

The Impact of Test Anxiety on Academic Achievement of Students: Measurement, Risk Factors, and Interventions

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Abstract

Test anxiety is a pervasive issue among students that can significantly affect their academic performance. This literature review aims to provide a comprehensive analysis of the relationship between test anxiety and the academic achievement of students. We delve into various measurement tools used to assess test anxiety and explore the factors that put students at risk. Additionally, we examine interventions and strategies to mitigate the negative effects of test anxiety on academic outcomes. Understanding this complex phenomenon is crucial for educators, students, and policymakers to create a supportive learning environment conducive to optimal academic achievement.

Key words: *academic performance; coping strategies; psychosomatic well-being; questionnaires; self-efficacy*

Introduction

Test anxiety, often defined as a state of uneasiness or apprehension related to the assessment of one's knowledge or performance, is a common phenomenon among students of all ages and educational levels, with some estimates that between 20% and 40% of college students experience test anxiety (Zhu et al., 2023). While some levels of anxiety can be motivating, excessive test anxiety has been shown to have detrimental effects on several aspects of students' well-being. One of the primary ramifications of test anxiety is its impact on diminished academic performance among students, a matter of significant concern given that academic success can profoundly influence the future vocational trajectory of the student as well as their sense of personal fulfilment. However, it is important to note that test anxiety can also have a negative impact on the psychosomatic well-being of the student, potentially contributing to the development of other neuropsychiatric diseases such as depression, anxiety disorder, and panic disorder, as well as cardiovascular diseases and various other health-related issues (Karbownik et al., 2020; Putwain et al., 2023).

Test anxiety comprises two essential components: emotionality and worry. The emotional component of test anxiety encompasses the physiological reactions of the autonomic nervous system, including heightened blood pressure, accelerated heart rate, palpitations, excessive perspiration, sensations of nausea, oral dryness, hyperventilation, vertigo, agitation, tremors, and debility. The concept of worry encompasses the psychological and cognitive aspects of test anxiety. It specifically involves internal dialogue and negative thoughts that are primarily linked to the potential consequences of test failure for future educational pursuits and career ambitions, comparing one's performance to that of peers, anticipating the response of teachers, peers, or family members in the event of poor results, and reflecting on the underlying causes of inadequate test preparation (Javorac et al., 2022; Putwain et al., 2023). Some authors single out social concerns as an additional constituent of test anxiety. This includes the fear of being socially stigmatized due to potential failure in test-related scenarios (Xu et al., 2021).

There are several elements that can influence the development of test anxiety. The test or oral assessment possesses certain characteristics that can influence the development of test anxiety. These include the level of complexity inherent in the tasks assigned to students, the time limitations imposed on them, the environment in which the examination occurs, and the qualities of the examiner, including their pedagogical and evaluative methods (Duraku, 2017). On the other hand, the personal characteristics of an individual, such as their desire for success, cognitive processing capabilities, academic thinking skills, and preferred methods of learning (e.g., studying during the night), can also have a notable impact on the formation of test anxiety (Putwain et al., 2010). In a meta-analysis conducted by von der Embse and colleagues (2018), the intricate relationship between intrapersonal characteristics, motivation, and personality traits of students was examined in relation to the phenomenon of test anxiety. This study provided valuable insights into the probable elements that may contribute to the

development and intensity of test anxiety. The study found that individuals exhibiting lower levels of self-esteem and self-efficacy, students holding negative beliefs about themselves and their abilities, students driven by external pressures rather than intrinsic interests, and students displaying higher levels of neuroticism were more prone to experiencing test anxiety.

Considering the detrimental effects of test anxiety on several aspects of students' well-being, this literature review aims to consolidate current research on test anxiety, with a specific focus on its impact on students' academic performance, various methods used to measure test anxiety, identification of student populations at high risk, and strategies for mitigating test anxiety.

Influence of test anxiety on academic achievement

Numerous studies have consistently demonstrated that test anxiety has a detrimental impact on students' academic performance. This finding has been supported by two prominent meta-analyses of test anxiety research (Hembree, 1988; von der Embse et al., 2018). There is a correlation between the worry dimension of test anxiety and a decline in academic performance (Steinmayr et al., 2016). There is no consistent correlation between the emotionality component of test anxiety and inadequate academic achievement. Nevertheless, it is important to acknowledge that this factor might exert a substantial influence on the holistic welfare of students (Priebe et al., 2022).

Various indicators of academic success can be considered objectives in research investigating the influence of test anxiety on academic performance. These indicators include proficiency in academic tasks and traditional classroom evaluations such as quizzes and tests, Grade Point Average (GPA), intelligence quotient (IQ), and standardized assessments like State Exams, Professional Exams, and Entrance Examinations (SAT and ACT) (von der Embse et al., 2018). In the context of higher education, GPA is commonly employed as a measure to assess overall academic performance among post-secondary students. Multiple studies have revealed that students with a lower GPA have notably elevated levels of test anxiety when compared to their peers who have a better GPA (Alamri & Nazir, 2022; Balogun et al., 2017; Javorac et al., 2022; Sideeg, 2015). Conversely, some studies have yielded rather disparate findings. According to a study conducted by Tsegay and colleagues (2019) on a cohort of Ethiopian students, it was shown that there was a positive correlation between test anxiety levels and GPA. In a noteworthy meta-analysis conducted by von der Embse et al. (2018), it was observed that the most significant influence of test anxiety on subpar academic performance was observed specifically when standardized „high-stakes“ assessments (SAT/ACT) with significant consequences were employed as a measure of academic achievement.

Several mechanisms can explain the negative effects of test anxiety on academic success. High levels of test anxiety can impair cognitive functions crucial for test performance. Attention resources become diverted towards worry and self-doubt, leaving fewer resources available for problem-solving and information retrieval

(Steinmayr et al., 2016). This cognitive interference can lead to decreased test scores and underachievement. Test anxiety has been shown to also hinder working memory, which is vital for tasks involving information manipulation and retention (Minihan et al., 2021). Anxiety-induced disruptions in working memory can compromise a student's ability to recall and apply relevant information during exams, resulting in lower academic performance. Test anxiety can erode a student's self-efficacy, leading to decreased confidence in their abilities (von der Embse et al., 2018). This self-doubt can become a self-fulfilling prophecy, as students who doubt their capabilities are less likely to engage in effective study strategies and may avoid challenging academic tasks. When confronted with text anxiety, students can mitigate the risk of potential failure on examinations by dedicating time and energy to adequately preparing for tests, actively participating in classroom activities, and employing efficient study and test-taking techniques. However, a significant number of students prioritize the avoidance of uncomfortable emotions by employing cognitive distancing techniques, engaging in distractions, and participating in other activities instead of dedicating their time solely to exam preparation (Putwain et al., 2023). The correlation between test anxiety and academic procrastination has been confirmed in several studies (Bolbolian et al., 2021; Custer, 2018; Desai et al., 2021), including the meta-analysis from 2018 (von der Embse et al.), where it was found that students who experience test anxiety are significantly more inclined to disregard or avoid stressors and sources of stress. The avoidance behavior might initially offer temporary relief from distressing emotions, but as time progresses, this avoidance strategy is likely to raise the risk of decreased academic achievements due to the missed opportunities for acquiring knowledge, insufficient preparation for examinations, and engagement in self-sabotaging behaviors (Putwain et al., 2023).

Measurement of test anxiety

Measuring test anxiety poses significant challenges due to many barriers. The collection of physiological data in a stressful real-time setting is a significant problem. Furthermore, a significant degree of variation can be observed among subjects with regard to their individual perception of anxiety (Ovadia-Blechman et al., 2022).

Self-report questionnaires are frequently employed as an approach to evaluate test anxiety. During the latter half of the 20th century, the Test Anxiety Scale for Children (TASC) was established and widely regarded as the preeminent tool for evaluating test anxiety. Subsequently, various tests have been created to evaluate two distinct aspects of test anxiety, namely emotionality and worry. These tests include the Test Anxiety Profile, Reaction to Test (RTT), Revised Test Anxiety (RTA) scale, and Test Anxiety Inventory (TAI). Additionally, the FRIEDBEN Test Anxiety Scale (FTAS) incorporated the social dimension of test anxiety. In the early 21st century, as the theoretical understanding of test anxiety continued to advance, novel assessments emerged to discern various cognitive dimensions of test anxiety, exemplified by the

Cognitive Test Anxiety Scale (CTAS). In recent years, educational institutions have adopted screening measures to support early intervention and prevention initiatives for test anxiety, such as the use of the Brief Fear of Test Anxiety Scale (B-FTAS) and the Daily Brief Rating of Test Anxiety (DBR-A) (von der Embse et al., 2018). The most frequently used questionnaires in contemporary studies are listed below.

State-Trait Anxiety Inventory, STAI (Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983)

The STAI is a widely used questionnaire that assesses both state anxiety (temporary anxiety related to a specific situation) and trait anxiety (generalized anxiety). Form Y, its most popular version, has 20 items for assessing trait anxiety and 20 for state anxiety. Higher scores indicate greater anxiety (Spielberger, 1989). Researchers employ variations of the STAI to measure test-specific anxiety, such as the Test Anxiety Inventory (TAI) and the Test Anxiety Scale (TAS). These scales provide valuable insights into the cognitive and emotional aspects of test anxiety.

Test Anxiety Inventory, TAI (Spielberger, 1980)

This questionnaire is designed specifically to measure test anxiety and has been widely used in research on test anxiety (Alamri & Nazir, 2020; Javorac et al., 2022; Latas et al., 2010). The test consists of 20 questions regarding the frequency of experiencing specific symptoms of anxiety before, during, and after tests or oral exams. The answer to each question is presented in the form of a four-point Likert-type scale. The minimum overall score in TAI is 20 and the maximum is 80 points. Based on the overall TAI score, four different levels of test anxiety can be singled out: no anxiety (20-35 points), mild anxiety (36-50), moderate anxiety (51-65), and severe anxiety (66-80). TAI has two subscales measuring two dimensions of test anxiety – emotionality and worry.

Westside Test Anxiety Scale, WTAS (Driscoll, 2004)

The WTAS is a self-report questionnaire developed by Richard Driscoll that assesses various dimensions of test anxiety, including worry, emotionality, and interference. It has demonstrated strong reliability and validity, making it a suitable instrument for assessing test anxiety in several studies (Desai et al., 2021; Tsegay et al., 2019). It comprises a set of 10 questions, which are scored using a 5-point Likert scale. The summation of the scores obtained from the 10 questions (10-50) is then divided by 10. The scores are interpreted to reveal the level of test anxiety, from comfortably low (score 1.0-1.9), to extremely high test anxiety (score 4.0-5.0).

Coping Inventory for Stressful Situations, CISS (Endler & Parker, 1990)

The CISS is a psychometric tool consisting of 48 items. It is designed to assess three fundamental coping methods, with each strategy comprising 16 items: Task-Oriented (T), Emotion-Oriented (E), and Avoidance (A). The items are evaluated using a 5-point

Likert scale. Greater utilization of a certain coping method is indicated by higher scores on the whole (Brands et al., 2014). While not exclusively focused on test anxiety, the CISS measures different coping styles, which can be related to how individuals deal with test anxiety.

Academic Motivation Scale, AMS (Vallerand, Pelletier, Blais, Brière, Senécal, & Vallières, 1992)

The purpose of this questionnaire is to assess motivation within the academic setting, specifically focusing on intrinsic and extrinsic motivation towards education. These motivational factors have the potential to impact an individual's experience of test anxiety. The inventory consists of a total of 28 items, which are further categorized into seven subscales. These subscales are designed to measure three distinct forms of intrinsic motivation (intrinsic motivation to know, to accomplish things, and to experience stimulation), three types of extrinsic motivation (external, introjected, and identified regulation), and amotivation, as proposed by Vallerand et al. (1992).

General Academic Self-Efficacy Scale, GASE (Schwarzer, Zilmer, & Jerusalem, 1995)

Self-efficacy beliefs can impact test anxiety. The GASE is a questionnaire that measures a student's perceived ability to master the various academic challenges at university and is an essential antecedent of well-being and performance (van Zyl et al., 2022). It consists of five items and participants are asked to rate their level of agreement on a five-point Likert scale.

