Sosyal Bilimler
EKEV AKADEMİ
dergisi

Makalenin geliş tarihi: 14.01.2025
1.Hakem Rapor Tarihi: 06.08.2025
2.Hakem Rapor Tarihi: 10.08.2025
Yayına Kabul Tarihi: 26.09.2025

eISSN:2148-0710 - pISSN:1301-6229

A NEW CHALLENGE IN DISTANCE EDUCATION: COGNITIVE TEST ANXIETY AND RELATED STUDENT EXPERIENCES[1]

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Abstract

Distance education offers significant opportunities for access and flexibility in education, especially with the integration of digital technologies and artificial intelligence applications that can provide more effective and personalized learning experiences. Research focusing on the cognitive dimension of test anxiety within the context of distance education is limited, and this study aims to contribute to the limited body of literature by offering student-centered recommendations to address gaps regarding educational program improvement and student well-being. A descriptive quantitative research design was employed. Data were collected online from 410 undergraduate students across medical, nursing, dentistry, and health sciences faculties. The primary data collection tools included an introductory sociodemographic information form and the Cognitive Test Anxiety Scale. Nonparametric tests were used for data analysis. The mean cognitive test anxiety score was 51.3±17.0, with notably higher levels of anxiety observed among dental students. Significant effects of academic expectations, concerns about evaluation methods, and satisfaction with distance education were found to influence anxiety levels ($p<0.05$). The satisfaction rate for online classes was 18.0%, with 50.2% of students uncertain about academic expectations, 83.7% perceiving the evaluation processes as unfair, and 91.0% feeling a lack of practical experience. Additionally, 84.6% of participants reported a decline in academic performance during distance education. Students who believed that instructors had difficulties adapting to distance education exhibited higher anxiety levels. There is a need for curricula that support academic expectations, practical skill development, and are enriched with technological resources to reduce cognitive test anxiety and improve educational outcomes.

Keywords: *Distance education, Cognitive test anxiety, Health sciences, University students.*

Uzaktan Eğitimde Yeni Mücadele: Bilişsel Sınav Kaygısı ve İlişkili Öğrenci Deneyimleri

Öz

Uzaktan eğitim, eğitimde erişim ve esneklik sağlama açısından önemli bir fırsat sunmakta olup, özellikle dijital teknolojilerin ve yapay zekâ uygulamalarının entegrasyonu ile daha etkili ve kişiselleştirilmiş öğrenme deneyimleri sunulabilir. Uzaktan eğitim bağlamında sınav kaygısının bilişsel boyutuna odaklanan araştırmalar sınırlıdır ve bu araştırma eğitim programlarının iyileştirilmesi ve öğrenci iyi oluşuna yönelik literatürdeki boşluklara katkı sağlamak amacıyla öğrenci odaklı öneriler sunmayı hedeflemiştir. Tanımlayıcı tipteki araştırmanın verileri tıp, hemşirelik, diş hekimliği ve sağlık bilimleri fakültelerinden eğitimlerini sürdürmekte olan 410 lisans öğrencisinden toplanmıştır. Çevrimiçi araştırmada tanıtıcı sosyodemografik bilgiler formu ve Bilişsel Sınav Kaygısı Ölçeği kullanılmıştır. Verilerin analizinde parametrik olmayan anlamlılık testleri kullanılmıştır. Bilişsel sınav kaygısı puanı ortalama 51.3±17.0 olup özellikle diş hekimliği öğrencilerinde kaygı düzeylerinin daha yüksek olduğu görülmüştür. Akademik beklentiler, değerlendirilme yöntemlerine dair güvenlik endişeleri ve uzaktan eğitim memnuniyeti gibi etmenlerin sağlık bilimlerindeki öğrencilerde kaygı düzeylerinde anlamlı farklılık yaratabildiği bulunmuştur ($p<0.05$). Çevrimiçi derslerden memnuniyet oranı %18.0'ken; öğrencilerin %50.2'si akademik beklentiler konusunda kararsız kalmış, %83.7'si değerlendirme süreçlerini adil bulmamış ve %91.0'ı uygulama eksikliği hissetmiştir. Katılımcıların %84.6'sı uzaktan eğitim sırasında akademik performanslarının düştüğünü ifade etmiştir. Öğretmenlerinin uzaktan eğitime uyumda zorlandığını düşünen öğrencilerin kaygı düzeyleri artmıştır. Akademik beklentilere uygun, uygulamalı becerileri destekleyebilecek ve teknolojik olanaklarla zenginleştirilmiş müfredatlara gereksinim vardır.

