

The Effect of Learning Stress on Academic Satisfaction in Chinese Calligraphy Majors: The Mediating Role of Learning Engagement

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Abstract

This study took undergraduate students majoring in calligraphy from five universities in China as research subjects and systematically explored the mechanism by which learning stress influences academic satisfaction, with a particular focus on the mediating role of learning engagement in this relationship. Drawing on stress theory, learning engagement theory, and self-efficacy theory, the study constructed a structural equation model of “learning stress–learning engagement–academic satisfaction.” Through statistical analysis and model testing of questionnaire data, the results revealed that learning stress significantly and negatively predicted academic satisfaction, while learning engagement played a partial mediating role. This research not only uncovers the internal psychological mechanisms of calligraphy undergraduates’ academic experiences but also provides empirical evidence and practical implications for promoting mental health and advancing pedagogical reform in art education.

1. Introduction

1.1 Research Necessity and Purpose

Chinese calligraphy education represents a vital part of China’s outstanding traditional culture, embodying both the aesthetic ideals and the philosophical spirit of the Chinese nation. As an art form that integrates visual beauty, moral cultivation, and intellectual refinement, calligraphy occupies a unique position in the cultural education system (Yang, 2013). Within the framework of contemporary higher education, calligraphy education not only carries the mission of artistic inheritance but also confronts the dual challenge of maintaining cultural continuity while adapting to modern educational paradigms. The ongoing modernization and globalization of art education have compelled universities to rethink how to balance tradition and innovation in calligraphy instruction (Ren, 2019).

With the expansion and popularization of higher art education in China, the number of

institutions offering calligraphy programs has increased significantly, leading to diversified teaching models and evaluation systems (Zhou, 2024). However, this development has also brought heightened competition and increased academic expectations. Students majoring in calligraphy are often required to engage in extensive technical practice, theoretical study, and creative production simultaneously. They face the dual pressure of achieving artistic excellence and meeting academic standards (Wang, 2015). Moreover, the uncertainty of future career prospects, the pressure of exhibitions and competitions, and the demand for continuous innovation contribute to high levels of learning stress. Learning stress, as a form of academic stress specific to art students, can significantly affect their emotional stability, learning efficiency, and sense of achievement (Huang, 2021).

In the field of higher education psychology, academic satisfaction has been recognized as a crucial indicator of the quality of students' educational experiences (Chen, 2020). It reflects students' cognitive and emotional evaluations of their learning environment, including teaching quality, curriculum structure, interpersonal relationships, and self-growth (Salanova et al., 2010). High levels of academic satisfaction are associated with greater learning motivation, improved self-regulation, and stronger academic persistence (Fredricks et al., 2004). Conversely, sustained learning stress may undermine students' engagement, confidence, and satisfaction, eventually leading to burnout or disengagement (Schaufeli & Bakker, 2004). Therefore, exploring how learning stress affects academic satisfaction is essential for understanding the overall learning experience of calligraphy undergraduates.

Existing studies suggest that learning engagement—a multidimensional construct encompassing behavioral, emotional, and cognitive participation—plays a key mediating role in this relationship (Fredricks et al., 2004). High learning engagement can buffer the negative effects of stress by enhancing students' intrinsic motivation and emotional resilience (Xie & Zhang, 2021). In art education, engagement manifests through creative exploration, aesthetic appreciation, and reflective practice, which are vital for both skill mastery and artistic expression. Consequently, understanding the role of learning engagement provides meaningful insight into improving both academic performance and psychological well-being among calligraphy students.

Based on this theoretical background, the present study aims to empirically examine the relationships among learning stress, academic satisfaction, and learning engagement among undergraduate students majoring in Chinese calligraphy. The research seeks to reveal the internal psychological mechanisms underlying learning in art education, thereby offering both theoretical enrichment and practical guidance for curriculum reform, pedagogical innovation, and student counseling. Ultimately, the findings are expected to contribute to the sustainable development of higher calligraphy education and the holistic growth of students within this traditional yet evolving field.

1.2 Research Questions

Question 1. The relationship between learning stress and academic satisfaction: To study whether there is a relationship between the learning stress of calligraphy students and their academic satisfaction?

