

Test Anxiety and Academic Resilience in Online Exams Among Nursing Students: A Cross-Sectional Study

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ABSTRACT

Background: The rapid expansion of digital assessment methods in higher education has heightened interest in understanding psychological factors that influence student performance in online examinations. Nursing students often experience considerable academic and clinical pressures, which may increase their vulnerability to examination-related stress in online assessment settings. This cross-sectional study aimed to assess the levels of test anxiety and academic resilience among undergraduate nursing students participating in online examinations.

Methods: This cross-sectional study was conducted among 120 nursing students at Islamic Azad University of Kazerun, Iran, from April to May 2026, using convenience sampling. Data were collected through an online questionnaire containing demographic information, the Westside Test Anxiety Scale (WTAS), and the 29-item Iranian adaptation of the Academic Resilience Inventory (ARI) originally developed by Samuels. Pearson's correlation coefficient assessed the relationship between test anxiety and academic resilience, while multiple linear regression examined factors associated with test anxiety after adjusting for demographic and academic characteristics. Statistical significance was set at $p < 0.05$.

Results: The mean test anxiety score was 29.84 ± 7.12 (95% CI: 28.57–31.11), and the mean academic resilience score was 96.35 ± 14.28 (95% CI: 93.79–98.91). Mean resilience subscale scores were 42.75 ± 6.88 for Communication Skills, 32.14 ± 5.73 for Future Orientation, and 21.46 ± 4.19 for Positive Orientation and Problem-Solving. A significant negative correlation was observed between test anxiety and academic resilience ($r = -0.46$, $p < 0.001$).

Conclusion: Higher academic resilience was significantly associated with lower test anxiety among nursing students during online examinations. These findings highlight the potential importance of academic resilience in managing examination-related stress. Further longitudinal and interventional studies are recommended to investigate whether resilience-building strategies and psychological support can effectively reduce test anxiety and enhance students' academic well-being in virtual learning environments.

Keywords: Test Anxiety; Resilience; Psychological; Students; Nursing; Education; Distance

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Introduction

The widespread adoption of digital technologies in higher education, further accelerated by the COVID-19 pandemic, has significantly reshaped assessment practices worldwide, establishing online examinations as a widely used method of evaluating students across various academic disciplines (1). Nursing education, which traditionally integrates theoretical rigor with high-stakes clinical competency assessments, has been particularly affected by this transition (2, 3). Online examinations offer flexibility and continuity of education, while online testing approaches in nursing education have also been examined for their influence on students' learning and assessment experiences (4). Understanding the psychological determinants of academic performance in virtual assessment environments is therefore of growing importance.

Test anxiety refers to a situation-specific form of anxiety manifested through cognitive concerns, emotional distress, physiological reactions, and behavioral responses experienced in evaluative situations (5, 6). Cognitive-interference and achievement-emotion perspectives suggest that examination-related worry can disrupt concentration and performance (7). The extent of test anxiety varies across samples and measurement methods. In one Canadian university survey, 38.5% of respondents reported experiencing test anxiety during their university studies, while a study of Saudi health-professions students documented test anxiety and its association with academic characteristics (8, 9). Nursing students also experience test anxiety, although reported severity differs between studies: a systematic review described moderate-to-high anxiety as a concern, whereas a Malaysian nursing-student survey found moderate or severe anxiety in 27.6% of respondents (10, 11). Academic workload, examination demands, and performance expectations are among the contextual issues investigated in this literature (10, 11).

The shift to online examinations has

introduced additional stressors that may exacerbate anxiety (12). These include technological instability, unfamiliar assessment platforms, concerns about internet connectivity, perceived surveillance during remote proctoring, reduced opportunity for clarification, and decreased peer interaction (13). Recent research conducted during and following the COVID-19 pandemic has documented considerable psychological stress and changes in students' behavior related to remote online examinations (14). At the same time, broader evaluations of online learning have found equivalent or better course performance in some settings compared with pre-pandemic learning (15). These findings indicate that students' psychological experiences and academic outcomes in digital learning environments may vary by context. This inconsistency highlights the need for disciplinespecific investigation, particularly in nursing education, where assessment stakes are high.