Anahtar Kelimeler: *Uzaktan eğitim, Bilişsel sınav kaygısı, Sağlık bilimleri, Üniversite öğrencisi.*

[1] This research's findings were presented as an oral presentation in 6th International 10th National Psychiatric Nursing Congress.

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1. Introduction

Distance education has become an essential part of modern education, offering flexibility, accessibility, and the ability to reach students regardless of geographical boundaries. As the world rapidly shifts towards digital platforms, it is becoming increasingly clear that the future of education will rely heavily on online and distance learning systems. This transition is not only driven by the need for flexible learning opportunities but also by the potential for integrating cutting-edge technologies to enhance the educational experience. Among these technologies, Artificial Intelligence (AI) stands out as a key tool that will shape the future of education, particularly in the realm of distance learning. AI can be used to personalize learning experiences, provide immediate feedback, and assist in addressing the challenges students face in both cognitive and practical learning environments (Limna et al., 2022). The convergence of distance education and AI technologies will be instrumental in creating a more adaptive and efficient educational system that can better meet the evolving needs of students in the future. In the context of test anxiety, AI has the potential to monitor and support students in managing stress, ultimately fostering a more effective and personalized learning journey (Dogan et al., 2023).

Test anxiety, also known as examination anxiety or exam phobia, refers to a psychological state characterized by heightened distress and physiological arousal when facing an evaluative context, such as a test or a performance (Rehab, 2021). It encompasses intense thoughts related to self-fulfillment and includes physical, emotional, cognitive, and behavioral responses that students experience before, during, and after tests (Núñez-Peña & Bono, 2019). Test anxiety can hinder students' ability to effectively demonstrate their skills during practical assessments, raising concerns about their performance in real-world healthcare settings (Poorman et al., 2009). Addressing test anxiety among health sciences students, who bear the immense responsibility of directly engaging with human lives, is crucial to ensure their success, confidence, and readiness to provide quality care to patients. The implementation of appropriate test anxiety management strategies can enhance students' learning experiences and foster their professional development.

Cognitive test anxiety focuses on the thought-related aspects of testing. Cassady and Johnson (2002) referred to the high level of anxiety related to measurement and evaluation as cognitive test anxiety, reflecting students' behavioral and belief states regarding learning and exam experiences. It is characterized by excessive concern, negative thinking, and mental distress, which can impair an individual's ability to perform effectively on cognitive tasks such as exams or tests. According to Hembree (1988), the cognitive component is the most important predictor of test anxiety.

Building on the discussion of test anxiety in the preceding paragraph, it is crucial to explore how external factors, such as unpredictable events, can further exacerbate students' psychological distress. Numerous studies have highlighted the impact of complex situations, including disasters and pandemics, on individuals' mental well-being. Therefore, delving into the nuances of how these unforeseen circumstances interact with the underlying test anxiety is essential for a comprehensive understanding of the psychological challenges faced by students. The unpredictable nature of disasters such as deviating earthquakes and the ongoing impact of the COVID-19 pandemic, combined with the need for distance education, have introduced a myriad of uncertainties for students. These circumstances necessitate obligatory modifications in response to effectively address the challenges posed by distance education. Research findings have consistently demonstrated that these modifications have significantly heightened concerns among health sciences students (García-González et al., 2021). Students have expressed dissatisfaction with online education, stating that it is inadequate for practical training and leaves them lagging behind in courses requiring manual skills (Elshami et al., 2021; Li et al., 2021; Oducado & Estoque, 2021). These conditions can worsen cognitive test anxiety, and those who suffer

from cognitive test anxiety may experience intrusive thoughts about potential failure, engage in negative self-evaluations, and have heightened self-doubt.

Distance education offers significant opportunities for access and flexibility in education, especially with the integration of digital technologies and artificial intelligence applications that can provide more effective and personalized learning experiences. Research focusing on the cognitive dimension of test anxiety within the context of distance education is limited, this study aims to offer student-centered recommendations to contribute to the limited literature on improving education programmes and student well-being in the context of distance education. Our hypotheses are as follows:

1. H_1: Undergraduate health sciences students receiving distance education experience high levels of cognitive test anxiety.

