% of the total variables, lower than the threshold of 40% [45]. Cautiously, we believe that there are no serious common method biases in the research data.

Descriptive statistics

The demographic data of the cases is presented in Table 1. Among all the participants, 67.52% are boys and 32.48% are girls. The participants' age ranged from 18 to 25 years (mean = 19.67, SD = 1.07). In terms of grade distribution, grade 2020 accounts for 48.08%, and grade 2021 accounts for 51.91%.

Descriptive analysis and correlations between overall variables

The basic descriptive data for mindfulness, stress perception, resilience and PTSD are shown in Table 2. The normality tests for each variable are presented in Supplementary Figs. 1 and 2. Although some variables do not conform to normality, they still exhibit good kurtosis and skewness, and thus can be considered to have an approximately normal distribution. We also conducted a multivariate collinearity analysis (Supplementary Figs. 3), and the results indicate that there is no multicollinearity among the variables (VIF < 5).The mean total scores for mindfulness were 61.89 ± 16.71 (range = 0–80), and the mean total scores for stress perception were 38.39 ± 8.18 (range = 14–70), the mean total scores for resilience were 25.70 ± 6.58 (range = 0–40). The mean total scores of PTSD were 36.64 ± 15.35 (range = 12–36).

Pearson correlation analysis was used to test the bivariate correlations of all the variables. All variables in the model have been standardized. Table 2 shows that all the variables were significantly correlated with each other. Mindfulness is positively correlated with resilience (r = 0.45, p < 0.01), and negatively correlated with stress perception (r = −0.55, p < 0.01) and PTSD (r = −0.51, p < 0.01). Stress perception was positively correlated with PTSD (r = 0.70, p < 0.01), and negatively correlated with

Table 1 Descriptive statistics of sociodemographic variables

Variable	N	(%)	Variable	N	(%)
Age			Gender		
18	22	7.01	Boys	212	67.52
19	130	41.40	Girls	102	32.48
20	122	38.85	Grade		
21	23	7.32	Junior	163	51.91
22	8	2.55	Sophomore	151	48.08
23	5	1.59	Marital status		
24	3	0.96	Unmarried	314	100.00
25	1	0.32	Educational level		
			Undergraduate	314	100.00

Table 2 Descriptive Analysis and Correlations of Main Variables

	Mean	*SD*	1	2	3	4
1.Mindfulness	61.89	16.71	1.00			
2.Stress perception	38.39	8.18	−0.55**	1.00		
3.Resilience	25.70	6.58	0.45**	−0.76**	1.00	
4.PTSD	36.64	15.35	−0.51**	0.70**	−0.64**	1.00

N=316

***p*<0.01; All tests were two-tailed. This table shows the general means, standard deviations, and correlations of the four major variables. **indicates a significant correlation between the variables, which obtains between all the variables

resilience ($r = -0.76$, $p < 0.01$). Finally, there is a significant negative correlation between resilience and the level of PTSD ($r = -0.64$, $p < 0.01$).

Regression analysis

Mindfulness, stress perception, resilience and PTSD have been significantly correlated with each other, which is consistent with the analysis of further exploring the mediation effect model of mindfulness and PTSD [46]. After controlling for gender, Model 6 in SPSS 26.0 compiled by Hayes was used to analyze the mediating effect of resilience and stress perception in the relationship between mindfulness and PTSD. Results from regression analysis showed that mindfulness was significant negative alleviation on PTSD ($\beta = —0.16$, $t = 0–3.26$, $p < 0.01$) and Stress perception ($\beta = —0.31$, $t = -8.04$, $p < 0.001$), and also positively enhances higher level of resilience ($\beta = 0.48$, $t = 9.73$, $p < 0.001$). Resilience had significant negative effect on stress perception ($\beta = -0.62$, $t = -15.96$, $p < 0.001$) and PTSD ($\beta = -0.23$, $t = -3.91$, $p < 0.01$). For stress perception, the data results show that it can affect PTSD positively ($\beta = 0.44$, $t = 6.85$, $p < 0.001$) (Table 3).

