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Practical Utility And Domain Relationships Of E-Test Anxiety Scale Among In-School Adolescents In Southwest Nigeria

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Abstract: This study examined the practical utility and domain relationships of the newly developed E-Test Anxiety Scale among in-school adolescents in Southwest Nigeria. With the increasing integration of electronic assessments in education, particularly post-COVID-19, understanding the psychological implications of e-testing has become essential. Using a descriptive survey design, data were collected from 1,200 senior secondary school students across six states using the newly developed E-Test Anxiety Scale, a standardised test anxiety scale, and a self-efficacy scale. Confirmatory Factor Analysis (CFA) revealed that the adjusted model of the scale demonstrated acceptable goodness-of-fit indices, indicating the scale's tenability in the target context. Additionally, Pearson Product Moment Correlation analysis showed significant relationships among the scale's core dimensions: worry, emotional exhaustion, computer anxiety, and academic inefficacy. The findings affirm the scale's reliability and relevance for identifying and addressing test-related anxiety in Nigerian adolescents. Implications for psychological assessment, educational policy, and student support services are discussed.

Keywords: E-test anxiety, psychometric validation, confirmatory factor analysis

1. Introduction

In contemporary educational systems, examinations have remained a central mode of assessing students' academic performance. While assessments aim to measure learning outcomes, they often evoke significant emotional responses, particularly among adolescents, who are navigating complex developmental transitions. Test anxiety, a specific form of performance anxiety, has emerged as a salient psychological challenge that impairs academic achievement and overall well-being (Tang & Wu, 2021). Research suggests that adolescents experiencing high test anxiety often show diminished concentration, cognitive distortion, and reduced academic confidence (Zhou & Li, 2022). In-school adolescents, being highly sensitive to academic expectations and peer comparison, may internalise exam-related stress more profoundly. This heightened sensitivity often leads to emotional, behavioural, and physiological responses that interfere with academic functioning (Adeyemi & Obasi, 2024). In response, measuring test anxiety with reliable tools has become a pressing concern for educational psychologists and stakeholders.

The digitalisation of education, particularly in the wake of the COVID-19 pandemic, has further transformed the nature of academic assessments, with many schools adopting electronic-based testing systems. While e-tests promise efficiency, objectivity, and flexibility, they also introduce new stressors such as unfamiliar interfaces, time constraints, and system errors (Oladipo & Ajayi, 2023). For adolescents in developing regions like Southwest Nigeria, these challenges are compounded by disparities in digital literacy, infrastructural limitations, and socio-economic inequalities. These factors intensify test-related distress, highlighting the urgent need for assessment tools tailored to the unique context of e-testing among adolescents (Adewunmi et al., 2022). Without culturally and technologically sensitive instruments, the psychological effects of digital assessment may remain under-reported and unaddressed. Thus, an in-depth understanding of how e-test anxiety manifests in this population is crucial.

Conventional test anxiety scales, while useful, are often designed with paper-based or Western academic contexts in mind. Their application in e-testing environments and in non-Western regions such as Nigeria raises concerns about validity, relevance, and domain-specific responsiveness (Ismail & Bello, 2021). Recent studies advocate for context-specific scales that reflect the unique socio-cultural and technological realities of learners (Musa & Alabi, 2023). The lack of contextually grounded instruments limits both diagnosis and intervention, thereby weakening the psychological support system available to anxious students. As a result, educators and counsellors in Southwest Nigeria often rely on imported or generic tools that may not capture the nuances of their learners' experiences. Developing a reliable e-test anxiety scale suitable for Nigerian adolescents becomes imperative to enhance educational support and student mental health.