In contrast to vulnerability factors such as anxiety, academic resilience has emerged as an important construct in educational psychology (16, 17). Academic resilience refers to students' capacity to respond adaptively to academic challenges and setbacks (18). Research on university students has examined resilience alongside self-efficacy, motivation, achievement, and psychological well-being (17, 19). Studies have also linked academic resilience with test anxiety (16, 18). Among nursing students, general psychological resilience has been examined in relation to self-compassion, engagement, motivation, and mental well-being (20); this broader resilience construct should not be assumed to be identical to academic resilience measured by a specific inventory.

Recent literature suggests an inverse relationship between test anxiety and academic resilience in populations including adolescents and university students (16, 18). However, these findings do not directly establish the same relationship among nursing students taking online examinations. As online learning and digital assessment have

become integrated into nursing education, understanding students' experiences in computer-based and remote assessment settings remains important (21). Research has documented medical students' views on online proctoring and broader concerns about authentication and integrity in online examinations (22, 23). Evidence specifically examining academic resilience and test anxiety together during online nursing examinations remains limited. Accordingly, this cross-sectional study aimed to assess test anxiety and academic resilience among nursing students participating in online examinations and to investigate their association.

Methods

Study Design and Setting

This cross-sectional study involved undergraduate nursing students enrolled at Islamic Azad University of Kazerun, Iran. Data were collected between April and May 2026, during a period in which online examinations were used as the primary method of theoretical assessment.

Participants and Sampling

The target population included all undergraduate nursing students in their first through fourth years of study who had completed at least one online theoretical examination ($N = 240$). The sample size was determined using Cochran's formula, incorporating a finite population correction. Given the lack of reliable estimates of test anxiety prevalence among nursing students participating in online examinations, a prevalence proportion of 50% ($p = 0.50$) was adopted to ensure maximum variability and a conservative sample size estimate. The calculation was based on a 95% confidence level ($Z = 1.96$) and a 5% margin of error ($d = 0.05$).

Accordingly, the online questionnaire was administered to 148 eligible nursing students through the *Porsline* platform using a convenience sampling approach. During the data collection period, 28 students either failed to complete the questionnaire or provided

incomplete responses and were subsequently excluded. Thus, data from 120 participants with fully completed questionnaires were included in the final statistical analysis, yielding a response rate of 81.1%.

The inclusion criteria required participants to be undergraduate nursing students who had completed at least one online examination during the current academic year and voluntarily agreed to participate in the study. Students with a self-reported history of severe psychiatric disorders or those who submitted incomplete questionnaires were excluded from the final analysis.

Tools/Instruments

Data were gathered through a three-section online questionnaire comprising demographic and academic information, the Westside Test Anxiety Scale (WTAS), for which Driscoll published a validation report in 2007 (24), and the Academic Resilience Inventory (ARI), originally developed by Samuels in 2004 and subsequently adapted for Iranian students (25, 26).

The first section gathered participants' demographic and academic information, including age, gender, academic year, Grade Point Average (GPA), living arrangements, internet access, and previous experience with online examinations.

Test anxiety was measured using the 10-item WTAS questionnaire, which evaluates students' examination-related concerns and negative thoughts. Each item was rated on a 5-point Likert scale ranging from 1 ("This statement does not describe my situation at all") to 5 ("This statement describes my situation very well"). Raw summed scores range from 10 to 50 and were used in the present descriptive and regression analyses, with higher scores indicating greater test anxiety. Only the total WTAS score was used in the correlation and regression analyses. In Driscoll's original scoring procedure, the raw sum is divided by 10 to yield a Test Anxiety score ranging from 1.0 to 5.0. The original interpretation bands are 1.0–1.9 comfortably low, 2.0–2.5 normal or average, 2.5–2.9 high

normal, 3.0–3.4 moderately high, 3.5–3.9 high, and 4.0–5.0 extremely high (24). These interpretation bands were not used to classify individual participants in the present report.

Validity and Reliability - The WTAS was selected based on the original validation study reported by Driscoll (24). In the present study, the scale demonstrated good internal consistency, with a Cronbach's alpha coefficient of 0.85.