2. H_1: Cognitive test anxiety scores differ among undergraduate health sciences students receiving distance education based on various sociodemographic characteristics.

3. H_1: Cognitive test anxiety scores differ among undergraduate health sciences students receiving distance education based on learning conditions.

2. Method

2.1. Research Type

This research employed a descriptive quantitative research design, which is commonly used to systematically describe characteristics of a population or phenomenon. Descriptive research aims to provide an accurate representation of variables without influencing them. This approach makes it particularly suitable for observational studies (Creswell & Creswell, 2017).

Furthermore, the findings of this study were reported in adherence to the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) checklist, which ensures transparency and reproducibility in observational research. The STROBE guidelines provide a standardized framework for reporting observational studies, thereby enhancing the quality and reliability of research outcomes (Von Elm et al., 2007). This is especially important in observational studies, where there are no controlled conditions and results need to be reported as clearly as possible.

2.2. Universe and Sample

This study used email applications to reach out to various entities, including Turkey's national universities' medical faculties, nursing faculties/schools, dentistry faculties, health sciences faculties/schools (midwifery, nutrition and dietetics, physiotherapy and rehabilitation, emergency medical technician, anesthesia technician departments), and non-governmental organizations such as the Student Nurses Association, Turkish Nurses Association Student Committee, Turkish Medical Students' Committee, Young Dentists Association, and Anatolian Midwives Association. The inclusion criteria were (1) being enrolled in an undergraduate health sciences program at a higher education institution; (2) participating in or continuing distance education practices due to the pandemic; and (3) expressing willingness and voluntary intent to participate in the research. The exclusion criteria were (1) having a condition that prevented the use of the online data collection tool and (2) not completing all the questions in the online data collection tool.

2.3. Process

Data collection was carried out in line with the Checklist for Reporting Results of Internet E-Surveys, which serves as a method and reporting guide for online survey research (Eysenbach, 2012). Data were collected using an online survey platform, which does not require a user fee or license. Specifically, the data collection process was carried out between May 1 and July 30, 2021, during the

period when distance education practices were intensively implemented due to the COVID-19 pandemic. Data security for the study was ensured through a user account accessible only to two members of the research team, and this account was not shared with any other individuals. The online form was piloted with 10 students. The questions were clarified, enhancing the online tool's user-friendliness. The data were collected using the following final tools. Completing the online surveys typically took approximately 15 minutes. The dataset of the study has been published on the Mendeley database repository (DOI: 10.17632/6bzj2kms84.1).

2.4. Data Collection Tools

Personal Data Collection Form: This form comprised 30 questions, which assess potential sociodemographic characteristics (2 questions) that might impact state anxiety and academic motivation, educational and instructional conditions and experiences (4 questions), remote learning experiences (4 questions), and views and attitudes toward distance education (20 questions), which were the dependent variables of the study.

The Cognitive Test Anxiety Scale-Revised (CTAR): The scale, an adapted version of the one originally developed by Cassady and Johnson (2002) for the Turkish culture, was validated and its psychometric properties were assessed by Bozkurt et al. (2017). It is a self-assessment scale designed to assess students' levels of cognitive test anxiety. Each item is rated on a 4-point Likert scale ranging from 1 (strongly disagree) to 4 (strongly agree), with total scores ranging from 25 to 100. Higher scores indicate higher levels of cognitive test anxiety. In this study, descriptive interpretations were made based on the total score, where lower scores reflected lower anxiety levels and higher scores indicated higher levels of cognitive test anxiety. The scale has been validated and has demonstrated satisfactory reliability for use among university students. The Cronbach's alpha value was found to be .93 in the Turkish adaptation study, and in this study too, it was .93.

2.5. Data Analysis

Descriptive statistics (frequency, percentage, mean, standard deviation) were used to evaluate the data. Continuous numerical variables were expressed as mean ± standard deviation, while categorical variables were presented as frequencies and percentages. The normal distribution of continuous numerical variables was assessed using Kolmogorov–Smirnov and Shapiro–Wilk tests, considering the participant numbers within the groups. Group differences were analyzed using the Kruskal-Wallis test. For significant results, pairwise comparisons were conducted with the Mann-Whitney U test. In the study, a $p<0.05$ indicated statistical significance.

