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The relationship between test anxiety and pre-service teachers' performance in quantitative research methods

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ABSTRACT

The mere mention of mathematics and its related courses such as quantitative research methods drive down shivers and create anxiety among most students. However, this phenomenon has not will been addressed among preservice teachers. The purpose of this study was to examine the relationship between preservice teachers test anxiety and performance in quantitative research methods in education. And to achieve this purpose, a random sample of 313 preservice teachers from a teacher education University in Ghana were administered the test anxiety inventory (TAI) and the data analysed using both descriptive and inferential statistics. The results revealed a significant inverse relationship between test anxiety and preservice teachers' performance. Similarly, factors such as the examiner, the exam format, previous failures, examination time, presence of invigilator, and lack of adequate preparations were identified as determinants of test anxiety. In terms of coping strategies, it was revealed that respondents adopted cognitive, and educational strategies to mitigate the effect of test anxiety.

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1. INTRODUCTION

One of the essential functions of education in the past and present is the responsibility to impart knowledge, instil good values and enhance the skills and performance of individuals. Education for many people is considered as a special purpose vehicle for actualising aspirational goals to prepare individuals to handle societal issues [1]–[3]. From childhood education all the way to pre-tertiary levels, students are exposed to various activities and tasks in schools aimed at developing their cognitive, affective, and psycho-motor domains [4]. Although tertiary education performs similar roles, one of the major aims of receiving tertiary education is to offer specialized programs and courses to produce students with the required knowledge and competencies for personal and national development [5]–[9]. Some of these programmes are not only qualitative in nature but are also quantitative or mathematically inclined. According to Campbell and Taylor [10], mathematics related courses are noted to cause stirs in the minds of students. It often leads to significant concerns for students and affects students learning capabilities and performance. For most universities in Ghana and abroad, research methods are one of the compulsory courses that University students would have to study. Such courses, which are usually designed to provide students with statistical insight into the world of research to address social, cultural, educational, and economic issues are often a major force students contend with because of the level of statistics involved in the study. Students'

performance in this area has generally been unsatisfactory and declining [11]. This development raises issues of what could be the possible factors and sources for the decline in performance [12].

Although many factors have been linked to students' poor performance in the University, the role of psychological variables such as anxiety in assessment situations appears to have received little attention [13]–[18]. It is critical to assess students' performance during and after the instructional period to ascertain whether a given content has been mastered as well as to evaluate the teaching and learning process. Thus, both formative and summative assessments are mostly used to perform such functions. Because assessments are used to make decisions about students learning and future educational and career advancement the decision-making functions of assessment generate fear and misconceptions among students [19]. In this direction, Pitt *et al*. [20] observed that the discrepancies between decisions about students' performance and actual scores obtained bring about some anxiety among students. Further, according to Von der Embse *et al*. [21] assessments make students develop test anxiety due to the seriousness or consequences with interpretations and assessment decisions.

It is against this background that students' anxiety towards quantitative methods or statistics related courses is increasingly high among college students [11], [12], [22], [23]. This is because, the effect of test anxiety through the interplay of cognitive evaluation, physiological arousal, behavioural, and physical components usually operate to decrease the quality of students' potentials to perform academically [11], [24]. Generically, test anxiety is a sensation of worry, nervousness or uneasiness, and fear that occur when a student takes assessment or test in whatever form [25]. Test anxiety is widely viewed among researchers in the literature as a bi-dimensional construct with physiological, emotional, and cognitive components which operate in most cases to have a negative effect and causes failure among students [24]. This form of anxiousness might emerge abruptly or gradually. It can be chronic at times, but it can also be over in a few hours before, during, and after the test [24], [26], [27].

Emotionality is manifested physiologically during tests (e.g., raised galvanic skin conductance, increased heart rate, dizziness, sweaty palms, and nausea) as well as through panic-like feelings [28], [29]. Accordingly, Zeidner [30] postulates that worry and pessimistic thinking, self-criticism, or anxiety about the negative effects of failure that emerge during testing situations, form the cognitive component of test anxiety, while also causing students to 'freeze up' mentally and unable to remember the required information needed to pass a test. Amini and Reamen [31] argued that worry, which is an element of test anxiety, is more consistently connected with decline in academic test scores.

Test anxiety is a diverse and dynamic concept that covers numerous human feelings as well as physiological and behavioral reactions [32]. Test Anxiety according to Balogun *et al*. [33], is a widespread phenomenon that is a universal cause of low academic accomplishment in students all over the world. This means that test anxiety can be explained as the worry of failing an exam, which students may feel before or during tests. A variety of things are thought to be causes of test anxiety. Students' perceptions towards a particular course, the examiner, exams format, previous failure, previous success, examination theatre, presence of invigilator, examination time, competition among students, financial distress, lack of adaptability of infrastructure, and instructional content or materials among others trigger anxiety among students [29]. Alemu and Feyssa [22] posited that the linkage of grades to academic assessment has resulted in test anxiety, which has come to dominate among students. Also, test anxiety affects academic achievements negatively at any educational level [34]. There is a broad consensus empirically in the literature that test anxiety is strongly linked to poor academic performance [35], [36] extrapolated and reported that 20% of American students suffered lower academic performance due to test anxiety. Similarly, prevalence rate of test anxiety has been estimated around 20-25% of tertiary students' worldwide [37].

