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Article

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Posted Date: October 27th, 2026

DOI: https://doi.org/10.21203/rs.3.rs-11225795/v1

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Additional Declarations: No competing interests reported.

Abusive supervision and academic performance among medical graduate students in China: A moderated mediation model

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ABSTRACT

This study examined the interrelationships among abusive supervision, emotional exhaustion, and academic performance over time in Chinese medical graduate students. Additionally, we also investigated the moderating role of self-efficacy (SE) in the relationship between abusive supervision and emotional exhaustion over time. This study employed a cross-lagged panel design, consisting of two data waves separated by a six-month interval. The sample of this research consisted of 1111 graduate students from medical universities in China. Self-report questionnaires were utilized to collect data at both time points. Longitudinal structural equation modeling (SEM) was employed to contrast the nested models. The findings from the cross-lagged model analysis support the established reciprocal model, suggesting that there exists an interaction among abusive supervision, emotional exhaustion, and academic performance. The findings also reveal that self-efficacy weakens the causal effect of abusive supervision on emotional exhaustion. Moreover, this research links abusive supervision with emotional experiences, a topic that has implications for personnel selection and evaluation.

1 | Introduction

Medical graduate students are high-level medical talents cultivated by the country and are one of the most important strategic resources in the national medical service system and technology innovation system. They are also an important reserve force for building an innovative country (Turner, 2017). The innovation level of medical graduate students is mainly reflected in their research performance (Horta & Santos, 2016). Although China has ranked first in the world in terms of the number of medical graduate student enrollments for several consecutive years, the research innovation of Chinese medical graduate students is insufficient compared to academic powerhouses like the United States, and their academic performance level is far lower than that of the United States. The Ministry of Education in China has proposed strengthening research innovation among medical graduate students as one of the key tasks to enhance academic performance (Wang, 2021) and fully utilizing the role of medical graduate students in scientific research (Stone et al., 2018). Therefore, enhancing the academic performance of medical graduate students in China is not only the focus of medical education in our country but also a challenge faced by medical education in China.

During the medical graduate students' academic journey, their supervisors serve as the primary source of knowledge and exert a significant influence on their growth and progress (Alsoufi et al., 2020). The guidance style of supervisors influences how medical graduate students allocates their resources. Among them, abusive supervision refers to the continuous display of hostile language and non-verbal behaviors (excluding physical contact) towards medical graduate students (Li et al., 2022). This abusive behavior inflicts psychological and emotional harm on individuals, resulting in a loss of personal psychological resources. The abusive supervision diminishes the resource level of medical graduate students and can affect their behavior in terms of resource investment and protection (Zhang & Liao, 2015). Meanwhile, drawing on the Conservation of Resources Theory (COR), when medical graduate students cope with abusive supervision, they employ emotional labor strategies that require the expenditure of resources, resulting in resource loss. Consequently, they will have fewer resources available for their research work, leading to high emotional exhaustion and reduced efficiency in their academic performance.

Due to the pressure exerted by Chinese universities on research outcomes, supervisors may resort to abusive supervision to enhance the academic performance of medical graduate students by increasing their research efforts. However, the perception of abusive supervision by students can potentially diminish their academic performance by undermining their self-efficacy beliefs. Based on Social Cognitive Theory (SCT), which explains the negative correlation between abusive supervision and subordinates' work efficiency (Akram et al., 2019). Thus, abusive supervision as a hindrance in the environment can influence the job-related outcomes of followers by undermining their sense of self-efficacy and enhancing emotional exhaustion in the workplace.

However, the underlying mechanisms that lead to various

Summary

What is currently known?

• Empirical evidence, only in the field of management, confirms that abusive management has a negative impact on employee emotional and work engagement.

• Theory predicts that emotionally exhausted people may choose to ignore work and study, passively coping with the stress caused by abusive bosses.

• Self-efficacy can alleviate the emotional exhaustion caused by stress.

• People who are emotionally exhausted not only have lower energy levels, but also lower engagement in the learning process.

What does this study add?

• Academic performance and abusive supervision were found to be positively correlated in the context of higher education in China.

• The mediating mechanism of student emotional issues between supervisory mentoring styles and academic performance in the medical education field.

• Students' self-efficacy may regulate their psychological state after experiencing abusive supervision.

• Abusive supervision has less of an effect on academic performance through emotional exhaustion at higher levels of self-efficacy.

Implications of the study findings for practitioners

• Simultaneously focusing on interventions for both supervisors and students is more valuable because it can minimize the resource costs associated with abusive supervision.

• Universities should also consider improving psychotherapy programs for supervisors and students.

• Individuals with higher self-efficacy exhibit an enhanced capacity to manage the stress induced by abusive supervision.

outcomes due to abusive supervision remain unclear (Pradhan & Jena, 2017; Tepper et al., 2017). Few studies have examined the moderating and mediating roles of factors between abusive supervision and job performance, particularly those that mitigate its negative impact on job performance (Jahanzeb et al., 2019; Lee et al., 2018). The study seeks to examine and identify the moderating factors that influence academic performance among medical graduate students in China through the mechanisms of abusive supervision.

2 | Literature review

2.1 | COR theory and SCT theory

The COR theory serves to provide insights into the determinants of an individual's behavior (Hobfoll, 1989). At its core, COR theory posits that individuals are driven to acquire, maintain, protect, and enhance the things they value (Hobfoll, 2001, p. 341). The COR theory explains that people experience psychological stress in response to particular situations. Firstly, individuals experience stress when they perceive a looming threat of resource loss. Secondly, stress arises when individuals lose resources that they previously possessed. Lastly, stress occurs when individuals invest resources but fail to attain the desired resources (Hobfoll, 2001). When individuals have a shortage of resources, they become more susceptible to further resource loss and tend to adopt a defensive mindset to conserve their remaining resources. Consequently, it is essential to focus on understanding the subsequent effects of emotional exhaustion, stemming from resource loss, on individuals' psychological well-being (Halbesleben et al., 2014).