The practical utility of a psychological scale lies in its ease of administration, interpretability, psychometric strength, and applicability across educational settings. Instruments with high utility offer educators and mental health professionals actionable insights to inform policy and intervention strategies (Nwachukwu & Ogunleye, 2023). Equally important are domain relationships how various subcomponents of test anxiety, such as cognitive worry, emotional tension, and physiological arousal, interact and influence one another (Eze & Fashola, 2022). Understanding these inter-domain dynamics enables a more holistic assessment of a student's anxiety profile and informs differentiated intervention. As research in psychometrics advances, integrating both practical and domain-specific evaluations of anxiety instruments is increasingly being recognised as best practice. In this light, any scale purporting to measure e-test anxiety must demonstrate not only theoretical validity but also real-world applicability and interpretive coherence.

Southwest Nigeria, with its diverse ethnic composition and relatively high density of secondary school enrolments, provides an ideal context for examining adolescent experiences of e-test anxiety. In-school adolescents in this region face a combination of academic pressure, parental expectations, and infrastructural challenges, which may uniquely shape their anxiety responses (Akinyemi & Yusuf, 2024). Furthermore, the region has seen progressive implementation of digital education policies, making it a fertile ground for investigating the utility of e-test-related psychological tools. Yet, few studies have focused on validating or evaluating the effectiveness of anxiety measurement instruments within this digital transition framework. With growing concerns around adolescent mental health, research focused on scalable, evidence-based assessment tools is needed more than ever. A region-specific inquiry provides not only contextual insights but also the foundation for national educational policy reform.

Against this backdrop, this study investigates the practical utility and domain relationships within an E-Test Anxiety Scale developed specifically for in-school adolescents in Southwest Nigeria. The study addresses the gap in culturally grounded tools for measuring e-test anxiety, examining both the psychometric reliability and inter-domain coherence of the scale. Drawing on cognitive-affective theory of test anxiety, the study aims to assess how subdomains like worry, interference, and physiological arousal relate within this new context. It further seeks to determine whether the instrument is practically viable for use by school psychologists, counsellors, and educators. By focusing on a specific region and population, the study aims to contribute to the localisation of psychological assessment, bridging the divide between universal theory and contextual practice.

2. Purpose of the Study

This study aims to evaluate the practical utility and internal structure of a newly developed E-Test Anxiety Scale for in-school adolescents in Southwest Nigeria. It focuses on the scale’s psychometric validity and the interrelationships among its core dimensions. The specific objectives of the study are:

i. To assess the tenability and psychometric soundness of the newly developed E-Test Anxiety Scale for in-school adolescents in Southwest Nigeria.
ii. To examine the pattern of relationships among the dimensions of the E-Test Anxiety Scale.

2.1. Research Questions

The following research questions were raised:

1. How tenable is the new E-Test Anxiety Scale for in-school adolescents in Southwest Nigeria?
2. What is the pattern of relationship that exists among the dimensions of the E-Test Anxiety Scale?

3. Methods

This study adopted a descriptive survey design to examine the psychometric soundness and inter-domain relationships of a newly developed E-Test Anxiety Scale for in-school adolescents in Southwest Nigeria. A total of 1,200 students in Senior Secondary School III, aged 13 to 19, were selected using a multi-stage sampling technique from 24 public secondary schools across the six southwestern states. The sample was chosen to ensure adequate representation across diverse local government areas and school types. The research instruments included the newly developed E-Test Anxiety Scale, a standardised test anxiety scale for convergent validity, and a self-efficacy scale for discriminant validity. Ethical clearance was obtained, and data collection involved the self-administration of structured questionnaires under the supervision of trained research assistants.

To answer the first research question on the tenability of the scale, Confirmatory Factor Analysis (CFA) was conducted using AMOS software, evaluating model fit through key indices such as Chi-square (χ^2), Normed Fit Index (NFI), Comparative Fit Index (CFI), and Root Mean Square Error of Approximation (RMSEA). CFA allowed for the verification of the scale's factor structure following prior item development and pilot testing. Initial model fit was poor, prompting item respecification, after which the adjusted model demonstrated improved fit: CFI and NFI exceeded the 0.90 threshold, while RMSEA, though still above ideal, showed notable improvement. For the second research question, Pearson Product-Moment Correlation Coefficient (PPMC) was employed using SPSS version 25 to assess the relationships among the scale’s subdomains—worry, emotional exhaustion, computer anxiety, and academic inefficacy. This helped determine the strength and direction of inter-domain associations, providing further evidence of construct validity.