Currently, there are a few studies of apposite findings with a few recommendations for further studies, which point to future research to factor out the most regular causes of student test anxiety among undergraduates [22], [23], [38], [39]. Test anxiety has become a major issue under contention among educational psychologists. Some scholars have argued that test anxiety affects not only academic achievement but nearly all human endeavours where assessment is used as a measure of evaluation. It becomes catastrophic when the influences or impacts of text anxiety exceed the human adaptive level, resulting in maladaptive outcomes [35]. It is believed that test anxiety has had a detrimental impact on student performance, resulting in a huge gap in reaching the real learning outcome.

Research conducted by Nixon III [40] revealed that test anxiety exists among test takers and has a direct association with learning and performance. Cassady [41] also reported that between 25 and 40 percent of students suffer from test anxiety. It was also found in the same research that students who have high levels of test anxiety are often more likely to perform worse academically. There is however conflicting data on the link between test anxiety and student performance; some researchers observed an inverse correlation, while others showed a positive relationship. This opposing results from different researchers seem to create an unclear relationship between test anxiety and students' performance. Despite the fog surrounding the relationship between academic performance and test anxiety, scholars like Khalaila [42], maintain that a

relationship exists between academic self-concept, intrinsic motivation, test anxiety, and academic achievement among nursing students. This according to him is because students who suffer from test anxiety are unable to provide what is needed intellectually to pass a test in a test situation. Ahmad *et al*. [43] reported a negative relationship between students' test anxiety and academic attainments of undergraduate students when they conducted a study on test anxiety by considering gender role and academic achievements of university students, and discovered a significant negative relationship between test anxiety and students' exam performance in both undergraduate and graduate students. Several other studies have found a link between test anxiety and academic success in undergraduate university students [43]. Ogden [44], on the other hand, found no link between test anxiety and student grade point average. Okoye and Onokpaunu [45] completed their research on the 'relationship between self-esteem, academic procrastination, and test anxiety with academic achievement of post-graduate diploma in education (PGDE) students at Delta State University, Abraka and discovered a negative and substantial connection between test anxiety and academic performance. Hence, there is the sudden urge to investigate thoroughly the relationship between test anxiety and preservice teachers performance from a Ghanaian university to help clear the doubt surrounding the construct's relationship with students' performance.

In Ghana, not much is known scientifically about test anxiety, causes, effects on students' performance, coping mechanisms as well as activities that strengthens the relationship between test anxiety and students' performance. The purpose of this study is to investigate the relationship between test anxiety and undergraduates' students' performance in quantitative research methods course. This study specifically aimed at answering the following research questions:

- What are the perceived causes of test anxiety?
- Is there any relationship between test anxiety and students' academic performance?
- Is there any difference between the age, gender, and residential status in the experience of test anxiety?
- What are the strategies pre-service teachers employ to cope with test anxiety?

2. METHOD

2.1. Research design and sample

The study employed the mixed methods approach to examine the association between test anxiety and academic performance of preservice teachers from a Ghanaian university. In terms of sample**,** this study adopted the non-probability strategy and conveniently sampled 313 undergraduate education students from the department of teacher education in one of the public Universities in Ghana. Out of this, 191 (61.4%) were females, while 120 (38.6%) were males. In terms of age distributions, majority (89%) of the respondents were between the ages of 21 and 25. Similarly, in terms of level (year) of study, majority (83%) of the respondents were in the 3rd year (level 300).

2.2. Data collection instrument and procedure

The instrument used for the data collection was test anxiety inventory (TAI) [46] and researcher-created open-ended questions. The questionnaire was divided into two sections, the first part contained the participant's demographic variables as well as academic details, while the second section presented the TAI and two researcher-made items to elicit information that assisted in identifying factors and interventions for test anxiety. The TAI consists of 20 statements, on a four (4) point scale in a Likert format (almost never, sometimes, often, and almost always). For academic performance, students test scores in quantitative research methods in education course were used.

Data collection for this study was monitored and collected by the researchers online using google forms. Well-structured questionnaires were developed and shared with participants through their respective course group pages and platforms. Participants were provided with all the details of the questionnaires, aims, and plans of the study which had received approval from authorities, and assuring them of anonymity, voluntary participation, and withdrawal from the study at any point without any consequences. It took participants 5-10 minutes to complete the online questionnaire.

2.3. Data analysis

Data were collected, coded, and extracted as an excel file and imported into SPSS version 25.0 for analysis. The analysis was conducted in two phases, the first phase tackled descriptive statistics using frequencies and percentages for the representation of the demographic data. The second phase dealt with inferential statistics such as using correlation, independent t-test, and One-way ANOVA to determine their relationship with test anxiety and academic outcome using a significant threshold of ($p < 0.05$).