According to social cognitive theory (Bandura, 1997), self-efficacy (SE) refers to an individual's beliefs regarding their ability to achieve desired outcomes through their capabilities. Self-efficacy beliefs are influenced by the specific context in which they are formed. They are context-dependent, meaning that individuals may feel confident and capable in certain situations or domains while lacking self-efficacy in others (Woodcock et al., 2019). Bandura (2010) proposed that SE develops through four primary sources: mastery experience, vicarious experience, social persuasion, and physiological and emotional states. Teacher self-efficacy has been conceptualized as a multidimensional construct in various domains. Meta-analyses of studies have consistently demonstrated that teacher self-efficacy plays a significant role in various aspects of the educational context. It has been found to positively contribute to instructional effectiveness, academic achievement, learning motivation, classroom quality, and even teachers' well-being (Klassen & Tze, 2014; Zee & Koomen, 2016).

2.2 | Abusive supervision and academic performance

The academic performance of medical graduate students refers to the achievements they attain during their studies, including papers, patents, projects, publications, and so on (Salimi & Rezaei, 2016). Scholars have explored the factors influencing the academic performance of medical graduate students from various perspectives, such as individual, supervisor, and institutional factors (van Rooij et al., 2021). At the individual level, demographic variables such as gender, age, marital status, age of first paper publication, work experience, disciplinary category, career goals, educational background, and study-abroad experience have been found to impact the academic performance/output of medical graduate students. Additionally, the internal and external motivations of medical graduate students, as well as personal psychological factors, also influence the academic performance of medical graduate students (Schmidt & Hansson, 2018). At the supervisor level, factors such as the frequency and style of guidance, academic support, and the relationship between supervisors and students all have an impact on the academic performance of medical graduate students. Among these, high-frequency guidance, academic support, and a

positive supervisor-student relationship are beneficial for the academic performance of medical graduate students. Kaur et al. (2022) confirmed that research collaboration with supervisors is beneficial for the research output of medical graduate students. Although scholars have studied the impact of individual, supervisor, and institutional factors on the academic performance of medical graduate students, the combined influence of supervisors and individual psychological factors on the academic performance of medical graduate students is still not sufficiently explored. Further research in this field is needed to improve educational outcomes.

According to Tepper (2000), abusive supervision can be defined as "subordinates' perceptions of the extent to which supervisors engage in the sustained display of hostile verbal and nonverbal behaviors, excluding physical contact" (p. 178). For example, behaviors such as telling students their ideas are stupid, reminding them of past mistakes and failures, or belittling them in front of others constitute abuse. Based on COR theory, abuse causes individuals to lose psychological resources and affects their resource levels (Kim et al., 2016). Supervisors play a crucial role in most medical graduate students' research and learning process because they possess valuable and controllable resources (such as project assignments and research outcomes) for the students. Additionally, medical graduate students need to invest a significant amount of time in interacting with their supervisors (Cooksey & McDonald, 2019). Thus, an abusive supervisory style from the advisor can affect the medical graduate student's emotional issues, thereby leading to an adverse impact on academic performance.

Given the limited existing literature on investigating the relationship between abusive supervision and medical graduate students' academic performance, some empirical studies have only proven in the management area that abusive supervision can have a negative impact on employees' emotions and work engagement (De Clercq et al., 2022; Malik et al., 2023). The study showed that the causal connection between abusive supervision and improvements in subordinate performance, which in turn influenced the behavior of the subordinates and resulted in more abusive supervision (Yu & Duffy, 2015). Research has shown that the supervisor-subordinate relationship is inherently dynamic and bidirectional, with the behaviors of the supervisor and subordinate affecting one another over time (Lam et al., 2017). This was just research finding in the field of management. In the area of higher education, the relationship between medical graduate students' academic performance and abusive supervision is relatively lacking and is currently an urgent problem that needs more attention. Thus, we propose the following:

H1. Abusive supervision is negatively related to academic performance.

H1a. There is a negative correlation between abusive supervision at Time 1 (T1) and academic performance at Time 2 (T2); likewise, there is a negative relationship between academic performance at Time 1 (T1) and abusive supervision at Time 2 (T2).

2.3 | The mediating role of emotional exhaustion

The existing literature has shown that if employees are exposed to verbally abusive leadership styles, it hinders their ability to improve job performance. However, literature has also shown that an abusive leadership style can lead to emotional exhaustion in students (Yao et al., 2023). Emotional exhaustion is "a long-term state of physical and emotional depletion caused by excessive work, personal demands, and high-stress situations" (Wright & Cropanzano, 1998, P. 486). From the theoretical perspective of COR, when an individual is in a high-stress situation for an extended period and experiences an emotional overload, this will lead to negative outcomes in their behavior (Akram et al., 2019). In other words, abusive supervision is a causative factor for emotional exhaustion, and it is positively correlated with emotional exhaustion (Lim et al., 2021). Additionally, abusive supervision is a source that leads to over-consumption of individual resources and subsequently generates feelings of frustration, disappointment, and anger, which then results in individuals refusing emotional awareness and ultimately causing emotional exhaustion.

Compared to the extensive research on the relationship between abusive supervision and emotional exhaustion, the exploration of the relationship between emotional exhaustion and academic performance has been relatively limited. While relevant research has examined the positive impact of positive emotions on academic achievement (Carmona-Halty et al., 2021), the issue of how emotional exhaustion affects academic performance has yet to be resolved. According to the COR theory, emotional exhaustion represents the feeling of depletion of an individual's psychological and physiological assets, which leads to long-term emotional exhaustion (Sun & Pan, 2008). Subsequently, emotionally exhausted individuals can choose to ignore work and learning and passively deal with the interpersonal stress caused by abusive supervision, which not only reduces their energy levels but also reduces their commitment to the learning process. Therefore, this study hypothesizes that emotional exhaustion is a mediating factor that explains the potential mechanism between abusive supervision and academic performance in medical graduate students.

H2. Abusive supervision is positively related to emotional exhaustion.

H2a. A positive correlation exists between abusive supervision at T1 and emotional exhaustion at T2, and a positive correlation exists between emotional exhaustion at T1 and abusive supervision at T2.

H3. Emotional exhaustion is negatively related to academic performance.

H3a. Emotional exhaustion at T1 is negatively related to academic performance at T2, and academic performance at T1 is negatively related to emotional exhaustion at T2.

H4. Emotional exhaustion mediates the relationship between abusive supervision and academic performance.

H4a. The interaction between abusive supervision at T1 and academic performance at T2 is mediated by emotional exhaustion

at T1.