The chain mediating effects analyses

The nonparametric percentile bootstrap method for bias correction provided by Hayes is used to test the intermediary effect. The 95% confidence interval is calculated for 5000 repeated samples. If the confidence interval does not include 0 value, it indicates statistical significance. The results (Table 4) show that the Bootstrap 95% confidence interval of the total indirect effect (−0.3769) of stress perception and resilience does not include 0, indicating that there is a significant intermediary effect between mindfulness and PTSD between these two mediating variables. It is composed of three indirect effects:

Table 4 Total, direct, and indirect effects of mindfulness on PTSD with resilience and stress perception as mediators

	Effect	BootSE	BootLLCI	BootULCI	Relative Mediation Effect
Total effect	−0.5329	0.0478	−0.6269	−0.4389	100%
Direct Effect	−0.1561	0.0479	−0.2504	−0.0618	29.3%
Indirect Effect	−0.3769	0.0506	−0.4763	−0.2783	70.7%
Indirect effect1	−0.1109	0.0322	−0.1738	−0.0481	20.8%
Indirect effect2	−0.1359	0.0293	−0.1991	−0.0842	25.5%
Indirect effect3	−0.1301	0.0327	−0.2015	−0.0724	24.4%

Indirect effect1: Mindfulness→Resilience→PTSD

Indirect effect2: Mindfulness→Stress Perception→PTSD

Indirect effect3: Mindfulness→Resilience→Stress Perception→PTSD

BootSE Bootstrap Standard Error, *BootLLCI* Bootstrap Lower Limit of Confidence Interval, *BootULCL* Bootstrap Upper Limit of Confidence Interval

1) Mindfulness → Resilience → PTSD (−0.1109)
2) Mindfulness → Stress Perception → PTSD (−0.1359)
3) Mindfulness → Resilience → Stress Perception → PTSD (−0.1301)

The confidence interval of the three indirect effect paths does not include 0, so their indirect effect is considered significant. It shows that stress perception and resilience play a significant mediating role in the influence of mindfulness on PTSD. Meanwhile, this also indicates that the chain effect of stress cognition and resilience also exists. To sum up, we can get the following model diagram (Fig. 2).

Table 3 Regression analysis of Mindfulness-Stress Perception-Resilience-PTSD (n = 316)

Variable	Resilience			Stress perception			PTSD		
	β	*SE*	*t*	*β*	*SE*	*t*	*β*	*SE*	*t*
Constant	0.35	0.15	2.36	0.11	0.10	1.12	0.04	0.12	0.34
Gender	−0.26	0.11	−2.50	−0.09	0.07	−1.19	−0.03	0.08	−0.36
Mindfulness	0.48	0.05	9.73***	−0.31	0.04	−8.04***	−0.16	0.05	−3.26**
Resilience				−0.62	0.04	−15.96***	−0.23	0.06	−3.91**
Stress perception							0.44	0.06	6.85***
R^2	0.21			0.65			0.55		
F	80.39***			193.31***			93.53***		

PTSD post-traumatic stress disorder

**$p<0.01$, ***$p<0.001$

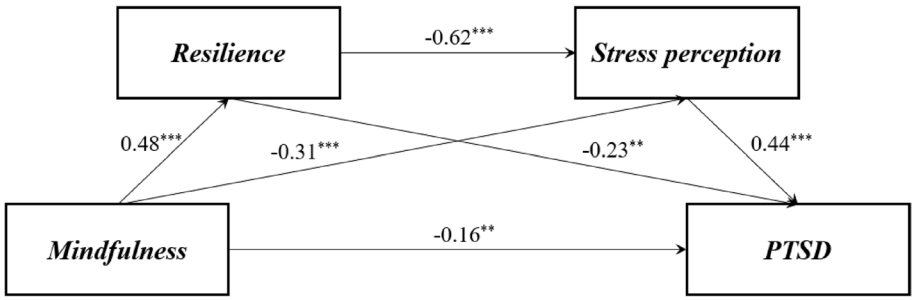

Fig. 2 Path map of the impact of mindfulness on PTSD. PTSD: post-traumatic stress disorder

Discussions

Based on the occurrence of campus violence, this article explores the impact of mindfulness on PTSD from the perspective of resilience and stress cognition. The results show that mindfulness has a significant negative impact on PTSD, and hypothesis 1 is valid. The results are similar to previous literature [47, 48]. This suggests that low levels of mindfulness are one of the main causes of PTSD after traumatic events. At the same time, it is also necessary to enhance the level of mindfulness of college students, which can effectively reduce the probability of mental illness when suffer violent events [49]. Resilience and stress perception play a mediating role in mindfulness affecting PSTD, indicating that after a traumatic event, due to the low level of mindfulness, there is insufficient focus on current life, excessive focus on the occurrence of traumatic events or possible future violent events [50]. Moreover, under the guidance of low resilience and erroneous cognition, traumatic events promote the generation of stress symptoms.

