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Examining the role of negative perfectionism on test anxiety with the mediating role of rumination and psychological hardiness and self-efficacy among university students with panic attack experience

Fatemeh Sedighi[1]; Maryam Siahpoosh[2]; Fatemeh Jamshiddoust Miyanroudi[3]; Hosniyeh Okhravi[4]; *Ghazal Jamshidi[5]

[1]Department of Psychology, Faculty of Nursing / Midwifery, Zanjan Branch, Islamic Azad University, Zanjan, Iran.
[2]Department of Counseling, Faculty of counseling and Educational sciences, Rudehen Branch, Islamic Azad University, Rudehen, Iran.
[3]Ph.D.student, Department of Psychology, Faculty of Education and Psychology,University of Mohaghegh Ardabili, Ardabil, Iran.
[4]Department of Psychology, Birjand Branch, Islamic Azad University, Birjand, Iran.
[5]Ph.D. student in health psychology, University of Tehran Kish International Campus, Kish, Iran.

Abstract

Introduction: Students' mental health is at risk due to test anxiety, which is closely connected to their academic performance in educational institutions. This study aims to explore how negative perfectionism contributes to test anxiety, with rumination, psychological hardiness, and self-efficacy serving as mediating factors among male students who have a history of panic attacks.

Materials and Methods: This descriptive-correlational research focused on all male university students aged 20 to 30 in Tehran, Iran, from July to October 2023 who had experienced panic attacks. A sample of 158 students who had experienced at least one panic attack was selected using purposive sampling. We used the Rumination Response Scale (RRS), Test Anxiety Questionnaire (TAQ), Terry-Short's Positive and Negative Perfectionism Scale (PANPS), Kobasa's Hardiness Scale (KHS), and General Self-Efficacy Scale (GSE-17). We analyzed the data using JASP version 0.18.1 software, descriptive statistics, and path coefficients.

Results: Rumination as a result of negative perfectionism had a significant and positive impact on test anxiety (β= 0.033, *P*< 0.001). Similarly, negative perfectionism influenced test anxiety positively and significantly through hardiness and self-efficacy (*P*< 0.001). The direct effect of rumination on test anxiety was significant and positive (β= 0.319, *P*< 0.001). There was a clear negative relationship between hardiness and test anxiety, (β= -0.239, *P*= 0.001).

Conclusion: The results indicated that factors such as negative perfectionism, rumination, psychological hardiness, and self-efficacy have notable impacts on test anxiety, potentially influencing students' educational experiences.

Keywords: Negative perfectionism, Panic attack, Rumination, Self-efficacy, Test anxiety

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***Corresponding Author:**
Department of Psychology, University of Tehran Kish International Campus, Kish, Iran.
gacela.ir@gmail.com
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Introduction

Academic life is essential in molding a person's life and influences various aspects of life. One common and significant issue in educational systems that is closely related to a decline in academic performance and dropout rates is test anxiety (1). Test anxiety, characterized by self-doubt, confusion, and physical symptoms like increased heart rate, affects students' performance. According to the American Psychiatric Association, 20% of students experience severe anxiety and 18% mild, with recent studies showing a prevalence nearing 40% (2).

Additionally, students with panic attacks may also experience test anxiety, as research has shown that panic attacks often occur during exams, presentations, or periods of high stress (3). A panic attack is a sudden and intense wave of fear or distress that reaches its peak within minutes, usually triggered by physical or emotional stress or trauma (4). A study focusing on test anxiety among students revealed that 37% of students reported experiencing panic attacks before exams (5).

Individuals who experience high levels of test anxiety often seek approval and have a tendency to avoid challenging tasks rather than confronting them (6). Perfectionism is characterized by setting extremely high standards, being fearful of failure, engaging in black-or-white thinking, and relying heavily on measures of success for self-assessment (7). Numerous studies conducted in the past two decades have demonstrated a significant correlation between students' test anxiety and their perfectionistic tendencies, suggesting that perfectionistic concerns may manifest cognitively in test anxiety (8). A study found that negative perfectionism, irrational beliefs, and gender collectively predict 26% of test anxiety (9).