3. RESULTS AND DISCUSSION

Table 1 shows the responses of the respondents on the TAI. The most highly scored statements, as indicated in Table 1, were: *"during tests, I get so nervous that I forget facts I really know* $(M = 3.19, SD = 0.99)$*", "after the test is over I try to stop worrying about it but I just can't* $(M = 2.80, SD = 1.01)$*", "during test, I find myself thinking about the consequences of failing* $(M = 2.79, SD = 1.07)$*", "I feel my heart beating very fast during important test* $(M = 2.79, SD = 0.93)$*", "I worry a great deal before taking an important test like quantitative research methods* $(M = 2.75, SD = 1.11)$*"*. On the other hand, the least responded items are; "I feel confident and relaxed while taking quantitative research methods test $(\mathrm{M} = 1.85, \mathrm{SD} = 0.83)$" followed by the item *"while taking quantitative research method test, I feel uneasy and upset* $(M = 2.17, SD = 1.07)$*", "thinking about my score in quantitative research interferes with my work on test* $(M = 2.23, SD = 0.86)$*"*, and *"I freeze up on important test, especially quantitative research recording* $(M = 2.28, SD = 0.83)$*"*.

Table 1. Analysis of respondents' TAI scores ($N = 313$)

Statement	Almost never		Sometimes		Often		Almost always		M	SD
	n	%	n	%	n	%	n	%		
1. I feel confident and relaxed while taking quantitative research methods test.	112	35.8	156	49.8	24	7.7	21	6.7	1.85	0.83
2. While taking quantitative research method test, I feel uneasy and upset.	36	11.5	134	42.8	73	23.3	70	22.3	2.57	0.96
3. Thinking about my score in quantitative research interferes with my work on test.	22	7.0	109	34.8	94	30.0	88	28.1	2.79	0.93
4. I freeze up on important test, especially quantitative research.	55	17.6	126	40.3	69	22.0	63	20.1	2.45	1.00
5. During quantitative research methods exams, I find myself thinking about whether I will ever get through the course.	40	12.8	97	31.0	73	23.3	112	35.8	2.79	1.07
6. The harder I work at taking the test, the more confuse I get	45	14.4	108	34.5	73	23.3	87	27.8	2.65	1.04
7. Thought of doing poorly in the test interferes with my concentration on other tests.	38	12.1	117	37.4	70	22.4	88	28.1	2.66	1.02
8. I feel very jittery when taking an important test.	37	11.8	185	59.1	56	17.9	35	11.2	2.28	0.816
9. Even when I am well prepared, I feel very nervous about it.	26	8.3	119	38.0	77	24.6	91	29.1	2.74	0.97
10. I start feeling very uneasy just before getting the test paper back.	30	9.6	128	40.9	90	28.8	65	20.8	2.61	.92
11. I feel very tensed hearing about quantitative research.	31	9.9	106	33.9	72	23.0	104	33.2	2.80	1.01
12. I wish quantitative research did not bother me so much.	19	6.1	73	23.3	52	16.6	169	54.0	3.19	0.99
13. During important tests like quantitative research, I feel so tensed that my stomach gets upset.	105	33.5	100	31.9	57	18.2	51	16.3	2.17	1.07
14. I seem to defeat myself whiles working on quantitative research test.	53	16.9	169	54.0	57	18.2	34	10.9	2.23	0.86
15. I feel very panicky when I take an important test like quantitative research.	35	11.2	124	39.6	74	23.6	80	25.6	2.64	0.99
16. I worry a great deal before taking an important test like quantitative research methods.	34	10.9	119	38.0	80	25.6	80	25.6	2.66	0.98
17. During test, I find myself thinking about the consequences of failing.	49	15.7	93	29.7	58	18.5	113	36.1	2.75	1.11
18. I feel my heart beating very fast during important test.	41	13.1	120	38.3	79	25.2	73	23.3	2.59	0.99
19. After the test is over, I try to stop worrying about it but I just can't.	46	14.7	117	37.4	61	19.5	89	28.4	2.62	1.05
20. During test, I get so nervous that I forget facts I really know.	49	15.7	117	37.4	77	24.6	70	22.4	2.54	1.01

M = mean, SD = standard deviation

The total potential TAI score ranges from 20 to 80, with higher scores reflecting higher anxiety levels. The overall TAI scores of the participants varied from 21 to 80, with a mean of 54.00 (± 13.06). According to Dawood *et al*. [23], the TAI is divided into two components: emotionality and worry subscales, each having eight (8) items and an estimated score of 8-38. Participants' scores on the worry and emotionality subscales ranged from 8 to 32, with a mean and standard deviation of $21.05\ (\pm 5.40)$, $19.05\ (\pm 5.58)$ respectively. Respondents were assigned to one of four categories of test anxiety based on their TAI scores: severe anxiety 80-66, moderate anxiety 65-51, mild anxiety 50-36, and no anxiety 35-20. According to these categorizations as indicated in Table 2, only 69 (22.04%) of respondents experienced severe anxiety, 124 (39.62%) experienced which was moderate anxiety, 95 (30.35 %) experienced mild anxiety, while

25 (7.99%) experienced no anxiety. The findings further revealed that there was a significant negative relationship between test anxiety and pre-service teachers' performance, $r(311) = 0.133, p = 0.033$ as shown in Table 3. This conclusion is consistent with the findings of [47], who investigated the link between test anxiety and academic success. From Table 4, even though Levene's assumptions of homogeneity has been met, $f(4.135) = 0.043$. The results from the equal variance assumed, revealed that there was no significant difference in test anxiety score and exams performance for both males $(M = 52.52, SD = 11.97)$ and females $(M = 54.87, SD = 13.65), t(274.59) = 1.59, p = 0.113$.

