

# Stressful Events and Anxiety in Graduate Students: The Mediating Role of Rumination

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## ABSTRACT

In recent years, mental health issues among graduate students have attracted increasing attention, with anxiety being particularly prevalent. Exploring the influencing factors and underlying mechanisms of graduate students' anxiety is of great significance for promoting their psychological well-being. Therefore, the present study examined the current status and influencing factors of anxiety among graduate students, with a particular focus on the roles of stressful events, rumination, and anxiety, and constructed a moderated mediation model. Methods: A questionnaire survey was conducted among 250 graduate students in Guangdong Province using the stressful events Scale, the Rumination Scale, and the Anxiety Scale. Results: (1) stressful events, rumination, and anxiety were all significantly positively correlated among graduate students; (2) Rumination played a partial mediating role in the relationship between stressful events and anxiety. Conclusion: stressful events not only directly influence graduate students' anxiety but also indirectly affect anxiety levels through rumination. These findings reveal the psychological mechanism through which stressful events influence anxiety from the perspective of cognitive processing, and provide empirical evidence for developing mental health interventions for graduate students in universities.

**KEYWORDS:** stressful events; anxiety; rumination; graduate students

## 1. INTRODUCTION

In recent years, with the continuous expansion of higher education and the intensification of social competition, the mental health of university and graduate student populations has attracted increasing attention from both academia and society. The graduate stage is not only a critical period for the development of academic competence and career planning, but also a period characterized by relatively high levels of academic and developmental pressure. Graduate students often face multiple challenges related to research tasks, academic publication requirements, graduation standards, and employment competition. These stressful circumstances may exert important influences on their mental health. Previous studies have shown that psychological problems such as anxiety and depression are relatively prevalent among graduate students. A survey of 2,279 graduate students from 26 countries found that approximately 41% of respondents reported moderate to severe anxiety symptoms and 39% reported moderate to severe depressive symptoms (Evans et al., 2018). In addition, a study by Levecque et al. (2017) indicated that doctoral students are about twice as likely to experience mental health problems compared with the general population. Further research has demonstrated that graduate students' mental health is closely associated with factors such as academic pressure, supervisor–student relationships, work–life balance, and uncertainty regarding future career development. These findings suggest that the mental

health of graduate students has become an important issue requiring urgent attention in the field of higher education.

Existing studies have mainly explored the mental health of university and graduate students from perspectives such as stress-related factors, social support, and individual cognitive styles. Among these, stress-related factors are considered important environmental variables influencing anxiety. Relevant research has shown that academic stress is significantly associated with individuals' anxiety. For example, some studies have found that academic stress significantly predicts test anxiety among college students (Zheng et al., 2023), and higher levels of academic stress are often accompanied by increased anxiety and psychological distress (Yulina et al., 2024). These findings indicate that stress may represent an important risk factor for anxiety among university and graduate students.

However, individuals do not exhibit identical emotional responses when facing stressful situations, suggesting that certain psychological mechanisms may exist between stress factors and emotional problems. Existing research has primarily focused on the direct influence of stress on emotional outcomes, whereas the mechanisms through which stress affects anxiety through specific cognitive processing processes remain insufficiently explored. In particular, empirical research examining the pathways linking stressful events, rumination, and anxiety among graduate students is still relatively limited. Therefore, it is necessary to further investigate the relationship between stressful events and anxiety among graduate students and to examine the potential role of rumination in this relationship.

### **1.1 stressful events and Anxiety Among Graduate Students**

stressful events generally refer to significant life changes or challenging situations that individuals encounter in their lives and that require psychological or behavioral adaptation, such as academic stress, interpersonal conflict, or career-related pressure (Holmes & Rahe, 1967). According to the cognitive appraisal theory of stress, individuals' subjective evaluation of stressful events plays a crucial role in emotional responses. When individuals appraise a situation as threatening and perceive that their resources are insufficient to cope with it, they are more likely to experience negative emotions such as anxiety (Lazarus & Folkman, 1984).