Additionally, research has shown that students with high levels of test anxiety are more likely to exhibit maladaptive perfectionistic behaviors (10). Rumination, characterized by repetitive passive thinking, impairs academic performance by disrupting problem-solving, increasing negative emotions, and reducing motivation, ultimately leading to poorer outcomes in educational settings (11). A study revealed a correlation between higher test anxiety, psychological inflexibility, and rumination (12). Another study indicated a positive relationship between rumination, perfectionism, and cognitive test anxiety (13).

Psychological hardiness, on the other hand, appears to be a significant factor connected to anxiety. Students who show mental hardiness believe in their ability to attain academic objectives through determination and emotional self-regulation, which can lead to lower levels of anxiety (14).

Psychological hardiness is a personality trait that allows individuals to effectively navigate interpersonal challenges and stress, using these experiences as opportunities for personal growth and strength (15). According to a study, high levels of hardiness can significantly decrease stress and anxiety levels (16). Moreover, hardiness plays a moderating role in the relationship between academic anxiety and academic avoidance (17). Self-belief is essential for academic success, boosting problem-solving skills and reducing test anxiety. Students with higher self-efficacy are more confident and experience less anxiety (18). The concept of self-efficacy beliefs, which refers to an individual's belief in their capabilities, significantly influences learning (19). There is a strong negative relationship between students' self-efficacy levels and test anxiety (20). Also, learning styles and thinking patterns can predict test anxiety by affecting self-efficacy levels (21).

The analysis of the research backgrounds indicates that various factors associated with students' psychological traits, such as test anxiety, perfectionism, and self-efficacy, can influence students' academic performance. Further investigation is required in this field because of the importance of these factors and how they affect students' academic success. Additionally, there are limited studies available on this topic.

Therefore, the primary objective of this study is to explore the relationship between negative perfectionism and test anxiety, with rumination serving as a mediator, as well as examining the roles of psychological hardiness and self-efficacy among male college students who have experienced panic attacks. This study aims to address the impact of negative perfectionism on test anxiety and the potential mediating effects of rumination, psychological hardiness, and self-efficacy on anxiety levels among male students with panic attacks. Figure 1 presents the conceptual framework.