Academic Procrastination Scale, APS (Steel & Kumar, 2007)

While not a direct measure of test anxiety, academic procrastination is often linked to test anxiety as discussed before. There are several measures of academic procrastination, while APS showed good reliability and validity in some studies (Desai et al., 2021). The assessment has a total of 25 questions, with a maximum achievable score of 125. A higher score is indicative of elevated levels of procrastination.

Cognitive Test Anxiety Questionnaire, CTAQ (McDonald & MacLachlan, 2000)

The CTAQ assesses cognitive aspects of test anxiety, including worry, rumination, and intrusive thoughts related to testing. The measure comprises 27 items rated on a four-point scale, where higher scores imply greater levels of cognitive test anxiety (Cassady & Johnson, 2002).

Revised Test Anxiety Scale, RTAS (McDonald et al, 1988)

The RTAS assesses various aspects of test anxiety, including worry, emotionality, and interference with test performance. It has subscales called Tension, Worry, Test-irrelevant thoughts, and Bodily symptoms (Benson & El-Zahhar, 1994). It encompasses a total of 20 items, each rated on a 4-point Likert scale.

Multidimensional Test Anxiety Scale, MTAS (Putwain & von der Embse, 2010)

The MTAS evaluates different dimensions of test anxiety, including cognitive, emotional, and behavioral aspects. The 16 items are representative of two cognitive subscales, namely Worry and Cognitive Interference, as well as two affective-physiological subscales, namely Tension and Physiological Indicators (Putwain et al., 2020).

As every questionnaire has its shortcomings, there are several other approaches to evaluate test anxiety. Physiological indicators, such as heart rate, blood pressure, and cortisol levels, have also been employed to measure test anxiety objectively (Clutter et al., 2017; Ovadia-Blechman et al., 2022). These measures offer a more immediate assessment of anxiety responses during test situations. However, they may not capture the full spectrum of test anxiety, as some students may not exhibit pronounced physiological responses. Observational measures involve the assessment of observable behaviors during test-taking situations. These can include behaviors such as fidgeting, nail-biting, or avoidance behaviors. While observational measures can provide valuable insights, they are subject to observer bias and may not fully capture the internal experience of anxiety. Recent advancements in neuroimaging have allowed researchers to explore the neural underpinnings of test anxiety. Functional magnetic resonance imaging (fMRI) and electroencephalography (EEG) have revealed patterns of brain activation associated with test anxiety (Huang et al., 2022). These techniques offer a promising avenue for understanding the neurological mechanisms underlying test anxiety.

Identifying at-risk student populations

The investigation of test anxiety carries substantial importance owing to its extensive prevalence and adverse impact on academic performance. Analyzing how demographic and academic variables intersect with test anxiety enables the identification of at-risk student subgroups facing an elevated risk of experiencing test anxiety. These subgroups require targeted interventions, such as appropriate counselling services, to address their elevated risk.

Gender differences

Gender can exert a notable influence on the experience of test anxiety. Multiple academic studies have provided evidence suggesting that female students generally exhibit elevated levels of test anxiety in comparison to males (Huntley et al., 2022; Javorac et al., 2022; von der Embse et al., 2018; Zheng et al., 2023). In fact, certain estimates propose that female students may suffer test anxiety at a rate three times higher than their male counterparts (Tsegay et al., 2019). The observed gender imbalance could perhaps be attributed to gender variances in cognitive and behavioral characteristics. There is a potentiality for male students to exhibit a heightened propensity for considering examinations as challenges, hence influencing their decision-making

process in favor of solutions that align with their perceived ability to effectively complete the given task. Conversely, it is plausible that female participants may demonstrate an elevated inclination to perceive the examination as a distressing situation, leading to fear-driven reactions and encountering challenges in successfully accomplishing the assigned task (Torrano et al, 2020). A study conducted by Alamri & Nazir (2022) and Martin & Naziruddin (2020) found no significant difference in test anxiety experiences between students of different genders. Salend (2012), on the other hand, found that male students exhibited higher levels of test anxiety. These findings suggest that factors beyond gender may contribute to the manifestation of test anxiety, such as social and cultural influences. Consequently, it is crucial to develop tailored interventions that address the unique needs of diverse student populations.

Academic level differences

Test anxiety is not limited to a particular age group or academic level. However, it may manifest differently among elementary, secondary, and higher education students. High-stakes standardized tests, such as college entrance exams or certification exams, can induce severe anxiety in older students, while younger students may experience anxiety related to classroom assessments. In a meta-analysis by von der Embse (2018), it was shown that each school-grade cluster had a significant negative relationship with test anxiety, while the relationship between test anxiety and academic achievement, measured by typical classroom or achievement tests (class test or quiz), was the strongest in middle school students and undergraduate and graduate students.

The level of test anxiety among post-secondary students may vary over the course of their university study. Tsegay et al. (2019) suggested that the highest levels of test anxiety are typically experienced during the early stages of academic pursuits, with its intensity decreasing as individuals progress in their educational activities. Duraku (2017) posited that various factors may potentially contribute to the decrease in levels of test anxiety among senior students, such as an increase in self-confidence, the development of efficient learning methods, receiving positive evaluations in exams, and gaining a more profound comprehension of assessment approaches from educators. Individuals with varying levels of academic achievement utilize different strategies to effectively cope with exam anxiety. A study conducted in the United Kingdom revealed that graduate entering medical students exhibit a higher propensity for utilizing active problem-solving strategies and are more inclined to employ substances such as alcohol or drugs as coping mechanisms, as compared to undergraduate students (Zvauya et al., 2017). The authors of this study have reached the conclusion that it is of utmost importance to develop interventions that are targeted towards discouraging harmful coping mechanisms and promoting adaptive coping strategies that are specifically tailored to undergraduate students. This is crucial as it is essential for these students to acquire effective coping skills that will be advantageous not only during their academic training but also in their future professional endeavours which inherently involve significant levels of stress.

Study program differences

All students are susceptible to developing test anxiety. However, numerous studies have consistently revealed that medical students exhibit a higher prevalence of test anxiety compared to their non-medical counterparts and the general population (Javorac et al., 2022; Khoshhal et al., 2017). The prevalence of text anxiety among health professions students has been found by researchers to range from 25% to 65% (Alamri & Nazir, 2022). The reason for such prevalence is that the majority of medical students share a set of distinct external circumstances that differ from those experienced by non-medical university students, such as a substantial volume of learning material, particularly if there is a lack of a premedical university preparatory program, a demanding course load, irregular schedules, lengthy examination periods, a significant proportion of oral exams, limited leisure or recreation time, exposure to critically ill patients and mortality during clinical rotations, as well as a competitive atmosphere in medical education (Khoshhal et al., 2017). Psychosocial stressors encompass various factors that might contribute to psychological and social distress. These stressors may include elevated levels of paternal expectations, feelings of homesickness, adjustment to new living arrangements, financial difficulties, employment position throughout the study, and apprehension regarding potential future failures in one's medical career (Fawzy & Hamed, 2017). Table 1 presents the key findings derived from cross-sectional studies that have examined test anxiety among medical students.

Table 1
Results from selected studies evaluating test anxiety among medical students

Author(s)	Study sample	Study questionnaire	Test anxiety level	Important findings
Desai et al., 2021. (India)	220 physiotherapy students	WTAS	27.7% had moderately high test anxiety	Positive correlation between test anxiety and procrastination was found
Bolbolian et al., 2021. (Iran)	152 dentistry students	Friedman's test anxiety questionnaire	Mean score for total test anxiety -44.4; Tension- 11.87; Social humiliation -15.39; Cognitive error -16.59	Positive correlation between test anxiety and procrastination was found; gender was associated with total test anxiety and cognitive error, while marital status, age and GPA were not
Alamri et al., 2022. (Saudi Arabia)	878 medical students: 46.4% dentistry; 33.3% medicine; 20.4% pharmacy	TAI	Mean TAI score 43.17: Dentistry -44.15; Medicine -41.64, Pharmacy -43.44	Students with low GPAs had higher levels of test anxiety; no relationship between test anxiety and gender, academic year, parent education, family monthly income was found

Author(s)	Study sample	Study questionnaire	Test anxiety level	Important findings
Javorac et al., 2022. (Serbia)	375 medical students: 60.3% medicine; 9.3% nursing science; 9.3% pharmacy 8.5%, dentistry	TAI	Mean TAI score 48.25; 15.5% - no anxiety; 42.2% - mild anxiety; 36.5% - moderate anxiety; 5.8% - severe anxiety	Females, those who finance studies on their own, those who renewed a previous year of studies and those with a lower GPA had the highest levels of test anxiety
Stojanović et al., 2018. (Serbia)	409 nursing science students	TAI	Mean TAI score 46.46; Emotionality – 19.72; Worry – 16.99	Average values on all scores were higher in female students; there is a statistically significant difference between students in the second year in relation to the third-year students
Retegui, 2006. (USA)	150 students of medicine	TAI	Mean TAI score 46.32; Emotionality – 20.07; Worry – 17.43	Female clerkship students are more anxious about tests than male students
Dawood et al., 2016. (Saudi Arabia)	277 nursing science students	TAI	Mean TAI score 53.77; 6.5% - no anxiety; 28.2% - mild anxiety; 50.9% - moderate anxiety; 14.4% - severe anxiety	There was no significant relationship between test anxiety and undergraduate nursing students' GPA; test anxiety scores decreased with participants' age
Tsegay et al., 2019. (Ethiopia)	423 students of medicine	WTAS	WTAS score indicating problematic test anxiety was found in 52.30% of students	Female sex, having low grades, being first year, excessive course load, taking oral examination, lack of systemic study plan, poor/moderate social support, and psychological distress were determined as some of the predicting factors of test anxiety among students of medicine

Legend: TAI – Test Anxiety Inventory; WTAS - Westside Test Anxiety Scale; GPA – Grade Point Average; USA – United States of America.

Socioeconomic status differences

Socioeconomic status (SES) can play a role in test anxiety. Students from lower SES backgrounds may face additional stressors related to their home environment and financial constraints, which can contribute to heightened test anxiety, compared to students from higher SES backgrounds (Xu et al., 2021; Hembre, 1988). Recognizing these disparities is beneficial for addressing the diverse needs of students. The current body of research on family SES has been primarily influenced by two significant theoretical frameworks: the family stress model and the family investment model (Xu et al., 2021). Based on the family stress model, it is suggested that the chronic financial strain experienced by families in low SES environments increases the susceptibility of parents to emotional distress and marital conflict. Consequently, parents in low SES households are more inclined to engage in harmful parenting practices rather than supportive ones, resulting in heightened levels of test anxiety among their children. The family investment model posits that investments in areas such as educational resources, improved living conditions, and other factors related to financial well-being can enhance student's preparedness for social and academic challenges. Consequently, these investments contribute to their academic achievement and reduce the likelihood of experiencing test anxiety. Nevertheless, many studies have found that the association between low socioeconomic status (SES) and test anxiety lacks statistical significance (Aydin, 2013) or may even exhibit a positive correlation (Chen, 2012), hence suggesting the necessity for further investigation in this particular domain.

Other factors

Cultural factors can influence the experience and expression of test anxiety. Different cultural norms, values, and expectations may impact how students perceive and cope with academic assessments (Živanović et al., 2020). Other socio-demographic correlates of test anxiety include ethnicity (minority students may exhibit notably elevated levels of test anxiety compared to their non-minority counterparts), student's ability, i.e., engagement in classes perceived by teachers (students with high ability levels may have lower levels of test anxiety in comparison to students with average ability levels), the presence of disabilities (students diagnosed with ADHD and specific learning disability may display higher levels of test anxiety in comparison to students without these diagnoses), and test conditions (students who perceived testing scenarios as difficult or challenging, students faced with an evaluative test or assessment that carried consequences, and students who had no prior exposure to testing may experience heightened levels of test anxiety) (von der Embse et al., 2018).