For graduate students, the learning stage is often accompanied by multiple stressful circumstances, including research tasks, academic evaluation, and uncertainty about future career development. These stressful events may trigger emotional responses such as anxiety through individuals' cognitive appraisal processes. A substantial body of empirical research supports the close relationship between stressful events and anxiety. For example, Michl et al. (2013) found that stressful events significantly predicted the subsequent development of anxiety symptoms. Individuals who experience more negative life events tend to exhibit higher levels of anxiety and psychological distress (Ruscio et al., 2015). Among college students, academic stress has also been identified as an important predictor of anxiety. For instance, research has found that academic stress is significantly positively correlated with college students' anxiety levels (Zheng et al., 2023). Chen et al. (2024), in a survey of 794 college students, reported a significant positive association between negative stressful events and anxiety levels, indicating that individuals who experience more stressful events tend to report higher levels of anxiety.

In summary, stressful events are considered important situational factors influencing individuals' anxiety. The more stressful events individuals experience, the higher their level of anxiety tends to be. For graduate students, frequent academic and developmental stressors may further increase their risk of anxiety.

Therefore, the present study proposes Hypothesis 1 (H1): stressful events are positively associated with anxiety among graduate students.

### **1.2 The Mediating Role of Rumination**

Rumination refers to a maladaptive cognitive processing style in which individuals repeatedly focus on their negative emotions and the causes and consequences of those emotions after experiencing negative events or emotional states (Allaert et al., 2019). According to the response styles theory, individuals may adopt different emotional response styles when confronted with negative emotions or stressful situations. A ruminative response style is characterized by persistent attention to negative experiences and their possible causes, without engaging in active problem-solving behaviors. This theory suggests that rumination prolongs and intensifies individuals' negative emotional responses and increases the risk of emotional problems such as anxiety and depression (Nolen-Hoeksema et al., 2008).

From the perspective of stressful events, negative stress situations in real life are often important contextual factors that trigger rumination. When individuals experience stressful events such as academic pressure, interpersonal conflict, or uncertainty about future development, they may repeatedly think about the causes of these events and their possible consequences, thereby forming a persistent negative cognitive processing pattern. Research has shown that negative life events are significantly positively correlated with rumination, indicating that individuals who experience more stressful events tend to exhibit higher levels of rumination (McLaughlin & Nolen-Hoeksema, 2011).

At the same time, rumination is considered an important cognitive mechanism underlying anxiety. Studies have shown that rumination leads individuals to continually focus on negative information and amplify potential threats, thereby increasing anxiety experiences (Spasojević & Alloy, 2001). The process model of emotion regulation proposes that individuals may regulate their emotions in different ways after emotional responses arise. Some strategies, such as repeatedly thinking about negative events, may fail to effectively reduce emotional intensity and may instead maintain or even exacerbate emotional distress (Gross, 1998). When individuals become trapped in repetitive thinking about stressful events, their attentional resources remain focused on negative information, thereby strengthening threat perception and increasing anxiety.

Further research suggests that stressful events not only directly predict individuals' anxiety levels but may also indirectly influence anxiety symptoms by increasing levels of rumination (McLaughlin & Nolen-Hoeksema, 2011). Domestic studies have also shown that negative life events significantly predict rumination among college students, and rumination further intensifies negative emotions such as anxiety (Wang & Zhang, 2012). Jiang and Li (2026), in a study of university students in ethnic regions, found that perceived stress, rumination, and state anxiety were all significantly positively correlated, and rumination partially mediated the relationship between perceived stress and state anxiety.

In summary, when graduate students face stressful events such as academic tasks, research pressure, and uncertainty about employment, they may develop rumination by repeatedly thinking about stressful situations and their potential consequences. This persistent ruminative processing may further intensify anxiety.

Therefore, the present study proposes Hypothesis 2 (H2): Rumination mediates the relationship between stressful events and anxiety among graduate students.

## 2. METHODS

### 2.1 Participants

A convenience sampling method was employed to recruit graduate students from various universities via social media platforms, including Xiaohongshu and WeChat. The survey was administered through the Wenjuanxing online platform, with a total of 250 participants completing the questionnaire. Following the criterion suggested by Huang et al. (2012), which identifies an average response time of no less than 2 seconds per item as a threshold for valid responding, 27 cases were excluded. This resulted in a final sample of 223 valid responses.

The demographic composition of the final sample was as follows: 54 males and 169 females. In terms of age, 191 participants were aged 20–25, 29 were aged 26–31, and 3 were aged 32 or above. Regarding their year of study, 82 were in their first year, 99 in their second year, and 42 in their third year of graduate studies. In terms of relationship status, 6 participants were married without children, 82 were in a relationship, and 135 were single. The sample included 73 students from STEM fields (Science, Technology, Engineering, Agriculture, and Medicine) and 150 from the Humanities and Social Sciences. Most participants ( $n = 217$ ) were full-time students, while 6 were part-time. Additionally, 176 were enrolled in professional master's programs and 47 in academic master's programs. Subjective family socioeconomic status (SES) was measured on a 1–10 scale, with the distribution across levels being 3, 5, 15, 26, 63, 61, 32, 14, 1, and 3, respectively.