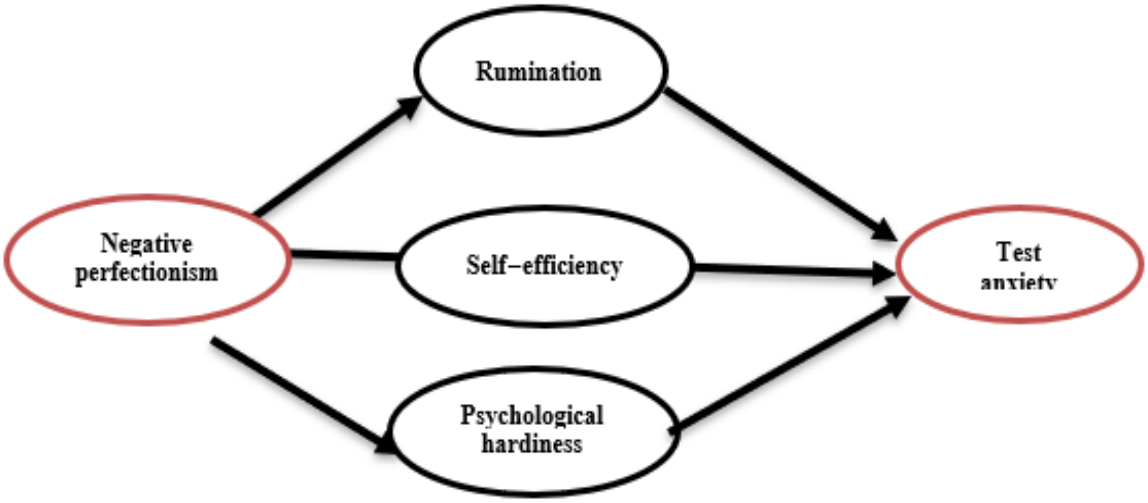

Figure 1. Conceptual framework of the research

Materials and Methods

The statistical population of this descriptive-correlational study, consisted of male university students aged 20 to 30 years in Tehran, who had encountered panic attacks and referred between July and October 2023. These individuals were diagnosed with panic attacks by either a psychiatrist or a medical professional in hospitals and psychotherapy clinics within the study area. Many of these individuals sought medical attention at hospitals during their initial panic attack due to mistaking it for a heart attack. Subsequently, they were diagnosed with panic disorder by specialists and referred to psychotherapy clinics.We studied 158 male university students who had experienced at least one panic attack and were selected using the purposive sampling. The adequacy of the sample size was determined using Cohen's formula in 2013 for path analysis and structural model techniques, considering the number of observed and latent variables, anticipated effect size, and desired probability and statistical power levels (22). Several calculations were made based on the formula, such as an effect size of 0.3, a statistical power of 0.8, four latent variables, 104 observed variables, and a p-value of 0.01. Based on these values, the researchers arrived at a sample size of 137 individuals. Anticipating a potential dropout rate, the researcher decided to increase the sample size to 160 to safeguard against any decrease.

Inclusion criteria included visiting the psychotherapy clinics at the research site, possessing a medical record related to panic attacks, obtaining informed consent, demonstrating adequate comprehension to take part in the study, being male and aged between 20 and 30, and having experienced at least one panic attack. Conversely, exclusion criteria encompassed the presence of any physical ailment that hindered participation, failing to respond to more than 10 questionnaire items leading to study withdrawal.

The research methodology involved obtaining necessary permits from the researcher's university, visiting four psychotherapy clinics in Tehran selected through available methods and university professors' recommendations, coordinating with clinic management, sending a research proposal to young male university students with panic attacks, and inviting them to participate in the study. The research process and online survey completion took four months due to limited cooperation, with 160 participants involved. Following the research, 158 out of 160 completed questionnaires were considered valid. Due to inadequate or intentional inaccuracies in the answers provided, two participants were excluded from the data analysis. Participants completed the self-administered surveys online.

Research instruments

A) Rumination Response Scale (RRS): The questionnaire developed by Nolen-Hoeksema et al. in 2003 assesses individuals' rumination levels. It consists of 22 questions, with responses rated on a four-point Likert scale ranging from never (1) to always (4). The questionnaire comprises three components: reflection (questions 7, 11, 12, 20, 21), brooding (questions 5, 10, 13, 15, 16), and depression (questions 1-4,

6, 8–9, 14, 17-19, 22). Scores range from 22 to 88, with low rumination indicated by scores of 22-33, moderate rumination by 33-55, and high rumination by scores above 55 (23). In Iran, the Cronbach's alpha coefficient was 0.78 (24). In this study, we found a Cronbach's alpha coefficient of 0.645 and a Composite Reliability value of 0.788 for the scale. Additionally, the AVE value for convergent validity was 0.884.

B) Test Anxiety Questionnaire (TAQ): Sarason (1997) developed this questionnaire to assess individuals' test anxiety levels in three dimensions: social humiliation, cognitive error, and tension. The questionnaire comprises 25 items, each rated on a four-point scale from never (0) to most of the time (3). The individual's final score is determined by combining their scores on a scale that ranges from 0 to 75. Higher scores are indicative of increased levels of test anxiety. A score below 12 suggests the absence of anxiety, while a score ranging from 13 to 37 suggests moderate anxiety, and a score exceeding 63 indicates high anxiety (25). In Iran, the scale demonstrated a reliability coefficient of 0.84 using Cronbach's alpha test and a criterion validity of 0.72 (26). In the current study, Cronbach's alpha for the questionnaire was 0.755, and its Composite Reliability value was 0.844. The AVE value for convergent validity was 0.579.

C) Terry-Short's Positive and Negative Perfectionism Scale (PANPS): Terry-Short et al. developed this scale in 1995 to assess people's levels of perfectionism in positive and negative aspects. The questionnaire consists of 40 items, with respondents selecting one of five options for each item to indicate the intensity of their perfectionism. Half of the questions focus on positive perfectionism, while the other half focus on negative perfectionism. For this study, only the negative dimension of the questionnaire was utilized. The answers to each question are on a five-point Likert scale that ranges from "not at all" to "severe." Each response is assigned a score from 1 to 5. The scores for all questions are then totaled, resulting in a sum between 20 and 100. Higher scores indicate higher levels of negative perfectionism in an individual (27). In Iran, the Cronbach's alpha coefficient for this scale was 0.83 (28). We obtained a Cronbach's alpha coefficient of 0.735 for the negative perfectionism dimension of the scale, with a Composite Reliability value of 0.834. Similarly, the AVE value for convergent validity was 0.556.

