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ORIGINAL

Stress Management as a Mediator Between Stressors and Stress Levels: Insights from Chinese Students

La gestión del estrés como mediador entre los factores estresantes y los niveles de estrés: Perspectivas de estudiantes chinos

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ABSTRACT

Introduction: the study explores the role of stress management as a mediator between stressors and stress levels among Chinese students. Stressors are categorized into three independent variables: interpersonal relations, personal factors, and environmental factors, while stress levels serve as the dependent variable.
Objective: the mediating effect of stress management is examined to understand how stress management can reduce the impact of stressors on stress levels.
Method: structural Equation Modeling (SEM) is employed to analyze the direct and indirect relationships among these variables. Data was collected through a survey of students from universities across Shandong Province, China.
Results: the first three hypotheses were found to significantly contribute to stress levels. Stress management did not mediate the relationship between these stressors and stress levels.
Conclusions: the study highlights the importance of stress management techniques, such as time management, mindfulness, and social support, in mitigating the negative effects of stressors on mental health. These findings suggest that universities and policymakers should prioritize stress management training and interventions to enhance student well-being and academic performance. By addressing stressors and promoting effective coping mechanisms, educational institutions can help students manage stress more effectively.

Keywords: Stress Management; Stress Levels; Interpersonal Relationships; Personal Factors; Environmental Factors; College Students.

RESUMEN

Introducción: el estudio explora el papel de la gestión del estrés como mediadora entre los factores estresantes y los niveles de estrés en estudiantes chinos. Los factores estresantes se clasifican en tres variables independientes: relaciones interpersonales, factores personales y factores ambientales, mientras que los niveles de estrés actúan como variable dependiente.
Objetivo: se examina el efecto mediador de la gestión del estrés para comprender cómo puede reducir el impacto de los factores estresantes en los niveles de estrés.
Método: se utiliza el Modelo de Ecuaciones Estructurales (MEE) para analizar las relaciones directas e indirectas entre estas variables. Los datos se recopilaron mediante una encuesta a estudiantes de universidades de la provincia de Shandong, China.
Resultados: se determinó que las tres primeras hipótesis contribuían significativamente a los niveles de estrés. La gestión del estrés no influyó en la relación entre estos factores estresantes y los niveles de estrés.
Conclusiones: el estudio destaca la importancia de las técnicas de gestión del estrés, como la gestión del

tiempo, la atención plena y el apoyo social, para mitigar los efectos negativos de los factores estresantes en la salud mental. Estos hallazgos sugieren que las universidades y los responsables políticos deberían priorizar la formación y las intervenciones en gestión del estrés para mejorar el bienestar y el rendimiento académico de los estudiantes. Al abordar los factores estresantes y promover mecanismos de afrontamiento eficaces, las instituciones educativas pueden ayudar a los estudiantes a gestionar el estrés de forma más efectiva.

Palabras clave: Manejo del Estrés; Niveles de estrés; Relaciones Interpersonales; Factores Personales; Factores Ambientales; Estudiantes Universitarios.

INTRODUCTION

Stress is a type of biological and global psychological tension.[1,2] It is the result of unreasonable stress provocation basically stemming from real or anticipated threats to the human being organism on an emotional or physical level. Students are viewed as vulnerable in the modern changing world, commonly referred to as the millennial generation. While this is the age of the millennium, where education is universal, sometimes, pupils are seen to differ concerning academic performance.[3] Stress has been described as a harmful negative emotional, cognitive, behavioral, and physiological response resulting from an individual's efforts to cope with or adapt.[4] Stress is an inescapable and essential factor of life. Stress is said to be essential because without stress, we would be lifeless, inactive, and passive organisms. Moreover, it is also inescapable because a stressor is defined as any external event, either a pleasurable or anxiety-generating one.

Academic stress may play a significant role in the development of depression among university students. Academic stress is the stress people may feel because of exams or assignments, the educational environment, being assessed, and other issues related to academics.[5,6] Students face academic stress due to both personal pressures to perform and the expectations of their parents and teachers. Academic stress can be extremely draining on both parents and students. Academic stress has tightened its grip on students, who must compete at every stage of their academic careers in today's fast-paced society. It is the product of a combination of academic-related demands that exceed the adaptive resources available to an individual.[7]

In China, growing academic and social expectations are associated with increased levels of emotional stress and internalized problems.[8] Though the literature commonly associates student stress with family problems, other studies conducted by other researchers have established that family problems affect students' learning capacities and academic outcomes.[9] Social support from the university, family, friends, and mentors has a significant impact on student accomplishment and performance. Similarly, emotional, academic, and financial support are critical determinants in the success of university students. University life can be difficult and disrupt a student's life experience; consequently, it is critical to spend time with family and friends while attending university.[10]