From Table 5, the One- way ANOVA revealed no statistical difference between the levels of test anxiety and exams performance, $f(3,255) = 1.414, p = 0.239$. Also, from Table 6 the one-way analysis of variance (ANOVA) results showed no significant age difference between education students who scored high or low on the test anxiety test score, $f(3,309) = 0.745, p = 0.526$. The independent t-test display in Table 7 did not reveal any significant difference between residential status and the test anxiety among pre-service teachers $t(311) = 0.392, p = 0.722$.

Table 2. Respondents' anxiety level distribution ($N = 313$)

Test anxiety level	Frequency	Percentage (%)
No anxiety	25	7.97
Mild anxiety	95	30.3
Moderate anxiety	124	39.62
Severe anxiety	69	22.04
Total	313	100.00

Table 3. Mean, standard deviation and correlation between test anxiety and exams performance

Variables	M	SD	1	2
1. Test anxiety total	54.00	13.06	-...133*	-
2. Exams scores	25.78	7.09		-

Note, N = 259.

Table 4. Mean comparison of gender and test anxiety score ($N = 313$)

Gender	M	SD	df	t	p
Male	52.5	11.97	310	1.54	0.133
Female	54.87	13.65	-	-	-

Table 5. One-way ANOVA analysis of variance in test anxiety across levels

Variable	No anxiety		Mild anxiety		Moderate anxiety		Severe anxiety		f(3,255)	P
	M	SD	M	SD	M	SD	M	SD		
Exam score	27.4	8.4	26.8	8.5	25.7	6.0	24.5	6.5	1.4	.24

Note, N = 313

Table 6. One-way ANOVA of test anxiety levels across age groups

Variable	Resident		Non-resident		df	t	p
	M	SD	M	SD			
Test anxiety level	54.14	12.96	53.48	13.54	311	0.36	0.72

Note, N = 313, p > 0.72

- Self-reported responses from the open-ended questions

With regards to the factors associated with test anxiety among pre-service teachers, the results from the self-reported factors revealed that the most self reported factors are; exam format with (182) students followed by the examiner (137), examination time (74), previous failure (63), not covered much (60), previous success/overexpectation (44), the presence of an invigilator (31), examination theatre (24), and the least being content of the course (9) respectively as shown in Figure 1. This findings contradicts with the factors indentified by Neemati *et al*. [48], who reported environmental and presence of invilator as predictors of test anxiety. However, the results from the self reported factors agreed with Simran *et al*. [49] on the evaluation of test anxiety facotors among students.

Based on the findings, test anxiety was grouped into two factors that is intrapersonal-interpersonal factors. The study shares similar view with Li *et al*. [50] on exams format and several other factors identified

as playing critical roles in promoting test anxiety among students. On coping strategies for test anxiety, the analysis revealed that pre-service teachers self-reported strategies were qualitatively categorized into cognitive, behavioural, cognitive-behavioural, educational, and religious strategies. Specifically, it emerged that majority of the respondents (55%) dealt with anxiety using behavioural strategies such as breathing exercise and progressive muscle relaxation. The findings revealed that even though behavioural interventions increased among students, there wasn't a corresponding increase in their academic performance. This finding is consistent with Rosado [51] that the increase in behavioural interventions did not yield increase in academic performance. Some of the reported responses include *"I try to relax, I quit reading the test for a while and continue later"*, and *"I relax for a while and go through again".*

Similarly, 15 percent of the respondents approached anxiety using cognitive restructuring and attention training under cognitive strategies. Even though the use of cognitive intervention among pre-service teachers was less, their performance was reassuring as 80 percent of those who deployed the cognitive intervention scored above average in their exams. This therefore confirms that majority of respondents who arrayed the cognitive approach performed well in their exams. The finding aligns with Pate *et al*. [52], who disclosed that cognitive interventions had a moderate to high influence on students' performance. Further, 10 percent of the respondents deployed the cognitive-behavioural strategy which succeeded in reducing their anxiety level from mild to moderate with an anxiety score from 36 to 50 and 51 to 65 respectively. In furtherance, von der Embse *et al*. [21] claimed, students who are at the receiving end of scoring high test anxiety can be best supported by using mixed strategies such as cognitive-behavioural interventions. Strangely, 14 percent of the pre-service teachers employed religious strategies such as prayers as means of controlling their test anxiety.