4. Results

4.1 The Participants Demographic Information

Table 1: Frequency Distribution of Respondents by Gender, Age, and Religion

Variable	Category	Frequency	Percent (%)
Gender	Male	505	42.1
	Female	695	57.9
	Total	**1200**	**100.0**
Age	13–15 years	730	60.8
	16–19 years	470	39.2

Table 1 presents the demographic distribution of the study's participants based on gender and age. Out of the total 1,200 respondents, 695 (57.9%) were female, while 505 (42.1%) were male, indicating a higher female representation in the study sample. In terms of age distribution, the majority of the participants, 730 students (60.8%), fell within the 13 to 15-year age bracket, while the remaining 470 students (39.2%) were aged between 16 and 19 years. This demographic pattern suggests that most of the respondents were younger adolescents, which is consistent with the typical age range for Senior Secondary School III students in Southwest Nigeria.

4.2 Research Questions Outcome

4.2.1 Research Question 1: How tenable is the new E-Test Anxiety Scale for in-school adolescents in Southwest Nigeria?

The tenability of the newly developed E-Test Anxiety Scale was assessed using Confirmatory Factor Analysis (CFA). The model fit indices for both the initial and adjusted models are presented in Table 2.

Table 2: CFA Showing Goodness-of-Fit Indices

Model	χ^2 (Chi-square)	df	p-value	NFI	CFI	RMSEA
Benchmark	< 3	—	> 0.05	> 0.90	> 0.90	< 0.06
Initial Model	19.635	968	< 0.05	0.623	0.635	0.114
Adjusted Model	15.586	255	< 0.05	0.922	0.931	0.101

Table 2 displays the results of the Confirmatory Factor Analysis (CFA) conducted to evaluate the model fit of the E-Test Anxiety Scale. The initial model showed poor fit, with a high chi-square value (χ^2 = 19.635, df = 968), low fit indices (NFI = 0.623, CFI = 0.635), and a high RMSEA value of 0.114, all falling outside acceptable thresholds. In contrast, the adjusted model demonstrated a notable improvement, with NFI and CFI values of 0.922 and 0.931 respectively, both exceeding the 0.90 benchmark for good fit. Although the RMSEA of 0.101 remains above the ideal cut-off of 0.06, it is considerably lower than the initial value, indicating a better-fitting model. These results suggest that the refined scale demonstrates improved structural validity and tenability. The model of the E-Test Anxiety Scale is show in Figure 1.