Despite the growing awareness of student stress, there remains a gap in comprehensive research that examines how relationships (e.g., family, peer, and teacher relationships)[11] (personal factors (e.g., self-esteem, coping mechanisms, and personal values), and environmental factors (e.g., academic workload, campus climate, and socioeconomic status) collectively impact stress levels in students.[12] This lack of holistic understanding hampers the ability to design targeted interventions that address the multifaceted nature of student stress.[12,13] However, there is a need to understand how various stressors specifically affect stress levels among Chinese students and how stress management practices mediate this relationship. Thus, the primary goal of this paper is to examine academic stress and stressors that are influencing the students' stress and also determine how the management of stress mediates the relationship between the stressors and the stress level of university students in China.

The objectives of this research are to examine various factors influencing stress levels among university students in Shandong Province, China. Specifically, the study aims to explore the impact of interpersonal relationships, personal factors, and environmental factors on students' stress levels. Additionally, it investigates the mediating role of stress management in the relationship between these stressors and the overall stress levels experienced by university students. This understanding is crucial to determining how such factors lead to the cause of stress in a student and the necessity for appropriate stress management strategies.

In particular, it is the specific challenges of settling at university that can significantly affect students' stress levels. Peer connections have also been found to serve as a stress-reducing factor. For instance, a survey conducted by Yang[14] identified that students who had good friendships experienced decreased academic stress and enhanced overall well-being. Peer support networks during stressful times such as tests can offer emotional support, encouragement, and shared resources that reduce feelings of loneliness and anxiety.

Students may be affected by the closeness of their relationships with their faculty members in terms of their stress levels. According to Ma and Bennett,[15,16] supportive teacher interactions facilitate a healthy learning

environment that reduces stress and anxiety. Personal characteristics, personal attributes, coping styles, and psychological states significantly influence stress among students. Students are likely to experience stress who are highly neurotic due to a predisposition toward worry, emotional instability, and pessimistic thinking.[17] Research revealed that higher levels of neuroticism were positively correlated with increased academic stress and general lower well-being.[18,19]

Personal lifestyle factors, such as sleep, nutrition, and exercise, contribute to the management of stress.[20,21] Becker[22] found that students with a healthy lifestyle characterized by regular exercise, proper diet, and sufficient sleep exhibit low levels of stress and overall well-being.[23] Lack of sleep and poor dieting are associated with higher levels of anxiety and stress, which further hampers academic performance. While an interpersonal factor, the active seeking and involvement of a student with social support can also be viewed as a personal factor. Students who place emphasis on developing and maintaining supportive relationships are more likely to manage stress effectively. According to Heaney and Israel,[24] social support enhances coping mechanisms and, thus, reduces stress levels.

Environmental factors have a large impact on pupils' stress levels and well-being. The physical environment of learning institutions, including classrooms, household conditions, and campus infrastructure, has a high impact on the level of stress among students.[25] Barrett[26] established that the design of the classroom has an influence on the attention and stress levels of students. Poorly constructed classrooms can cause pain and distraction, hence increasing academic stress. A student is stressed when they stay in overcrowded or poorly maintained lodgings, research states. It is significant that the academic environment, including workload and instructional styles, even in faculty interactions, influences the levels of student stress. High academic demands can trigger extra stress. Misra et al.[27] found students who perceived their workload to be excessive reported higher levels of stress and poorer academics. Balancing academics with personal responsibilities aids in managing stress.[28]

Stress management is typically used by people who are able to function normally but may be dealing with challenging situations at work or in social situations.[29,30] Second, as opposed to psychotherapy, education is the main objective of stress management. Programs are typically based on learning theoretical principles and seek to modify an aspect of behavior or thought related to a specific environment or situation; thirdly, the duration is usually shorter than longer, consisting of a set number of sessions; fourthly, the service is typically provided to groups rather than individuals; and fifthly, the person providing the stress management interventions typically does not establish a therapeutic relationship with participants. Instead, s/he serves as a facilitator and educator, empowering participants to set their own objectives and to oversee and assess their own development. There is rarely long-term follow-up once the program has been completed.[31]

The effects of stress management strategies such as progressive muscle relaxation and behavioral modification were comparable. According to Rasid et al.[32], students' anxiety levels were lowered by behavioral relaxation and gradual muscle relaxation. 88 high school students who agreed to be part of the experiment were used for the study; however, only 26 males and 29 females finished all the phases. Comparing the results with the control group, it was shown that school children were able to lower their anxiety via the use of both the progressive relaxation technique and the behavioral relaxation strategy.