In summary, the findings of this study revealed a statistically significant negative relationship between test anxiety and academic outcome among pre-service teachers. Thus, pre-service teachers who exhibited moderate to high test anxieties were more likely to obtain low academic performance. This result is consistent with findings from other studies [53], [54], that revealed that a high level of test anxiety is associated with poor academic achievement. This observation gives credence to Spielberger's theory of situation-specific and state-trait interference [55]. According to the theory, test-takers whose test anxiety level exceeds human adaptive levels are more likely to focus on irrelevant factors associated with the test, such as what they presume the purpose of the test is and other related issues before, during, and after a test, which decrease their performance. Forgetting important facts can sometimes manifest itself before, during and after test due to test anxiety, which creates interference between test relevant and irrelevant information generated from the person's anxious state.

Another important finding of this study was the results of the test of mean differences across the demographic variables in this study. For instance, this study identified no gender difference in the experience of test anxiety among pre-service teachers. This finding corroborated with studies which found no gender differences in the experience of test anxiety [56], and several factors could have contributed to these findings. For instance, pre-service teachers were given limited period to complete about 40 objectives and essay test questions. They were also not allowed to retake any exams unless they resit papers. These variables may have affected the study's outcomes by causing respondents to have heightened test anxiety. Also, data was collected after the respondents had completed their exams and as a result, both females and males have comparable test anxiety dispositions.

The study also did not also find age differences in the test anxiety score among pre-service teachers. The ANOVA result disclosed no age difference in the reporting of anxiety among the respondents during test ($p = 0.53$). However, observing the results closely, it was noted that the age categories used in this study did not have much variation as majority of the respondents (89%) were aged between 20 to 25 years. Which raises issues of the probability of reporting similar experience of test anxiety. One would have thought that students in their early years would be more anxious than their older peers, but this was not the case. There must have been some psychological variables at play, as seen in Figure 1 with the strategies used by the students. However, the results of this study show that age is not a strong factor of test anxiety among pre-service teachers. This finding lends credence with studies conducted in Nigeria [57].

Finally, students self-report on factors that contributes to test anxiety and coping strategies revealed that factors such as exams format and examiner were the most pressing factors that contributed to low performance in quantitative methods among pre-service teachers through the effect of test anxiety. This findings contradicts with the factors indentified by Li *et al*. [50], who reported environmental and presence of invilator as predictors of test anxiety. However, the results from the self reported factors agreed with Li *et al*. [50] on the evaluation of test anxiety factors among students. Results from the coping strategies revealed strategies for coping with test anxiety that were classified as cognitive, behavioural, cognitive-behavioural, educational, and religious strategies.

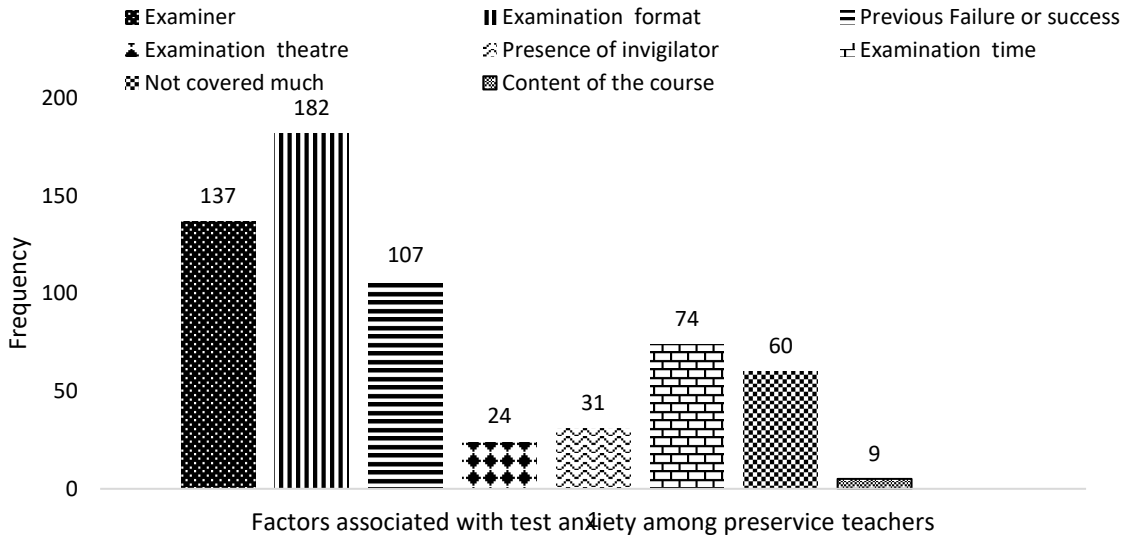

Figure 1. Frequency of self-reported factors associated with Test Anxiety among preservice teachers

4. CONCLUSION

The main aim of this study was to examine the relationship between test anxiety and academic performance of pre-service teachers in quantitative research methods in education in one of the teacher education universities in Ghana. The major finding of the study revealed that there was a statistically significant negative relationship between test anxiety and academic outcome among pre-service teachers. That's to say that pre-service teachers that exhibit higher levels of test anxiety tend to have low academic outcomes. Also, it was revealed in this study that the format of examination, and the examiner were the highly predictors of test anxiety among pre-service teachers. Further, it was found that pre-service teachers employed strategies that are cognitive, behavioural, educational, and religious to cope and manage with text anxiety.