Mediation of Resilience and Stress perception between Mindfulness and PTSD

The data results show that resilience and stress perception play a mediating role in the relationship between mindfulness and PTSD, and hypothesis 2 and 3 are valid, which is consistent with previous research results. Andrew Thomas Reyes'research suggests that resilience can effectively serve as an important moderator in the mediating model of mindfulness affecting PTSD [26]. Hypothesis 2 holds, indicating that toughness has an important impact on PTSD. This demonstrates that for those with low levels of mindfulness, they are unable to effectively overcome the negative psychological factors brought about by trauma after the occurrence of the traumatic event, and will be slower or difficult to recover from the event. People exposed to trauma are often prone to immerse themselves in the occurrence of violent events, their causes, and concerns about the possibility of such situations in the future. In lower risk daily life events, resilience often overcomes this immersion and returns to normal life. However, violent events give people too much impact, so that the resilience of some people cannot withstand it, making it difficult to focus on the present and more prone to malignant consequences, manifested as post-traumatic stress disorder [50].

Hypothesis 3 is valid, indicating that the level of post-traumatic stress perception largely mediates the generation of PTSD. As demonstrated by mindfulness reduction therapy, treatment based on mindfulness reduction is an effective way to alleviate PTSD symptoms [48]. This indicates that stress cognition, as a mediating regulation, plays a crucial role in the influence of mindfulness on PTSD. Low mindfulness leads to a decrease in current cognitive levels, which can lead to negative perceptions of stress, such as incorrectly assessing the causes of violent events and assessing one's own campus environment. And if mindfulness continues to fail to correct these negative perceptions, these negative cognitions are likely to continue to cause typical symptoms of PTSD, such as repeated recall of traumatic events and avoidance [6]. On the one hand, there are objective factors in such cognition, which is the evaluation of the current situation. Generally, it will not have a significant impact due to focusing on other activities of campus life. On the other hand, there are also long-term abnormal concentration after traumatic events, which increases the likelihood of PTSD symptoms.

The Chain Mediating Role of Resilience and Stress Perception between mindfulness and PTSD

The study also found that resilience and stress perception have a chain mediating role in the relationship between mindfulness and PTSD. Based on the above discussion assumptions 2 and 3, individuals with low levels of mindfulness are unable to focus normally on the present and psychologically, and unable to resist the impact of traumatic events, resulting in negative cognition of their own environment and events. When negative cognition persists, there is a greater likelihood of PTSD. In other

studies, there have also been results indicating that stress cognition can affect resilience [51]. This is because in other studies negative events are often nonviolent factors such as academic stress and life stress. The stress events in this article have violent factors, which can easily lead to excessive cognition. This cognition is related to the evaluation of the surrounding campus social environment, and the evaluation itself is based on non-violent factors. This suggests that violent and non-violent events often generate different pressures and corresponding stress perceptions. Experiencers of violent events may first encounter cognitive shocks psychologically, requiring a certain degree of resilience.

Horizontal Comparison with Other Similar Studies

After that, some scholars have reported similar psychological studies related to PTSD. Zhang Xinmiao and colleagues reported that psychological resilience and PTSD acted as chain mediators between personality traits and cognition in breast cancer patients. The CD-RISC-10 scale was also used for resilience, and the average value of psychological resilience in their population was 25, close to the average value of 25.7 in this study [52]. This suggests that resilience levels are similar in violent events and other disease-related incidents. Similarly, in Zhang Yi and colleagues'study on the impact of mindfulness among professional rescue personnel on PTSD, scales similar to those used in this study were employed. The results indicated that the level of mindfulness (61.74 ± 12.40) was similar to that of the sample population in this study (61.89 ± 16.71), but the standard deviation of the mindfulness level in this study's sample population was larger, suggesting that the impact of traumatic events may be related to the occupation of the population and the specific scope of the event's impact [11].