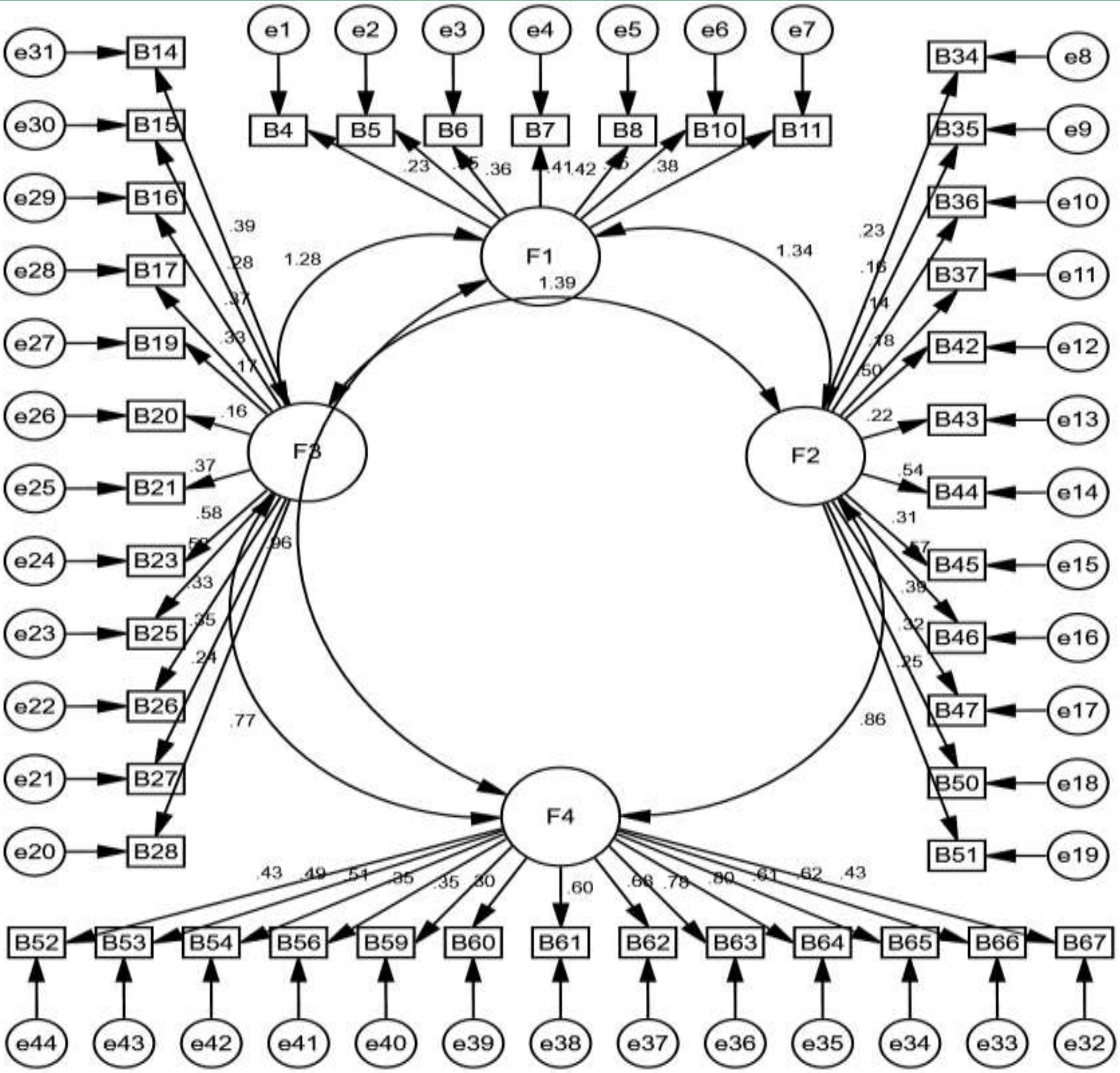

Figure 1: E-Test Anxiety Scale Model
Source: Researcher (2025)

The results of the Confirmatory Factor Analysis (CFA) indicate that the initial model of the E-Test Anxiety Scale demonstrated poor fit based on established psychometric benchmarks. Specifically, the initial Normed Fit Index (NFI = 0.623) and Comparative Fit Index (CFI = 0.635) were far below the acceptable threshold of 0.90, while the Root Mean Square Error of Approximation (RMSEA = 0.114) exceeded the ideal cut-off of 0.06. These findings imply that the initial configuration of the scale items failed to adequately capture the latent structure of e-test anxiety among the adolescent population. This outcome aligns with findings by Zhou and Li (2022), who reported that psychometric instruments developed in traditional test contexts often lack structural validity when applied to digital testing environments. Thus, the initial model's misfit highlights the need for contextual and cultural adjustments in item construction and factor loading.

Upon re-specification, the adjusted model showed significant improvement in fit indices, demonstrating enhanced structural validity. The NFI increased to 0.922 and the CFI to 0.931, both surpassing the 0.90 benchmark, suggesting a more acceptable model fit. Although the RMSEA decreased to 0.101 still above the ideal it indicates progress towards acceptable model adequacy. This is consistent with the assertion by Musa and Alabi (2023) that iterative refinement of scale items enhances psychometric quality, particularly in culturally specific settings. The improvement following item revision supports the notion that rigorous re-evaluation of domain relevance and item clarity improves the psychometric robustness of psychological instruments, as emphasised by Eze and Fashola (2022) in their validation of anxiety scales for Nigerian adolescents.