When pre-service teachers report moderate to severe test anxiety, it may be a sign that they have difficulty taking examinations or are unprepared for them, which could lead to a more serious situation in the future considering the unique role of teachers in education and for that matter assessments. It is therefore recommended that pre-service teachers should be trained on how to prepare for and take examinations and tests properly, and to also acquire knowledge about the importance of assessments in education. Also, pre-service teachers should also be encouraged throughout classes, before, during, and after examinations to help boost their self-esteem and study self-concepts, resulting in a more optimistic attitude toward examinations and other life challenges.

Further, since this study found a significant negative relationship between test anxiety and student performance, it is recommended that future studies should investigate how test anxiety factors are interpreted by students empirically. Similarly, the religious (spiritual) intervention found in this study should be examined to learn more about what makes such treatments so distinctive. Also, further studies should investigate cultural differences and coping strategies to understand the incidence of test anxiety among pre-service teachers from different religious and cultural backgrounds.

REFERENCES

[1] C. A. Omebe, "Human resource management in education: issues and challenges," *British Journal of Education*, vol. 2, no. 7, pp. 26–31, 2014.
[2] L. L. Bucciarelli and S. Kuhn, "Engineering education and engineering practice: improving the fit," in *Between Craft and Science*, Cornell University Press, 2018, pp. 210–229.
[3] F. Suleman, "The employability skills of higher education graduates: insights into conceptual frameworks and methodological options," *Higher Education*, vol. 76, no. 2, pp. 263–278, Aug. 2018, doi: 10.1007/s10734-017-0207-0.
[4] Ministry of Education, "National pre-tertiary education curriculum framework: National pre-tertiary education curriculum framework for developing subject curricula." May. 2018. Available: https://nacca.gov.gh/wp-content/uploads/2019/04/National-Pre-tertiary-Education-Curriculum-Framework-final.pdf.
[5] P. G. Altbach, "The emergence of a field: research and training in higher education," *Studies in Higher Education*, vol. 39, no. 8, pp. 1306–1320, Sep. 2014, doi: 10.1080/03075079.2014.949541.
[6] L. R. Lattuca and J. S. Stark, *Shaping the college curriculum: academic plans in context*, 2nd ed. San Francisco, CA: Jossey-Bass