2.4 | Self-efficacy acts as a mediator

Given the connection between abusive supervision and negative emotions, what can individuals do to alleviate the relationship between abusive supervision and emotional exhaustion? SCT theory and COR theory suggest that self-efficacy, as a self-motivating force, provides individuals with a pathway to recover their resources (Lent, 2016; Pulido-Martos et al., 2023). Zhen et al. (2017) also suggested that self-efficacy in learning can help reduce negative emotions and fatigue. Self-efficacy is "a belief in one's perceived capability that helps them shape their behavior and take actions in different life environments" (Bandura, 1986, P. 288). It can help medical graduate students' academic beliefs and research competence, as students with higher levels of self-efficacy can enhance their learning motivation and strengthen their ability to adapt to adversity and failure. Developing these capabilities can help establish new internal resources, reducing negative emotions, and as their learning level gradually improves, they will acquire sufficient useful academic resources.

However, the research findings on the role of self-efficacy in alleviating the emotional exhaustion caused by abusive supervision are not sufficient. Research has confirmed that an individual's self-efficacy is a dynamic mechanism of self-regulation, meaning that self-efficacy can regulate one's psychological state and alleviate certain negative emotions (Fan & Cui, 2024). Based on the definition of self-efficacy, one may proposed that following abusive supervision, an individual's self-efficacy can strengthen their self-affirmative beliefs, thereby reducing emotional exhaustion (Zhang et al., 2022). Empirical evidence supporting this proposition shows that self-efficacy can alleviate the emotional exhaustion caused by stress (Hu & Yeo, 2020). Additionally, other studies have shown that mindfulness is a factor that can regulate the correlation between abusive supervision and emotional exhaustion (De Clercq et al., 2022). Mindfulness awareness is a personal resource that helps individuals mitigate negative work attitudes and detach themselves from adverse environments (Taylor & Millear, 2016). Consequently, it is anticipated that self-efficacy could undermine the significant correlation between abusive supervision and emotional exhaustion as time progresses. This research finding offer a chance to confirm the effectiveness of self-efficacy's moderating effect in the field of medical education. Therefore, we hypothesize that:

H5. Self-efficacy moderates the relationship between abusive supervision and emotional exhaustion.

H5a. The positive correlation between abusive supervision at T1 and emotional exhaustion at T2 is moderated by self-efficacy at T1, meaning that the strength of the connection will differ based on the level of self-efficacy at T1.

H6. Emotional exhaustion at T1 has an impact on the correlation between abusive supervision at T1 and academic performance at T2. This impact is influenced by self-efficacy at T1, meaning that the strength of the indirect effect will vary depending on the level of self-efficacy.

3 | Method

3.1 | Research design

We used structural equation modeling (SEM) in Mplus 8.0, employing a cross-lagged panel design with a 6-month time lag. The current study employed the cross-lagged panel method using SEM, which provided strong proof of temporal precedence and stability, and avoided the disadvantages of cross-sectional designs (O'Laughlin et al., 2018). Additionally, in comparison to cross-sectional designs, the cross-lagged panel method proves reliable to evaluate mediation hypothesize, as it takes into account the previous levels of mediating factors and the outcomes (at time t-1), and evaluates the importance of the effects of changes in the mediator and the outcome (Falkenström, 2024). While there are no clear guidelines in the literature for the optimal measurement time interval (Lesener et al., 2019), we believe that a six-month time interval is most appropriate for testing the hypothesized relationships in this study on the stress-strain relationship.

3.2 | Participants and procedure

The study sample comprised graduate students representing different medical disciplines at medical universities across various provinces in China. The participants were primarily drawn from the 2nd and 3rd years of their graduate programs. Respondents were methodically selected through the Chinese online survey platform Wenjuanxing.

The first wave of data collection was conducted in October 2023, and the second wave was conducted in May 2024. The study sample was selected by the implementation of a method known as stratified sampling. Prior to data collection, each participant provided informed consent documents and was assured of both anonymity and confidentiality. Measures to ensure participant anonymity were implemented throughout the data processing workflow. Additionally, the researchers applied for and received approval from the academic ethics committee to conduct this questionnaire survey (Chengdu Normal University [2023] No. 09). The committee reviewed the study's objectives, procedures, and scales.

During the initial phase at Time (T1), 1260 graduate students were asked to take part, and 1111 students (response percentage of 88.2%) shared their demographic details and completed surveys, including assessments for abusive supervision, emotional exhaustion, academic performance, as well as self-efficacy. All 1111 students were asked to take part in the second survey at T2, which was conducted after a 6-month interval, and 1111 students got involved, with a response percentage of 100%. The sample included 791 female students (71.2%) and 320 male students (28.8%), with the majority of graduate students aged between 22 and 30. The participants' average work experience was around 2 years. Among them, 496 participants (44.6%) were in their first year of graduate studies, 101 (9.1%) were in the second year, 254 (22.9%) were in the third year, and 260 (23.4%) were in the fourth year or beyond.

3.3 | Measures

Abusive supervision. The measure of abusive supervision used a 6-item shortened version from Xu et al. (2015). Tepper (2000) created a 15-item measure to evaluate how subordinates perceive abusive supervision. An example item is "My supervisor gives me the silent treatment". The response was rated with "1" representing "strongly disagree" and "7" representing "strongly agree". The composite reliability was calculated to be 0.984 at T1 and 0.975 at T2.

Emotional exhaustion. Students' emotional exhaustion was assessed using a 3-item scale developed by Watkins et al. (2015) from the Maslach Burnout Inventory (MBI) (Maslach & Jackson, 1986). An example is "I feel burned out from my research work". Ratings for the response ranged from "1" representing "strongly disagree" to "7" representing "strongly agree". At T1 and T2, the composite reliability (CR) was 0.910 and 0.939, respectively.

Academic performance. The study used a 5-item academic performance scale designed by Liu et al. (2020) to evaluate the academic performance of medical graduate students. A sample item is "Compared with my classmates, my competence in reflection and professional growth is". The response was scaled from 1 (very bad) to 7 (excellent). At T1 and T2, the composite reliability was 0.970 and 0.938, respectively.

Self-efficacy. The study utilized a 3-item self-efficacy scale to assess the academic self-efficacy of the medical graduate students. The shortened scale was established by Zhang et al. (2013) and has been utilized in some research self-efficacy studies. An example item is "I am confident in my ability to handle research work". The 7-point Likert scale was used for scoring, with higher scores indicating higher research self-efficacy of the university faculty. At both T1 and T2, the composite reliability was 0.924 and 0.852.