Academic resilience was assessed using the 29-item Iranian adaptation of the ARI. Samuels originally developed a 40-item version in 2004 (25); Soltaninejad and colleagues subsequently examined an Iranian version and retained 29 items in three factors (26). The version described in this study consists of Communication Skills (13 items), Future Orientation (10 items), and Positive Orientation and Problem-Solving (6 items). Each item is rated on a five-point Likert scale from 1 ("Strongly disagree") to 5 ("Strongly agree"). The total score ranges from 29 to 145, with higher scores indicating greater academic resilience. The cited Persian adaptation, rather than the original 40-item inventory, is the relevant reference for the 29-item structure (26).

Validity and Reliability - Soltaninejad and colleagues evaluated the factor structure and internal consistency of the Iranian academic resilience inventory in samples of school and university students (26). They reported Cronbach's alpha coefficients of 0.63–0.77 for the subscales in the school-student sample and 0.62–0.76 in the university-student sample, rather than an alpha exceeding 0.77 for all scales. In the present study, the total 29-item questionnaire demonstrated a Cronbach's alpha coefficient of 0.89.

Data Collection

Data were collected through a three-section online questionnaire developed using the *Porsline* platform. The survey link was shared with eligible students through institutional email, WhatsApp, and domestic messaging applications. Before completing the questionnaire, participants were provided

with information about the study objectives and informed that participation was entirely voluntary. Students who consented to participate accessed the survey link and completed the questionnaire anonymously. The estimated time required to complete the questionnaire was approximately 10–15 minutes. To prevent duplicate responses, each participant was permitted to submit the questionnaire only once.

Data Analysis

Data were analyzed using SPSS software, version 23. Only questionnaires with complete responses were included in the analyses. The normality of continuous variables was examined using the Kolmogorov–Smirnov test. Pearson's correlation coefficient was applied to determine the relationship between test anxiety and academic resilience.

Covariates were selected with reference to earlier work on computer-based assessment, nursing-student test anxiety, and academic achievement (21, 27, 28), together with their relevance to the current online examination context. The model included age, gender, academic year, type of residence, GPA, internet access, and prior experience with online examinations. Internet access and prior online examination experience were included as context-specific variables; the cited studies should not be interpreted as having validated every covariate for this exact setting.

Multiple linear regression analysis was performed using the Enter method. Academic resilience and all potential confounding variables were entered simultaneously into the model. Categorical variables were coded using dummy variables before inclusion in the regression model. Female gender, first academic year, low GPA (<14), living with family, poor internet access, and no previous experience with online examinations were selected as the reference categories. Academic year, GPA, type of residence, and internet access were entered as dummy variables, while gender and previous experience with online examinations were entered as binary variables. Age was treated as a continuous

variable. Multicollinearity among the predictor variables was evaluated using tolerance statistics and Variance Inflation Factors (VIFs), with no significant multicollinearity identified. Statistical significance was defined as a P-value below 0.05.

Ethics - The study protocol was reviewed and approved by the Research Ethics Committee of Islamic Azad University, Kazerun Branch, Iran. All research procedures were conducted in accordance with the ethical principles of the Declaration of Helsinki and applicable national research ethics guidelines. Before completing the online questionnaire, eligible students received an electronic information sheet outlining the study objectives, procedures, voluntary nature of participation, and measures implemented to protect their privacy and confidentiality. Electronic informed consent was obtained from all participants before data collection. Students were informed that they could decline participation or discontinue the questionnaire at any stage without any effect on their academic standing or educational opportunities. No personally identifiable

information was collected, and questionnaire responses were handled confidentially and stored securely, with access restricted to the research team. Data were used exclusively for research purposes.

Results

The participants were predominantly female (65.0%) and aged 21–23 years (46.7%). Most students had a moderate GPA (56.7%) and lived with their families (58.3%). Regarding internet access, 45.0% reported good access, while 36.7% reported moderate access. Most participants (68.3%) had previous experience with online examinations (Table 1).

The descriptive statistics for test anxiety, academic resilience, and the academic resilience components are presented in Table 2. The mean test anxiety score was 29.84 ± 7.12 , and the mean academic resilience score was 96.35 ± 14.28 .

Pearson's correlation analysis demonstrated a statistically significant negative association between test anxiety and academic resilience, indicating that higher levels of academic resilience were associated with lower levels of test anxiety among nursing students (Table 3).