### 2.2 Instruments

#### 2.2.1 stressful events

The stressful events Scale, developed by Deng (2020), was employed to assess participants' stress levels. The scale consists of 36 items and provides two primary indicators: the total number of stressful events and the perceived stress score. For each item, participants first indicated whether a specific stressful event had occurred. If the event had not occurred, a score of 0 was assigned. If it had occurred, participants rated their level of perceived stress at the time of the event on a 5-point Likert scale, ranging from 1 (minimal) to 5 (extreme). All items were positively scored, with higher total scores indicating a greater level of perceived pressure. In the present study, the Cronbach's alpha coefficient for this scale was 0.934.

#### 2.2.2 Rumination

The Ruminative Responses Scale (RRS), originally developed by Nolen-Hoeksema (1991) and revised by Han and Yang (2009), was used to measure rumination levels. The scale consists of 22 items categorized into three dimensions: brooding, symptom rumination, and reflective pondering. Items are rated on a 4-point Likert scale, with higher total scores indicating a higher tendency toward rumination. The RRS has demonstrated robust reliability and validity among adolescent populations. In the present study, the Cronbach's alpha coefficient for this scale was 0.965.

### 2.2.3 Anxiety

Anxiety was assessed using the Generalized Anxiety Disorder-7 (GAD-7) scale, a 7-item self-report instrument designed to evaluate the frequency of anxiety symptoms over the past two weeks. The scale covers seven domains, including feeling nervous, inability to control worrying, and excessive worry. Each item is rated on a 4-point Likert scale ranging from 0 (not at all) to 3 (nearly every day), with total scores ranging from 0 to 21. Higher scores indicate greater anxiety severity, with a score of 10 serving as the clinical cutoff point for identifying GAD symptoms.

In the present study, six additional items were incorporated to measure specific anxiety domains relevant to the target population: social anxiety ("I feel nervous when talking to my supervisor, unfamiliar classmates, or senior students"), research-related anxiety ("I feel irritable and frustrated when encountering difficulties in my research or thesis"), financial anxiety ("I often feel worried and distressed about my current financial situation"), relationship anxiety ("Romantic and emotional issues often cause me distress"), employment anxiety ("I feel uneasy after seeing posts about the job market on social media platforms"), and age-related anxiety ("I feel that being older than my peers makes me uneasy in academic or social settings"). Following the inclusion of these items, the Cronbach's alpha coefficient for the expanded scale in this study was 0.926.

### 2.2.4 Control Variables

The present study controlled for several demographic variables, including gender, age, grade level, relationship status, academic major, mode of study (full-time vs. part-time), degree type (professional vs. academic), and subjective family socioeconomic status (SES).

### 2.3 Data Analysis

Statistical analyses were performed using IBM SPSS Statistics (Version 26.0). Descriptive statistics were first calculated for all primary variables. Pearson correlation analysis was then conducted to examine the relationships among stressful events, rumination, and anxiety. To test the mediating effect, Model 4 of the SPSS PROCESS macro (Hayes, 2017) was utilized. The significance of the path coefficients was evaluated using the bias-corrected bootstrapping method with 5,000 resamples. A 95% confidence interval (CI) that does not include zero was considered to indicate statistical significance.

## 3. RESULTS

### 3.1 Common Method Bias Test

Before formal data analysis, Harman's single-factor test was conducted to examine potential common method bias (Zhou & Long, 2004). The results of the unrotated factor analysis revealed 12 factors with eigenvalues greater than 1. The first factor accounted for 35.945% of the total variance, which is below the threshold of 40%. This indicates that no significant common method bias was present in the current study.

### 3.2 Descriptive Statistics and Correlation Analysis

As shown in Table 1, the overall level of anxiety among graduate students was moderately high. Specifically, social anxiety, research-related anxiety, employment anxiety, and financial anxiety all exhibited levels above the moderate threshold. Pearson correlation analysis indicated that stressful events were significantly and positively correlated with anxiety ( $r = .650, p < .01$ ), suggesting that stressful events serve as a contributing factor to graduate students' anxiety. Furthermore, stressful events were significantly and positively correlated with

rumination ( $r = .625, p < .01$ ), and rumination was also significantly and positively correlated with anxiety ( $r = .819, p < .01$ ).