The findings suggest that mindfulness can significantly positively influence resilience while negatively affecting stress perception and the risk of developing PTSD. In light of these results, tailored interventions can be designed to effectively support individuals who have experienced traumatic events and reduce their vulnerability to PTSD. For individuals who have undergone traumatic experiences, integrating mindfulness practices alongside evidence-based therapeutic approaches can prove beneficial. This combined approach can help enhance resilience and coping mechanisms, ultimately mitigating the risk of developing PTSD. Furthermore, focusing on stress perception management through cognitive-behavioral techniques and stress reduction strategies can be pivotal in preventing the escalation of PTSD symptoms. Resilience-building activities, such as engaging in social support networks, regular physical activity, and cultivating meaningful hobbies, can contribute to a more robust psychological foundation. By enhancing resilience, individuals are better equipped to manage stress perception, thus further reducing the risk of PTSD. In summary, incorporating a multifaceted approach that integrates mindfulness practices, evidence-based therapies, and resilience-building strategies can effectively reduce the risk of PTSD for individuals who have experienced traumatic events. This comprehensive strategy addresses the complex interplay between mindfulness, resilience, stress perception, and PTSD, enabling better long-term mental well-being outcomes.

Limitations

The questionnaire method used in this study has certain limitations, and further longitudinal studies or other more reasonable research methods should be used in the future to explore the relationship between mindfulness and PTSD symptoms. Secondly, this study conducted an investigation after the campus violence during the prevalence of the COVID-19 epidemic. It cannot be ruled out that the prevalence of the COVID-19 epidemic has a certain impact on the psychology of the test group. Moreover, although all participants in this study are aware of the severe campus violence incident, we cannot confirm that all reported PTSD symptoms are directly related to it. Some participants may attribute their symptoms to other traumatic experiences, which could lead to ambiguity in relationships between variables and reduce the study's internal validity. This limitation should be considered, and the results should be interpreted with caution.

In addition, the bias test results of the common method used in this study are on the high side, which may be due to some concealment of the subjects filling in the questionnaire or some unreasonable structure of the questionnaire itself. At the same time, there are also some issues that deserve in-depth consideration, such as the inconsistency between the results of some studies and the views of this study. Due to the limitations of the topic of the article, it is necessary to further explore the reasons for their differences in the future.

Conclusion

Mindfulness is positively correlated with higher resilience and negatively associated with stress perception and PTSD. Resilience and stress perception play a mediating role between mindfulness and PTSD, respectively, and stress perception is influenced by resilience. Stress perception and resilience play a chain mediating role in mindfulness prediction of PTSD.

Abbreviations

PTSD	Post-traumatic stress disorder
SIF	Sociodemographic Information Form
PCL-5	PTSD Checklist for DSM-5

DSM-5	Diagnostic and Statistical Manual of Mental Disorders, 5th Edition
PSS	Perceived Stress Scale
CD-RISC	Connor-Davidson Resilience Scale
MASS	Mindful Attention Awareness Scale

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s12888-025-06933-x.

Supplementary Material 1

Supplementary Material 2

Supplementary Material 3

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Authors' contributions
The study was conceptualized and designed by SQ, JK, WL, JZ, MH, GB, XX, YX, TY, and ZM. Data acquisition and analysis were conducted by JK, WL, MH, TY, and ZM. SQ, JK, JZ, GB, XX, YX, TY, and ZM were involved in data processing, analysis, and manuscript revision.

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Data availability
While the datasets generated during this study are not publicly accessible due to a lack of data release permissions at the time of consent, they can be obtained upon reasonable request from the corresponding author.

Declarations

Ethics approval and consent to participate:
This study adhered to the principles outlined in the Declaration of Helsinki and received approval from the Medical Ethics Committee of the Army Medical University (2021 NO.11–02). All survey participants willingly took part in the study and provided informed consent by signing a consent form before participating in the questionnaire.

Consent for publication
Not applicable.

Competing interests
The authors declare no competing interests.

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