The study controlled for two demographic variables (gender and age) as they have been shown to influence academic performance and/or emotional exhaustion significantly (Wang et al., 2019). Additionally, some studies conducted a robustness analysis by evaluating the models either with or without the control variables, and the results remained consistent across the two regression equations (Becker, 2005; Spector & Brannick, 2011).

3.4 | Analytical strategy

The analysis in this study includes four steps: Firstly, testing the bivariate correlation among the variables in the current research. Secondly, before measuring the structural model, the study evaluated the measurement model for each variable. Specifically, we performed confirmatory factor analyses (CFA) for two measurement time points, T1 and T2, separately. Thirdly, we conducted an assessment of measurement invariance, which included configural, metric, and scalar. This assessment is essential for analyzing the cross-lagged interactions (Little, 2024). Subsequently, we examined these hypotheses through contrasting different models that explain the causal connection among the variables. In more detail, the goal is to examine four models: a. The stability model (M1) was used to imitate the time stability by measuring the autocorrelations between variables at T1 and T2. This model didn't include any cross-lagged associations, as shown in Figure 1 (Panel A). b. The normal causality model (M2) is the same as M1, but it replicates additional cross-lagged results. These effects include the influence of T1 abusive supervision on T2 emotional exhaustion and academic performance, and the cross-lagged paths from T1 emotional exhaustion to T2 academic performance, as shown in Figure 1 (Panel B). c. The reversed causality model (M3) is the same as M1, but it includes extra cross-lagged effects. Specifically, it incorporates the influence of T1 academic performance on T2 abusive supervision and emotional exhaustion, and the impact of T1 emotional exhaustion on T2 abusive supervision. d. The reciprocal model (M4) is the same as M1, but it simulates the reciprocal connections among abusive supervision, emotional exhaustion, and academic performance, as illustrated in Figure 1 (Panel D). To evaluate the fit of the model, this study used several fit indices including the chi-square statistic (χ^2), the root mean square error of approximation (RMSEA), the comparative fit index (CFI), the Tucker-Lewis index (TLI), and the standardized root mean square residual (SRMR). Additionally, the study used chi-square difference tests to compare the different competing nested models (Pavlov et al., 2020). After choosing the best-fitting model, we used the bootstrapping method to test the cross-lagged interactions among the variables and the mediating effect of emotional exhaustion on the association between abusive supervision and academic performance, as proposed by Nawrocka et al. (2021). Meanwhile, the 95% confidence interval is applicable for testing the value of the mediation effect and conditional indirect effects. Partial mediation can only be examined in a two-wave cross-lagged panel design, which is a type of semi-longitudinal design (Xu et al., 2020). Finally, we adopted an unconstrained model formation method, using all possible products to specify the latent interaction terms, and constructed multiple indicators of the latent interaction terms to test the moderating role of self-efficacy (Marsh et al., 2004). Furthermore, the slope graph shows the conditional indirect impact of emotional exhaustion on academic performance at different levels of self-efficacy.