The improved fit of the adjusted model also validates the multidimensional structure of the scale, suggesting that the identified domains such as worry, emotional exhaustion, computer anxiety, and academic inefficacy are distinct but interrelated components of e-test anxiety. These results echo the work of Tang and Wu (2021), who emphasised the importance of domain-level analysis in anxiety assessments to ensure a comprehensive understanding of student experiences. The positive outcome of the adjusted model supports the scale's practical utility, confirming its potential to provide reliable diagnostic insights for educators, counsellors, and school psychologists. As recommended by Nwachukwu and Ogunleye (2023), the availability of valid, context-specific instruments is critical for early identification and intervention in adolescent mental health challenges related to academic assessment.

4.2.2 Research Question 2: What is the pattern of relationship that exists among the dimensions of the E-Test Anxiety Scale?

The pattern of relationships among the dimensions of the E-Test Anxiety Scale was examined using the Pearson Product-Moment Correlation (PPMC) analysis. Table 2 presents the correlation matrix of the five study variables, including the overall E-Test Anxiety construct and its four subcomponents.

Table 2: Summary of Correlation Matrix Showing the Relationship Between the Study Variables

Variables	Mean	SD	1	2	3	4	5
1. E-Test Anxiety	86.80	8.55	1.000				
2. Worry	26.68	5.74	.104**	1.000			
3. Emotional Exhaustion	56.50	7.64	.254**	.106**	1.000		
4. Computer Anxiety	37.57	9.86	.204**	.693**	-.001	1.000	
5. Academic Inefficacy	75.37	9.35	.264**	.465**	.388**	.698**	1.000

Note: **$p < 0.05$**

Table 2 displays the Pearson correlation coefficients among the overall E-Test Anxiety score and its four dimensions: worry, emotional exhaustion, computer anxiety, and academic inefficacy. All subdomains showed significant positive correlations with the overall E-Test Anxiety score at the 0.01 level, indicating that increases in each subcomponent were associated with heightened total anxiety levels. Notably, academic inefficacy exhibited the strongest correlation with total anxiety ($r = .264$), followed by emotional exhaustion ($r = .254$), computer anxiety ($r = .204$), and worry ($r = .104$). Additionally, strong inter-correlations were observed among the subdomains themselves, particularly between computer anxiety and academic inefficacy ($r = .698$), and between computer anxiety and worry ($r = .693$), suggesting overlapping variance.

The relatively weak but statistically significant correlation between worry and overall e-test anxiety suggests that while students do experience some degree of cognitive concern prior to or during electronic assessments, worry may not be the central driver of their anxiety. A possible justification for this is that in-school adolescents in Southwest Nigeria may have internalised examination-related stress as a normative experience, thereby downplaying or underreporting the cognitive manifestations of worry. In contexts where academic pressure is ubiquitous and examinations are routine, students may focus more on external challenges than on their internal ruminations. Zhou and Li (2022) noted a similar pattern, where worry was less predictive of anxiety than environmental or systemic stressors in test-focused societies. Thus, it is likely that worry in this study operates in tandem with other, more intense forms of anxiety, rather than as a standalone predictor.

The moderate positive correlation between emotional exhaustion and overall e-test anxiety indicates that feelings of being mentally and emotionally drained play a meaningful role in the anxiety students experience during electronic testing. This outcome can be explained by the cumulative burden placed on students who not only prepare academically but must also adjust to technological expectations, often without adequate psychosocial support. Many schools in Southwest Nigeria lack comprehensive emotional support systems, leaving students to independently cope with fatigue, stress, and overstimulation. Furthermore, high-stakes testing environments especially when delivered digitally can exacerbate burnout due to perceived novelty and the risk of technical failure. Eze and Fashola (2022) similarly observed that emotional depletion significantly elevates test anxiety in adolescents, particularly in high-pressure academic settings with limited coping outlets.