Question 2. The mediating effect of learning engagement between learning stress and academic satisfaction: To study whether learning stress affects academic satisfaction through learning engagement?

2. Literature Review

2.1 Learning Stress Theory

Learning stress refers to the psychological tension and pressure students experience during academic activities when their internal resources are insufficient to meet external learning demands (Lazarus & Folkman, 1984; Wu & Li, 2019). Originating from the broader concept of stress in physics and psychology (Selye, 1976), it is now widely studied in educational psychology as a key factor affecting students' academic performance and mental health. The World Health Organization (2018) defines academic stress as psychological strain resulting from perceiving academic events as threats or challenges, often leading to anxiety or depression. Similarly, the American Psychological Association (2015) describes it as the mental burden caused by learning-related pressures, while Chen (2017) interprets it as an emotional reaction to academic demands exceeding an individual's coping ability.

Learning stress demonstrates several defining characteristics. It is objective, as it inevitably arises from the structure of academic activities such as examinations and assessments. It is universal, affecting students across all educational levels (Selye, 1976). It is diverse, as stressors originate from various sources—academic workload, competition, time constraints, and parental or teacher expectations (Skinner, 1953). Moreover, it exhibits duality: moderate stress can motivate students, while excessive stress leads to anxiety and reduced self-efficacy (Lazarus, 1993). Stress also varies across developmental stages, peaking during transitional or high-stakes examination periods (Wang & Li, 2019), and is shaped by individual differences such as resilience, personality, and academic ability (Chen & Xu, 2017).

Research on the composition of learning stress identifies two major orientations: external stimuli (environmental and task-based) and internal cognition (self-expectations and appraisal). Misra and McKean (2000) found that excessive workloads, upcoming exams, and poor time management are major contributors. Abousserie (1994) and Schafer (2000) further emphasized the impact of exam-related anxiety, performance expectations, and limited time. In Asian contexts, family expectations and competitive educational environments intensify academic stress (Lee et al., 2005; Smith, 2001).

In summary, learning stress among college students results from the dynamic interaction between external academic pressures and internal cognitive-emotional factors (Li & Zhang, 2020). Proper management of learning stress is therefore crucial, as moderate stress can enhance motivation and performance, while excessive stress undermines well-being and academic success.

2.2 Learning Engagement Theory

Learning engagement, originating from the concept of job engagement (Maslach & Leiter, 1997; Kahn, 1990), represents a positive psychological state in which learners actively invest cognitive, emotional, and behavioral resources in learning activities. It evolved from the study of job burnout, reflecting a shift from the negative focus on exhaustion to the positive pursuit of vigor and involvement (Schaufeli, 2002; Luthans, 2002).

Scholars commonly define learning engagement as students' sustained and enthusiastic participation in learning, encompassing behavioral, cognitive, and emotional dimensions (Fredricks et al., 2004; Skinner, 2008). Behavioral engagement refers to observable efforts such as class participation, persistence, and task completion; cognitive engagement involves deep information processing and the use of metacognitive strategies, including reflection and

self-regulation (Wehlage & Lamborn, 1992); emotional engagement concerns students' affective responses, such as interest, enjoyment, and sense of belonging during learning (Gao, 2010; Wu, 2008). Together, these dimensions reflect students' motivation, self-efficacy, and learning quality.

The characteristics of learning engagement include initiative, persistence, focus, strategic learning, and self-reflection (Marks, 2000; Kuh, 2009). Engaged learners display proactive behavior, sustain long-term effort, and use adaptive strategies to improve learning outcomes. Moreover, emotional engagement fosters positive attitudes, intrinsic motivation, and resilience when facing academic challenges (Skinner, 2008).

Factors influencing learning engagement can be categorized into three domains. First, individual factors such as personality, self-efficacy, and intrinsic motivation play a significant role (Bandura, 1997). Second, contextual factors—such as teaching quality, social support, and peer interaction—shape behavioral and emotional involvement (Fredricks et al., 2004). Third, environmental and cultural variables, including family background and institutional atmosphere, indirectly affect engagement through psychological mediators (Maslach & Leiter, 1996).