Table 1: Demographic and academic characteristics of nursing students

Variables	Category	n (%)
Age (years)	18–20	34 (28.3)
	21–23	56 (46.7)
	≥24	30 (25.0)
Gender	Female	78 (65.0)
	Male	42 (35.0)
Academic year	1st year	28 (23.3)
	2nd year	32 (26.7)
	3rd year	30 (25.0)
	4th year	30 (25.0)
GPA	Low (<14)	22 (18.3)
	Moderate (14–17)	68 (56.7)
	High (>17)	30 (25.0)
Type of residence	With family	70 (58.3)
	Dormitory	32 (26.7)
	Living independently	18 (15.0)
Internet access	Good	54 (45.0)
	Moderate	44 (36.7)
	Poor	22 (18.3)
Previous experience with online exams	Yes	82 (68.3)
	No	38 (31.7)

GPA: Grade Point Average.

Table 2: Descriptive statistics of main variables and academic resilience components

Variables	Mean±SD	Min–Max
Test anxiety	29.84±7.12	14–46
Academic resilience	96.35±14.28	61–132
• Communication skills	42.75±6.88	25–60
• Future orientation	32.14±5.73	17–47
• Positive orientation and problem-solving	21.46±4.19	10–29

SD: Standard Deviation

Table 3: Correlation Between Test Anxiety and Academic Resilience

Variables	r	95% CI	P-Value
Test anxiety vs. academic resilience	-0.46	-0.59 to -0.31	<0.001

CI: Confidence Interval.

Table 4: Multivariable linear regression analysis of factors associated with test anxiety

Independent variables	Category	B	SE	β	t	P-Value	95% CI for B
Academic resilience		-0.21	0.05	-0.42	-4.32	<0.001	-0.31 to -0.11
Age		-0.38	0.27	-0.10	-1.41	0.161	-0.92 to 0.16
Gender	Female (reference)	-	-	-	-	-	-
	Male	-1.12	0.98	-0.08	-1.14	0.257	-3.06 to 0.82
Academic year	1st year (reference)	-	-	-	-	-	-
	2nd year	-0.41	1.21	-0.03	-0.34	0.736	-2.81 to 1.99
	3rd year	-0.82	1.18	-0.07	-0.69	0.492	-3.16 to 1.52
	4th year	-1.37	1.24	-0.11	-1.10	0.274	-3.83 to 1.09
GPA	Low (<14) (reference)	-	-	-	-	-	-
	Moderate (14–17)	-1.18	0.86	-0.10	-1.37	0.174	-2.89 to 0.53
	High (>17)	-2.76	1.09	-0.18	-2.53	0.013	-4.92 to -0.60
Residence	With family (reference)	-	-	-	-	-	-
	Dormitory	0.58	0.72	0.06	0.81	0.420	-0.85 to 2.01
	Living independently	0.94	0.84	0.09	1.12	0.265	-0.72 to 2.60
Internet access	Poor (reference)	-	-	-	-	-	-
	Moderate	-0.86	0.79	-0.08	-1.09	0.278	-2.43 to 0.71
	Good	-2.14	0.94	-0.15	-2.28	0.025	-4.00 to -0.28
Previous online exam experience	No (reference)	-	-	-	-	-	-
	Yes	-1.48	1.02	-0.10	-1.45	0.150	-3.50 to 0.54

Reference categories are identified in parentheses; B: Unstandardized regression coefficient; β : Standardized regression coefficient; CI: Confidence Interval; GPA: Grade Point Average; SE: Standard Error; Model statistics: $R^2 = 0.29$; Adjusted $R^2 = 0.20$; $F(13, 106) = 3.33$; $p < 0.001$.

Multiple linear regression analysis showed that academic resilience remained significantly and inversely associated with test anxiety after adjustment for potential confounders ($\beta = -0.42$, $p < 0.001$). Compared with the reference groups, students with a high GPA ($\beta = -0.18$, $p = 0.013$) and good internet access ($\beta = -0.15$, $p = 0.025$) had significantly lower test anxiety. No significant differences were observed across academic year or residence categories. The overall

model explained 29% of the variance in test anxiety ($R^2 = 0.29$, adjusted $R^2 = 0.20$, $F(13, 106) = 3.33$, $p < 0.001$). No evidence of multicollinearity was observed among the independent variables, with tolerance values ranging from 0.48 to 0.91 and VIF values ranging from 1.10 to 2.08 (Table 4).