2.6. Ethical Considerations

The study received approval from the Ege University Scientific Ethics Committee (Approval No: 30-04-21:4/2). Necessary permissions were obtained from the owners of the scales, and all participants provided informed consent through an online form. Informed consent was obtained by completing the informed consent form, following which the data collection instruments became available for the students to complete.

3. Results

The distribution of students according to their sociodemographic characteristics is provided in Table 1. The participants had a mean age of 21.38±1.84 years. The majority of the participants were female (78.2%), while only 21.8% were male, reflecting a predominantly female sample. During the pandemic, most students (80.1%) reported spending time with their families, whereas only a small fraction (2.7%) experienced the period alone at home.

Table 1

Distribution of Students According to Sociodemographic Characteristics (n=410)

Sociodemographic Characteristics	n	%
Gender (n=409)		
Female	320	78.2
Male	89	21.8
Field of Study		
Nursing	145	35.3
Medicine	91	22.2
Dentistry	56	13.7
Midwifery	46	11.2
Physical Therapy	43	10.5
Other (Social services, audiology, health officer, emergency medical technician, occupational therapy, pharmacy, nutrition and dietetics, speech and language therapy)	29	7.1
People Spent the Pandemic with (n=408)		
With my family	331	81.1
With my roommate	66	16.2
Alone at home	11	2.7

In Table 2, the distribution of students' experiences, perceptions and thoughts regarding distance education institutional management, teaching staff, their own living conditions, and distance education implementation is presented. The satisfaction rate of students with the courses they attended remotely is 18.0%. During this process, approximately every other student (50.2%) is unsure about what is expected of them academically, while 83.7% believe they are not being evaluated fairly, 91.0% feel a lack of practical implementation, and 84.4% are uncomfortable with the fact that vocational courses are evaluated based on assignments and exams, without practical assessment. 23.4% of the students believed that educators were able to adapt to the conditions of distance education. The percentage of those reporting a decrease in academic performance in distance education is 84.6%.

Table 2

The Distribution of Students' Experiences, Perceptions and Thoughts Regarding Distance Education (n=410)

Students' Experiences, Perceptions and Thoughts	Agree		Partially Agree		Disagree	
	n	%	n	%	n	%
I am satisfied with the decisions my institution has made for my education.	91	22.2	211	51.5	108	26.3
I can effectively cope with the uncertainties in distance education.	72	17.6	202	49.2	136	33.2
I can communicate better with academic staff in distance education conditions.	91	22.2	179	43.7	140	34.1
I believe that academic authorities are adequately adapting to distance education conditions.	105	25.6	209	51.0	96	23.4
I find the guidance, support, and assistance provided by academic authorities in distance education conditions to be satisfactory.	105	25.6	230	56.1	75	18.3
Despite the COVID-19 pandemic, I would have preferred our practical education to continue.	253	61.7	89	21.7	68	16.6
I am not sure about what is expected of me academically in distance education conditions.	206	50.2	154	37.6	50	12.2
My academic performance is declining in distance education conditions.	224	54.6	123	30.0	63	15.4
I do not believe that my academic performance is being evaluated fairly in distance education conditions.	199	48.6	144	35.1	67	16.3
I have considered or thought about suspending my education due to distance learning.	104	25.4	87	21.2	219	53.4
I feel that I am falling behind in my practical lessons.	276	67.3	97	23.7	37	9.0

The average score of the CTAR was 51.3±17.0 points, ranging from 23.0 to 92.0 (Table 3). According to the classification by Thomas et al. (2018), this score is considered moderate. Therefore, Hypothesis 1 ($1H_1$), which proposed that "Undergraduate health sciences students receiving distance education have high levels of cognitive test anxiety," *has not been accepted.*

Table 3

Distribution of Students According to Cognitive Test Anxiety Scale Scores (n=410)

Scale Score Averages	$\bar{X}$	Ss	Min	Max	Range	α	Normal Distribution
Cognitive Test Anxiety Scale	51.3	17.0	23.0	92.0	23-92	0.960	p:0.001 Not suitable

The mean CTAR scores significantly differed among students who lived with a roommate (KW=9.785, p=0.008, 95% CI [59.69–67.75]), had economic concerns (KW=10.492, p=0.005, 95% CI [53.65–63.35]), and were studying in the field of dentistry (KW=22.550, p=0.001, 95% CI [52.97–62.55]) (Table 4). These findings indicate that sociodemographic factors have a meaningful impact on cognitive test anxiety levels. Consequently, Hypothesis 2 ($2H_1$), which posited that "Cognitive test anxiety scores differ among undergraduate health sciences students receiving distance education based on various sociodemographic characteristics," *has been accepted*.