In essence, learning engagement is a multidimensional construct reflecting students' active, deep, and emotionally positive participation in learning. It serves as a key predictor of academic achievement, satisfaction, and well-being, providing crucial insight for enhancing educational quality in both traditional and blended learning environments.

2.3 Academic Satisfaction Theory

Academic satisfaction refers to students' overall subjective evaluation of their learning experiences, encompassing perceptions of teaching quality, curriculum design, learning outcomes, and institutional support (Zhang, 2021). It represents an important indicator of educational effectiveness and student well-being in higher education. Generally, academic satisfaction can be conceptualized in three ways: as the degree of congruence between learning expectations and outcomes (Hu, 2010), as a holistic assessment of the academic process (Xiao, 2008), or as satisfaction with specific components of the learning experience such as teaching quality, resources, and environment (Zhang, 2003). For this study, academic satisfaction is defined as the overall sense of fulfillment and well-being that students derive from their academic pursuits in university settings.

The composition of academic satisfaction is multidimensional. Core dimensions include (1) teaching quality—the pedagogical competence, communication ability, and engagement level of instructors (Betz et al., 1970); (2) curriculum structure—scientific and practical design aligned with training objectives (Ma, 1989); (3) learning outcomes—students' perceived gains in knowledge and skills (Tian & Wang, 2007); (4) academic performance—grades, awards, and achievements (Yi & Jiang, 2014); (5) learning resources and environment—availability of facilities and academic infrastructure (Li & Wang, 2009); and (6) self-development and interest alignment—the degree to which academic content meets personal interests and future career goals (Shin, 2015; Duffy, 2015).

A number of measurement scales have been developed. Ben (1970) proposed six dimensions covering institutional facilities, faculty, teaching management, and outcomes. Later, Ma (1989) and Li & Wang (2009) refined these into multidimensional instruments integrating learning satisfaction, teaching satisfaction, and hardware satisfaction—often measured on a five-point Likert scale.

The factors influencing academic satisfaction are diverse. Teaching quality remains the most significant determinant (Liu, 2009; Dai, 2010). Students' satisfaction increases when teaching

meets or exceeds expectations regarding clarity, engagement, and fairness (Zhu, 2008). The learning environment also plays a critical role: adequate physical spaces, hygienic conditions, and a positive academic atmosphere promote satisfaction (Zhang, 2009; Tan, 2007). Demographic factors such as gender, family background, and institutional type have been shown to produce differences in satisfaction levels (Li, 2009; Hong, 2007). Furthermore, psychological and behavioral variables—including self-efficacy, motivation, learning engagement, and stress—mediate satisfaction outcomes (Wu, 2010; Balkis, 2016).

In conclusion, academic satisfaction in higher education is a comprehensive construct shaped by both external (institutional and instructional) and internal (psychological and motivational) factors. It reflects the interaction between educational quality and students' subjective experiences, serving as a crucial measure of academic success and mental well-being.

2.4 Relationship between Learning Stress and Academic Satisfaction

Existing research on the relationship between **learning stress** and **academic satisfaction** remains limited, with most studies focusing on related variables such as burnout, performance anxiety, and procrastination (Wang, 2012). Academic satisfaction reflects the extent to which students' learning experiences meet their expectations and is positively correlated with academic performance (Zhang & Li, 2015). While moderate learning stress can enhance cognitive efficiency, excessive stress negatively impacts mental health and learning outcomes (Zhou & Zhang, 2017). Current research has clarified stress structures and developed assessment tools (Zhang, 2015), yet several gaps persist. Theoretical integration remains weak, underlying mechanisms are insufficiently explored, and longitudinal studies are scarce (Liu & Zhang, 2014; Chen & Wang, 2015). Moreover, empirical research on coping strategies and interventions is underdeveloped (Wang & Li, 2018). Future studies should adopt dynamic, multidisciplinary approaches to examine how learning stress influences academic satisfaction and how targeted strategies can promote student well-being.