Table 1 Descriptive Statistics and Correlations Among Variables

Variables	1	2	3	3-1	3-2	3-3	3-4	3-5	3-6	<i>M</i> ± <i>SD</i>
1. Stressful events	1.000									2.983±0.774
2. Rumination	0.626**	1.000								2.076±0.700
3. Anxiety	0.650**	0.819**	1.000							2.195±0.634
3-1. Social anxiety	0.421**	0.557**	0.621**	1.000						2.310±0.910
3-2. Research anxiety	0.543**	0.603**	0.755**	0.490**	1.000					2.620±0.850
3-3. Financial anxiety	0.565**	0.626**	0.748**	0.377**	0.560**	1.000				2.160±0.940
3-4. Relationship anxiety	0.460**	0.431**	0.549**	0.228**	0.329**	0.404**	1.000			1.770±0.870
3-5. Employment anxiety	0.483**	0.575**	0.703**	0.406**	0.620**	0.559**	0.369**	1.000		2.480±0.940
3-6. Age-related anxiety	0.493**	0.520**	0.598**	0.420**	0.375**	0.367**	0.442**	0.497**	1.000	1.860±0.930

Note.  $N = 223$ . \*\*\* $p < .001$ , \*\* $p < .01$ , \* $p < .05$ .

### 3.3 Mediation Effect Analysis

Following the mediation analysis procedure based on structural equation modeling (Wen et al., 2014), the mediating effect of rumination was tested using the PROCESS macro (Version 3.5, Model 4; Hayes, 2013). Demographic variables, including gender, age, grade level, relationship status, academic major, mode of study, degree type, and subjective family SES, were entered into the regression equation as control variables. All continuous variables were standardized before analysis. The results and the corresponding path diagram are presented in Table 2 and Figure 1, respectively.

The bias-corrected nonparametric percentile Bootstrap method (with 5,000 resamples) was utilized to estimate the confidence intervals (CIs) for each effect. The results indicated that the direct effect of stressful events on anxiety was 0.185 (95% CI [0.109, 0.261]). Since the 95% CI did not include zero, the direct impact of stressful events on anxiety remained significant after including the mediator, accounting for 34.709% of the total effect. Regarding the mediation effect, the indirect effect of the path "stressful events → rumination → anxiety" was 0.348 (95% CI [0.269, 0.429]). The exclusion of zero from the 95% CI confirmed that rumination played a significant mediating role between stressful events and anxiety, with the mediation effect accounting for 65.291% of the total effect. Furthermore, all path coefficients were significant: stressful events significantly predicted rumination (Effect = 0.565, 95% CI [0.472, 0.659]), and rumination significantly predicted anxiety (Effect = 0.615, 95% CI [0.531, 0.699]).

In summary, rumination exerted a partial mediating effect on the relationship between stressful events and anxiety. Stressful events not only directly led to anxiety but also indirectly increased anxiety levels by inducing ruminative thinking.

Table 2 Analysis of Total, Direct, and Indirect Effects

Model Path	Effect	SE	LLCI	ULCI	效应占比
Stressful events → Anxiety (Direct Effect)	0.185	0.039	0.109	0.261	34.709%
Stressful events → Rumination	0.565	0.047	0.472	0.659	-
Rumination → Anxiety	0.615	0.043	0.531	0.699	-
Stressful events → Rumination → Anxiety (Indirect Effect)	0.348	0.040	0.269	0.429	65.291%