The scores of cognitive test anxiety are significantly higher among those who are not satisfied with distance education (KW=16.98, p=0.001, 95% CI [55.69–65.95]), have a negative perception of personal academic quality and manual skills (KW=18.250, p=0.023, 95% CI [50.66–56.34]), feel uncertain about demanding expectations from them (KW=12.120, p=0.026, 95% CI [39.23–46.69]), and feel unsecure about fair examination (KW=9.563, p=0.s045, 95% CI [44.41–52.63]), have limited technological resources (KW=24.205, p=0.046, 95% CI [39.04–57.63]) The hypothesis $3.H_1$, which states “Cognitive test anxiety scores differ among undergraduate health sciences students receiving distance education based on learning conditions.” *has been accepted* (Table 4).

Table 4

Distribution of Students' Cognitive Test Anxiety Scale Score Averages According to Various Variables (N=410)

Variables	CTAR Total Score Average					
	n	$\bar{X}$	Ss	KW	MWU Z	p
Gender (n=409)						
Female	320	52.03	16.93		12470.0	0.073
Male	89	48.74	17.54		-1.195	
Field of Study						
(1)Nursing	145	48.43	16.07	22.550		**0.001**
(2)Medicine	91	47.85	16.81			
(3)Dentistry	56	57.76	18.28			1=2=4=5=6<3
(4)Midwifery	46	54.06	15.12			
(5)Physical Therapy	43	56.97	17.01			
(6)Other	29	51.65	18.36			
People Spent the Pandemic with						
(1)With my family	331	56.18	12.60	9.785		**0.008**
(2)With my roommate	66	63.72	16.69			1=3<2
(3)Alone at home	11	50.49	21.29			
Having Economic Concern						
(1)A lot	264	50.60	1.08	10.492		**0.005**
(2)Somewhat	94	49.87	1.52			3<1=2
(3)Do not have	50	17.50	2.47			
Satisfaction with Distance Education Vocational Courses						
Satisfied	89	48.34	15.32	16.98		**0.001**
Partially Satisfied	257	50.00	15.81			1=2<3
Not Satisfied	64	60.82	20.92			

Note. In nonparametric analyses involving multiple independent groups, post-hoc group differences were assessed using pairwise Mann-Whitney U tests.

CTAR=Cognitive Test Anxiety Scale-Revised

4.Conclusion, Discussion and Suggestions

4.1. Distance Education Satisfaction of Undergraduate Health Sciences Students Receiving Distance Education

Distance education has been a longstanding, effective method for training professionals in the field of health sciences, and it is continuously evolving and improving. However, the rapid need to adapt to unforeseen conditions, such as the COVID-19 pandemic, caught many educational institutions and academics unprepared. Inexperience, limited time for planning and evaluation, and educators' challenges in adapting to digital transformation have posed significant difficulties, particularly during unexpected events like pandemics (Comparcini et al., 2022).

Numerous studies conducted globally have highlighted concerns regarding student satisfaction with distance education, particularly among health sciences students. While some findings suggest that synchronous distance education may offer advantages in terms of satisfaction (He et al., 2021), a broader body of research points to low or moderate satisfaction levels among students during the COVID-19 pandemic (Hjiej et al., 2022; Karadağ & Yücel, 2020; Tabatabaeichehr et al., 2022). Key influencing factors include challenges in communication, increased workload, limited engagement, lack of interactivity, and students' perceived inability to meet learning outcomes effectively (Elshami et al., 2021; Li et al., 2021; Oducado & Estoque, 2021). Our findings are consistent with these results, revealing a notably low satisfaction rate of 18.0% among health sciences students who transitioned to distance education, reinforcing global concerns about the effectiveness and acceptance of this learning modality in practice-based disciplines. It is plausible that students' challenges in comprehending educational goals and outcomes play a substantial role in a considerable proportion perceiving their

academic performance as less than satisfactory. These findings stress the importance of enhancing curriculum structures to enhance satisfaction through accessible and high-quality approaches. It is imperative for students to recognize the potential within distance education and perceive its value in terms of opportunities for self-directed learning. considering the current circumstances and the potential for similar events in the future, distance education may become more prevalent than ever, making it necessary for students to become comfortable with this mode of education too.