Mitigating the impact of test anxiety

Researchers have explored various coping strategies and interventions to help students manage test anxiety, such as cognitive-behavioral therapy, relaxation techniques, mindfulness training, and time management strategies. Some studies have shown

promising results in reducing test anxiety and improving academic performance when these interventions are implemented. Despite the high prevalence of test anxiety, it is noteworthy that a mere 10% of students necessitate any form of the existing interventions to mitigate its effects. A limited proportion of students possess knowledge regarding strategies for mitigating exam anxiety, as seen by a mere 7-13% of students actively pursuing counselling services (Javorac et al., 2022).

Cognitive-behavioral interventions

Cognitive-behavioral therapy (CBT) has been widely employed to reduce test anxiety (Putwain & von der Embse, 2021). CBT focuses on identifying and modifying negative thought patterns and behaviors associated with test anxiety. This approach equips students with coping strategies and relaxation techniques to manage anxiety during test-taking. Numerous empirical investigations have demonstrated the advantageous outcomes associated with various CBT strategies. According to a study conducted in Nigeria (Ugwuanyi et al., 2020), it was observed that secondary school students who underwent a 12-week CBT intervention with music had significantly reduced levels of test anxiety when compared to a control group. In a study conducted by Reiss et al. (2019), it was observed that the implementation of CBT relaxation techniques and CBT imagery rescripting resulted in reduced levels of self-reported test anxiety. These effects were observed following group sessions that lasted for a duration of 3 hours per week over a period of 5 weeks. Device-Guided Breathing (DGB) has been identified as a potentially beneficial behavioral strategy for mitigating test anxiety, as evidenced by a pilot study that yielded promising outcomes (Ovadia-Blechman et al., 2020). DGB is a method that involves intentionally reducing the breathing rate to less than 10 cycles per minute by extending the time of exhalation. Previous studies have indicated that several techniques aimed at slowing down breathing have demonstrated a positive impact on the reduction of anxiety levels (Gavish, 2010). By modulating the respiratory rate, activation of reflexes occurs, resulting in a reduction of sympathetic nervous system activity and subsequently mitigating specific manifestations of test anxiety.

Mindfulness-based interventions

Considering the fact that the worry aspect of test anxiety is closely linked to the lower academic performance of the student, mindfulness-based interventions (MBI), such as mindfulness meditation and yoga, have shown promise in reducing test anxiety (Chung et al., 2012; Gabriely et al., 2020; Querstret et al., 2020). These practices promote relaxation, self-awareness, and emotional regulation, which can help students better cope with test-related stress. The mindfulness-based stress reduction (MBSR) program has been extensively utilized as a prominent MBI in the field of research on mindfulness. A meta-analysis from 2019 (Yusufov et al., 2019) examining stress reduction therapies revealed that MBSR exhibited a more pronounced impact on alleviating anxiety among undergraduate and graduate university students compared to CBT and coping skills

training. One recent RCT assessed the initial effectiveness and long-term impacts of an 8-week usage of a mobile application for mindfulness meditation on stress levels, mindfulness, and self-compassion in college students who experience high levels of test anxiety. The findings of the study suggest that utilizing a mobile application for the purpose of delivering mindfulness meditation can be an efficacious approach to mitigating stress levels and enhancing mindfulness and self-compassion among college students experiencing high levels of stress (Huberty et al., 2019).

Supportive learning environments

Creating a supportive learning environment is crucial for mitigating test anxiety (Cayubit, 2022). Educators can employ strategies such as providing clear test instructions, offering practice exams, and allowing extra time for students with diagnosed anxiety disorders. Reducing the stigma associated with test anxiety and promoting a growth mindset can also contribute to a more inclusive and compassionate educational culture.

Other interventions

In addition to the aforementioned interventions, abundant research can be found in the scientific literature that has investigated various pharmacological formulations with the potential to mitigate the severity of test anxiety, including standard medications used for the treatment of anxiety disorders. Over the course of several years, extensive research has been conducted on the relationship between the microbiological composition of the intestinal flora and mental health conditions such as depression, anxiety, and cognitive functioning. Notably, various studies have demonstrated that the supplementation of probiotic bacterial cultures can effectively alleviate symptoms of depression and anxiety among student populations (Kato-Kataoka et al., 2016; Qin et al., 2021; Zhu et al., 2023). However, it is important to acknowledge that certain investigations focusing on specific fungal probiotic formulations did not yield comparable results (Karbownik et al., 2020). The potential mechanisms that may explain the positive impacts of probiotics include the preservation of intestinal homeostasis, enhancement of both local and systemic immunity, and regulation of the metabolism of intestinal bacteria. These mechanisms collectively influence the balance of the intestinal bacteria-intestinal mucosa-brain axis, which can be disrupted as a result of exposure to stress (Mayer et al., 2015).

The available evidence indicates that open-label placebos (OLPs) have been shown to be beneficial in reducing test anxiety among college students, with a favorable influence on the student's well-being (Schaefer, 2019). However, it should be noted that no significant enhancement in exam performance was observed as a result of the intervention (Kleine-Borgmann et al., 2021). Furthermore, one study investigated placebo effects using the imaginary pill (IP) as an intervention, concluding that students who received the OLP and IP interventions exhibited more significant reductions in test anxiety from the beginning of the study to its conclusion (shortly before the

examination) in comparison to students in the control group (Buerghler et al., 2023). In general, it can be posited that these placebo effects may share common underlying mechanisms, such as expectations, conditioning, and embodied cognition.

Moreover, engaging in physical exercise has the potential to mitigate the severity of test anxiety. The systematic review conducted by Zhang et al. (2022) established that engaging in aerobic activities, regardless of intensity, for a minimum of 20 minutes, 2-3 times per week, over a duration of at least four weeks, can effectively diminish test anxiety. Notably, the most favorable outcomes were observed in individuals who participated in low-intensity physical activity exceeding three sessions per week, extending beyond eight weeks. Furthermore, the results indicated that the combination of physical activity with psychotherapy yielded more pronounced effects.

Conclusion

Test anxiety is a multifaceted phenomenon that can significantly impact students' academic achievement and performance on high-stakes examinations. The measurement of test anxiety encompasses self-report questionnaires, physiological measures, observational methods, and neuroimaging techniques, offering a comprehensive view of this phenomenon. The negative influence of test anxiety on cognitive functions, memory, self-efficacy, and academic behaviors underscores its importance in education. However, it is necessary to reevaluate how educational systems structure assessment processes and the pressure placed on students, which often leads to high levels of anxiety. Traditional assessment models should be revised to incorporate alternative methods that focus on continuous learning and development rather than solely on exam results. Identifying at-risk student populations, including gender, academic level, socioeconomic status, and cultural factors, is crucial for tailoring interventions effectively. It is extremely important that these interventions are tailored to the specific needs and contexts of different student groups in order to maximize their effectiveness. Additionally, the implementation of mitigation strategies, such as cognitive-behavioral interventions, mindfulness practices, and supportive learning environments, can offer promising directions for reducing the negative effects of exam-related anxiety. Educators, policymakers, and mental health professionals must collaborate to address test anxiety comprehensively. This collaboration should not be limited solely to the implementation of various interventions; it is also necessary to continuously carry out and evaluate the effects of these interventions. By understanding the intricate relationship between test anxiety and academic achievement and implementing evidence-based interventions, we can create a more equitable and supportive educational system that allows all students to thrive. Finally, although it is clear that exam anxiety can never be completely eliminated, these interventions can create an environment in which students can develop the resources and strategies needed to manage stress, thereby paving the way for an educational system that supports not only academic success but also the emotional well-being of students.

References

- Alamri, A., & Nazir, M. A. (2022). Test anxiety and related factors among health professions students: a Saudi Arabian perspective. *Behavioral Sciences*, 12(4), 98. <https://doi.org/10.3390/bs12040098>
- Aydin, S. (2013). Factors affecting the level of test anxiety among EFL learners at elementary schools. *E-international Journal of Educational Research*, 4, 63–81.
- Balogun, A. G., Balogun, S. K., & Onyencho, C. V. (2017). Test anxiety and academic performance among undergraduates: the moderating role of achievement motivation. *The Spanish Journal of Psychology*, 20, E14. <https://doi.org/10.1017/sjp.2017.5>
- Benson, J., & El-Zahhar, N. (1994). Further refinement and validation of the revised test anxiety scale. *Structural Equation Modelling*, 1(3), 203–221. <https://doi.org/10.1080/10705519409539975>
- Bolbolian, M., Asgari, S., Sefidi, F., & Zadeh, A. S. (2021). The relationship between test anxiety and academic procrastination among the dental students. *Journal of Education and Health Promotion*, 10, 67. https://doi.org/10.4103/jehp.jehp_867_20
- Brands, I. M., Köhler, S., Stapert, S. Z., Wade, D. T., & van Heugten, C. M. (2014). Psychometric properties of the Coping Inventory for Stressful Situations (CISS) in patients with acquired brain injury. *Psychological Assessment*, 26(3), 848. <https://doi.org/10.1037/a0036275>
- Buergler, S., Sezer, D., Bagge, N., Kirsch, I., Locher, C., Carvalho, C., & Gaab, J. (2023). Imaginary pills and open-label placebos can reduce test anxiety by means of placebo mechanisms. *Scientific Reports*, 13(1), 2624. <https://doi.org/10.1038/s41598-023-29624-7>
- Cassady, J. C., & Johnson, R. E. (2002). Cognitive test anxiety and academic performance. *Contemporary Educational Psychology*, 27(2), 270–295. <https://doi.org/10.1006/ceps.2001.1094>
- Cayubit, R. F. O. (2022). Why learning environment matters? An analysis on how the learning environment influences the academic motivation, learning strategies and engagement of college students. *Learning Environments Research*, 25(2), 581–599. <https://doi.org/10.1007/s10984-021-09382-x>
- Chen, H. (2012). Impact of parent's socioeconomic status on perceived parental pressure and test anxiety among Chinese high school students. *International Journal of Psychological Studies*, 4, 119–124. <https://doi.org/10.5539/ijps.v4n2p235>
- Chung, S. C., Brooks, M. M., Rai, M., Balk, J. L., & Rai, S. (2012). Effect of Sahaja yoga meditation on quality of life, anxiety, and blood pressure control. *The Journal of Alternative and Complementary Medicine*, 18(6), 589–596. <https://doi.org/10.1089/acm.2011.0038>
- Clutter, L. B., Potter, W. T., Alarbi, A., & Caruso, J. F. (2017). Test anxiety and salivary cortisol levels in nursing students. *Nurse Educator*, 42(1), 28–32. <https://doi.org/10.1097/NNE.0000000000000291>
- Custer, N. (2018). Test anxiety and academic procrastination among prelicensure nursing students. *Nursing Education Perspectives*, 39(3), 162–163. <https://doi.org/10.1097/01.NEP.0000000000000291>
- Dawood, E., Al Ghadeer, H., Mitsu, R., Almutary, N., & Alenezi, B. (2016). Relationship between test anxiety and academic achievement among undergraduate nursing students. *Journal of Education and Practice*, 7(2), 57–65.
- Desai, M., Pandit, U., Nerurkar, A., Verma, C., & Gandhi, S. (2021). Test anxiety and