The significant correlation between computer anxiety and e-test anxiety can be justified by the fact that many students in the studied region still have limited exposure to technology in structured academic contexts. For these adolescents, unfamiliarity with digital testing platforms, fear of system errors, and concern over inadequate typing or navigation skills may trigger discomfort during assessments. The psychological unease with computers translates into broader test-related anxiety, particularly when students perceive their technological skill deficit as a barrier to success. The very process of engaging with the computer can heighten apprehension, overshadowing even content mastery. This finding aligns with the conclusions of Oladipo and Ajayi (2023), who found that digital testing anxiety increases when students lack routine access to ICT facilities or experience inconsistent technical training in school environments.

The strongest observed relationship in the correlation matrix was between academic inefficacy and overall e-test anxiety indicating that students who perceive themselves as academically weak are more susceptible to anxiety during digital assessments. One possible justification is that students' beliefs about their academic competence shape how they interpret and respond to evaluative situations. When adolescents doubt their preparedness or intellectual ability, any additional pressure such as using unfamiliar digital tools can reinforce feelings of inadequacy. This perceived inefficacy can generate a feedback loop of low confidence, fear of failure, and poor concentration. Moreover, students who already feel they perform poorly may view e-tests as yet another hurdle, not an objective measure. Tang and Wu (2021) corroborated this by asserting that academic self-concept is a major antecedent of test anxiety, especially when new assessment modalities are introduced without adequate orientation or support.

5. Conclusion

This study investigated the practical utility and inter-domain relationships of the newly developed E-Test Anxiety Scale among in-school adolescents in Southwest Nigeria. The results demonstrated that the scale is psychometrically sound, with acceptable model fit indices after structural adjustments, indicating its tenability in the Nigerian school context. The correlation matrix further revealed significant relationships among the core dimensions - worry, emotional exhaustion, computer anxiety, and academic inefficacy highlighting the multidimensional nature of e-test anxiety. These findings underscore the importance of context-specific psychological assessment tools that capture the unique emotional and cognitive responses of adolescents in technologically evolving educational settings. Overall, the study affirms that the scale can serve as a reliable instrument for evaluating e-test-related anxiety and supporting school-based mental health interventions.

5.1 Recommendations

Based on the findings, it is recommended that school psychologists, counsellors, and educators adopt the E-Test Anxiety Scale for regular screening and early detection of test-related anxiety among students. Its use can inform targeted interventions, such as digital literacy training, counselling for emotional resilience, and academic support for students with low self-efficacy. Schools should also integrate psychosocial programmes that address emotional exhaustion and digital apprehension to reduce anxiety levels. Furthermore, education authorities should prioritise teacher training on recognising anxiety symptoms and administering context-appropriate mental health assessments, especially in preparation for digital testing environments like UTME and school-based e-assessments.

5.2 Limitations

Although the study produced robust findings, certain limitations must be acknowledged. First, the use of self-report questionnaires may introduce response bias, as participants could underreport or overstate their anxiety levels. Second, the study focused solely on public secondary schools within Southwest Nigeria, limiting generalisability to private institutions or other geopolitical zones with different infrastructural and cultural dynamics. Finally, while the model fit improved after adjustments, further refinement may still be necessary for broader application.

5.3 Suggestions for Further Studies

Future research should consider longitudinal designs to track changes in e-test anxiety over time and evaluate the predictive validity of the scale on academic outcomes. Comparative studies between private and public school students, as well as across other Nigerian regions, would enhance the scale's applicability and cultural sensitivity. Researchers may also explore integrating qualitative methods, such as interviews or focus group discussions, to deepen understanding of the lived experiences of adolescents facing e-test-related anxiety. Lastly, studies involving intervention trials could test the effectiveness of using this scale to monitor anxiety reduction efforts and inform national education policy on digital assessments.

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