2.5 Relationship between Learning Stress and Learning Engagement

Current research primarily emphasizes school-related factors such as teacher support, peer relationships, and classroom climate, while limited attention has been given to external factors like learning stress and learning resilience (Chen, 2014). The university stage is crucial for students' academic and personal development, where learning engagement plays a key role. Studies indicate that learning stress is negatively correlated with engagement—moderate stress enhances motivation and performance, whereas excessive stress causes fatigue and disengagement (Demerouti, 2001; Zhang, 2014). Despite its importance, overall learning engagement among college students remains below average (Cui, 2012). Since engagement significantly promotes academic achievement and reduces dropout rates (Cong, 2012), it is imperative for higher education institutions to identify factors influencing engagement and implement targeted interventions to improve students' learning motivation and performance.

2.6 Mediating Relationship between Learning Engagement in Learning Stress and Academic Satisfaction

Learning engagement serves as a crucial mediating variable between learning stress and

academic satisfaction. Moderate levels of stress can stimulate students' motivation and enhance engagement, thereby improving satisfaction. However, excessive stress often leads to emotional exhaustion and disengagement, reducing satisfaction and learning effectiveness (Schaufeli et al., 2002). Learning engagement reflects students' behavioral, emotional, and cognitive investment in academic activities (Fredricks et al., 2004). When students actively participate, focus attention, and employ effective learning strategies, they are more likely to experience a sense of accomplishment and satisfaction. Conversely, low engagement weakens the positive effects of learning experiences. Thus, engagement transforms learning stress into productive academic effort, linking external academic pressure with internal psychological fulfillment. Strengthening learning engagement is therefore essential to reducing the negative influence of stress and promoting higher levels of academic satisfaction and overall well-being among college students.

3. Methodology and Procedures

3.1 Research Participants

This study selected undergraduate students majoring in calligraphy from five universities in China, including both comprehensive universities and art colleges. A total of 650 questionnaires were distributed, and 618 valid responses were collected. The sample covered students of different grades, genders, and years of study, ensuring a certain degree of representativeness.

3.2 Research Method

A research model is a concise conceptual framework developed by researchers for a specific research purpose. It serves as an important tool for identifying and indirectly explaining certain phenomena, and it is also an essential process in scientific inquiry. When applied appropriately, a research model can play a significant theoretical role.

This study aims to explore the relationships among learning stress, academic satisfaction and learning engagement, among college students majoring in calligraphy. Based on theoretical and empirical research on each variable, and in accordance with the hypothesized relationships among them, a research model was constructed to illustrate the influence of learning stress on academic satisfaction and learning engagement among calligraphy major college students, as shown in Figure 1.1.

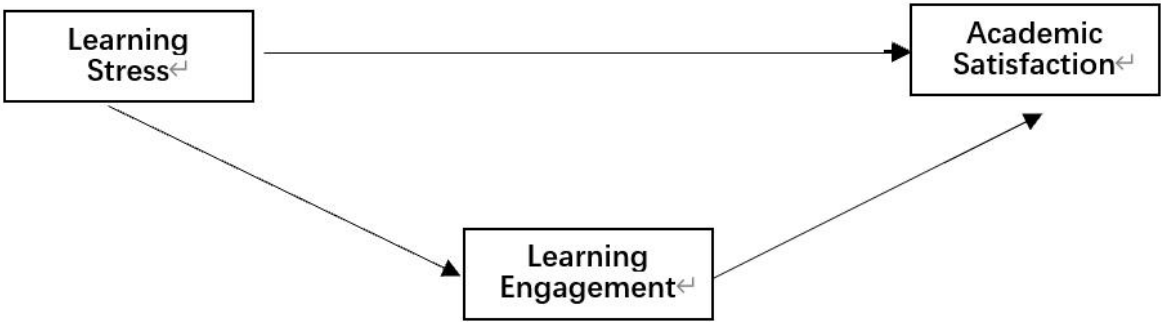


Figure 1.1: Research Method

3.3 Research Instruments

Four well-established measurement scales were employed in this study:

Learning Stress Scale: Adapted from domestic and international academic stress questionnaires, covering dimensions such as learning tasks, time management, test anxiety, and family expectations.

Learning Engagement Scale: Based on the three-dimensional structure proposed by Fredricks (2004), including behavioral, emotional, and cognitive engagement.