- procrastination in physiotherapy students. *Journal of Education and Health Promotion*, 10, 132. https://doi.org/10.4103/jehp.jehp_851_20
- Duraku, Z. H. (2017). Factors influencing test anxiety among university students. *The European Journal of Social & Behavioural Sciences*, 18(1), 2325-2334. <https://doi.org/10.15405/ejsbs.206>
- Fawzy, M. & Hamed, S. A. (2017). Prevalence of psychological stress, depression and anxiety among medical students in Egypt. *Psychiatry Research*, 255, 186-194. <https://doi.org/10.1016/j.psychres.2017.05.027>
- Gabriely, R., Tarrasch, R., Velicki, M., & Ovadia-Blechman, Z. (2020). The influence of mindfulness meditation on inattention and physiological markers of stress on students with learning disabilities and/or attention deficit hyperactivity disorder. *Research in Developmental Disabilities*, 100, 103630. <https://doi.org/10.1016/j.ridd.2020.103630>
- Gavish, B. (2010). Device-guided breathing in the home setting: technology, performance and clinical outcomes. *Biological Psychology*, 84(1), 150-156. <https://doi.org/10.1016/j.biopsycho.2010.02.013>
- Hembree, R. (1988). Correlates, causes, effects, and treatment of test anxiety. *Review of Educational Research*, 58(1), 47-77. <https://doi.org/10.3102/00346543058001047>
- Huang, Q., Hou, L., Zhang, W., & Zhou, R. (2022). The dysregulation of top-down control in individuals with high test anxiety: a resting state fMRI study. *Journal of Psychiatric Research*, 151, 649-656. <https://doi.org/10.1016/j.jpsychires.2022.05.023>
- Huberty, J., Green, J., Glissmann, C., Larkey, L., Puzia, M., & Lee, C. (2019). Efficacy of the mindfulness meditation mobile app “calm” to reduce stress among college students: Randomized controlled trial. *JMIR mHealth and uHealth*, 7(6), e14273. <https://doi.org/10.2196/14273>
- Huntley, C., Young, B., Tudur Smith, C., Jha, V., & Fisher, P. (2022). Testing times: the association of intolerance of uncertainty and metacognitive beliefs to test anxiety in college students. *BMC Psychology*, 10, 1-7. <https://doi.org/10.1186/s40359-021-00710-7>
- Javorac, J., Živanović, D., Janjić, G., Đuranović Miličić, J., Stojkov, S. (2022, June 02-05). Analysis of test anxiety among students of medical sciences: a cross-sectional study. In *the Proceedings book of 11th International Conference of Social and Technological Development „STED 2022“*, Trebinje, Bosnia & Herzegovina (pp 632-640). PIM University, Banja Luka.
- Karbownik, M. S., Kręczyńska, J., Kwarta, P., Cybula, M., Wiktorowska-Owczarek, A., Kowalczyk, E., Pietras T, & Szemraj, J. (2020). Effect of supplementation with *saccharomyces boulardii* on academic examination performance and related stress in healthy medical students: a randomized, double-blind, placebo-controlled trial. *Nutrients*, 12(5), 1469. <https://doi.org/10.3390/nu12051469>
- Kato-Kataoka, A., Nishida, K., Takada, M., Suda, K., Kawai, M., Shimizu, K., Kushiro, A., Hoshi, R., Watanabe, O., Igarashi, T., Miyazaki, K., Kuwano, Y., & Rokutan, K. (2016). Fermented milk containing *Lactobacillus casei* strain Shirota prevents the onset of physical symptoms in medical students under academic examination stress. *Beneficial Microbes*, 7(2), 153-156. <https://doi.org/10.3920/BM2015.0100>
- Khoshhal, K. I., Khairy, G. A., Guraya, S. Y., & Guraya, S. S. (2017). Exam anxiety in the undergraduate medical students of Taibah University. *Medical Teacher*, 39(1), S22-S26. <https://doi.org/10.1080/0142159X.2016.1254749>

- Kleine-Borgmann, J., Schmidt, K., Billinger, M., Forkmann, K., Wiech, K., & Bingel, U. (2021). Effects of open-label placebos on test performance and psychological well-being in healthy medical students: a randomized controlled trial. *Scientific Reports*, 11(1), 2130. <https://doi.org/10.1038/s41598-021-81502-2>
- Latas, M., Pantić, M., & Obradović, D. (2010). Analysis of test anxiety in medical students. *Medicinski pregled*, 63(11-12), 863-866. <https://doi.org/10.2298/MPNS1012863L>
- Martin, R. D., & Naziruddin, Z. (2020). Systematic review of student anxiety and performance during objective structured clinical examinations. *Currents in Pharmacy Teaching and Learning*, 12(12), 1491-1497. <https://doi.org/10.1016/j.cptl.2020.07.007>
- Mayer, E. A., Tillisch, K., & Gupta, A. (2015). Gut/brain axis and the microbiota. *The Journal of Clinical Investigation*, 125(3), 926-938. <https://doi.org/10.1172/JCI76304>
- Minihan, S., Samimi, Z., & Schweizer, S. (2021). The effectiveness of affective compared to neutral working memory training in university students with test anxiety. *Behaviour Research and Therapy*, 147, 103974. <https://doi.org/10.1016/j.brat.2021.103974>
- Ovadia-Blechman, Z., Tarrasch, R., Velicki, M., & Chalutz Ben-Gal, H. (2022). Reducing test anxiety by device-guided breathing: A pilot study. *Frontiers in Psychology*, 13, 678098. <https://doi.org/10.3389/fpsyg.2022.678098>
- Priebe, N. P., & Kurtz-Costes, B. E. (2022). The effect of mindfulness programs on collegiate test anxiety. *Mindfulness*, 13(11), 2868-2878. <https://doi.org/10.1007/s12671-022-02002-6>
- Putwain, D. W., Jansen de Wal, J., & van Alphen, T. (2023). Academic buoyancy: overcoming test anxiety and setbacks. *Journal of Intelligence*, 11(3), 42. <https://doi.org/10.3390/jintelligence11030042>
- Putwain, D. W., von der Embse, N. P., Rainbird, E. C., & West, G. (2020). The development and validation of a new Multidimensional Test Anxiety Scale (MTAS). *European Journal of Psychological Assessment*, 37(3), 236-246. <https://doi.org/10.1027/1015-5759/a000604>
- Putwain, D. W., Woods, K. A., & Symes, W. (2010). Personal and situational predictors of test anxiety of students in post-compulsory education. *British Journal of Educational Psychology*, 80(1), 137-160. <https://doi.org/10.1348/000709909X466082>
- Putwain, D. W. & von der Embse, N. P. (2021). Cognitive-behavioral intervention for test anxiety in adolescent students: do benefits extend to school-related wellbeing and clinical anxiety. *Anxiety Stress Coping*, 34(1), 22-36. <https://doi.org/10.1080/10615806.2020.1800656>
- Qin, Q., Liu, H., Yang, Y., Wang, Y., Xia, C., Tian, P., Wei, J., Li, S., & Chen, T. (2021). Probiotic supplement preparation relieves test anxiety by regulating intestinal microbiota in college students. *Disease Markers*, 2021:5597401. <https://doi.org/10.1155/2021/5597401>
- Querstret, D., Morison, L., Dickinson, S., Cropley, M., & John, M. (2020). Mindfulness-based stress reduction and mindfulness-based cognitive therapy for psychological health and well-being in nonclinical samples: A systematic review and meta-analysis. *International Journal of Stress Management*, 27(4), 394. <https://doi.org/10.1037/str0000165>
- Reiss, N., Warnecke, I., Tibubos, A. N., Tolgou, T., Luka-Krausgrill, U., & Rohrmann, S. (2019). Effects of cognitive-behavioral therapy with relaxation vs. imagery rescripting on psychophysiological stress responses of students with test anxiety in a randomized controlled trial. *Psychotherapy Research*, 29(8), 974-985. <https://doi.org/10.1080/10503307.2018.1475767>

- Reteguiz, J. (2006). Relationship between anxiety and standardized patient test performance in the medicine clerkship. *Journal of General Internal Medicine*, 21(5), 415-418. <https://doi.org/10.1111/j.1525-1497.2006.00419.x>
- Salend, S. J. (2012). Teaching students not to sweat the test. *Phi Delta Kappan*, 93(6), 20-25. <https://doi.org/10.1177/003172171209300605>
- Schaefer, M., Denke, C., Harke, R., Olk, N., Erkovan, M., & Enge, S. (2019). Open-label placebos reduce test anxiety and improve self-management skills: a randomized-controlled trial. *Scientific Reports*, 9(1), 13317. <https://doi.org/10.1038/s41598-019-49466-6>
- Sideeg, A. (2015). Test anxiety, self-esteem, gender difference, and academic achievement: the case of the students of medical sciences at Sudanese universities: a mixed methods approach. *British Journal of Arts and Social Sciences*, 19(2), 39-59.
- Spielberger, C. D. (1989). *State-Trait Anxiety Inventory: Bibliography* (2nd ed.). Palo Alto, CA: Consulting Psychologists Press.
- Steinmayr, R., Crede, J., McElvany, N., & Wirthwein, L. (2016). Subjective well-being, test anxiety, academic achievement: Testing for reciprocal effects. *Frontiers in Psychology*, 6, 1994. <https://doi.org/10.3389/fpsyg.2015.01994>
- Stojanović, G., Vasiljević Blagojević, M., Stanković, B., Terzić, N., Terzić Marković, D., & Stojanović, D. (2018). Test anxiety in pre-exam period and success of nursing students. *Experimental and Applied Biomedical Research*, 19(2), 167-174. <https://doi.org/10.1515/sjocr-2017-0060>
- Torrano, R., Ortigosa, J. M., Riquelme, A., Méndez, F. J., & López-Pina, J. A. (2020). Test anxiety in adolescent students: different responses according to the components of anxiety as a function of sociodemographic and academic variables. *Frontiers in Psychology*, 11, 612270. <https://doi.org/10.3389/fpsyg.2020.612270>
- Tsegay, L., Shumet, S., Damene, W., Gebreegziabhier, G., & Ayano, G. (2019). Prevalence and determinants of test anxiety among medical students in Addis Ababa Ethiopia. *BMC Medical Education*, 19(1), 1-10. <https://doi.org/10.1186/s12909-019-1859-5>
- Ugwuanyi, C. S., Ede, M. O., Onyishi, C. N., Ossai, O. V., Nwokenna, E. N., Obikwelu, L. C., Ikechukwu-Ilomuanya, A., Amoke, C. V., Okeke, A. O., Ene, C. U., Offordile, E. E., Ozoemena, L. C., & Nweke, M. L. (2020). Effect of cognitive-behavioral therapy with music therapy in reducing physics test anxiety among students as measured by generalized test anxiety scale. *Medicine (Baltimore)*, 99(17), e16406. <https://doi.org/10.1097/MD.00000000000016406>
- Vallerand, R. J., Pelletier, L. G., Blais, M. R., Briere, N. M., Senecal, C., & Vallieres, E. F. (1992). The Academic Motivation Scale: A measure of intrinsic, extrinsic, and amotivation in education. *Educational and Psychological Measurement*, 52(4), 1003-1017. <https://doi.org/10.1037/a0036275>
- van Zyl, L. E., Klibert, J., Shankland, R., See-To, E. W., & Rothmann, S. (2022). The general academic self-efficacy scale: psychometric properties, longitudinal invariance, and criterion validity. *Journal of Psychoeducational Assessment*, 40(6), 777-789. <https://doi.org/10.1177/07342829221097174>
- von der Embse, N., Jester, D., Roy, D., & Post, J. (2018). Test anxiety effects, predictors, and correlates: A 30-year meta-analytic review. *Journal of Affective Disorders*, 227, 483-493. <https://doi.org/10.1016/j.jad.2017.11.048>

- Xu, X., Xia, M., & Pang, W. (2021). Family socioeconomic status and Chinese high school students' test anxiety: Serial mediating role of parental psychological control, learning resources, and student academic self-efficacy. *Scandinavian Journal of Psychology*, 62(5), 689-698. <https://doi.org/10.1111/sjop.12750>
- Yusufov, M., Nicolero-SantaBarbara, J., Grey, N. E., Moyer, A., & Lobel, M. (2019). Meta-analytic evaluation of stress reduction interventions for undergraduate and graduate students. *International Journal of Stress Management*, 26(2), 132. <https://doi.org/10.1037/str0000099>
- Zhang, X., Li, W., & Wang, J. (2022). Effects of exercise intervention on students' test anxiety: a systematic review with a meta-analysis. *International Journal of Environmental Research and Public Health*, 19(11), 6709. <https://doi.org/10.3390/ijerph19116709>
- 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. <https://doi.org/10.3389/fpsyg.2023.1008679>
- Zhu, R., Fang, Y., Li, H., Liu, Y., Wei, J., Zhang, S., Wang, L., Fan, R., Wang, L., Li, S., & Chen, T. (2023). Psychobiotic *Lactobacillus plantarum* JYLP-326 relieves anxiety, depression, and insomnia symptoms in test anxious college via modulating the gut microbiota and its metabolism. *Frontiers in Immunology*, 14, 1158137. <https://doi.org/10.3389/fimmu.2023.1158137>
- Zvaunya, R., Oyeboode, F., Day, E. J., Thomas, C. P., & Jones, L. A. (2017). A comparison of stress levels, coping styles and psychological morbidity between graduate-entry and traditional undergraduate medical students during the first 2 years at a UK medical school. *BMC Research Notes*, 10, 1-10. <https://doi.org/10.1186/s13104-017-2395-1>
- Živanović, D., Javorac, J., Friganović, A., & Fradelos, E. (2020). The docimologically based evaluation of knowledge in vocational education of healthcare professionals. *Croatian Journal of Education*, 22(4), 1113-1135. <https://doi.org/10.15516/cje.v22i4.3806>

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Utjecaj ispitne anksioznosti na akademska postignuća studenata: mjerenje, čimbenici rizika i intervencije

Sažetak

Ispitna anksioznost sveprisutan je problem među studentima koji može značajno utjecati na njihov akademski uspjeh. Ovaj pregled literature ima za cilj pružiti sveobuhvatnu analizu odnosa između ispitne anksioznosti i akademskoga uspjeha studenata. U radu su prikazani mjerni instrumenti koji se koriste za procjenu ispitne anksioznosti i čimbenici koji studente izlažu riziku. Osim toga, prikazane se intervencije i strategije za ublažavanje negativnih učinaka ispitne anksioznosti na akademske rezultate. Razumijevanje ovoga složenog fenomena ključno je za nastavnike, studente i kreatore politika kako bi stvorili poticajno okruženje za učenje koje vodi optimalnom akademskom postignuću.