Recent studies have shown that college students who participate in stress management programs and receive psychological treatment for common mental disorders have lower perceived stress and clinically significant symptoms of anxiety and depression.[33,34,35,36] However, treatment adherence among college students is low,[37] and schedule conflicts and other systemic barriers prevent access to psychological treatments for common mental disorders.[38] This study aimed to identify the causes of academic stress among students in Chinese universities and to explore how stress management influenced their academic success.

Research Model

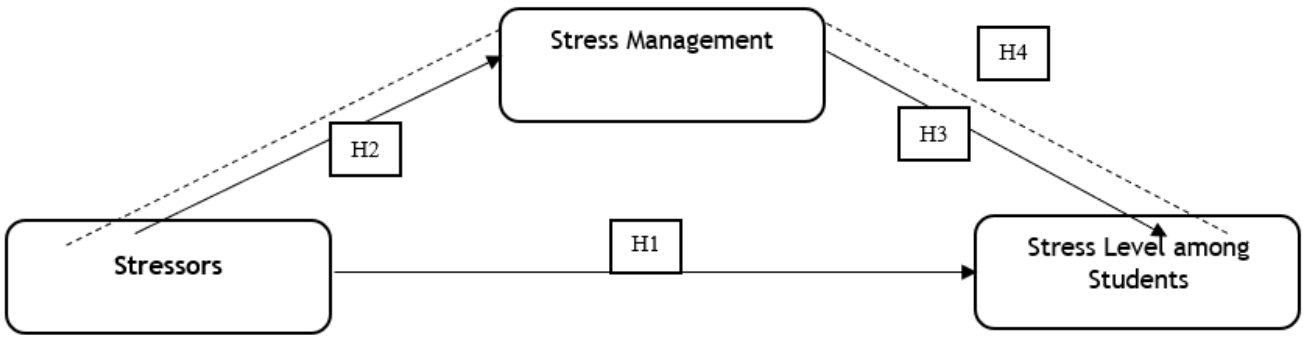

Figure 1. Research Model

The framework is the center of all studies and gives a basis to any research plan.[39,40,41] As emphasized by Ennis[39] research framework identifies and describes the major rudiments of the study. In current study stressors are independent which are interpersonal relations, personal factors and environmental factors, stress level is dependent variable and stress management is mediator variable.

METHOD

Type of Study, Period, and Location

This study employed a quantitative, cross sectional research design conducted in Shandong Province, China. Data were collected within the specified period of the survey phase across multiple universities.

Population, Sample, and Sampling Technique

The study population comprised students from Qufu Normal University, University of Jinan, Shandong University of Art and Design, and Linyi University. A random sampling method was applied to ensure representation. The sample size of 384 was determined based a study[20] guidelines, ensuring sufficient statistical power for Structural Equation Modeling (SEM).

Variables Analyzed

The study focused on three independent variables interpersonal relations, personal factors, and environmental factors and their relationship with the dependent variable: student stress levels. The mediating variable was stress management, which was examined for its role in reducing the impact of stressors on stress levels. These constructs were operationalized through validated survey items adapted from existing scales.

Instruments, Techniques, and Procedures

A structured survey questionnaire served as the primary data collection instrument. Items measuring stressors, stress levels, and stress management were drawn from established scales previously validated in related studies. The instrument was pre tested for clarity and reliability before large scale administration. Each variable (interpersonal stressors, personal stressors, environmental stressors, stress management, and stress level) was assessed using 6 items on a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree).

Validity and reliability of the scale were confirmed through a pilot test, yielding Cronbach's alpha values above 0,70 for all constructs, ensuring internal consistency. Composite Reliability (CR) and Average Variance Extracted (AVE) were also tested during SEM analysis, meeting recommended thresholds (CR > 0,70; AVE > 0,50).

Data Collection Process

Official approval letters from Management and Science University (MSU), Malaysia, were obtained to support data collection. Each participant received a cover letter outlining the purpose and objectives of the study, ensuring transparency and voluntary participation. Surveys were distributed to the target sample across the four universities, and responses were collected during the study period.

Data Analysis Process

Data were first analyzed descriptively using SPSS software, summarizing demographic information and responses with tables, frequencies, and percentages. For inferential analysis, Structural Equation Modeling (SEM) was applied using Smart PLS software, which allowed for the estimation of complex relationships, testing of direct and indirect effects, and management of measurement errors. Variance based SEM was chosen, aligning with methodological recommendations by Hair[21] and Sarstedt[46].