Numerous factors have been identified as significantly influencing students' satisfaction with distance education, including demographic characteristics, prior learning experience, adaptability of course materials, interactivity, use of multimedia, stress levels, and technological access (Li et al., 2021; Tabatabaeichehr et al., 2022). Network problems, in particular, have been shown to disrupt learning for a considerable proportion of students (Abbasi et al., 2020). Our findings further highlight these issues: six out of ten students preferred face-to-face education, and only a small proportion (17.2%) felt capable of coping effectively with the problems of distance education, while just 23.4% believed that educators successfully adapted to online teaching. These results suggest that student satisfaction is closely tied to their ability to adjust to new learning conditions and to their perceptions of faculty competence. Moreover, students who trusted that the challenges of distance education would not hinder their academic performance tended to report lower levels of cognitive test anxiety (Akar, 2018). This underlines the importance of adopting institutional management strategies—such as clear guidelines, contingency plans, and supportive action frameworks—to sustain student satisfaction and reduce anxiety in times of disruption.

Another major challenge in distance education is students' difficulty in fully understanding educational objectives and expectations, which has been consistently linked to lower satisfaction (Cassady & Finch, 2020; Sahin & Baz, 2021). Our findings strongly support this, as nearly half of the students (50.2%) expressed uncertainty about academic expectations, and a large majority (83.7%) believed they were not receiving equitable evaluations. These results indicate that unclear curricula and lack of transparency in evaluation processes substantially contribute to dissatisfaction. Addressing this issue requires adopting educational and managerial approaches that emphasize transparency and provide clear guidance, while also enriching curricula with multimedia resources to foster greater motivation and engagement in distance learning.

One of the most significant drawbacks of distance education in health sciences is the lack of hands-on experience in clinical skills, which many students perceive as a critical limitation (Abbasi et al., 2020; Kürtüncü & Kurt, 2020; Roick et al., 2023). Although some reviews suggest that distance education can be as effective as traditional education in terms of academic (Abualadas & Xu, 2023; He et al., 2021; McCutcheon et al., 2015), concerns remain regarding its adequacy for practice-based learning. Our findings strongly support these concerns, with nearly 90% of students reporting deficiencies in practical skills and 84.4% expressing discomfort with the assessment of vocational courses. These results underline that while theoretical knowledge may be effectively delivered online, students in practice-oriented disciplines continue to prefer face-to-face instruction due to its stronger contribution to clinical competence and overall satisfaction.

These results affirm that while students can acquire knowledge through online instruction, they exhibit higher satisfaction levels when taught face-to-face. This emphasizes the need for more interactive activities and access to multimedia studying resources to enhance students' engagement in self-regulated learning during distance education. One potential solution is to implement a hybrid learning model for medical students, combining both online and face-to-face educational methods.

4.2. Cognitive Test Anxiety Levels of Undergraduate Health Sciences Students Receiving Distance Education

Cognitive test anxiety is a specific form of anxiety related to cognitive processes, encompassing elements such as thinking, problem-solving, memory retrieval, and information handling (Schwarzer, 1984). In educational assessments, this form of anxiety may obscure students' genuine capabilities and negatively affect both physical and psychological well-being (Cassady & Johnson, 2002). Although some studies have suggested that online assessments may increase test anxiety, while others reported reduced anxiety compared to traditional settings, the overall findings remain inconsistent across investigations. Our results add to this limited body of knowledge by showing that undergraduate health sciences students experienced a moderate level of cognitive test anxiety (M = 51.3, SD = 17.0) during distance education, suggesting that the rapid transition to online learning may have exacerbated anxiety levels, particularly in practice-based disciplines.