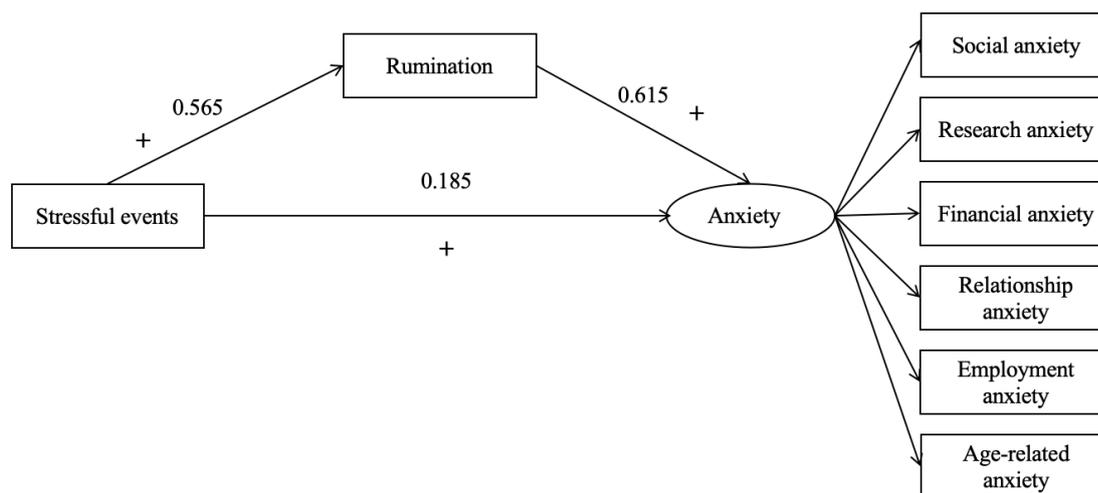


Figure 1 Path Model of the Relationship Between stressful events and Anxiety with Rumination as a Mediator

## 4. DISCUSSION

### 4.1 The Positive Predictive Effect of stressful events on Graduate Students' Anxiety

The results of the present study indicate a significant positive correlation between stressful events and anxiety among graduate students, and stressful events significantly and directly predict anxiety levels. Stressful events constitute an important external risk factor for the development of anxiety among graduate students. The more stressful events individuals experience and the greater the level of stress they subjectively perceive, the higher their level of anxiety tends to be. This finding is consistent with previous studies on young student populations, which have shown that negative stressful events and perceived stress can directly and significantly predict individuals' state anxiety (Chen et al., 2025; Jiang et al., 2026).

At present, the overall level of anxiety among graduate students appears to be moderately high, with particularly prominent anxiety related to research tasks, employment prospects, social interactions, and financial concerns. This phenomenon reflects the unique transitional context in which graduate students are situated, as they move between advanced academic training and future career development. In addition to undertaking intensive research tasks, graduate students are often required to cope with severe employment competition and financial pressures. Negative stressors and adverse life events have been widely identified as key antecedents of mental health problems, particularly anxiety (Li et al., 2003; Wang, 2025; Zhu, 2022). Stressful events during the graduate stage often exhibit characteristics of persistence, accumulation, and unpredictability. The complexity of research work, the long training cycle, and uncertainty regarding the future job market collectively constitute chronic stressors faced by graduate students. Anxiety frequently reflects individuals' concerns about uncertain or uncontrollable outcomes.

According to stress appraisal theory, individuals' cognitive evaluations of stressful events play a crucial role in shaping emotional responses. When graduate students are exposed to multiple overlapping stressors for a prolonged period, and they perceive their coping resources as insufficient to deal with current challenges, their psychological resources may become excessively depleted. Such perceptions of resource insufficiency may lead to a strong sense of loss of control, thereby directly triggering or intensifying anxiety about the future. Therefore, when addressing graduate students' mental health, it is important to help them accurately identify the multiple stressors present in their environment and to facilitate more adaptive and constructive cognitive appraisals of stressful events.

#### **4.2 The Mediating Role of Rumination**

Rumination was found to play a partial mediating role in the relationship between stressful events and anxiety among graduate students. Stressful events not only directly evoke anxiety but also indirectly increase individuals' anxiety levels by inducing or intensifying rumination, an internal cognitive processing mechanism. This finding is consistent with the empirical study conducted by Jiang and Li (2026) among college students.

Stressful events serve as environmental triggers that elicit rumination. According to the cognitive–interactional theory of stress, rumination represents a typical maladaptive cognitive response under stressful circumstances. The academic and research tasks undertaken by graduate students are often characterized by long durations and high complexity. When they encounter negative life events such as academic setbacks, interpersonal conflicts, or uncertainty regarding future development, they are particularly prone to engaging in deep reflection on the causes of failure and self-doubt (Zheng et al., 2025; Chen, 2022), which may manifest as elevated levels of rumination.