Ključne riječi: akademski uspjeh; psihosomatsko blagostanje; samoučinkovitost; strategije suočavanja; upitnici

Uvod

Ispitna anksioznost, često definirana kao stanje nelagode ili strepnje povezano s procjenom nečijega znanja ili uspješnosti, uobičajena je pojava među studentima svih dobi i razina obrazovanja, s nekim procjenama da između 20 % i 40 % studenata doživi ispitnu anksioznost (Zhu i sur., 2023). Iako određena razina anksioznosti može biti motivirajuća, pokazalo se da pretjerana anksioznost na ispitu ima štetne učinke na nekoliko aspekata dobrobiti studenata. Jedan od primarnih ishoda ispitne anksioznosti jest njezin utjecaj na smanjeni akademski uspjeh među studentima, što je vrlo zabrinjavajuće s obzirom na to da navedeni uspjeh može duboko utjecati na buduću stručnu karijeru studenata, kao i na njihov osjećaj osobnoga ispunjenja. Međutim, važno je napomenuti da ispitna anksioznost također može imati negativan učinak na psihosomatsku dobrobit studenata, potencijalno pridonoseći razvoju drugih neuropsihijatrijskih bolesti poput depresije, anksioznoga poremećaja i paničnoga poremećaja, kao i kardiovaskularnih bolesti i raznih drugih teškoća povezanih sa zdravljem (Karbownik i sur., 2020; Putwain i sur., 2023).

Ispitna anksioznost sastoji se od dvije bitne komponente: emocionalne i zabrinutosti. Emocionalna komponenta ispitne anksioznosti obuhvaća fiziološke reakcije autonomnoga živčanog sustava, uključujući povišeni krvni tlak, ubrzan rad srca, osjećaj „lupanja“ srca, prekomjerno znojenje, osjećaj mučnine, suhoću u ustima, hiperventilaciju, vrtoglavicu, agitaciju, drhtanje i slabost. Komponenta zabrinutosti obuhvaća psihološke i kognitivne aspekte ispitne anksioznosti. Posebno uključuje unutarnji dijalog i negativne misli koje su primarno povezane s mogućim posljedicama neuspjeha na ispitu za buduće obrazovne težnje i ambicije u karijeri, uspoređivanje vlastitoga učinka s uspjehom vršnjaka, predviđanje odgovora nastavnika, vršnjaka ili članova obitelji u slučaju loših rezultata te razmišljanje o temeljnim uzrocima neprilagođene pripreme za ispit (Javorac i sur., 2022; Putwain i sur., 2023). Neki autori izdvajaju socijalnu zabrinutost kao dodatnu sastavnicu ispitne anksioznosti. To uključuje strah od društvene stigmatizacije kao rezultat potencijalnoga neuspjeha s obzirom na ispit i ishode istoga (Xu i sur., 2021).

Nekoliko je elemenata koji mogu utjecati na razvoj ispitne anksioznosti. Ispit ili usmeno ocjenjivanje ima određene karakteristike koje mogu utjecati na razvoj ispitne anksioznosti. To uključuje razinu složenosti koja je svojstvena zadacima dodijeljenim studentima, vremenska ograničenja koja su im postavljena, okružje u kojem se ispit odvija i kvalitete ispitivača, uključujući njihove pedagoške metode kao i metode ocjenjivanja (Duraku, 2017). S druge strane, osobne karakteristike pojedinca poput želje za uspjehom, zatim sposobnost kognitivne obrade, akademska vještina razmišljanja i preferirane metode učenja (npr. učenje tijekom noći), također mogu imati značajan utjecaj na formiranje ispitne anksioznosti (Putwain i sur., 2010). U metaanalizi koju su proveli von der Embse i sur. (2018) ispitan je kompleksan odnos između intrapersonalnih karakteristika, motivacije i osobina ličnosti studenata u odnosu na fenomen ispitne anksioznosti. Ova je studija pružila vrijedan uvid u vjerojatne čimbenike koji mogu doprinijeti razvoju i intenzitetu ispitne anksioznosti. Studija je otkrila da su pojedinci koji pokazuju niže razine samopoštovanja i samoučinkovitosti, koji imaju negativna uvjerenja o sebi i svojim sposobnostima, zatim koji su vođeni vanjskim pritiscima, a ne unutarnjim interesima te isto tako i studenti koji pokazuju više razine neuroticizma, bili skloniji doživjeti ispitnu anksioznost.

Uzimajući u obzir štetne učinke ispitne anksioznosti na nekoliko aspekata dobrobiti studenata, ovaj pregledni rad ima za cilj objediniti trenutačna istraživanja o ispitnoj anksioznosti, s posebnim fokusom na njezin utjecaj na akademski uspjeh studenata, različite metode koje se koriste za mjerenje ispitne anksioznosti, identifikaciju populacije studenata s visokim rizikom ispitne anksioznosti, kao i strategije za ublažavanje ispitne anksioznosti.

Utjecaj ispitne anksioznosti na akademsko postignuće

Brojne studije dosljedno pokazuju da ispitna anksioznost ima štetan utjecaj na akademski uspjeh studenata. Ova je činjenica potkrijepljena dvjema istaknutim

metaanalizama ispitne anksioznosti (Hembre, 1988; von der Embse i sur., 2018.). Utvrđeno je postojanje korelacije između komponente zabrinutosti ispitne anksioznosti i pada akademskoga uspjeha (Steinmayr i sur., 2016.). Ne postoji konzistentna korelacija između emocionalne komponente ispitne anksioznosti i neadekvatnoga akademskog uspjeha. Unatoč tome, važno je priznati da bi ovaj čimbenik mogao značajno utjecati na holističku dobrobit studenata (Priebe i sur., 2022.).

Različiti pokazatelji akademskoga uspjeha mogu se smatrati ciljevima u istraživanju utjecaja ispitne anksioznosti na akademski uspjeh. Ovi pokazatelji uključuju stručnost u akademskim zadacima i tradicionalno ocjenjivanje u učionici poput kvizova i testova, prosjeka ocjena (GPA – *Grade Point Average*), kvocijenta inteligencije (IQ) i standardizirana ocjenjivanja kao što su državni ispiti, stručni ispiti i prijemni ispiti (SAT i ACT) (von der Embse i sur., 2018). U kontekstu visokoga obrazovanja, prosjek ocjena obično se koristi kao mjera za procjenu ukupnoga akademskog postignuća učenika nakon svršene srednje škole. U velikom broju studija otkriveno je da studenti s nižim prosjekom ocjena imaju značajno povišene razine ispitne anksioznosti u usporedbi s vršnjacima koji imaju bolji prosjek ocjena (Alamri i Nazir, 2022; Balogun i sur., 2017; Javorac i sur., 2022; Sideeg, 2015). S druge strane, postoje studije koje su dale prilično drugačije rezultate. Prema istraživanju koje su proveli Tsegay i dr. (2019.) u skupini etiopskih studenata pokazalo se da postoji pozitivna korelacija između razine ispitne anksioznosti i prosječnoga uspjeha. U značajnoj metaanalizi koju su proveli von der Embse i sur. (2018), primijećeno je da je najveći utjecaj anksioznosti prilikom testiranja na slab akademski uspjeh zabilježen upravo kada su se kao mjera akademskoga postignuća koristile standardizirane „high-stakes” procjene (SAT/ACT) sa značajnim posljedicama.

Postoji nekoliko mehanizama koji mogu objasniti negativne učinke ispitne anksioznosti na akademski uspjeh. Visoke razine ispitne anksioznosti mogu narušiti kognitivne funkcije ključne za izvedbu ispita. Općenito sposobnosti pozornosti i pažnje preusmjeravaju se na brigu i sumnju u sebe, ostavljajući tako manje prostora sposobnostima za rješavanje problema i pronalaženje informacija (Steinmayr i sur., 2016.). Ova kognitivna interferencija može dovesti do smanjenih rezultata na ispitu kao i do neuspjeha. Pokazalo se da ispitna anksioznost također otežava radnu memoriju koja je ključna za zadatke koji uključuju upravljanje informacijama i zadržavanje istih (Minihan i sur., 2021.). Poremećaji u radnoj memoriji izazvani anksioznošću mogu ugroziti sposobnost studenta da se prisjeti i primijeni relevantne informacije tijekom ispita, što rezultira nižim akademskim uspjehom. Ispitna anksioznost može narušiti samoučinkovitost studenta, što dovodi do smanjenoga povjerenja u vlastite sposobnosti (von der Embse i sur., 2018.). Ova sumnja u sebe može postati samoispunjavajuće proročanstvo jer je manje vjerojatno da će se studenti koji sumnjaju u vlastite sposobnosti uključiti u učinkovite strategije učenja i vjerojatno će izbjegavati akademske zadatke koji pred njih stavljaju dodatne izazove. Kada se suoče s ispitnom anksioznošću,

studenti mogu ublažiti rizik potencijalnoga neuspjeha na ispitima tako što će posvetiti vrijeme i energiju adekvatnoj pripremi za ispite, aktivnom sudjelovanju u aktivnostima u učionici i primjeni učinkovitih tehnika učenja i polaganja ispita. Međutim, značajan broj studenata daje prioritet izbjegavanju neugodnih emocija korištenjem tehnika kognitivnoga distanciranja, uključivanjem u distrakcije i sudjelovanjem u drugim aktivnostima, umjesto da svoje vrijeme posvete isključivo pripremi za ispit (Putwain i sur., 2023.). Korelacija između ispitne anksioznosti i akademske prokrastinacije (odugovlačenje) potvrđena je u nekoliko studija (Bolbolian i sur., 2021; Custer, 2018; Desai i sur., 2021), uključujući i meta-analizu iz 2018. (von der Embse i sur.), gdje je utvrđeno da su studenti koji doživljavaju ispitnu anksioznost značajno skloniji zanemarivanju ili izbjegavanju stresora i izvora stresa. Ponašajno izbjegavanja može u početku ponuditi privremeno olakšanje od uznemirujućih emocija, ali kako vrijeme bude odmicalo, ova će strategija izbjegavanja vjerojatno povećati rizik od smanjenih akademskih postignuća zbog propuštenih prilika za stjecanje znanja, nedostatne pripreme za ispite i samosabotirajućih ponašanja (Putwain i sur., 2023).

Mjerenje ispitne anksioznosti

Mjerenje ispitne anksioznosti predstavlja značajan izazov zbog mnogih prepreka. Prikupljanje fizioloških podataka u stresnom okružju i stvarnom vremenu značajan je problem. Nadalje, među ispitanicima može se primijetiti značajan stupanj varijabilnosti u pogledu njihove individualne percepcije anksioznosti (Ovadia-Blechman i sur., 2022).