D) Kobasa's Hardiness Scale (KHS): In 1982, Kobasa created a questionnaire to evaluate hardiness in individuals, and confirmed its validity and reliability. The questionnaire consists of 20 items rated on a four-point Likert scale from 0 (never) to 3 (often). The overall score of an individual, ranging from 0 to 60, is calculated based on the total score obtained on the scale. Higher scores indicate higher levels of hardiness. Kobasa et al. found a Cronbach's alpha of 0.81 for this scale (29), while in Iran, the Cronbach's alpha was 0.73 (30). In this study, the Cronbach's alpha for the questionnaire was 0.695, and the Composite Reliability value was 0.760. The AVE value for convergent validity was 0.772.

E) General Self-Efficacy Scale (GSE-17): In 1982, Sherer Maddux created a survey known as the GSE-17 questionnaire to assess general self-efficacy. This questionnaire consists of 17 items, each rated on a four-point Likert scale from completely disagree to agree. The scale measures three aspects of behavior: initiation, persistence, and effort in the face of obstacles. The total score ranges from 17 to 68 (31). In Iran, the internal consistency of this scale was 0.83 (32). Additionally, we calculated Cronbach's alpha to be 0.761 and Composite Reliability to be 0.827. In the same way, the AVE value for convergent validity was 0.887.

We utilized JASP version 0.18.1 software for descriptive statistics, data analysis, and examining path coefficients between variables. We evaluated the normality of the variable distribution by conducting the Shapiro-Wilk test.

Results

In this study, 158 young men who were dealing with panic attacks were included and divided into two groups depending on whether they were taking medication or not. The participants were divided into two groups according to their educational background, with 38.0% having completed undergraduate degrees and 62.0% possessing master's degrees. Similarly, the participants were split into three groups by age, with 75.3% falling in the 20 to 23 years, 17.1% in the 23 to 26, and 7.6% aged 26 and above.

Table 2 displays the mean and variability of the factors. Table 3 shows the correlation between research variables based on Pearson's correlation coefficient.

Table 1. Descriptive statistics of the variables

Variable	Groups	F	%	Total	Median
Do you take medication?	Yes	89	56.3	158	1
	No	69	43.7		
Age (Year)	20-23	119	75.3	158	1
	23-26	27	17.1		
	>26	12	7.6		
Education	Undergraduate	60	38.0	158	2
	Master's degree	98	62.0		

Table 2. Description of the main research variables

Variable	Mean	Std. Deviation	Skewness	Kurtosis	Shapiro-Wilk	P	Min	Max
Test anxiety	46.019	4.067	-0.088	0.304	0.969	0.001	37	57
Negative perfectionism	48.316	4.685	0.466	-0.815	0.937	< 0.001	41	59
Rumination	38.639	3.165	-0.542	-0.144	0.953	< 0.001	31	45
Hardiness	30.930	8.084	0.199	-1.664	0.850	< 0.001	20	44
Self-efficacy	37.937	7.118	0.123	-1.324	0.909	< 0.001	28	49

Table 3. Pearson's correlations

Variable	1	2	3	4	5
1. Test anxiety	—				
2. Negative perfectionism	0.674***	—			
3. Rumination	0.666***	0.481***	—		
4. Hardiness	-0.658***	-0.619***	-0.450***	—	
5. Self-efficacy	-0.678***	-0.558***	-0.478***	0.504***	—

****P*< 0.001

Based on the findings in Table 3, there was a strong and positive correlation between test anxiety and negative perfectionism (r= 0.674, *P*< 0.001) as well as rumination (r= 0.666, *P*< 0.001). On the other hand, test anxiety showed a significant negative relationship with hardiness (r= -0.658, *P*< 0.001) and self-efficacy (r= -0.678, *P*< 0.001). After examining the data, the researcher assessed the path coefficients and the p-value of the variables listed in Table 4.