Inc., 2009.
[7] M. M. Karp, "Entering a program: helping students make academic and career decisions." 2013, https://doi.org/10.7916/D8CJ8BGD.
[8] J. Edelheim, "How should tourism education values be transformed after 2020?," *Tourism Geographies*, vol. 22, no. 3, pp. 547–554, May 2020, doi: 10.1080/14616688.2020.1760927.
[9] S.-K. K. Lee, C. B. Goh, B. Fredriksen, and J.-P. Tan, *Toward a better future : education and training for economic development in Singapore since 1965*. 2008.
[10] C. G. Campbell and T. Z. Taylor, "Assessing student learning and knowledge transfer using principles of team-based learning and bridge assignments in large introductory statistics classes," *Scholarship of Teaching and Learning in Psychology*, vol. 6, no. 1, pp. 15–23, Mar. 2020, doi: 10.1037/stl0000167.
[11] T. Fujii, "Misconceptions and alternative conceptions in mathematics education," in *Encyclopedia of Mathematics Education*, Dordrecht: Springer Netherlands, pp. 625-627, 2020, https://doi.org/10.1007/978-3-030-15789-0.
[12] M. Kargar, R. A. Tarmizi, and S. Bayat, "Relationship between mathematical thinking, mathematics anxiety and mathematics attitudes among university students," *Procedia - Social and Behavioral Sciences*, vol. 8, pp. 537–542, 2010, doi: 10.1016/j.sbspro.2010.12.074.
[13] L. Mukonga and W. Pieters, "Investigating the factors that affect academic performance of first year psychology and sociology students at the University of Namibia," *Journal for Studies in Humanities and Social Sciences*, vol. 8, no. 2, pp. 1–36, 2019, doi: https://doi.org/10.32642/.v8i2.1448.
[14] V. Kassarnig, E. Mones, A. Bjerre-Nielsen, P. Sapiezynski, D. D. Lassen, and S. Lehmann, "Academic performance and behavioral patterns," *EPJ Data Science*, vol. 7, no. 1, p. 10, Dec. 2018, doi: 10.1140/epjds/s13688-018-0138-8.
[15] I. Mushtaq and S. N. Khan, "Factors affecting students' academic performance," Global Journal of Management and Business Research., vol. 12, no. 9, pp. 17-22, 2012.
[16] B. Son and Y. Cho, "An analysis on factors that affect academic achievement in globalized environment," *Journal of Industrial Distribution & Business*, vol. 11, no. 6, pp. 7–17, Jun. 2020, doi: 10.13106/jidb.2020.vol11.no6.7.
[17] M. Pérez-Pérez, A. M. Serrano-Bedia, and G. García-Piqueres, "An analysis of factors affecting students´ perceptions of learning outcomes with Moodle," *Journal of Further and Higher Education*, vol. 44, no. 8, pp. 1114–1129, Sep. 2020, doi: 10.1080/0309877X.2019.1664730.
[18] M. B. Dube and P. R. Mlotshwa, "Factors influencing enrolled nursing students' academic performance at a selected private nursing education institution in KwaZulu-Natal," *Curationis*, vol. 41, no. 1, Aug. 2018, doi: 10.4102/curationis.v41i1.1850.
[19] F. C. Lunenburg, "The Principal as Instructional Leader," *National Forum of Educational and Supervision Journal*, vol. 27, no. 4, pp. 1–7, 2010.
[20] A. Pitt, F. Oprescu, G. Tapia, and M. Gray, "An exploratory study of students' weekly stress levels and sources of stress during the semester," *Active Learning in Higher Education*, vol. 19, no. 1, pp. 61–75, Mar. 2018, doi: 10.1177/1469787417731194.
[21] N. Von D. Embse, D. Jester, D. Roy, and J. Post, "Test anxiety effects, predictors, and correlates: A 30-year meta-analytic review," *Journal of Affective Disorders*, vol. 227, pp. 483–493, Feb. 2018, doi: 10.1016/j.jad.2017.11.048.
[22] B. M. Alemu and T. Feyssa, "The relationship between test anxiety and academic achievement of grade ten students of Shirka Woreda, Oromia Regional State, Ethiopia," *African Educational Research Journal*, vol. 8, no. 3, pp. 540–550, 2020, doi: 10.30918/AERJ.83.20.09.
[23] E. Dawood, H. Al Ghadeer, R. Mitsu, N. Almutary, and B. Alenezi, "Relationship between test anxiety and academic achievement among undergraduate nursing students," *Journal of Education and Practice*, vol. 7, no. 2, pp. 57–65, 2016.
[24] Z. H. Duraku, "Factors influencing test anxiety among university students," *The European Journal of Social & Behavioural Sciences*, vol. 18, no. 1, pp. 69–78, Jan. 2017, doi: 10.15405/ejsbs.206.
[25] C. D. Spielberger, "State-trait anxiety inventory," in *The Corsini Encyclopedia of Psychology*, Wiley, 2010, pp. 1–1.
[26] K. Rajiah, S. Coumaravelou, and O. W. Ying, "Relationship of test anxiety, psychological distress and academic motivation among first year undergraduate pharmacy students," *International Journal of Applied Psychology*, vol. 2014, no. 2, pp. 68–72, 2014, doi: 10.5923/j.ijap.20140402.04.
[27] A. Arbabisarjou, S. Zare, M. Shahrakipour, and G. Ghoreishinia, "Analyzing test anxiety among medical sciences students of Zahedan in 2015," *International Journal of Medical Research & Health Sciences*, vol. 6, no. 7, pp. 334–337, 2016, doi: Analyzing Test Anxiety among Medical Sciences Students of Zahedan in 2015.
[28] A. Asghari, R. A. Kadir, H. Elias, and M. Baba, "Test anxiety and its related concepts: a brief review," *EDUCATION Sciences and Psychology*, vol. 3, no. 22, pp. 3–8, 2012.
[29] Z. Hyseni-Duraku, "Class size: teaching quality and students? level of satisfaction with their academic performance," *International Journal of Teaching and Education*, vol. 2, no. 2, pp. 39–46, 2014.
[30] M. Zeidner, "Anxiety in education," in *International Handbook of Emotions in Education*, 1st ed., Routledge, 2014.
[31] C. M. Amini and J. N. Reamen, "Effects of psychological variables, coping strategies on test anxiety and academic performance of undergraduate distance learning students in National Open University of Nigeria," *Journal of Education in Developing Areas(JEDA)*, vol. 7, no. 1, pp. 1–17, 2019.
[32] C. L. Thomas, J. C. Cassady, and M. L. Heller, "The influence of emotional intelligence, cognitive test anxiety, and coping strategies on undergraduate academic performance," *Learning and Individual Differences*, vol. 55, pp. 40–48, Apr. 2017, doi: 10.1016/j.lindif.2017.03.001.
[33] A. G. Balogun, S. K. Balogun, and C. V. Onyencho, "Test anxiety and academic performance among undergraduates: the moderating role of achievement motivation," *The Spanish Journal of Psychology*, vol. 20, p. E14, Feb. 2017, doi: 10.1017/sjp.2017.5.
[34] S. Habibullah and J. Ashraf, "Factors affecting academic performance of primary school children," *Pakistan Journal of Medical Researc*, vol. 52, no. 3, pp. 47–52, 2013.
[35] J. N. Oluoch, P. J. O. Aloka, and B. C. Odongo, "Test anxiety beliefs as predictor of students' achievement in chemistry in public secondary schools in Kenya," *International Journal of Psychology and Behavioral Sciences*, vol. 8, no. 4, pp. 70–76, 2018, doi: 10.5923/j.ijpbs.20180804.03.
[36] F. L. Schillinger, J. A. Mosbacher, C. Brunner, S. E. Vogel, and R. H. Grabner, "Revisiting the role of worries in explaining the link between test anxiety and test performance," *Educational Psychology Review*, vol. 33, no. 4, pp. 1887–1906, Dec. 2021, doi: 10.1007/s10648-021-09601-0.
[37] C. Saravanan, R. Kingston, and M. Gin, "Is test anxiety a problem among medical students: a cross sectional study on outcome of test anxiety among medical students?," *International Journal of Psychological Studies*, vol. 6, no. 3, Jul. 2014, doi: 10.5539/ijps.v6n3p24.
[38] S. I. Chinaza, *The effect of test anxiety on academic performance of EFL students*. Lambert Academic Publishing.
[39] M. R. Ebrahimi and H. Khoshsima, "On the association(s) between test anxiety and emotional intelligence, considering