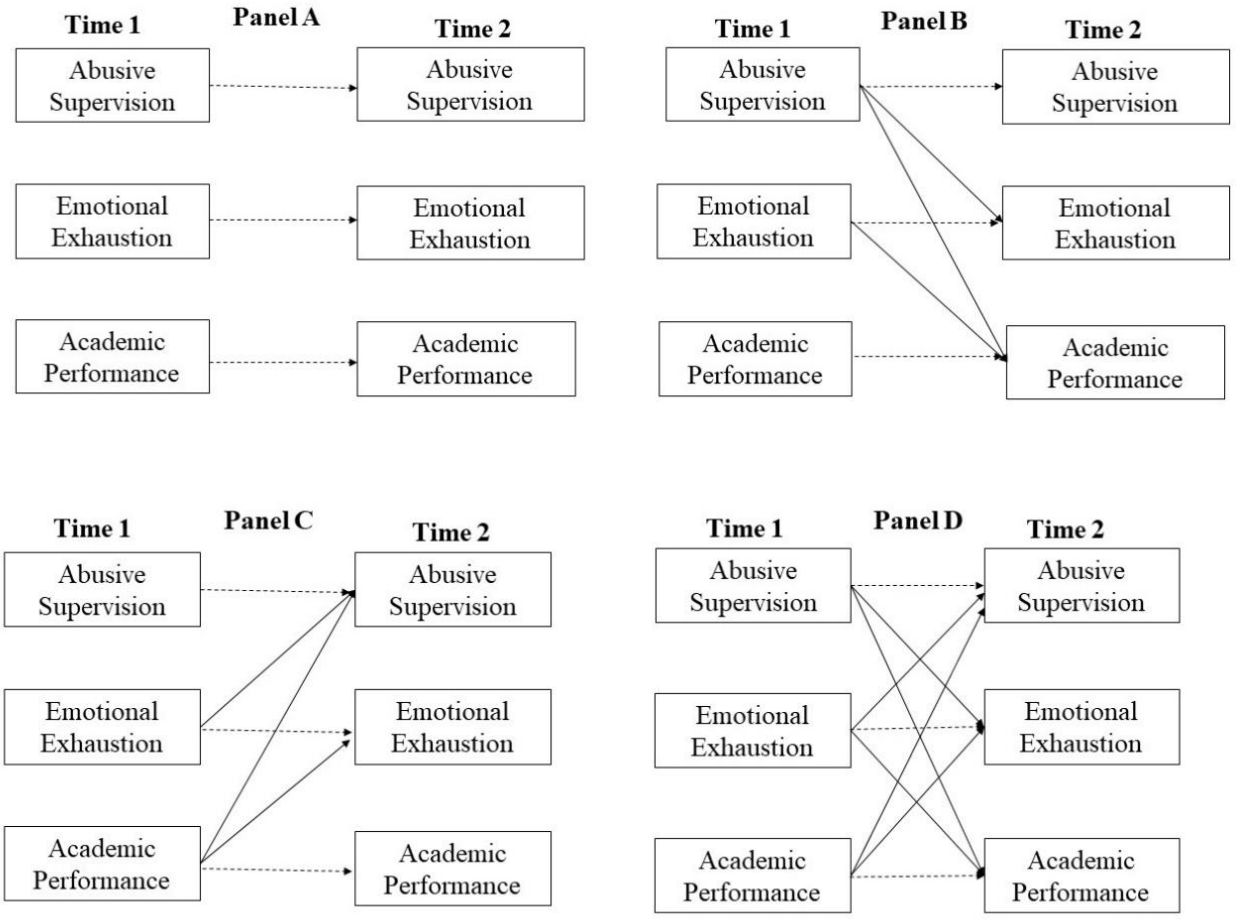


FIGURE 1 | The four types of models

4. Results

4.1 | Descriptive and Correlation Statistics

The means, standard deviations, and bivariate correlations between the two waves of data are shown in Table 4.1. The observed main variables' correlations followed predicted patterns. Specifically, abusive supervision, emotional exhaustion, academic performance, and self-efficacy were significantly correlated at the $p < 0.01$ level at both T1 and T2. However, there was no significant correlation found between the key variables and the control variables. Therefore, to enhance the validity of this study, the study excluded the influence of these control variables from the analysis of regression (Bernerth & Aguinis, 2016).

4.2 | Measurement Model

The study performed a confirmatory factor analysis (CFA) using the maximum likelihood method in Mplus 8.0. The findings suggested that the four-factor model fit the data well at each point in time. Specially, Table 4.2 showed that the four-factor model fit the data better at T1 [χ^2 (113) = 367.937, p = 0.000; RMSEA = 0.045; CFI = 0.991; TLI = 0.989; SRMR = 0.009] and T2 [χ^2 (113) = 484.993, p = 0.000; RMSEA = 0.054; CFI = 0.983; TLI = 0.979; SRMR = 0.016] in comparison the other models.

4.3 | Measurement Invariance

After the evaluation of the measurement models, this study continued to examine the measurement invariance. Given that each indicator in both measures has a consistent loading pattern, with fixed and free loadings, and the configural invariance model is likewise validated. The configural invariance model (Model 1) fits well with the data: χ^2 (482) = 1540.752, p = 0.000, RMSEA = 0.044, CFI = 0.980, TLI = 0.977, SRMR = 0.013. As the metric invariance model (M2) is a subset of the combined configural invariance model (M1), we used a chi-square test to compare the two models (Teo et al., 2009). Table 4.3 shows the values of ΔCFI = -0.007 and ΔRMSEA = -0.008, indicating evidence in support of metric invariance (Cheung & Rensvold, 2002). Comparing the metric invariance model (M2) and the scalar invariance model (M3) using the chi-square difference test shows that ΔCFI = 0.008 and ΔRMSEA = -0.002, and there is no statistically significant difference ($p > 0.05$); thus, the result supports scalar invariance.

Table 4.1 | Descriptive and correlation results

Construct	1	2	3	4	5	6	7	8	9	10	11	12
Time1												
1. Gender	1											
2. Age	-.012	1										
3. Work experience	-.010	.856**	1									
4. Grade	-.065*	.568**	.583**	1								
5. AS	-.030	.035	.009	.030	1							
6. EX	-.029	.045	.026	.052	.754**	1						
7. AP	.021	-.010	.011	-.016	-.933**	-.789**	1					
8. SE	.027	-.014	.010	-.013	-.692**	-.607**	.689**	1				
Time2												
9. AS	-.034	.030	.001	.030	.902**	.771**	-.879**	-.669**	1			
10. EX	-.018	.033	.011	.032	.863**	.762**	-.866**	-.658**	.842**	1		
11. AP	.024	-.009	.011	-.021	-.779**	-.657**	.787**	.617**	-.724**	-.725**	1	
12. SE	.017	.010	.006	-.017	-.281**	-.243**	.304**	.397**	-.272**	-.268**	.274**	1
Mean	1.720	1.331	2.070	2.433	4.102	3.258	3.972	4.281	3.863	3.811	4.274	3.245
SD	0.449	0.497	1.293	1.524	1.509	0.885	1.186	0.945	1.213	1.129	0.938	0.669

Note: AS = abusive supervision; EX = emotional exhaustion; AP = academic performance; SE = self-efficacy. $^{**}p < 0.01$

Table 4.2 | Alternative measurement model comparison

Model	χ^2/(df)	*p*	RMSEA	CFI	TLI	SRMR
Time1						
Four-factor model:	367.937(113)	0.000	0.045	0.991	0.989	0.009
Three-factor model a: Combined AS and EX items	1400.132(116)	0.000	0.100	0.955	0.947	0.039
Three-factor model b: Combined AS and AP items	1234.927(116)	0.000	0.093	0.961	0.954	0.019
Three-factor model c: Combined EX and AP items	1098.190(116)	0.000	0.087	0.966	0.960	0.030
Two-factor model: Combined AS, EX, and AP items	2090.720(118)	0.000	0.123	0.931	0.920	0.038
One-factor model: All factors combined	3497.848(119)	0.000	0.160	0.881	0.865	0.060
Time2						
Four-factor model:	484.993(113)	0.000	0.054	0.983	0.979	0.016
Three-factor model a: Combined AS and EX items	1369.091(116)	0.000	0.099	0.941	0.931	0.032
Three-factor model b: Combined AS and AP items	2727.566(116)	0.000	0.142	0.878	0.857	0.069
Three-factor model c: Combined EX and AP items	2037.268(116)	0.000	0.122	0.910	0.895	0.048
Two-factor model: Combined AS, EX, and AP items	3460.448(118)	0.000	0.160	0.844	0.820	0.070
One-factor model: All factors combined	5019.147(122)	0.000	0.190	0.771	0.745	0.157

Note: AS = abusive supervision; EX = emotional exhaustion; AP = academic performance; SE = self-efficacy.