Academic Satisfaction Scale: Adopted from Li & Wang (2009), consisting of three dimensions—satisfaction with the learning process, satisfaction with teaching quality, and satisfaction with the physical learning environment.

All scales employed a five-point Likert scale. The reliability coefficients (Cronbach's α) of all instruments exceeded 0.85, indicating high internal consistency.

3.4 Research Hypothesis

This study aimed to analyze the effect of learning stress on academic satisfaction education and the mediating role of learning engagement and self-efficacy. Therefore, the following research hypotheses were proposed according to the research purpose.

At the same time, the following hypothesis was made, given that learning stress can also influence learning indirectly through learning engagement and self-efficacy.

H1: Learning stress has a significant effect on academic satisfaction

H2: Learning stress has a significant negative impact on learning engagement.

H3: Learning engagement has a significant positive impact on academic satisfaction

H4: Learning engagement acts as a mediator between learning stress and academic satisfaction.

3.5 Research Methods

Data analysis was conducted in three stages:

Descriptive Statistics and Difference Analysis: Means, standard deviations, skewness, and kurtosis were calculated using SPSS 26.0, followed by *t*-tests and ANOVA to examine demographic differences.

Correlation and Regression Analysis: Used to test the relationships and predictive effects among the variables.

Structural Equation Modeling (SEM) Verification: AMOS 24.0 was used to construct the path model and analyze the mediating effect of learning engagement, while the Bootstrap method was applied to test the significance of the mediation effect.

4. Results and Discussion

4.1 Overall Level Description

In order to observe the average level and distribution trend of learning stress, learning engagement academic satisfaction among Chinese college students, this study used a descriptive statistical analysis of SPSS 26.0. Table 1.1 presents the statistics of the mean, standard deviation, skewness Skewness, and kurtosis Kurtosis for all variables used in the current study.

As shown in Table 1.1, the average score of Chinese calligraphy major students learning stress is 3.484, and the average score of the three dimensions is learning prospect stress was 3.411, stress to academic competition 3.655, and stress to schoolwork 3.385. In terms of learning

engagement and all dimensions, the average score of learning engagement is 3.488, and the score of the three dimensions is action investment 3.517, cognitive engagement 3.476, and emotional investment 3.472. In the study statistics of academic satisfaction, the average score of learning satisfaction is 3.593, learning cognitive ability is 3.670, , and interpersonal promotion is 3.524; The absolute Skewness values measured in this study are within 3 and 1 Kurtosis for each level satisfy a normal distribution and can be used for subsequent studies.

Table 1.1: Descriptive Statistics of Main Variables (N=618)

<i>Variables</i>	<i>Min</i>	<i>M</i>	<i>SD</i>	<i>Skew.</i>	<i>Kurt.</i>
Learning Prospects Stress	1.00	3.411	.871	-.085	-.872
Academic Competition Stress	1.00	3.655	.840	-.586	-.354
Schoolwork Burden Stress	1.00	3.385	.845	-.167	-.637
Learning Stress	1.44	3.484	.684	-.412	-.053
Learning Cognitive Ability	1.33	3.670	.809	-.377	-.858
Self-management Ability	1.00	3.585	.807	-.308	-.785
Interpersonal Promotion	1.00	3.524	.816	-.118	-.831
Academic Satisfaction	1.44	3.593	.658	-.309	-.292
Action Investment	1.00	3.517	.864	-.289	-.730
Cognitive Engagement	1.33	3.476	.856	-.201	-.797
Emotional Investment	1.00	3.472	.886	-.094	-.108
Learning Engagement	1.33	3.488	.710	-.334	-.291

4.2 Demographic Differences

Significant differences were found across gender, grade level, type of institution, years of calligraphy study, and place of origin. Female students reported higher levels of learning stress than male students, but slightly lower levels of learning engagement and academic satisfaction. Lower-grade students experienced significantly higher learning stress compared to upper-grade students. Students from professional art colleges showed higher levels of learning engagement and academic satisfaction than those from comprehensive universities.