RESULTS

Rate

Table 1. Summary of Response Rate

No. of questionnaires distributed	384
No. of questionnaires returned	384
No. of questionnaires unreturned	0
Percentage of response rate	100 %
No. of questionnaires incomplete	0
No. of questionnaires final usable	384
Percentage of valid response rate	100 %

A study indicates that response rate is determined by the number of respondents who completed the questionnaire relative to the sample size. In this study, 384 questionnaires were distributed, with 384 completed and returned, resulting in a response rate of 100 %. Due to direct contact with participants, all questionnaires were collected, with none left unreturned. Upon review, all responses were complete, with no missing data. Table 1 shows the summary of response details.

Respondent Profile

The summary of demographic profile of the respondents indicates a significant gender imbalance, with 60,2 % identifying as male compared to 39,8 % female. Most respondents are relatively young, with 56 % aged between 18-23 years, and only a small fraction (7 %) over 30. This youthfulness may reflect trends in educational participation or employment in specific sectors.

In terms of education, the data shows that a large majority (66,7 %) hold a Bachelor's degree, suggesting a highly educated sample, while only 3,4 % have achieved a PhD. Additionally, a considerable portion of respondents (61,7 %) are single family, indicating a prevalent family structure among the sample. Overall, this demographic information highlights a young, predominantly male, and well-educated group, predominantly without familial obligations.

Table 2. Summary of Demographic Profile of the Respondents

Demography	Indicator	Frequency	Percentage
Gender	Male	231	60,2
	Female	153	39,8
Age	18-23	215	56
	24-29	142	37
	30 and above	27	7
Education	Diploma	28	7,3
	Bachelors	256	66,7
	Masters	87	22,7
	PhD.	13	3,4
Family Structure	Single	237	61,7
	Joint	147	38,3

Descriptive Statistics

The data summary for 384 respondents reveals slight gender imbalance and a predominantly young group with diverse academic backgrounds. Generally high stress levels among students (mean = 4,143) and moderate to high perceived stressors (mean = 4,087). Stress management are fairly well-utilized (mean = 4,336), reflecting respondents' coping mechanisms.

Table 3. Descriptive Analysis

Items	N	Minimum	Maximum	Mean	Std. Deviation
Stressors	384	1,0	5,0	4,087	0,595
Stress Level Among Students	384	1,0	5,0	4,143	0,676
Stress Management	384	1,0	5,0	4,336	0,593

Indicator Reliability

Indicator reliability is classically estimated by measuring the factor loading or outer loading for each domain in a measurement model. An outer loading of 0,70 or higher indicates that the item provides adequate indications of the underlying construct. If an indicator's loading falls below 0,40, it is considered weak and may need to be reconsidered. However, if the loading falls between 0,40 and 0,70, it can still be acceptable if it contributes to an increase in the AVE to 0,50 or higher, as suggested by [42,43,44].

Given these criteria, no further conclusion is necessary as the factor loading values for each indicator are within an appropriate range (0,40 or higher), which is fall between the range of 0,731 to 0,889 and the AVE values for each variable meet the baseline requirement of 0,50 or above, which is in the range of 0,619 to 0,716 This indicates satisfactory indicator reliability for the measurement model.

Convergent Validity

It depicts how much a test is similar to a substituted ratio of an associated dimension.[45] The averages that were employed in the last study are tabulated in table. Every figure represented the 0,50 AVE. Therefore, the methodology that is employed to estimate the value of the current research is appropriate. Further, all the features met the threshold of the AVE for a booster value of 0,50, signifying good convergent validity of the evaluation methods utilized in the study under study.

Table 4. Convergent Validity

Variable	CR	Alpha Value	AVE
Stressors	0,938	0,922	0,716
Stress Level among Students	0,923	0,909	0,621
Stress Management	0,919	0,907	0,619

Path coefficient

In momentum research, the structural model is also analyzed or appraised based on measurement coefficients. While determining the importance and effectiveness of an interaction between two new attributes, weight values for coefficients are used. The Smart PLS approach, also known as "bootstrapping," creates values to examine links (paths) between dependent and independent variables.

According to Hair[46], the present study possesses a t-statistic of 0,95 at a significance level of 0,05. Hair[46] describes "PLS-SEM," which applies a nonparametric measurable test, often referred to as bootstrapping, in order to quantify the significance of the determined route coefficient. Additionally, it is established that coefficient ranges are often between " -1 and +1". Thus, in this regard, this research concludes that a correlation coefficient value near to +1 implies a greater relationship while the correlation coefficient value close to -1 implies weaker or insufficient relation. In table, exact p-esteem, t-worth and path coefficients of components involved in the current study. The hypotheses are accepted or rejected based on their path evaluation.