Table 4.3 | Measurement invariance models

Model	χ^2/(df)	RMSEA	CFI	TLI	SRMR	Compariso	ΔCFI	ΔRMSEA

						n		
Configural invariance (M1)	1540.752(482)	0.044	0.980	0.977	0.013	M2 vs. M1	0.001	0
Metric invariance (M2)	1970.979(504)	0.051	0.972	0.969	0.027	M3 vs. M2	-0.007	-0.008
Scalar invariance (M3)	2101.203（521）	0.052	0.970	0.968	0.027	M4 vs. M3	0.008	-0.002

ΔCFI ≤ 0.01, ΔRMSEA ≤ 0.015

4.4 | Testing Hypotheses

Table 4.4 displays the fit indices and model comparison for the competing models. According to the chi-square difference test, the reciprocal model fits better ($\Delta\chi^2$ = 989.453; Δdf = 6; p = 0.000), the normal causal model ($\Delta\chi^2$ = 199.715; Δdf = 3; p = 0.000), and the reciprocal causal model ($\Delta\chi^2$ = 142.54; Δdf = 3; p = 0.000). Figure 2 illustrates that abusive supervision exhibits a superior level of temporal stability, with academic performance and self-efficacy following closely behind. Nevertheless, the temporal stability of emotional exhaustion is very low, but it is statistically significant. Meanwhile, abusive supervision in T1 was negatively correlated with academic performance in T2 (β = -0.340; p = 0.000), and academic performance in T1 was negatively related to abusive supervision in T2 (β = -0.176; p = 0.000), as shown in Figure 2. Furthermore, the study revealed a positive correlation between abusive supervision in T1 and emotional exhaustion in T2 (β = 0.394; p = 0.000). Besides, emotional exhaustion in T1 was significantly related to abusive supervision in T2 (β = 0.175; p = 0.000). At last, emotional exhaustion in T1 was negatively correlated with academic performance in T2 (β = -0.079; p = 0.000), and academic performance in T1 was negatively related to emotional exhaustion in T2 (β = -0.351; p = 0.000). Thus, the findings confirmed H1, H2, and H3.

To assess the mediation effect of emotional exhaustion, we used the 5000 bootstrap resampling method. The test of the mediating effect indicated that the association between abusive supervision in T1 and academic performance in T2 was significantly mediated by emotional exhaustion in T1 (effect = -0.027, p = 0.009, 95% CI = [-0.047, -0.007]). The results also supported H4.

According to Figure 3, the study investigated the influence of self-efficacy (SE) on the causal connection between abusive supervision (AS) in T1 and emotional exhaustion (EX) in T2. The study established an interaction term (AS × SE) in T1 and integrated it into the overall model that predicted emotional exhaustion in T2. The results found that the interaction factor (AS × SE) in T1 had a statistically significant negative impact on emotional exhaustion in T2 (β = -0.104, p = 0.000). Meanwhile, Figure 4 shows the simple slope plot illustrating the moderating influence of self-efficacy. The finding revealed that a significant impact of abusive supervision for T1 on emotional exhaustion for T2, this level of self-efficacy was determined to be moderate (β = 0.598, p = 0.000), moderate when self-efficacy was at a higher level (β = 0.357, p = 0.002), and relatively weak when self-efficacy was relatively low (β = 0.227, p = 0.016). Thus, the finding supported H5.

In Table 4.5, the moderated mediation effect is negative, and the results of the moderated mediation analysis are statistically significant (effect = -0.021, p = 0.000, 95% C. I. [-0.028, -0.014]). It was anticipated that when T1 self-efficacy was lower (-1SD) (effect = 0.394, p = 0.000, 95% C. I. [0.331, 0.458]), the conditional indirect effect of T1 abusive supervision on T2 academic performance through T1 emotional exhaustion would be stronger. Additionally, the conditional indirect effect of T1 abusive supervision on T2 academic performance through T1 emotional exhaustion was relatively weak when self-efficacy was high (+1SD) (effect = 0.230, p = 0.000, 95% C. I. [0.172, 0.288]), indicating the effect was significant. Therefore, the findings supported H6.

Table 4.4 | Model comparison and fit indices

Model	**χ^2/(df)**	**p**	**RMSEA**	**CFI**	**TLI**	**SRMR**	**Comparison**	**$\Delta\chi^2$**	**Δdf**
Stability (M1)	1027.470(12)	0.000	0.276	0.801	0.635	0.115			
Normal (M2)	237.732(9)	0.000	0.151	0.955	0.890	0.028	M1 vs. M2	789.738***	3
Reversed (M3)	180.557(9)	0.000	0.131	0.966	0.918	0.027	M1 vs. M3	846.913***	3
Reciprocal (M4)	38.017(6)	0.000	0.069	0.994	0.977	0.016	M1 vs. M4	989.453***	6
							M2 vs. M4	199.715***	3
							M3 vs. M4	142.54***	3

Table 4.5 | The analysis of the moderating effects

	Indirect effect	SE	Boot LLCI	Boot ULCI
Low (Mean-1SD)	0.394	0.032	0.331	0.458
Mean	0.312	0.029	0.256	0.369
High (Mean+1SD)	0.230	0.030	0.172	0.288
Index of moderated mediation	-0.021	0.004	-0.028	-0.014