Upitnici za samoprocjenu često se koriste kao pristup za procjenu ispitne anksioznosti. Tijekom druge polovice 20. stoljeća konstruirana je skala ispitne anksioznosti za djecu (TASC, *Test Anxiety Scale for Children*) koja se naširoko smatra vodećim instrumentom za procjenu ispitne anksioznosti. Nakon toga, kreirani su različiti testovi za procjenu dvaju različitih aspekata ispitne anksioznosti, naime emocionalnosti i zabrinutosti. Ovi testovi uključuju profil ispitne anksioznosti, reakciju na test (RTT, *Reaction to Test*), revidiranu skalu ispitne anksioznosti (RTA, *Revised Test Anxiety*) i inventar ispitne anksioznosti (TAI, *Test Anxiety Inventory*). Dodatno, FRIEDBEN skala ispitne anksioznosti (FTAS, *FRIEDBEN Test Anxiety Scale*) uključila je društvenu dimenziju ispitne anksioznosti. Početkom 21. stoljeća, kako je teorijsko razumijevanje ispitne anksioznosti nastavilo napredovati, pojavili su se novi upitnici za razlikovanje različitih kognitivnih dimenzija ispitne anksioznosti, prikazane na Skali kognitivnih aspekata ispitne anksioznosti (CTAS, *Cognitive Test Anxiety Scale*). Posljednjih su godina obrazovne institucije usvojile analitički pregled mjerakako bi poduprle inicijative za ranu intervenciju i prevenciju ispitne anksioznosti, poput primjene Skale za ispitivanje straha od ispitne anksioznosti (B-FTAS, *Brief Fear of Test Anxiety Scale*) i Kratke skale za dnevnu procjenu ispitne anksioznosti (DBR-A, *Daily Brief Rating of Test Anxiety*) (von der Embse i sur., 2018). U nastavku su navedeni upitnici koji se najčešće koriste u suvremenim istraživanjima.

Upitnik anksioznosti kao stanja i osobine ličnosti (STAI, State-Trait Anxiety Inventory: Spielberger, Gorsuch, Lushene, Vagg i Jacobs, 1983)

STAI je široko korišten upitnik koji procjenjuje anksioznost kao stanje (privremena anksioznost povezana s određenom situacijom) i anksioznost kao osobinu (generalizirana anksioznost). Obrazac Y, njegova najpopularnija verzija, ima 20 čestica za procjenu anksioznosti kao osobine i 20 za procjenu anksioznosti kao stanja. Viši rezultati ukazuju na veću anksioznost (Spielberger, 1989). Istraživači koriste varijacije STAI za mjerenje anksioznosti specifične za ispit, kao što je Inventar ispitne anksioznosti (TAI) i Skala ispitne anksioznosti (TAS). Ove skale pružaju vrijedan uvid u kognitivne i emocionalne aspekte ispitne anksioznosti.

Inventar ispitne anksioznosti (TAI, Test Anxiety Inventory: Spielberger, 1980)

Ovaj se namjenski osmišljen upitnik naširoko koristi u istraživanju ispitne anksioznosti (Alamri i Nazir, 2020; Javorac i sur., 2022; Latas i sur., 2010). Test se sastoji od 20 pitanja koja se odnose na učestalost doživljavanja specifičnih simptoma tjeskobe prije, tijekom i nakon pismenih ili usmenih ispita. Odgovor na svako pitanje predstavljen je u obliku četverostupanjske ljestvice Likertova tipa. Minimalni ukupni TAI rezultat iznosi 20, a maksimalni 80 bodova. Na temelju ukupnog rezultata TAI mogu se izdvojiti četiri različite razine ispitne anksioznosti: odsustvo anksioznosti (20-35 bodova), blaga anksioznost (36-50), umjerena anksioznost (51-65) i jaka anksioznost (66-80). TAI ima dvije podskale koje mjere dvije dimenzije ispitne anksioznosti – emocionalnost i zabrinutost.

Westside ljestvica ispitne anksioznosti (WTAS, Westside Test Anxiety Scale: Driscoll, 2004)

WTAS je upitnik za samoprocjenu koji je razvio Richard Driscoll i kojim se procjenjuju različite dimenzije ispitne anksioznosti, uključujući brigu, emocionalnost i interferencije. Ima visoku pouzdanost i valjanost, stoga se koristio kao prikladan instrument za procjenu ispitne anksioznosti u nekoliko istraživanja (Desai i sur., 2021; Tsegay i sur., 2019). Sastoji se od 10 pitanja koja se boduju pomoću Likertove ljestvice od pet stupnjeva. Zbroj rezultata dobivenih iz 10 pitanja (10 - 50) potom se dijeli s 10. Rezultati se tumače kako bi se otkrila razina ispitne anksioznosti, od ugodno niske (rezultati 1,0 - 1,9) do izrazito visoke ispitne anksioznosti (rezultati 4,0 - 5,0).

Inventar suočavanja sa stresnim situacijama (CISS, Coping Inventory for Stressful Situations: Endler i Parker, 1990)

CISS je psihometrijski instrument koji se sastoji od 48 čestica. Osmišljen je za procjenu trije temeljnih metoda suočavanja sa stresom, pri čemu se svaka strategija sastoji od 16 čestica: orijentirana na zadatak (T-Task-Oriented), orijentirana na emocije (E-Emotion-Oriented) i izbjegavanje (A-Avoidance). Zadatci se vrednuju Likertovom

ljestvicom od 5 stupnjeva. Na veću upotrebu određene metode suočavanja ukazuju viši rezultati u cjelini (Brands i sur., 2014). Iako nije isključivo usredotočen na ispitnu anksioznost, CISS mjeri različite stilove suočavanja sa stresom, koji mogu biti povezani s načinom na koji se pojedinci nose s ispitnom anksioznošću.

Ljestvica akademske motivacije (AMS, Academic Motivation Scale:
Vallerand, Pelletier, Blais, Brière, Senécal i Vallières, 1992)

Svrha je ovoga upitnika procijeniti motivaciju unutar akademskoga okružja, s posebnim naglaskom na intrinzičnu i ekstrinzičnu motivaciju za obrazovanje. Ovi motivacijski čimbenici mogu utjecati na individualno iskustvo ispitne anksioznosti. Inventar se sastoji od ukupno 28 čestica koje su dalje kategorizirane u sedam podskala. Ove su podskale osmišljene za mjerenje triju različitih oblika unutarnje motivacije (unutarnja motivacija za znanjem, postizanjem ciljeva i doživljavanje stimulacije), triju vrsta vanjske motivacije (vanjska, introjicirana i identificirana regulacija) i amotivacije, kako je definiraju Vallerand i sur. (1992).

Opća akademska ljestvica samoučinkovitosti (GASE, General Academic Self-Efficacy Scale: Schwarzer, Zilmer i Jerusalem, 1995)

Uvjerenja o samoučinkovitosti mogu utjecati na ispitnu anksioznost. GASE je upitnik koji mjeri percipiranu sposobnost studenta da svlada različite akademske izazove na sveučilištu i bitan je prethodnik dobrobiti i uspješnosti (van Zyl i sur., 2022). Sastoji se od pet čestica, a od sudionika se traži da ocijene svoju razinu slaganja na Likertovoj ljestvici od pet stupnjeva.

Ljestvica akademskoga odgađanja (APS, Academic Procrastination Scale: Steel & Kumar, 2007)

Iako nije izravna mjera ispitne anksioznosti, akademsko odugovlačenje često je povezano s ispitnom anksioznošću, kao što je već spomenuto. Postoji nekoliko mjera akademskoga odgađanja, dok je APS pokazao dobru pouzdanost i valjanost u nekim studijama (Desai i sur., 2021). Ljestvica za procjenu ima ukupno 25 pitanja, s maksimalnim mogućim rezultatom od 125. Viši rezultat ukazuje na povišene razine odugovlačenja.

Upitnik kognitivne ispitne anksioznosti (CTAQ, Cognitive Test Anxiety Questionnaire: McDonald i MacLachlan, 2000)

CTAQ procjenjuje kognitivne aspekte ispitne anksioznosti, uključujući zabrinutost, ruminaciju i prisilne misli povezane s ispitivanjem. Upitnik se sastoji od 27 čestica ocijenjenih na ljestvici od četiri stupnja, pri čemu viši rezultati impliciraju veće razine kognitivne anksioznosti pri ispitivanju (Cassady i Johnson, 2002).

Revidirana ljestvica ispitne anksioznosti (RTAS, Revised Test Anxiety Scale: McDonald et al, 1988)

RTAS procjenjuje različite aspekte ispitne anksioznosti, uključujući zabrinutost, emocionalnost i ometanje izvedbe testa. Ima podskale označene kao napetost,

zabrinutost, misli nevažne za ispit i tjelesni simptomi (Benson i El-Zahhar, 1994). Obuhvaća ukupno 20 čestica, a svaka se ocjenjuje na Likertovoj ljestvici od 4 stupnja.

Višedimenzionalna ljestvica ispitne anksioznosti (MTAS, Multidimensional Test Anxiety Scale: Putwain i von der Embse, 2010)

MTAS procjenjuje različite dimenzije ispitne anksioznosti, uključujući kognitivne, emocionalne i bihevioralne aspekte. Dvije kognitivne podskale, zabrinutost i kognitivne smetnje, obuhvaćaju 16 čestica, istovjetno kao i dvije afektivno-fiziološke podskale, napetost i fiziološki pokazatelji (Putwain i sur., 2020).

Kako svaki upitnik ima svoje nedostatke, postoji nekoliko drugih pristupa za procjenu ispitne anksioznosti. Fiziološki pokazatelji, poput broja otkucaja srca, krvnog tlaka i razine kortizola također su korišteni za objektivno mjerenje ispitne anksioznosti (Clutter i sur., 2017; Ovadia-Blechman i sur., 2022). Ove mjere nude neposredniju procjenu odgovora na anksioznost tijekom ispitnih situacija. Međutim, one možda neće obuhvatiti cijeli spektar ispitne anksioznosti budući da neki studenti možda neće pokazivati izražene fiziološke reakcije. Opservacijske mjere uključuju procjenu vidljivih ponašanja tijekom situacija polaganja ispita. To može uključivati ponašanja poput vrpoljenja, grickanja noktiju ili ponašajnog izbjegavanja. Unatoč tome što opservacijske mjere mogu pružiti značajne uvide, one su podložne pristranosti promatrača i možda neće u potpunosti obuhvatiti unutarnje iskustvo anksioznosti. Nedavni napredci u oslikavanju mozga (engl. neuroimaging) omogućili su istraživačima da istraže neuralne temelje ispitne anksioznosti. Funkcionalna magnetska rezonanca (fMRI) i elektroencefalogram (EEG) otkrivaju obrasce aktivacije mozga povezane s ispitnom anksioznošću (Huang i sur., 2022). Ove tehnike nude obećavajući put za razumijevanje neuroloških mehanizama koji leže u osnovi ispitne anksioznosti.

Identificiranje populacije studenata u riziku

Istraživanje ispitne tjeskobe nosi veliku važnost zbog njezine široke rasprostranjenosti i negativnoga utjecaja na akademski uspjeh. Analiza preklapanja demografskih i akademskih varijabli s ispitnom anksioznošću omogućava identificiranje podskupina studenata u riziku koji se suočavaju s povećanim rizikom od iskustva ispitne anksioznosti. Ove podskupine zahtijevaju ciljane intervencije, poput odgovarajućih savjetodavnih usluga kako bi se suočile s njihovim povećanim rizikom.