Table 4. Path coefficients

					95% Confidence Interval	
Path	Estimate	Std. Error	Z	P	Lower	Upper
Rumination → Test anxiety	0.319	0.052	6.143	< 0.001	0.215	0.459
Hardiness → Test anxiety	-0.239	0.057	-4.165	< 0.001	-0.343	-0.125
Self-efficacy → Test anxiety	-0.286	0.055	-5.188	< 0.001	-0.401	-0.186
Negative perfectionism → Test anxiety	0.045	0.013	3.546	< 0.001	0.017	0.070
Negative perfectionism → Rumination	0.103	0.015	6.891	< 0.001	0.072	0.130
Negative perfectionism → Hardiness	-0.132	0.013	-9.901	< 0.001	-0.153	-0.108
Negative perfectionism → Self-efficacy	-0.119	0.014	-8.449	< 0.001	-0.141	-0.093

Table 4 showed that rumination has a significant positive impact on test anxiety, with a coefficient of 0.319 and a *P*< 0.001. On the other hand, test anxiety is significantly decreased by hardiness (β= -0.239, *P*< 0.001). Additionally, self-efficacy directly contributes to reducing test anxiety (β= -0.286, *P*< 0.001). Negative perfectionism has a strong influence on test anxiety, with a significant positive impact (β= 0.045, *P*< 0.001). Negative perfectionism also correlates positively with rumination (β= 0.103, *P*< 0.001) but negatively with hardiness (β= -0.132, *P*< 0.001) and self-efficacy (β= -0.119, *P*< 0.001). We also explored the direct and indirect impacts of the variables in Table 5.

Table 5. Indirect and total effects

						95% Confidence Interval	
	Path	**Estimate**	**Error**	**Z**	**P**	**Lower**	**Upper**
Direct effects	Negative perfectionism→ Test anxiety	0.045	0.013	3.546	< 0.001	0.017	0.070
Indirect effects	Negative perfectionism→ Rumination→ Test anxiety	0.033	0.007	4.585	< 0.001	0.018	0.053
	Negative perfectionism→ Hardiness→ Test anxiety	0.032	0.008	3.839	< 0.001	0.017	0.046
	Negative perfectionism→ Self-efficacy→ Test anxiety	0.034	0.008	4.421	< 0.001	0.022	0.049
Total effects	Negative perfectionism→ Test anxiety	0.144	0.013	11.455	< 0.001	0.118	0.168
Total indirect effects	Negative perfectionism→ Test anxiety	0.098	0.012	7.971	< 0.001	0.075	0.126
Residual covariance	Rumination↔ Hardiness	-0.151	0.056	-2.711	0.007	-0.252	-0.055
	Rumination↔ Self-efficacy	-0.208	0.060	-3.478	< 0.001	-0.317	-0.098
	Hardiness↔ Self-efficacy	0.158	0.053	2.971	0.003	0.054	0.274

The findings in Table 5 indicated that rumination-driven negative perfectionism had a positive and statistically significant impact on test anxiety (β= 0.033, *P*< 0.001). Similarly, negative perfectionism had a significant positive effect on test anxiety through hardiness and self-efficacy (*P*< 0.001). The decrease in the coefficient for negative perfectionism suggests that hardiness and self-efficacy can mitigate the impact of negative perfectionism on test anxiety. Table 6 presents the reliability and validity of the model.