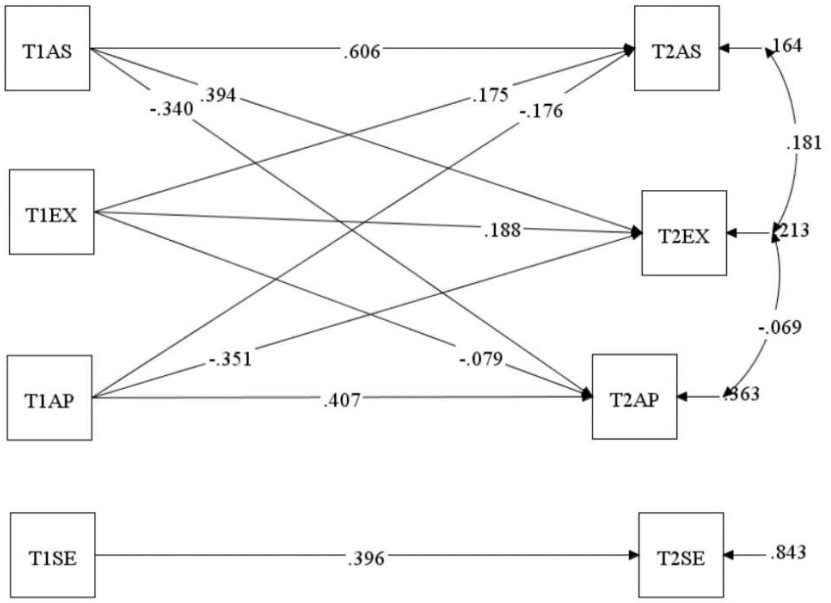


Figure 2 | Standardized path coefficients of the reciprocal model

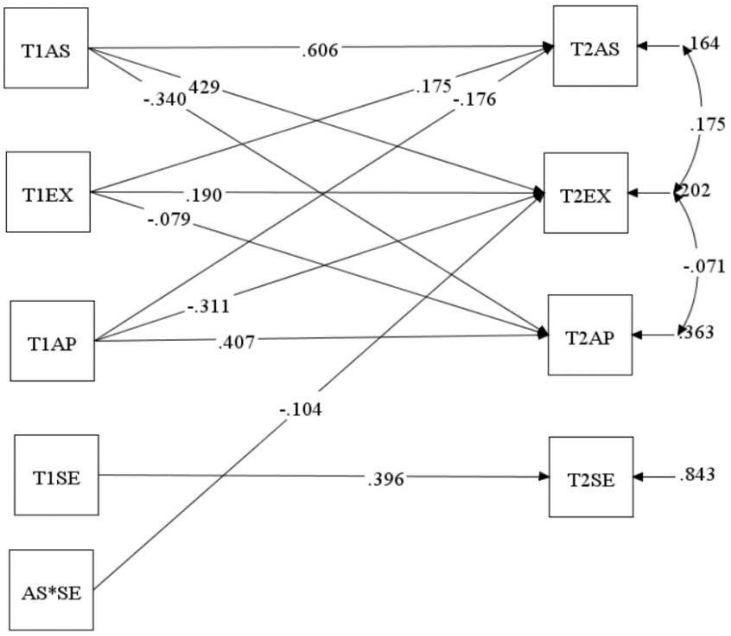


Figure 3 | The standardized path coefficients of the model

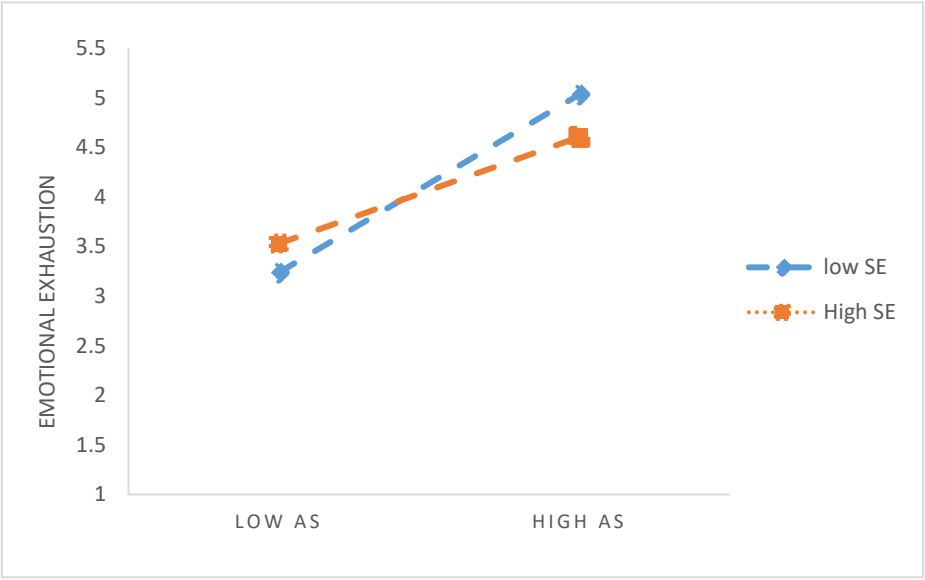


Figure 4 | The mediation effect of self-efficacy

5 | Discussion

While abusive supervision has received significant attention in research for the past 20 years, there is a lack of research examining the reciprocal and dynamic nature of the faculty-student relationship in universities. A recent literature review noted that longitudinal relationship-focused research examining abusive supervision is very limited (Rice & Reed, 2022). This study aims to determine the longitudinal relationships among abusive supervision, emotional exhaustion, academic performance, and self-efficacy. The mediation function of emotional exhaustion and the moderating role of self-efficacy were also examined in the connection between abusive supervision and academic performance. In general, our hypotheses were confirmed. To expand the knowledge base, this pilot study employs abusive supervision to investigate the potential association between Chinese medical graduate students and academic performance. Our research findings may help clarify how supervisors' mentoring styles are associated with academic performance in higher education and provide empirical support for interventions aimed at improving medical graduate students' academic performance.

5.1 | Abusive Supervision and Academic Performance

Academic performance and abusive supervision were found to be positively correlated, according to the study's prediction and testing. The study employed longitudinal cross-lagged models for contrasting nested models. These findings supported H1 and H1a. The study's key finding is that supervisors' abusive supervision and students' academic performance reinforce each other over time. In the current study, we used COR theory to explain how abusive supervision triggers a loss of personal resources, which often ultimately leads to individuals neglecting the completion of work and academic performance. This aligns with the results of prior research (Hobfoll & Freedy, 2017; Kim et al., 2016; Malik et al., 2023).

The reciprocal association between abusive supervision and academic performance aligns with the findings of previous research. Research has investigated the roles of personality, opinions, or behaviors that may cause individuals to become targets of hostility as a result of the effects of abusive supervision on reducing work and learning effectiveness (Chan & McAllister, 2014; Tepper et al., 2017). In the dynamic of a supervisor-student relationship, if the subordinate (student) invests little effort in their work or studies, the supervisor may perceive them as a frustrating and undesirable person (Whitman et al., 2014). Therefore, if the supervisor believes the subordinate (student) is deliberately reducing their work or learning effort, they may intensify the relationship in the form of abusive supervision, making the subordinate a victim (Tepper et al., 2011). From the students' perspective, there is research supporting that students must bear some responsibility for abusive supervision by their supervisors. Studies have found that underperforming students could be singled out for abusive supervision, as they possess the description of a provocative victim (Tepper et al., 2011). Surprisingly, Khan et al. (2018) found that abusive supervision can also occur toward highly effective individuals. Thus, the findings of this study provide further groundwork for future research on the mutual relationship between supervisors and students in the medical field in China.