While research on test anxiety in online assessments is limited, previous studies present mixed results. Some report that students with high test anxiety in traditional classrooms feel less anxious online (Cassady & Gridley, 2005; Stowell & Bennett, 2010), whereas others demonstrate increased anxiety and poorer performance in online exams (Woldeab & Brothen, 2019). Factors such as unfamiliarity with the system, lack of trust in assessment methods, and concerns about exam integrity have been identified as contributors to this heightened anxiety (Ajmal & Ahmad, 2019). Moreover, test anxiety has been closely linked to overall anxiety, reduced life satisfaction, and lower academic performance in distance education settings (Ajmal & Ahmad, 2019; Rehab, 2021). Our findings add to this debate by showing that health sciences students reported moderate levels of cognitive test anxiety, with higher scores among those dissatisfied with evaluation fairness and academic expectations, suggesting that concerns about assessment practices remain a key driver of anxiety in distance education.

The majority of previous research has focused on students who choose online courses and possess more experience with online learning. In contrast, during the COVID-19 pandemic, students were ill-prepared for and lacked experience in online learning. Therefore, both the pandemic and the adaptation to a new and rapidly changing educational system during this period inevitably posed more challenges for students, which may have elevated their test anxiety levels. Ahmad and Khan (2022) found that 28% of distance learners of language reported high cognitive test anxiety, with hesitation, perceived test bias, examiner characteristics, technical issues, and lack of feedback being identified as major issues related to the CTAR. In their intervention study on physics students' cognitive test anxiety, Chancey et al. (2023) found that the pre-intervention average score was above 75.0 points. Furthermore, a study by Cambaz and Ünal (2021) suggested that students who received traditional education before the pandemic demonstrated a higher level of cognitive flexibility compared to students who underwent distance education during the pandemic. Our findings are consistent with these concerns, as undergraduate health sciences students in our study reported a moderate level of cognitive test anxiety (M = 51.3, SD = 17.0), suggesting that the abrupt shift to online learning contributed to difficulties in adapting, reduced cognitive flexibility, and heightened anxiety. Considering that cognitive flexibility is a key precursor of anxiety (Thomas et al., 2018) further research is needed to clarify the long-term psychological impact of distance education on health sciences students.

4.3. Differences in Cognitive Test Anxiety Levels Based on Various Living and Academic Conditions

The level of cognitive test anxiety in distance education varied among individuals and was influenced by a range of sociodemographic variables. Our study revealed that cognitive test anxiety did not significantly differ between male and female students in the context of distance learning, which was

an unexpected finding. Traditionally, female students are often reported to show higher levels of cognitive anxiety than males, attributed to intrusive thoughts and heightened worrying (Comparcini et al., 2022). In contrast, male students are generally described as having higher self-efficacy in using digital tools and greater confidence in test-related situations (Ong & Lai, 2006; Roos et al., 2021). The absence of such a gender difference in our results suggests that the unique conditions of distance education—such as the sudden shift to online learning and the challenges of adapting to new environments—may have overshadowed typical gender-related patterns of cognitive test anxiety.

One of the key predictors of test anxiety is a student's personal perception of their academic achievements (Stojanovic et al., 2018). Therefore, it is expected that test anxiety would be higher in students who are dissatisfied with distance education, particularly those who feel that their practical skills have not improved (Mascret et al., 2021). Our study found that students with negative self-perceptions regarding their academic and clinical skills, as well as those who perceived unfairness in assessments, reported significantly higher levels of cognitive test anxiety. This suggests that dissatisfaction with distance education and perceived deficiencies in practical skills are key drivers of anxiety. Moreover, fostering clear goal orientations has been shown to help reduce test anxiety and enhance performance (Möcklinghoff et al., 2023). Taken together, these findings highlight the importance of designing distance education programs that strengthen students' confidence in their academic progress and provide transparent and fair evaluation processes.

The intensity of cognitive test anxiety in the context of distance education can vary based on various factors, including the quality of the online learning experience, the individual's extent of familiarity with technology, the nature of the tests, and the support provided by the educational institution (Ajmal & Ahmad, 2019). Cassady and Finch (2020) found that higher levels of test anxiety were associated with specific conditions: when learners primarily embraced either extrinsic or intrinsic goal orientations, when dealing with academic tasks where the outcome was uncertain, when learners employed passive learning strategies, and when learning strategies were more internally focused, as opposed to relying on externalized study behaviors. Therefore, it is expected that students in distance education programs, especially those in which educational goals are unclear and not well understood by them, will experience an increase in test anxiety. It can be inferred that their moderate-level anxiety may be associated with unclear educational objectives and low levels of satisfaction with distance education.