Rumination greatly amplifies the adverse effects of stressful events on individuals' mental health. As a maladaptive cognitive pattern characterized by passive and repetitive thinking about the causes and consequences of negative emotions, rumination significantly increases individuals' attention to and recall of negative information (Lan, 2020; Lü, 2025). The process model of emotion regulation (Gross, 1998) suggests that rumination essentially functions as a maladaptive emotion regulation strategy. When individuals remain trapped in repetitive thinking about stressful events, their attentional resources become persistently anchored to negative information and potential threats (Spasojević & Alloy, 2001). This not only consumes cognitive resources that could otherwise be used to cope with stress or solve problems, but also fosters catastrophic expectations about the future, such as concerns about failing to graduate or pessimism regarding future employment (Xue, 2022). As a result, negative emotions become difficult to dissipate naturally and may eventually develop into more severe anxiety symptoms (Wang, 2025).

In summary, rumination represents a key internal cognitive mechanism through which stressful events are transformed into anxiety. External stressors not only directly deplete graduate students' psychological resources but also trigger rumination, a maladaptive cognitive processing style that leads to the continued exhaustion of cognitive resources and ultimately exacerbates overall anxiety levels.

#### **4.3 Limitations and Future Directions**

(1) The representativeness of the sample is limited. Convenience sampling was adopted in this study, and graduate students were recruited through social media platforms. The final valid sample consisted of 223 participants. The sample characteristics indicate that participants were mainly concentrated in the age range of

20–25 years (191 participants), were predominantly from the humanities and social sciences (150 participants), and were mostly full-time master's students (217 participants), with the proportion of female participants significantly higher than that of males. Such a relatively homogeneous sample may limit the external validity of the findings. Future research should expand the sampling scope to include individuals with different educational backgrounds, age groups, and more diverse occupational groups, in order to test whether the relationships identified in this study (e.g., among stressful events, rumination, and anxiety) can be generalized to broader populations.

(2) The cross-sectional design of the study imposes certain limitations. Although the present study explored the mechanism through which stressful events influence anxiety via mediation analysis, the cross-sectional survey design does not allow for rigorous causal inference. There may be bidirectional influences or mutually reinforcing cycles between rumination and anxiety. Future research could employ longitudinal designs or diary studies to collect data, which would allow for a more precise examination of the temporal causal relationships among the variables.

(3) the objectivity of data collection could be further improved. The present study relied primarily on self-report questionnaires administered through the online platform Wenjuanxing. Although invalid responses with completion times shorter than two seconds per item were removed following the recommendation of Huang et al. (2012) to ensure data quality, self-report measures may still be influenced by social desirability bias or recall bias. Future research could incorporate objective physiological indicators (e.g., cortisol levels or heart rate variability) or informant reports to assess individuals' perceived stress and emotional states from multiple perspectives, thereby enhancing the accuracy and robustness of the research findings.

## 5. CONCLUSION

(1) stressful events, rumination, and anxiety among graduate students were all significantly and positively correlated with one another. stressful events significantly and positively predicted graduate students' anxiety. In other words, the more stressful events individuals experience and the stronger the stress they subjectively perceive, the higher their level of anxiety tends to be.

(2) Rumination played a partial mediating role in the relationship between stressful events and anxiety. stressful events not only directly increased graduate students' anxiety but also indirectly elevated anxiety levels by inducing or intensifying individuals' rumination.

## REFERENCES

1. Allaert, J., De Raedt, R., & Vanderhasselt, M. A. (2019). When choosing means losing: Regret enhances repetitive negative thinking in high brooders. *Journal of Experimental Social Psychology*, 85, 103850.
2. Chen, K. (2022). The relationship between academic stress, rumination, and internalizing problems among high school students and its intervention (Master's thesis, Central China Normal University).
3. Chen, K., Cai, Y., Pan, Q., Wang, Y., Li, M., Zhou, H., & Tian, L. (2025). The influence of negative stressful life events on anxiety among college students: A moderated mediation model. *Psychological Monthly*, 20(16), 101–104.
4. Deng, L. (2020). Development and application of the Stressful Life Events Scale for first-year graduate students (Master's thesis, Huazhong University of Science and Technology).
5. Evans, T. M., Bira, L., Gastelum, J. B., Weiss, L. T., & Vanderford, N. L. (2018). Evidence for a mental health crisis in graduate education. *Nature Biotechnology*, 36(3), 282–284.