demographic information; a case of Iranian EFL University students," *International Journal on Studies in English Language and Literature (IJSELL)*, vol. 2, no. 7, pp. 147–157, 2014.
[40] E. C. Nixon III, "The relationship between study habits (attitude, motivation, and study aids), and test anxiety of secondary students attending private school," Grand Canyon University, 2021.
[41] J. C. Cassady, "Anxiety in the schools: causes, consequences, and solutions for academic anxieties," in *Handbook of Stress and Academic Anxiety*, Cham: Springer International Publishing, 2022, pp. 13–30.
[42] R. Khalaila, "The relationship between academic self-concept, intrinsic motivation, test anxiety, and academic achievement among nursing students: Mediating and moderating effects," *Nurse Education Today*, vol. 35, no. 3, pp. 432–438, Mar. 2015, doi: 10.1016/j.nedt.2014.11.001.
[43] N. Ahmad, S. Hussain, and F. N. Khan, "Test anxiety: gender and academic achievements of university students," *Journal of Postgraduate Medical Institute*, vol. 32, no. 3, pp. 295–300, 2018.
[44] J. S. Ogden, "Public speaking anxiety, test anxiety, and academic achievement in undergraduate Students," Bucknell University, 2010.
[45] K. R. E. Okoye and M. Oghenekaro, "Relationship between self-esteem, academic procrastination and test anxiety with academic achievement of post graduate diploma in education (PGDE) students in Delta state university, Abraka," *International Scholars Journal of Arts and Social Science Research*, vol. 3, no. 1, pp. 37–47, 2020.
[46] C. D. Spielberger, R. L. Gorsuch, R. Lushene, P. R. Vagg, and G. A. Jacobs, *Manual for the state-trait anxiety inventory*. Palo Alto: Consulting Psychologists Press.
[47] F. G. DordiNejad *et al.*, "On the relationship between test anxiety and academic performance," *Procedia - Social and Behavioral Sciences*, vol. 15, pp. 3774–3778, 2011, doi: 10.1016/j.sbspro.2011.04.372.
[48] N. Neemati, R. Hooshangi, and A. Shurideh, "An investigation into the learners' attitudes towards factors affecting their exam performance: a case from Razi University," *Procedia - Social and Behavioral Sciences*, vol. 98, pp. 1331–1339, May 2014, doi: 10.1016/j.sbspro.2014.03.550.
[49] G. Simran, N. Sangeeta, and W. Lily, "Evaluation of examination anxiety status and its associated factors among first professional medical (mbbs) students," *International Journal of Interdisciplinary and Multidisciplinary Studies (IJIMS)*, vol. 2, no. 8, pp. 1–11, 2015.
[50] N. Li, B. Li, J. Dou, and X. Wang, "The anxiety and influence factor of the nurse students in different levels before the NCLEX-RN.," *Iranian journal of public health*, vol. 44, no. 4, pp. 588–9, Apr. 2015.
[51] B. L. Rosado, "The effects of deep muscle relaxation and study skills training on test anxiety and academic performance," East Texas Baptist University, 2013.
[52] A. N. Pate, S. Neely, D. R. Malcom, K. K. Daugherty, M. Zagar, and M. S. Medina, "Multisite Study assessing the effect of cognitive test anxiety on academic and standardized test performance," *American Journal of Pharmaceutical Education*, vol. 85, no. 1, p. 8041, Jan. 2021, doi: 10.5688/ajpe8041.
[53] S. T. Akanbi, "Comparisons of test anxiety level of senior secondary school students across gender, year of study, school type and parental educational background," *IFE Psychologia: An International Journal*, vol. 21, no. 1, pp. 40–54, 2013.
[54] E. U. Onyeizugbo, "Self-efficacy, gender and trait anxiety as moderators of test anxiety," *Electronic Journal of Research in Education Psychology*, vol. 8, no. 20, 2017, doi: 10.25115/ejrep.v8i20.1377.
[55] C. D. Spielberger, "State-trait anxiety inventory for adults (STAI-AD)," in *APA PsycTests*, 1983.
[56] A. Getachew, "Anxiety, Attitude towards mathematics and mathematics achievement of tenth grade students at government and private schools in Kolfe Keranio Sub-City of Addis Ababa," Addis Ababa Univeristy, 2015.
[57] S. E. Oladipo and A. Ogungbamila, "Demographic predictors of test anxiety among undergraduates," *International Journal of Learning and Development*, vol. 3, no. 1, p. 62, Jan. 2013, doi: 10.5296/ijld.v3i1.3133.

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