Comparcini et al. (2022) demonstrated that concerns related to achieving good grades ($\beta=0.42$, $p < 0.001$) were a significant factor contributing to anxiety levels. Notably, among first-year students, completing clinical placements was also identified as a significant predictor of test anxiety levels. In the context of cognitive test anxiety, our study particularly observed a notable increase in scores among fourth- and fifth-year students. This increase could potentially be attributed to students being in their final years of nursing and dentistry education. These final years are typically characterized by intensive clinical practices, including internships, which are critical during this phase of education. It can be speculated that this increase in anxiety scores might be related to concerns about addressing potential deficiencies in practical experience during this important year.

Our study showed that only two out of ten students were able to effectively manage the challenges of distance education, suggesting that difficulties in coping with these problems may trigger stress and lead to increased cognitive test anxiety. This finding supports previous research showing that internal and external challenges in distance education, such as technological barriers and lack of coping strategies, reduce satisfaction and elevate anxiety levels. For instance, disruptions in online learning and differences in institutional preparedness between developed and developing countries have been associated with lower satisfaction and higher CTAR scores (Abbasi et al., 2020). Similarly, satisfaction with distance education has been linked to metacognitive strategies and self-efficacy perceptions, which

are closely related to stress, test anxiety, and cognitive coping (Roick et al., 2023). Taken together, these results highlight the importance of equipping students with effective coping mechanisms and ensuring equitable learning environments across different contexts.

The findings of this study should be interpreted in light of several limitations. Our results are based on undergraduate students in health-related disciplines, many of whom were engaged in intensive practical courses, which may have influenced their perceptions of distance education. Because the data relied on self-reported measures of test anxiety and satisfaction, response bias is possible, as students may have unintentionally misrepresented their experiences or provided socially desirable answers. Furthermore, the study focused specifically on the cognitive dimension of test anxiety, limiting the exploration of other anxiety components that could also play an important role. The sample composition may also restrict generalizability, as some subgroups—such as nursing students—were not proportionally represented. Future research should aim to include a broader range of student groups, investigate additional dimensions of test anxiety, and examine more experienced learners in well-structured distance education settings. Finally, the cross-sectional design limits causal interpretation; longitudinal studies are needed to clarify the temporal relationships among distance education, satisfaction, and cognitive test anxiety.

The study's primary focus on the cognitive dimension of test anxiety is relatively unexplored in the existing literature. This unique perspective offers valuable insights into an area that has received limited attention. We present comprehensive findings concerning students' satisfaction with distance education, their understanding of academic expectations, perceptions of unfair evaluation, and deficiencies in practical skills.

During distance education, one out of every two students struggles to comprehend the academic expectations, and the majority lacks confidence in the fairness of the evaluation process. Most students believe that educators have difficulty adapting to the demands of distance education. Almost all students recognize gaps in their practical skills due to the absence of clinical exposure. Students experience a moderate level of cognitive test anxiety, with anxiety levels increasing depending on the specific field of health sciences, particularly for dentistry, living and learning environment discomfort, low perceived academic and clinical achievement, apprehension about examinations, and dissatisfaction with the distance education program.

This study suggests that it would be beneficial for distance education curricula, especially in health sciences, to adopt an institutional management approach characterized by transparency to address students' academic and physical concerns and effectively manage cognitive test anxiety. It is vital to develop and implement a curriculum program aligned with students' academic expectations and promote the development of clinical skills through up-to-date technology and resources. In addition, fostering a student-centered learning environment that supports autonomy and motivation can contribute to long-term academic success and well-being.

There is a clear need for improving distance education methods, with a strong recommendation for healthcare students to incorporate blended learning approaches. Both students and educators play a crucial role in enhancing learning quality by documenting and assessing the impact of ongoing changes. This process facilitates the adoption of new principles and practices for future learning and application. Furthermore, digitalization not only drives the advancement of medical education through active curriculum innovation and transformation but also marks a significant turning point for multiple disciplines. These substantial challenges should be considered opportunities to advance telehealth, employ adaptive research protocols, and adopt flexible approaches to clinical trials.

Acknowledgments

The authors declare no potential conflicts of interest with respect to the research, authorship, or publication of this article. The authors did not receive any financial support for the research, writing, and/or publication of this article. The study was conducted and reported with equal collaboration among the researchers.

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