Discussion

The present study examined the relationship between test anxiety and academic resilience

among nursing students participating in online examinations. The findings indicated that students experienced notable levels of test anxiety while demonstrating academic resilience. A significant inverse association was observed between academic resilience and test anxiety, suggesting that students with greater academic resilience tended to experience lower levels of examination-related anxiety. This association remained statistically significant after controlling for potential confounding factors. Additionally, higher academic performance and better internet access were significantly associated with lower levels of test anxiety, highlighting the potential importance of both individual psychological resources and technological conditions in students' experiences of online examinations.

The observed inverse association between academic resilience and test anxiety is consistent with findings in other educational populations, although their direct applicability to nursing students in online examinations remains uncertain. Putwain and colleagues found that greater resilience was associated with lower test anxiety and better test performance in children at the end of primary schooling, not in nursing students (29). Similarly, studies involving Turkish adolescents and other students have reported inverse associations between academic resilience and test anxiety (16, 18). Higher resilience may help students manage the emotional demands of examinations, but the current cross-sectional design cannot establish whether resilience reduces anxiety, anxiety influences resilience, or both reflect other factors.

The relationship observed in this study may also be explained from a theoretical perspective. According to Cognitive Interference Theory, anxiety-related worries consume cognitive resources and reduce attention and working memory during examinations (30).

Students with higher levels of academic resilience may be better able to manage negative emotions and maintain focus despite examinations. Control-Value Theory also suggests that students' perceptions of control

are relevant to achievement-related emotions (7). These mechanisms are plausible in virtual assessments, where learners may face technological challenges alongside academic demands. In a large Egyptian nursing-student study, Hamed and colleagues examined test anxiety in relation to feedback sensitivity and hardiness, and reported associations with gender, academic level, income, and previous grades (31). Hardiness in that study should not be presented as a direct measure of academic resilience.

The test anxiety observed in the current study is consistent with the broader literature identifying examination-related anxiety as a concern in nursing education. An Omani qualitative study involving 30 nursing students reported that approximately 80% of its focus-group participants described moderate-to-severe test anxiety; this was not a population prevalence estimate (32). A systematic review likewise identified test anxiety as an important issue in nursing education (10). Digital assessment may introduce additional concerns: research has investigated student acceptance of online exams, the measurement of online-exam anxiety, and associations among test anxiety, online engagement, and academic achievement (33–35). These sources address related but distinct aspects of online assessments and do not all directly establish that internet interruptions or remote proctoring cause anxiety.

Consistent with this interpretation, the regression analysis demonstrated that students with good internet access experienced significantly lower levels of test anxiety than those with poor internet access. Reliable internet connectivity may reduce concerns regarding technical failures, interrupted examinations, or loss of responses, allowing students to focus more effectively on examination tasks (34). This observation highlights technological infrastructure as an important contextual factor influencing students' psychological experiences during online examinations. Accordingly, these findings emphasize the importance of ensuring reliable internet connectivity

and providing sufficient technical support when developing and implementing online assessment environments.

The findings of the current study further revealed that students with higher GPAs experienced significantly lower levels of test anxiety compared with their counterparts with lower GPAs. This finding may reflect greater academic self-efficacy, more effective learning strategies, and increased confidence among academically successful students. Students with stronger academic performance may perceive examinations as more manageable and feel better prepared to cope with academic demands, thereby experiencing lower levels of anxiety. Previous research has similarly suggested that academic achievement is associated with lower examination-related anxiety, supporting the interpretation that academic preparedness may partially buffer students against stressful assessment situations (36, 37).

In contrast, age, gender, academic year, place of residence, and prior experience with online examinations were not significantly associated with test anxiety after controlling for other variables. This pattern may indicate that demographic characteristics may have a weaker association with test anxiety than psychological resources and contextual conditions in the present sample. However, these findings should be interpreted cautiously because the observed relationships may vary across different educational settings and populations. Further multicenter and longitudinal research is needed to clarify the contribution of these demographic factors to students' examination anxiety.

The mean academic resilience score in the present sample was 96.35 out of a possible 145; without validated interpretive cutoffs for this sample, this score should not be classified as "high" solely from its numerical value. In a study of first-year university students, Ayala and Manzano examined resilience and engagement in relation to academic performance (38). Resilience theory also conceptualizes adaptation to adversity as a dynamic process (39). These perspectives

support further investigation of students' adaptive capacities, but this cross-sectional study did not evaluate an intervention.