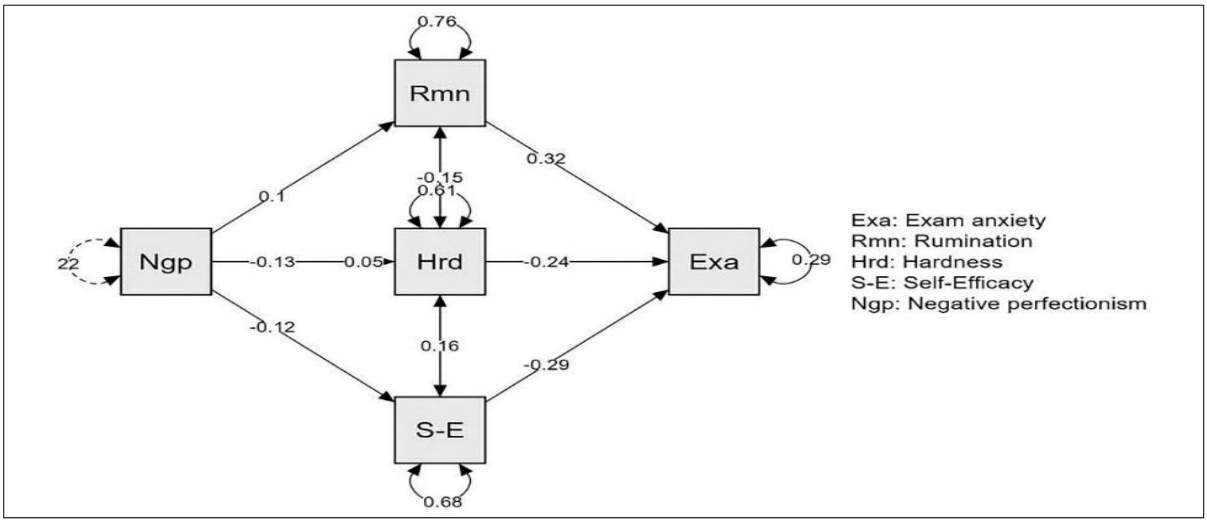

Figure 2. Statistical diagram

Table 6. Reliability and validity of the model

Variable	Cronbach's alpha	Composite reliability	AVE
1. Test anxiety	0.755	0.844	0.579
2. Negative perfectionism	0.735	0.834	0.556
3. Rumination	0.645	0.788	0.884
4. Hardiness	0.695	0.760	0.772
5. Self-efficacy	0.761	0.827	0.887

Based on Table 6, the model has been validated and deemed reliable. The variables have a Cronbach's alpha reliability exceeding 0.6. Moreover, the combined reliability of these variables is above 0.7. Additionally, the validity was assessed through the average variance extracted index, which surpasses 0.5 for the research variables, confirming the validity.

Discussion

The current findings, showing that rumination and negative perfectionism increase exam anxiety while resilience and self-efficacy reduce it, align with prior research. In Baytemir's study with 178 parents from the central Black Sea region of Turkey, negative perfectionism, irrational beliefs, and gender predicted 26% of parental exam anxiety, with negative perfectionism having the greatest impact. Tools included demographic data, the Need for Social Approval Scale, the Irrational Beliefs Scale, the Parent Exam Anxiety Scale, and the APS Perfectionism Scale (9).

Aydın and Yerin Güneri studied 715 university students in Turkey, finding that psychological inflexibility, rumination, perfectionism cognitions, and cognitive defusion predicted cognitive test anxiety. Instruments used were the Revised Cognitive Test Anxiety Scale, the Acceptance and Action Questionnaire-II, the Rumination Response Scale, and others (13). Kalinin et al.'s study on 47 athletes at Babe-Bolyai University in Romania found a negative relationship between mental toughness and stress, anxiety, and depression using the Mental Toughness Scale and the DASS-21 (16). Yıldız and Çolak surveyed 384 students from health departments at Turkish universities. They found a negative relationship between self-efficacy and exam anxiety using the Anatomy Self-Efficacy Scale and the Exam Anxiety Scale (20).

Academic achievement is a main worry for students, and those who strive for perfection may feel self-blame, blame others, and lack engagement in activities, leading to poor academic performance and increased anxiety (6). Due to their age and educational level, these students may develop perfectionistic tendencies and heightened emotional reactivity, leading to disturbing thoughts and prolonged negative moods, which in turn increase anxiety (11). On the other hand, having mental hardiness, which involves effectively dealing with interpersonal difficulties and stress, can assist students in reaching challenging academic objectives and undergoing personal development, ultimately lowering levels of anxiety, contrary to negative perfectionism and rumination (14). Similarly, self-efficacy, or belief in one's ability to succeed, helps reduce test anxiety by boosting confidence and effective problem-solving, leading to lower anxiety levels in students (18). According to one of the conclusions, there is a connection between negative perfectionism, higher levels of rumination, and lower levels of hardiness and self-efficacy, which aligns with earlier studies (33-35). Prior research has also highlighted a significant correlation between perfectionistic concerns and rumination in students' mental health (33). Ahmadi et al.'s research supports a negative relationship between negative perfectionism and self-efficacy (34). It has also been suggested in a study that perfectionism and traumatic experiences directly impact psychological hardiness (35).