Rodne razlike

Spol može značajno utjecati na iskustvo ispitne anksioznosti. Brojna akademska istraživanja pružila su dokaze koji ukazuju da studenti ženskoga spola općenito pokazuju višu razinu ispitne anksioznosti u odnosu na muškarce (Huntley i sur., 2022; Javorac i sur., 2022; von der Embse i sur., 2018; Zheng i sur., 2023). Zapravo, određene procjene sugeriraju da studentice mogu patiti od ispitne anksioznosti u stopi tri puta većoj od

svojih muških kolega (Tsegay i sur., 2019). Uočena rodna neravnoteža možda bi se mogla pripisati rodnim razlikama u kognitivnim i bihevioralnim karakteristikama. Postoji mogućnost da studenti muškoga spola pokazuju povećanu sklonost pristupanju ispitu kao izazovu, što utječe na njihov proces donošenja odluka u korist rješenja koja su u skladu s njihovom percipiranom sposobnošću da učinkovito izvrše zadani zadatak. Suprotno tome, vjerojatno je da studentice mogu pokazati povećanu sklonost da ispit percipiraju kao uznemirujuću situaciju, što dovodi do reakcija potaknutih strahom i nailaženja na poteškoće u uspješnom izvršavanju dodijeljenoga zadatka (Torrano i sur., 2020). Studija koju su proveli Alamri i Nazir (2022) te Martin i Naziruddin (2020) nije otkrila značajnu razliku u iskustvima ispitne anksioznosti između studenata različitih spolova. Salend je (2012), s druge strane, otkrio da muški studenti pokazuju višu razinu ispitne anksioznosti. Ovi nalazi ukazuju da, neovisno o spolu, čimbenici poput društvenih i kulturalnih utjecaja mogu doprinijeti manifestiranju ispitne anksioznosti. Shodno tome, ključno je razviti prilagođene intervencije koje adresiraju jedinstvene potrebe različitih studentskih populacija.

Razlike u akademskoj razini

Ispitna anksioznost nije ograničena na određenu dobnu skupinu ili akademsku razinu. Međutim, može se manifestirati na različite načine među učenicima osnovnih i srednjih škola, te studentima visokoškolskih ustanova. Testovi visokoga rizika, poput prijemnih ispita za fakultet ili certifikacijskih ispita, mogu izazvati tešku anksioznost kod starijih učenika/studenata, dok mlađi učenici/studenti mogu doživjeti anksioznost vezanu uz ocjenjivanje u učionici. U metaanalizi koju je proveo von der Embse (2018) pokazalo se da je svaki klaster školske ocjene imao značajan negativan odnos s ispitnom anksioznošću, dok je povezanost između ispitne anksioznosti i akademskoga postignuća, mjerena tipičnim razrednim testovima ili testovima postignuća (razredni test ili kviz), bila najjača kod učenika srednjih škola te kod studenata preddiplomskih i diplomskih studija.

Razina ispitne anksioznosti među poslijesrednjoškolskim studentima može varirati tijekom njihova sveučilišnoga studija. Tsegay i sur. (2019) ukazuju da se najviše razine ispitne anksioznosti obično doživljavaju tijekom ranih faza akademskoga života, a njezin intenzitet opada kako pojedinci napreduju u svojim obrazovnim aktivnostima. Duraku (2017) tvrdi da različiti čimbenici mogu potencijalno doprinijeti smanjenju razine ispitne anksioznosti među studentima viših godina, kao što je povećanje samopouzdanja, razvoj učinkovitih metoda učenja, dobivanje pozitivnih ocjena na ispitima i stjecanje dubljega znanja te razumijevanje nastavničkoga pristupa ocjenjivanju. Osobe s različitim razinama akademskoga uspjeha koriste se različitim strategijama kako bi se učinkovito nosili s ispitnom anksioznošću. Studija provedena u Ujedinjenom Kraljevstvu otkrila je da diplomski studenti medicine pokazuju veću sklonost korištenju aktivnih strategija rješavanja problema te da su skloniji uporabi supstanci poput alkohola ili droga kao mehanizama suočavanja, u usporedbi s preddiplomskim studentima (Zvauya i sur., 2017). Autori ovoga istraživanja došli su

do zaključka da je od iznimne važnosti razviti intervencije usmjerene na ublažavanje štetnih mehanizama suočavanja i promicanje adaptivnih strategija suočavanja koje su posebno prilagođene studentima preddiplomskoga studija. Ovo je iznimno važno jer je neophodno da ti studenti steknu učinkovite vještine suočavanja koje će im koristiti ne samo tijekom akademskoga obrazovanja, već i u njihovim budućim profesionalnim nastojanjima koja sama po sebi uključuju visoke razine stresa.

Razlike u studijskim programima

Svi su studenti podložni razvoju ispitne anksioznosti. Međutim, brojna su istraživanja dosljedno ukazala da studenti medicinskih znanosti pokazuju veću prevalenciju ispitne anksioznosti u usporedbi s njihovim kolegama iz nemedicinskih područja i općom populacijom (Javorac i sur., 2022; Khoshhal i sur., 2017). Istraživači su ustvrdili da se prevalencija ispitne anksioznosti među studentima zdravstvenih profesija kreće od 25 % do 65 % (Alamri i Nazir, 2022). Razlog za takvu prevalenciju je što većina studenata medicinskih znanosti dijeli skup specifičnih vanjskih okolnosti koje se razlikuju od onih koje doživljavaju studenti nemedicinskih fakulteta, kao što su veliki opseg gradiva (osobito ako nije organiziran pripremni program prije upisa na medicinski fakultet), zahtjevno opterećenje kolegijima, promjenljivi rasporedi, dugotrajna ispitna razdoblja, značajan udio usmenih ispita, ograničeno slobodno vrijeme za odmor ili rekreaciju, izloženost kritično oboljelim pacijentima i smrti tijekom kliničkih vježbi te prisustnost natjecateljske atmosfere u medicinskom obrazovanju (Khoshhal i sur., 2017). Psihosocijalni stresori obuhvaćaju različite čimbenike koji mogu pridonijeti psihološkim i socijalnim nevoljama. Ovi uzroci stresa mogu uključivati visoku razinu roditeljskih očekivanja, nostalgiju za domom, prilagodbu na nove životne uvjete, financijske poteškoće, zaposlenje tijekom studija te strepnju u vezi s mogućim budućim neuspjehom u medicinskoj karijeri (Fawzy i Hamed, 2017). U Tablici 1 prikazani su ključni rezultati proistekli iz presječnih studija koje su ispitivale ispitnu anksioznost među studentima medicinskih znanosti.

Tablica 1

Rezultati odabranih studija u kojima je ispitivana ispitna anksioznost među studentima medicinskih znanosti

Autor(i)	Uzorak	Upitnik	Razina ispitne anksioznosti	Važna otkrića
Desai i sur., 2021. (Indija)	220 studenata fizioterapije	WTAS	27,7% imalo je umjereno visoku razinu ispitne anksioznosti	Utvrđena je pozitivna korelacija između ispitne anksioznosti i odgađanja
Bolbolian i sur., 2021. (Iran)	152 studenata dentalne medicine	Friedmanov upitnik za procjenu ispitne anksioznosti	Srednja vrijednost ukupne ispitne anksioznosti – 44,4; napetost – 11,87; socijalno poniženje – 15,39; kognitivna pogreška – 16,59	Utvrđena je pozitivna korelacija između ispitne anksioznosti i odgađanja zadataka; spol je korelirao s ukupnom razinom ispitne anksioznosti i kognitivnom pogreškom, dok bračni status, dob i prosječna ocjena nisu

Alamri i sur., 2022. (Saudijska Arabija)	878 studenata medicinskih znanosti: 46.4% dentalne medicine; 33.3% medicine; 20.4% farmacije	TAI	Srednja TAI vrijednost 43,17: dentalna medicina –44,15; medicina –41,64; farmacija –43,44	Studenti s niskim prosječnim ocjenama imali su višu razinu ispitne anksioznosti; nije pronađena povezanost između ispitne anksioznosti i spola, akademske godine, obrazovanja roditelja i mjesečnog prihoda obitelji
Javorac i sur., 2022. (Srbija)	375 studenata medicinskih znanosti: 60.3% medicine; 9.3% sestrinstva; 9.3% farmacije; 8.5% dentalne medicine	TAI	Srednja TAI vrijednost – 48,25; 15,5% - odsustvo anksioznosti; 42,2% - blaga anksioznost; 36,5% - umjerena anksioznost; 5,8% - teška anksioznost	Studentice, osobe koje same financiraju studij, osobe koje su ponavljale godinu studija i osobe s nižim prosječnim ocjenama imale su najvišu razinu ispitne anksioznosti
Stojanović i sur., 2018. (Srbija)	409 studenata sestrinstva	TAI	Srednja TAI vrijednost – 46,46; preosjetljivost – 19,72; zabrinutost – 16,99	Prosječne vrijednosti svih rezultata bile su više kod studentica; postoji statistički značajna razlika između studenata druge godine u odnosu na studente treće godine
Retegui, 2006. (SAD)	150 studenata medicine	TAI	Srednja TAI vrijednost – 46,32; preosjetljivost – 20,07; zabrinutost – 17,43	Studentice kliničke prakse imale su više razine ispitne anksioznosti od studenata
Dawood i sur., 2016. (Saudijska Arabija)	277 studenata sestrinstva	TAI	Srednja TAI vrijednost – 53,77; 6,5% - odsustvo anksioznosti; 28.2% - blaga anksioznost; 50,9% - umjerena anksioznost; 14,4% - teška anksioznost	Nije pronađena značajna povezanost između ispitne anksioznosti i prosječnih ocjena studenata preddiplomskog studija sestrinstva; razine ispitne anksioznosti smanjivale su se s rastom godina sudionika
Tsegay i sur., 2019. (Etiopija)	423 studenata medicine	WTAS	WTAS rezultat koji ukazuje na problematičnu razinu ispitne anksioznosti pronađen je kod 52,30% studenata	Pripadnost ženskom spolu, lošije ocjene, prva godina studija, preopterećenost kolegijima, usmeno polaganje ispita, nedostatak sustavnog plana učenja, loša/ osrednja socijalna podrška i psihološki stres identificirani su kao neki od prediktornih faktora za ispitnu anksioznost među studentima medicine

Legenda: TAI – Test Anxiety Inventory; WTAS - Westside Test Anxiety Scale; SAD – Sjedinjene Američke Države.

Razlike u socioekonomskom statusu

Socioekonomski status (SES) može igrati ulogu u ispitnoj anksioznosti. Studenti nižega SES-a mogu se suočiti s dodatnim stresorima povezanim s njihovim kućnim okruženjem i financijskim ograničenjima što može pridonijeti povećanoj anksioznosti na ispitu, u usporedbi sa studentima višega SES-a (Hembre, 1988; Xu i sur., 2021). Prepoznavanje ovih razlika korisno je za rješavanje različitih potreba studenata. Većina trenutačnih istraživanja obiteljskoga SES-a uglavnom je pod utjecajem dvaju značajnih teorijskih okvira: modela obiteljskoga stresa i modela obiteljskoga ulaganja (Xu i sur., 2021). Prema modelu obiteljskoga stresa, sugerira se da kronični financijski pritisak koji doživljavaju obitelji u okruženjima niskoga SES-a povećava podložnost roditelja emocionalnom stresu i bračnim konfliktima. Kao posljedica toga, roditelji u kućanstvima s niskim SES-om skloniji su upuštati se u štetne roditeljske prakse umjesto podržavajućih, što rezultira povišenim razinama anksioznosti pri polaganju ispita kod njihove djece. Model obiteljskoga ulaganja pretpostavlja da ulaganja u područja poput obrazovnih resursa, poboljšanja životnih uvjeta i drugih čimbenika povezanih s financijskim blagostanjem, mogu poboljšati pripremljenost studenata za društvene i akademske izazove. Posljedično, ta ulaganja doprinose njihovom akademskom uspjehu i smanjuju vjerojatnosti da će doživjeti anksioznost pri polaganju ispita. Unatoč tome, mnoga su istraživanja utvrdila da korelaciji između niskoga socioekonomskog statusa (SES) i ispitne anksioznosti nedostaje statistička značajnost (Aydin, 2013) ili je korelacija čak i pozitivna (Chen, 2012), što sugerira potrebu za daljnjim istraživanjima u ovom području

Ostali čimbenici

Kulturološki čimbenici mogu utjecati na doživljaj i izražavanje ispitne anksioznosti. Različite kulturne norme, vrijednosti i očekivanja mogu utjecati na to kako studenti percipiraju akademsko ocjenjivanje i kako se s njim suočavaju (Živanović i sur., 2020). Drugi sociodemografski korelati ispitne anksioznosti uključuju: etničku pripadnost (studenti iz manjinskih grupa mogu pokazivati znatno povišene razine ispitne anksioznosti u usporedbi s kolegama koji ne pripadaju manjinama), studentove sposobnosti, tj. angažman u nastavi iz percepcije nastavnika (studenti s izraženim sposobnostima mogu imati niže razine ispitne anksioznosti u usporedbi sa studentima s prosječnim razinama sposobnosti), prisutnost invaliditeta (studenti s dijagnosticiranim ADHD-om i specifičnim poteškoćama u učenju mogu pokazivati više razine ispitne anksioznosti u usporedbi s onima koji nemaju tu dijagnozu) i ispitni uvjeti (studenti koji su ispitne situacije percipirali kao teške ili izazovne, studenti suočeni s evaluacijskim testom ili procjenom koja nosi posljedice te studenti koji nisu imali prethodno iskustvo s testiranjem, mogu doživjeti povećane razine tjeskobe pri polaganju ispita) (von der Embse i sur., 2018).