Hypotheses Testing (Direct Paths)

Path coefficients were mainly drawn from the algorithm function. Then, as a third step, bootstrapping is taken with a sample size of 384. While implementing Smart PLS, it must be ensured that the selected sample size during its run is greater than the real sample size as stated by [45]. Both Kumar[47] and Lowry et al.[48] have undertaken greater sample sizes.

Table 5. Path coefficients of Direct Paths (Main Hypotheses)

Hypotheses	Relationship	B-values	T-values	P-values	Decision
H1	S-->SL	0,301	3,56	0,01	Accepted
H2	S-->SM	0,252	2,84	0,01	Accepted
H3	SM-->SL	-0,284	4,23	0,001	Accepted

H1: it has been hypothesized in the study that stressors (S) have a significant positive impact on stress level (SL) among students. Higher stressors (interpersonal, personal, environmental) should directly increase stress levels.

H2: it has been hypothesized that stressors (S) significantly impact stress management (SM) among students. When students face more stressors, they tend to adopt more stress management strategies.

H3: it has been hypothesized that stress management (SM) has a significant negative impact on stress level (SL) among students. Effective stress management (time management, mindfulness, social support, exercise) should reduce stress levels.

Mediating effect of stress management (Indirect hypothesis)

Mediation is often used to test hypotheses and determine causality.[49] Social science and business researchers apparently focus on mediation models. It is often called an "indispensable tool" for improving scientific understanding of the mechanisms that affect exogenous and endogenous variable relationships. Thus, the mediation paradigm is now "ubiquitous" and "nearly compulsory" in literature and study. The linkages between variables of interest and their theoretical relevance must be considered when conceptualizing a mediation relationship.[50]

Bootstrapping is a non-parametric resampling strategy, and it is one of the rigorous and powerful methods of

analyzing the mediating impact.[46,51] The statisticians apply bootstrapping in estimating a population parameter through repeated sampling with replacement. It is used to approximate a parameter if data source estimation is either problematic or impossible. Hair et al.[45] recommended that the indirect effect distribution should be sampled through bootstrapping in analyzing the mediating impact.

This method works for basic and numerous mediation models. No assumptions are made about variable distribution or statistical sampling. This approach is suitable for PLS-SEM and may be used with small sample sizes.[51,52]

When the mediator is absent, the independent variable does not need to have a substantial effect on the dependent variable when employing this method. Thus, the total effect does not need to be considerable for the mediation effect to occur in a model. The significance of indirect effects through bootstrapping technique is more crucial than the magnitude of the indirect effect itself.

The indirect effect is obtained using the bootstrapping method to test the mediation hypotheses proposed by.[53] Bootstrap samples are generated by iteratively estimating the coefficients using 5000 bootstrap samples, each consisting of N=384 instances randomly selected with replacement from the original sample. A significant effect is shown when the 95 % confidence interval does not include the value of 0. In conclusion, substantial mediation occurs when the confidence interval does not include 0.[54,55,56]

Table 6. Path coefficients of indirect Paths (Mediation Hypotheses)

Hypo	Relationship	B-values	T-values	P-values	Decision
H4	S-->SM-->SL	0,27	2,41	0,01	Accepted

H4: it has been hypothesized in the study that stressors (S) have positive affect stress level (SL) through the mediating effect of stress management (SM).

CONCLUSIONS

This study highlights the critical role of stress management as a mediator between stressors and stress levels among Chinese students. The findings confirm that interpersonal relations, personal factors, and environmental factors significantly increase stress levels. At the same time, stressors also influence students' adoption of stress management practices. Importantly, stress management was found to have a negative effect on stress levels, indicating that students who actively practice coping strategies—such as time management, mindfulness, or seeking social support are able to reduce the negative impacts of stressors on their well-being.

The mediation analysis further demonstrates that stress management partially mediates the relationship between stressors and stress levels. This finding reinforces the importance of stress management as a buffering mechanism, helping students to mitigate the harmful effects of academic and environmental challenges. These results are consistent with prior studies, which emphasize the protective role of effective coping mechanisms in maintaining mental health and academic performance.

From a practical perspective, the study underscores the need for universities and policymakers to design and implement structured stress management interventions. Training in time management, mindfulness programs, and stronger peer support systems could significantly reduce stress levels among students, thereby promoting both academic success and psychological well-being.

In conclusion, this research provides strong evidence that while stressors are unavoidable in academic life, their negative impacts can be reduced through effective stress management practices. Future research should examine the long-term effects of such interventions and explore differences across cultural and institutional contexts to develop more tailored and effective student support strategies.

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