Negative perfectionism can cause fear of failure and decreased self-efficacy in students due to unrealistic expectations. Perfectionists often experience high motivation to succeed and avoid failure, but their rigid thinking and chronic stress lead to negative emotions, impacting their resilience (7). Perfectionistic students may overly focus on others' opinions and strive for perfection, leading to rumination. This involves persistent, intrusive thoughts about their mistakes, causing them to become trapped in negative thought cycles (8,11).

This study showed that resilience and self-efficacy can reduce the impact of negative perfectionism on exam anxiety, while rumination exacerbates it. Although no specific studies were conducted in this area, the findings align with previous research (17,36,37). Hasty et al. assessed 444 high school students through the Mental Toughness Scale, the Academic Anxiety Scale, and the Academic Avoidance Scale. The results indicated that in students with generally low academic anxiety, higher anxiety was related to more time invested in after-school learning among those with higher mental toughness (17).

De Rosa et al. studied 151 university students and 42 outpatients with depression in Argentina. They used the Almost Perfect Scale, the Beck Depression Inventory, the Rumination Questionnaire, and the Positive Beliefs About Rumination Scale. They found that rumination mediated the relationship between maladaptive perfectionism and depression, and positive beliefs about rumination moderated the indirect effect of maladaptive perfectionism on depression (36). Huang et al. in 2023, studied 587 nursing students from two universities in China, using the Perfectionism Scale, the Academic Procrastination Scale, the Self-Efficacy Scale, and the Resilience Scale. They

concluded that maladaptive perfectionism and lower levels of self-efficacy and resilience were associated with increased academic procrastination. Self-efficacy partially mediated the relationship between perfectionism and procrastination, while resilience acted as a moderator (37). Hardiness and self-efficacy are positive traits that help students overcome challenges and solve problems. Students with high self-efficacy believe they can take the necessary actions to complete tasks, influencing academic performance through persistence and effort. Additionally, self-efficacy can mitigate the negative effects of anxiety caused by negative perfectionism (6). Psychological hardiness reflects mental well-being in students. Those with high hardiness are committed to their actions, believe they can control life events, and see changes as growth opportunities rather than threats. This mindset helps mitigate the negative effects of perfectionism and reduce test anxiety (15). Conversely, negative perfectionist students who obsess over the adequacy of their actions may experience rumination, decreased performance, and increased test anxiety due to fear of failure and procrastination (10,13).One limitation of this study was the obtaining consent from participants who did not perceive personal benefits from the research. The number of surveys administered may have influenced participants' responses, but researchers mitigated this by allowing ample time for completion. The study focused only on male students, which restricted generalizability, suggesting that future research should include female participants to enhance the scope of findings. Participants' awareness of being part of a study might have impacted results, though this was minimized through self-report measures and observations. Other limitations included the inability to control factors like motivation, external activities, genetics, lifestyle, and the small sample size, all of which should be considered in future studies. Including a larger, more diverse sample and examining external factors such as environmental influences could provide deeper insights.

Conclusion

This study underscores the significant influence of negative perfectionism, rumination, psychological hardiness, and self-efficacy on test anxiety. Maladaptive cognitive patterns, such as negative perfectionism and rumination, contribute to heightened anxiety, highlighting the need for targeted interventions. Educational institutions and counselors should integrate these factors into exam preparation strategies, while policymakers should enhance student support initiatives. Implementing training programs to mitigate perfectionism and test anxiety, alongside fostering an inclusive learning environment, can improve students' academic outcomes.

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Conflict of interest

There was no conflict of interest.

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Ethical Considerations

The researchers explained to participants through social media, providing detailed information regarding the objectives, permits, and ethical guidelines.

Code of Ethics

IR thesis.IAU.K.REC.1403.091

Authors' Contributions

The first author: data gathering; the second and third authors: concept and design; the fourth author: manuscript drafting; the fifth author: research supervision and final manuscript writing; all authors: statistical analysis and final editing.

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