5.2 | Mediating Effects of Emotional Exhaustion

Abusive supervision by supervisors is significantly positively and mutually related to emotional exhaustion. These findings support our H2 and H2a. This is consistent with the concept of "resource loss" from the COR theory derived from Akram et al. (2019). At the same time, our research findings align with previous research conducted in professional work environments, emphasizing the generalizability of the results from our study (Fan et al., 2020; Malik et al., 2023; Scheuer et al., 2016). Therefore, our study examined how abusive supervision by supervisors can lead to emotional exhaustion in students, and over time, students could experience a vicious cycle of resource loss as a result of what they perceive to be increasingly abusive supervision. These findings revealed that students' emotional exhaustion and academic

performance are interrelated in a higher education context, suggesting that emotionally exhausted students have reduced motivation and engagement in learning and use passive and "push learning" as coping strategies to protect their limited resources, and the learning neglect displayed by students may, in turn, jeopardize the learning resources (such as supervisor and peer support) associated with them, which over time could result in increased emotional exhaustion. Thus, our hypotheses 3 and 3a were supported.

The mediation analysis results of this study show that emotional exhaustion partially mediates the reciprocal relationship between abusive supervision and academic performance, which confirms hypotheses 4 and 4a. This finding aligns with the resource loss process under the COR theory (Hobfoll & Freedy, 2017), which continuously reveals that the ongoing exposure to abusive supervision by supervisors depletes the psychological and physical resources of students, leading to them becoming exhausted and emotionally drained. Emotionally exhausted students may exhibit psychological withdrawal behaviors as a means of avoiding additional resource depletion (Hobfoll & Freedy, 2017). Meanwhile, we also draw on the COR theory, where emotional exhaustion represents the feeling of one's emotional and material resources being overly consumed and extended, which may reduce the level of effort investment and academic performance of medical graduate students in their learning process. Conversely, emotionally exhausted students may perceive their supervisor's behavior as more abusive, because compared to students not experiencing emotional distress, these emotionally distressed students have a more pessimistic outlook on their external environment (Ng et al., 2021). This study further confirms, through a longitudinal research design, the mediating mechanism of student emotional issues between supervisory mentoring styles and academic performance in the medical education field.

5.3 | Moderating Effect of Self-efficacy

Our research revealed that self-efficacy, which refers to one's psychological resources, attenuates the reciprocal lagged connection between abusive supervision and emotional exhaustion, indicating that students' self-efficacy may regulate their psychological state after experiencing abusive supervision. This suggests they may recognize that their experiences of being verbally abused have not generated excessive negative emotions, ultimately leading to a reduction in emotional exhaustion. Therefore, these research findings support hypotheses 5 and 5a. The capability belief effects of self-efficacy are consistent with the propositions represented by social cognitive theory, which posits that performance outcomes are determined by triadic reciprocal causation involving personal (cognitive and affective), behavioral, and environmental factors (Beauchamp et al., 2019). Hence, the factor of supervisors' abusive supervision behavior has a certain predictive effect on students' emotional exhaustion. Our research findings support the suggested moderated mediation model, indicating that abusive supervision has less of an effect on academic performance through emotional exhaustion under higher levels of self-efficacy. Conversely, medical graduate students believe they are unable to achieve the research accomplishments needed for graduation. In that case, this is likely to increase their emotional burden, leading to the exhaustion of emotional reserves that cannot be sufficiently restored.

6 | Limitations and Future Direction

Our study has some potential limitations that are worth noting. First, while our study employed a longitudinal design to verify our hypotheses, the cross-lagged impacts among abusive supervision, emotional exhaustion, and academic performance need more comprehensive investigation through multi-wave studies. What's more, this study only conducted a questionnaire survey, revealing the interrelationships between abusive supervision, emotional exhaustion, and academic performance. Therefore, we hope that in future research, we can conduct intervention experiments to provide psychological guidance for individuals with more severe emotional exhaustion. Furthermore, for pragmatic reasons, we chose a specific time lag, rather than for theoretical reasons. While the 6-month time lag was highly practical, using the different time lags in future research could further verify the replicability of these findings. Meanwhile, while the half-longitudinal mediation model is more reliable than the basic mediation model (O'Laughlin et al., 2018), the absence of a third wave of data to some extent violates the stationarity assumption and the assumption that one variable has a certain time interval to affect another variable. Finally, we need to acknowledge that self-report measures are susceptible to social desirability bias and may result in overestimation.

7 | Conclusion

To sum up, this study's contribution is to deepen our knowledge of how student learning behaviors could promote and strengthen abusive supervision, thereby deepening our understanding of how isolated abusive incidents may progressively develop into comprehensive abusive supervision in the long term. This association between supervisors' abusive supervision and students' academic performance indicates that interventions that simultaneously focus on both supervisors and students have greater value, as they can minimize the resource-depletion costs associated with abusive supervision. Additionally, universities should also consider improving the psychological treatment plans for both supervisors and students. Furthermore, individuals with higher self-efficacy exhibit an enhanced capacity to manage the stress induced by abusive supervision.

Authors' contributions

All authors contributed to the conceptualization and design of the study. Questionnaires and data collection were carried out by Binhong Hu and Mao Zhao; data organization and data analysis were carried out by Binhong Hu, Fenglin Jiang, Wei Zhao, and Mao Zhao. The first draft of the manuscript was written by Binhong Hu and Mao Zhao. Mao Zhao supervised the project and advised on the writing. All authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

Funding

The 2024 annual research planning project of the Sichuan

Psychological Society (SCSXLXH202403018) and the 2025 general project of Sichuan International Education Development Research Centre (SCGJ202503).

Disclosure statement

No potential conflict of interest was reported by the authors.

Data availability

The datasets used and analyzed during the current study are available from the corresponding author on reasonable request.

Ethical approval

This study was performed in line with the principles of the Declaration of the Academic Ethics Review Committee of Chengdu Normal University (Article 2). Approval was obtained from the Ethics Committee of the Faculty of Education and Psychology, Chengdu Normal University, on Sep 27, 2023 (No. CDNU [2023 (09)]). All procedures used in the study involving human participants followed institutional and/or National Research Council ethical standards.

Informed consent

All participants were informed of the purpose of the research, and their data would only be used for academic research purposes. Participation is completely voluntary, and participants can terminate the survey at any time without any consequences. The data collection process is anonymous, ensuring that no personally identifiable information is collected. This process was organized and completed in September 2023 by specialized faculty. Since the methods of data collection and analysis do not allow for the identification of specific individuals, there are no privacy concerns.

Competing interests

The authors declare no competing interests.

Consent for publication

Not applicable.

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