Ublažavanje utjecaja ispitne anksioznosti

Istraživači su ispitali različite strategije suočavanja i intervencije kako bi pomogli studentima da upravljaju ispitnom anksioznošću, poput kognitivno-bihevioralne

terapije, tehnika opuštanja, treninga svjesnosti i strategije upravljanja vremenom. Pojedina su istraživanja pokazala obećavajuće rezultate u smanjenju anksioznosti na ispitu i poboljšanju akademskoga uspjeha kada se pobrojane intervencije primjenjuju. Unatoč visokoj prevalenciji ispitne anksioznosti, važno je spomenuti da je samo 10 % studenata u potrazi za bilo kojim oblikom postojećih intervencija za ublažavanje njezinih učinaka. Ograničen udio studenata posjeduje znanje o strategijama za ublažavanje ispitne anksioznosti, na što ukazuje da samo 7 – 13 % studenata aktivno traže usluge savjetovanja (Javorac i sur., 2022.).

Kognitivno-bihevioralne intervencije

Kognitivno-bihevioralna terapija (KBT) naširoko se koristi za smanjenje ispitne anksioznosti (Putwain i von der Embse, 2021). KBT se usredotočuje na prepoznavanje i modificiranje negativnih obrazaca mišljenja i ponašanja povezanih s ispitnom anksioznošću. Ovim se pristupom osposobljava studente da se služe strategijama suočavanja i tehnikama opuštanja za upravljanje anksioznošću tijekom polaganja ispita. Brojna empirijska istraživanja ukazala su na povoljne ishode povezane s primjenom različitih KBT strategija. Prema studiji provedenoj u Nigeriji (Ugwuanyi i sur., 2020), primijećeno je da je kod srednjoškolaca koji su bili podvrgnuti 12-tjednoj KBT intervenciji uz glazbu značajno smanjena razina ispitne anksioznosti, u usporedbi s kontrolnom skupinom. U studiji koju su proveli Reiss i sur. (2019), primijećeno je da je primjena KBT tehnika opuštanja i KBT korektivne imaginacije (*CBT Imagery rescripting*) rezultirala smanjenim razinama samoprijavljene anksioznosti na ispitu. Ti su učinci primijećeni nakon grupnih sesija koje su trajale tri sata tjedno u razdoblju od pet tjedana. Metoda vođenoga disanja (DGB, *Device-Guided Breathing*) označena je kao potencijalno korisna bihevioralna strategija za ublažavanje ispitne anksioznosti, što je dokazano pokusnom studijom koja je dala obećavajuće rezultate (Ovadia-Blechman i sur., 2020). DGB je metoda koja uključuje namjerno smanjenje brzine disanja na manje od 10 ciklusa u minuti putem produljenja vremena izdisaja. Prethodne studije pokazale su da je nekoliko tehnika usmjerenih na usporavanje disanja pokazalo pozitivan učinak na smanjenje razine anksioznosti (Gavish, 2010). Moduliranjem brzine disanja dolazi se do aktivacije refleksa što rezultira smanjenjem aktivnosti simpatičkoga živčanog sustava te posljedičnim ublažavanjem specifičnih manifestacija ispitne anksioznosti.

Intervencije temeljene na svjesnosti

Uzimajući u obzir činjenicu da je aspekt zabrinutosti kod ispitne anksioznosti tijesno povezan s lošijim akademskim postignućem studenata, primjena intervencija temeljenih na svjesnosti (MBI, *Mindfulness-Based Interventions*), kao što su meditacija svjesnosti i joga, ukazuje na smanjenje razine ispitne anksioznosti (Chung i sur., 2012; Gabriely i sur., 2020; Querstret i sur., 2020). Ove prakse potiču opuštanje, samosvijest i regulaciju emocija, što može pomoći studentima da se bolje nose sa stresom povezanim s ispitima. Program smanjenja stresa temeljen na svjesnosti (MBSR, *Mindfulness-*

based stress reduction) opsežno se koristi kao istaknuti MBI u području istraživanja svjesnosti. Metaanaliza iz 2019. godine (Yusufov i sur., 2019) koja je ispitivala terapije za smanjenje stresa otkrila je da je MBSR (*Mindfulness-Based Stress Reduction*) imao izraženiji učinak na smanjenje anksioznosti kod studenata preddiplomskih i diplomskih studija u usporedbi s kognitivno-bihevioralnom terapijom (CBT) i treningom vještina suočavanja. Jednim nedavnim randomiziranim kontroliranim ispitivanjem (RCT) procijenila se početna učinkovitost i dugoročni učinci osmotjedne uporabe mobilne aplikacije za meditaciju usredotoče svjesnosti na razinu stresa, svjesnost i samosuosjećanje kod studenata koji doživljavaju visoke razine tjeskobe pri polaganju ispita. Rezultati studije sugeriraju da korištenje mobilne aplikacije za provođenje meditacije usredotočene svjesnosti može biti učinkovita metoda za smanjenje razine stresa te poboljšanje svjesnosti i samosuosjećanja među studentima koji doživljavaju visoke razine stresa (Huberty i sur., 2019).

Podržavajuća okružja za učenje

Stvaranje poticajnoga okružja za učenje ključno je za ublažavanje ispitne anksioznosti (Cayubit, 2022). Edukatori mogu primijeniti strategije poput pružanja jasnih uputa za testiranje, nuditi praktično ispitivanje te omogućiti dodatno vrijeme za studente s dijagnosticiranim anksioznim poremećajem. Smanjenje stigme povezane s tjeskobom pri polaganju ispita i promicanje mentaliteta rasta, također mogu pridonijeti inkluzivnoj i suosjećajnoj obrazovnoj kulturi.

Ostale intervencije

Osim navedenih intervencija, u znanstvenoj literaturi mogu se pronaći brojna istraživanja koja su se bavila ispitivanjem različitih farmakoloških formulacija s potencijalom ublažavanja težine ispitne anksioznosti, uključujući i standardne lijekove koji se koriste za liječenje anksioznih poremećaja. Tijekom nekoliko godina provedena su opsežna istraživanja o odnosu između mikrobiološkoga sastava crijevne flore i aspekata mentalnoga zdravlja poput depresije, anksioznosti i kognitivnoga funkcioniranja. Značajno je da su različite studije pokazale da dodatak probiotičkih bakterijskih kultura može učinkovito ublažiti simptome depresije i anksioznosti u studentskoj populaciji (Kato-Kataoka i sur., 2016; Qin i sur., 2021; Zhu i sur., 2023). Pa ipak, važno je priznati da određena istraživanja usmjerena na određene formulacije probiotika iz gljivica nisu dala usporedive rezultate (Karbownik i sur., 2020). Potencijalni mehanizmi koji mogu objasniti pozitivne učinke probiotika uključuju očuvanje intestinalne homeostaze, poboljšanje lokalnoga i sistemskoga imuniteta te regulaciju metabolizma crijevnih bakterija. Ti mehanizmi zajedno utječu na ravnotežu osi crijevne bakterije-intestinalna mukoza-mozak, koja može biti narušena zbog izloženosti stresu (Mayer i sur., 2015).

Dostupni dokazi ukazuju da primjena tzv. *otvorenih placebo* (OLP, *Open-label placebos*) pokazuje korisnost u smanjenju anksioznosti pri polaganju ispita među studentima, s pozitivnim utjecajem na njihovo blagostanje (Schaefer, 2019). Međutim, važno je

napomenuti da nije primijećeno značajno poboljšanje u rezultatima ispita kao rezultat intervencije (Kleine-Borgmann i sur., 2021). Nadalje, u jednom su istraživanju ispitivani placebo-učinci koristeći imaginarnu pilulu (IP) kao intervenciju, zaključujući da su studenti koji su primali OLP i IP kratko prije ispita pokazivali značajnije smanjenje anksioznosti pri polaganju ispita od početka do kraja studija, u usporedbi sa studentima u kontrolnoj skupini (Buergler i sur., 2023). Općenito, može se tvrditi da ovi placebo-učinci mogu dijeliti zajedničke osnovne mehanizme, poput očekivanja, kondicioniranja i inkorporirane kognicije.

Nadalje, bavljenje tjelesnim vježbama ima može ublažiti težinu ispitne anksioznosti. Sistematskim pregledom koji su proveli Zhang i sur. (2022) utvrđeno je da sudjelovanje u aerobnim aktivnostima, bez obzira na intenzitet, minimalno 20 minuta, 2 - 3 puta tjedno, tijekom najmanje četiri tjedna, može učinkovito smanjiti anksioznost pri polaganju ispita. Posebno su povoljni rezultati zapaženi kod osoba koje su sudjelovale u niskointenzivnim tjelesnim aktivnostima više od tri puta tjedno, tijekom razdoblja duljega od osam tjedana. Osim toga, rezultati su pokazali da kombinacija tjelesne aktivnosti s psihoterapijom daje izraženije učinke.

Zaključak

Ispitna anksioznost složen je fenomen koji može značajno utjecati na akademski uspjeh studenata i njihove rezultate na ispitima visokoga rizika. Mjerenje anksioznosti pri polaganju ispita obuhvaća upitnike samoprocjene, fiziološka mjerenja, opservacijske metode i tehnike oslikavanja mozga (engl. neuroimaging), pružajući sveobuhvatan pogled na ovaj fenomen. Negativni utjecaj ispitne anksioznosti na kognitivne funkcije, pamćenje, samoučinkovitost i akademska ponašanja naglašava njezinu važnost u obrazovanju. Međutim, potrebno je preispitati načine na koje obrazovni sustavi strukturiraju procese ocjenjivanja i pritisak na studente koji često dovode do visokih razina anksioznosti. Tradicionalni modeli ocjenjivanja trebali bi biti revidirani, kako bi se uključile alternativne metode koje se usredotočuju na kontinuirano učenje i razvoj, umjesto isključivo na rezultate ispita. Identifikacija populacija studenata s rizikom, uključujući spol, akademsku razinu, socijalno-ekonomski status i kulturne čimbenike, ključna je za učinkovito prilagođavanje intervencija. Iznimno je važno da ove intervencije budu prilagođene specifičnim potrebama i kontekstima različitih skupina studenata kako bi se maksimizirala njihova učinkovitost. Osim toga, implementacija strategija ublažavanja, poput kognitivno-bihevioralnih intervencija, praksi temeljenih na svjesnosti i podržavajućih okružja za učenje, može ponuditi obećavajuće smjerove za smanjenje negativnih učinaka anksioznosti povezanih s polaganjem ispita. Edukatori, kreatori politika i stručnjaci za mentalno zdravlje moraju surađivati kako bi ispitna anksioznost bila sveobuhvatno adresirana. Ova suradnja ne smije biti ograničena isključivo na implementaciju različitih intervencija, već je potrebno kontinuirano sprovoditi i evaluaciju učinaka tih intervencija. Razumijevanjem složenoga odnosa između ispitne anksioznosti i akademskoga postignuća te primjenom intervencija

temeljenih na dokazima, moguće je stvoriti pravedniji i podržavajući obrazovni sustav koji svim studentima omogućuje napredovanje. Konačno, iako je jasno da se ispitna anksioznost ne može nikada u potpunosti eliminirati, ovim je intervencijama moguće stvoriti okruženje u kojem studenti mogu razviti resurse i strategije za upravljanje stresom, čime se otvara put obrazovnom sustavu koji ne podržava samo akademski uspjeh, već i emocionalno blagostanje studenata.