6. Gross, J. J. (1998). The emerging field of emotion regulation: An integrative review. *Review of General Psychology*, 2(3), 271–299.
7. Han, X., & Yang, H. (2009). A preliminary application of the Nolen-Hoeksema Rumination Scale in China. *Chinese Journal of Clinical Psychology*, 17(5), 550–551.
8. Holmes, T. H., & Rahe, R. H. (1967). The Social Readjustment Rating Scale. *Journal of Psychosomatic Research*, 11(2), 213–218.
9. Huang, J. L., Curran, P. G., Keeney, J., Poposki, E. M., & DeShon, R. P. (2012). Detecting insufficient effort responding to surveys. *Journal of Business and Psychology*, 27(1), 99–114.
10. Jiang, Y., & Li, S. (2026). The effect of perceived stress on state anxiety among college students in ethnic regions: The mediating role of rumination. *Psychological Monthly*, 21(3), 122–125.
11. Lan, H. (2020). The mediating role of cognitive emotion regulation strategies in the relationship between rumination and depressive symptoms among first-year graduate students and its intervention (Master's thesis, Xiamen University).
12. Levecque, K., Anseel, F., De Beuckelaer, A., Van der Heyden, J., & Gisle, L. (2017). Work organization and mental health problems in PhD students. *Research Policy*, 46(4), 868–879.
13. Li, W., & Tao, S. (2003). The relationship between perceived stress and depression and anxiety among college students: The role of social support. *Chinese Journal of Clinical Psychology*, 11(2), 108–110.
14. Lü, W. (2025). The influence of negative life events on perceived stress among college students (Master's thesis, Guangxi Normal University).
15. McLaughlin, K. A., & Nolen-Hoeksema, S. (2011). Rumination as a transdiagnostic factor in depression and anxiety. *Behaviour Research and Therapy*, 49(3), 186–193.
16. Michl, L. C., McLaughlin, K. A., Shepherd, K., & Nolen-Hoeksema, S. (2013). Rumination as a mechanism linking stressful life events to symptoms of depression and anxiety. *Journal of Abnormal Psychology*, 122(2), 339–352.
17. Nolen-Hoeksema, S. (1991). Responses to depression and their effects on the duration of depressive episodes. *Journal of Abnormal Psychology*, 100(4), 569–582.
18. Nolen-Hoeksema, S., Wisco, B. E., & Lyubomirsky, S. (2008). Rethinking rumination. *Perspectives on Psychological Science*, 3(5), 400–424.
19. Ruscio, A. M., Gentes, E. L., Jones, J. D., Hallion, L. S., Coleman, E. S., & Swendsen, J. (2015). Rumination predicts heightened responding to stressful life events in major depressive disorder and generalized anxiety disorder. *Journal of Abnormal Psychology*, 124(1), 17–26.
20. Spasojević, J., & Alloy, L. B. (2001). Rumination as a common mechanism relating depressive risk factors to depression. *Emotion*, 1(1), 25–37.
21. Wang, Z., & Zhang, D. (2012). The relationship between rumination and adolescents' depression and anxiety. *Psychological Development and Education*, 28(5), 557–562.
22. Wang, Z. (2025). The influence of perceived stress on anxiety among high school students: The chain mediating role of interpretation bias and rumination and its intervention (Master's thesis, Guangxi Normal University).
23. Wen, Z., Zhang, L., Hou, J., & Liu, Y. (2004). Testing and application of mediation effects. *Acta Psychologica Sinica*, 36(5), 614–620.
24. Xue, Y. (2022). The influence of employment anxiety on episodic future thinking among college students (Master's thesis, Wuhan University).
25. Yulina, E., Yunita, Y., Dewi, I. K., & Lubis, D. M. G. (2024). The relationship between academic stress and mental health of university students. *Journal of Comprehensive Science*, 4(7).

26. Zheng, G., Zhang, Q., & Ran, G. (2023). The association between academic stress and test anxiety in college students: The mediating role of regulatory emotional self-efficacy and the moderating role of parental expectations. *Frontiers in Psychology*, 14, 1008679.
27. Zheng, Z., Qi, W., & Guo, X. (2025). The influence of negative life events on sleep among college students: The mediating role of rumination. *Psychological Monthly*, 20(21), 119–122.
28. Zhou, H., & Long, L. (2004). Statistical tests and control methods for common method bias. *Advances in Psychological Science*, 12(6), 942–950.
29. Zhu, Z. (2022). The relationship between perceived stress, coping style, and test anxiety among postgraduate entrance examination candidates and its intervention (Master's thesis, Yunnan Normal University).