4.3 Correlation and Regression Analysis Results

Learning stress was significantly and negatively correlated with academic satisfaction ($r = -.426, p < .001$). Learning stress was significantly and negatively correlated with learning engagement ($r = -.487, p < .001$). Learning engagement was significantly and positively correlated with academic satisfaction ($r = .494, p < .001$).

Regression analysis further revealed that learning stress significantly and negatively predicted academic satisfaction, while learning engagement significantly and positively predicted academic satisfaction ($\beta = 0.47, p < .001$).

Table 1. 2: Results of the Correlation Analysis

	1	2	3
1. Learning Stress	1		
2. Learning Engagement	-.487**	1	
4. Academic Satisfaction	-.426**	.494**	1

** $p < .01$

4.4 Test of Mediating Effect

The structural equation model showed good fit indices ($\chi^2/df = 2.84$, $CFI = 0.94$, $RMSEA = 0.043$). Learning engagement played a partial mediating role between learning stress and academic satisfaction, accounting for approximately 38% of the total effect. In other words: Learning Stress $\rightarrow$ Learning Engagement (–) $\rightarrow$ Academic Satisfaction (+)

These results indicate that learning stress not only directly affects academic satisfaction but also indirectly exerts a negative influence by reducing students' learning engagement.

Table 1.3: Indirect, Direct, and Total Effects of the Model

Mediation Path	Effect	Lower limit	Upper limit	Proportion of mediating effect (%)
LS $\rightarrow$ LE $\rightarrow$ AS	.252	-.372	-.151	27.74

Note. LS: Learning Stress, AS: Academic Satisfaction, LE: Learning Engagement, SE: Self-efficacy

5. Conclusion and Suggestion

5.1 Major Conclusions

Learning stress has a significant negative impact on the academic satisfaction of calligraphy major undergraduates. Learning engagement plays a partial mediating role between learning stress and academic satisfaction. Learning stress, learning engagement, and academic satisfaction are all influenced by factors such as gender, grade level, and type of institution. Enhancing learning engagement can effectively buffer the adverse effects of learning stress.

5.2 Educational Recommendations At the Institutional Level

At the institutional level, universities play a pivotal role in shaping students' learning experiences and psychological well-being. To enhance academic satisfaction and alleviate the negative effects of learning stress, higher education institutions should adopt a multi-dimensional approach that integrates curriculum reform, psychological support, teaching innovation, and campus culture development.

First, curriculum design and workload management should be optimized. Institutions need to balance course difficulty and learning volume to prevent excessive academic burden. Flexible credit systems, diversified course options, and reasonable assessment methods can help students manage learning stress effectively. Integrating interdisciplinary and practice-based courses—such as calligraphy workshops, exhibitions, or cultural exchange programs—can enrich students'

learning experiences and strengthen intrinsic motivation.

Second, teacher training and professional development are essential. Teachers should be encouraged to adopt learner-centered pedagogies that promote interaction, feedback, and emotional support. Faculty members can receive training in educational psychology and counseling skills to identify students experiencing high stress and provide timely guidance. Building strong teacher-student relationships enhances students' sense of belonging and increases engagement, ultimately improving academic satisfaction.

Third, universities should establish comprehensive mental health and counseling systems. Regular psychological screenings, stress management workshops, and peer support programs can help students develop resilience and coping strategies. Institutions can also provide online mental health platforms offering accessible counseling services and self-help resources.

Fourth, promoting active learning environments and campus engagement is vital. Extracurricular activities, student associations, and research opportunities can enhance students' emotional and social engagement. Creating spaces for collaborative learning, art practice, and cross-cultural dialogue can further strengthen their self-efficacy and learning identity.

Finally, institutional evaluation and feedback mechanisms should be improved. Periodic surveys on student satisfaction and stress levels can help administrators identify potential issues and implement data-driven interventions. Continuous monitoring and feedback ensure that educational reforms remain responsive to students' evolving needs.

In summary, universities should adopt a holistic, student-centered approach that integrates academic flexibility, psychological support, teacher development, and participatory learning culture. Such strategies can effectively reduce learning stress, enhance engagement, and promote sustained academic satisfaction and well-being among college students.