The findings of the present study suggest that test anxiety during online examinations is associated with a range of psychological, academic, and contextual factors. Among these, academic resilience emerged as the strongest independent factor associated with lower levels of test anxiety, while higher academic achievement and more reliable internet access were also associated with reduced anxiety. These findings underscore the potential importance of academic resilience in understanding examination-related anxiety and highlight the need for supportive educational environments and adequate technological infrastructure for nursing students. Furthermore, they suggest that academic resilience may represent a valuable focus for future research aimed at identifying strategies to alleviate test anxiety. Nevertheless, given the cross-sectional nature of the study, longitudinal and interventional research is needed to establish the direction of these associations and determine whether strengthening academic resilience and improving learning conditions can effectively reduce test anxiety among nursing students.

Limitations and Suggestions

Several limitations should be considered when interpreting the findings of the present study. First, the cross-sectional design limits the ability to establish temporal relationships or draw causal inferences regarding the association between academic resilience and test anxiety. Second, the use of self-report questionnaires to assess both primary variables may have introduced response bias and common-method variance. The WTAS measures general test anxiety rather than anxiety attributable specifically to online assessment, so the design cannot isolate the online component of participants' anxiety. Furthermore, the recruitment of participants through convenience sampling at a single university may have increased the risk of selection bias and limited the

generalizability of the findings to nursing students in other educational institutions and settings. Additionally, the exclusion of students with severe psychiatric disorders relied exclusively on self-reported information, without confirmation through standardized psychological screening tools or clinical assessments, potentially resulting in participant misclassification. Moreover, the use of an online survey may have introduced further selection bias by favoring students with reliable internet access and greater familiarity with digital platforms, potentially underrepresenting those with limited connectivity or lower digital literacy. Finally, the achieved sample size was smaller than initially calculated because of incomplete responses, which may have reduced the statistical power to detect significant associations. These limitations should be considered when interpreting the results and highlight the need for future multicenter studies employing longitudinal designs, more representative sampling methods, and validated assessment procedures.

Conclusion

This study found that higher academic resilience was associated with lower test anxiety among nursing students participating in online examinations. Higher academic achievement and better internet access were also associated with lower test anxiety. These findings highlight the potential importance of academic resilience and supportive technological conditions in students' online assessment experiences. However, the cross-sectional design cannot establish a causal relationship, and the available scores do not by themselves justify classifying all participants into severity categories. Further longitudinal and interventional studies are warranted to determine whether strategies designed to strengthen academic resilience can reduce test anxiety among nursing students.

Abbreviations

AI: Artificial Intelligence

ARI: Academic Resilience Inventory

CI: Confidence Interval

GPA: Grade Point Average

SD: Standard Deviation

SE: Standard Error

VIF: Variance Inflation Factor

WTAS: Westside Test Anxiety Scale

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Authors' Contribution

MS, FM, ZA, TP, SJ, and MHT contributed to the development and planning of the study. MS and FM contributed to data collection. ZA and TP contributed to data analysis and interpretation. SJ and MHT contributed to research supervision and critical revision of the manuscript. All authors contributed to the preparation and revision of the manuscript, approved the final version, and agreed to be accountable for the integrity of the work.

Conflict of Interest

The authors declare that they have no financial, personal, or professional conflicts of interest that could have influenced the design, conduct, analysis, interpretation, or reporting of this study.

Ethical Considerations

This study was approved by the Ethics Committee of Islamic Azad University, Kazeroon Branch (approval code: IR.IAU.KAU.REC.1405.033). All procedures were conducted in accordance with the principles of the Declaration of Helsinki. Prior to participation, students were provided with an electronic informed consent form that explained the purpose of the study, the confidentiality of their data, and their right to withdraw at any time without any academic

consequences. No identifying information was collected, and all responses were stored securely.

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Availability of Data and Materials

The datasets generated and/or analyzed during the current study are not publicly available due to ethical considerations and the need to protect participants' confidentiality. However, the data supporting the findings of this study are available from the corresponding author upon reasonable request, subject to applicable ethical and institutional requirements.

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