5.3 Limitations and Future Directions

The sample of this study was mainly drawn from five universities in Shaanxi Province, which inevitably introduces a degree of geographical and cultural limitation. Although Shaanxi is an important center of calligraphy education in China, the regional characteristics, institutional environments, and teaching styles may differ from those of other provinces. Therefore, the findings may not fully represent the experiences of calligraphy undergraduates across the nation. To enhance the external validity and generalizability of future research, it is recommended to expand the sample size and include participants from universities located in other regions, such as Beijing, Jiangsu, and Zhejiang, where calligraphy programs have unique teaching traditions and student compositions. A more diverse sampling framework would allow for meaningful comparative analyses of regional differences in learning stress, engagement, and academic satisfaction, providing a broader and more comprehensive understanding of the phenomenon.

Moreover, this study adopted a cross-sectional design, which captures data at a single time point and thus limits the ability to infer causal or developmental relationships among variables. Although the current findings reveal significant correlations and mediation effects, they cannot fully explain how learning stress and engagement interact and evolve over time to influence academic satisfaction. To overcome this limitation, future research could adopt longitudinal designs to track changes in students' psychological states and learning behaviors across multiple academic semesters. In addition, the use of mixed methods—combining quantitative surveys with qualitative interviews—would help reveal the deeper emotional and cognitive mechanisms underlying the relationship between stress and satisfaction, offering richer insights into students' lived experiences.

Furthermore, subsequent studies could expand the theoretical framework by incorporating

additional psychological and contextual variables, such as emotional regulation, learning motivation, and social support. Emotional regulation, for instance, may act as a moderator that influences how students cope with learning stress and sustain engagement. Similarly, social support from peers and instructors could buffer the negative impact of stress, while intrinsic learning motivation could enhance persistence and satisfaction. By integrating these dimensions, researchers could build a more comprehensive psychological model that captures the complex interplay of individual, environmental, and cultural factors.

In summary, while this study provides valuable empirical evidence for understanding the relationship among learning stress, engagement, and academic satisfaction in calligraphy education, future research should pursue broader, deeper, and more dynamic explorations to strengthen both theoretical development and practical application in the field of art education.

5.4 Conclusion

Drawing on both psychological and educational perspectives, this study revealed the intrinsic and dynamic relationships among learning stress, learning engagement, and academic satisfaction among Chinese calligraphy undergraduates, and verified the mediating role of learning engagement. The results demonstrate that excessive learning stress not only negatively influences students' academic satisfaction but also reduces their motivation, creativity, and emotional stability. In contrast, high levels of learning engagement—characterized by vigor, dedication, and absorption—can buffer the adverse effects of stress and foster a sense of accomplishment and self-worth. This mediating process highlights the crucial psychological pathway through which students transform pressure into productive energy, ultimately achieving better academic and emotional outcomes.

From a broader perspective, these findings provide empirical support for the theoretical integration of stress-coping models and engagement theory within the field of art education. They also contribute to a more nuanced understanding of how students in creative disciplines, such as calligraphy, experience learning differently from those in general academic fields. Calligraphy, as a discipline deeply rooted in cultural heritage and personal expression, often requires students to sustain long-term concentration, patience, and self-discipline. Therefore, managing stress effectively and maintaining consistent engagement are essential for achieving both artistic mastery and psychological well-being.

Furthermore, this study offers practical implications for educational reform and mental health promotion in higher art education. By reducing unnecessary academic stress through reasonable workload adjustments and supportive teaching environments, institutions can create conditions conducive to intrinsic motivation and creative exploration. Strengthening students' engagement—through interactive teaching, project-based learning, and opportunities for artistic exhibitions—can further enhance their sense of competence and belonging. Additionally, cultivating self-efficacy helps students face artistic challenges with confidence, transforming stress into a driving force for growth rather than a source of burnout.

In conclusion, the findings underscore the importance of a holistic educational strategy that integrates psychological support, teaching innovation, and student engagement. By reducing stress, strengthening engagement, and enhancing self-efficacy, universities can effectively improve calligraphy students' learning well-being, foster sustainable artistic development, and promote the long-term enhancement of educational quality in higher art education.

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