

Research Article

Associations between Students' Test Preparation Strategies and Test Anxiety: Gender, Age, and Parents' Level of Education as Control Variables

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Although students' test preparation tendencies are related to their test-taking confidence, empirical evidence on how students' test preparation strategies relate to their test anxiety is still lacking. Framed within the skills deficit model, we examined the associations between students' test preparation strategies (cognitive, metacognitive, and social preparation strategies) and their test anxiety (worry, cognitive, tension, and physiological test anxiety). Students' gender, age, and parents' level of education served as control variables. Participants were 248 students in two randomly selected secondary schools in Awka, Anambra state, Nigeria. Survey questionnaires were used for data collection. Major findings revealed that cognitive and metacognitive test preparation strategies significantly predicted worry and physiological indicators components of test anxiety, respectively. When the sociodemographic variables were controlled, the ΔR^2 was significant only in the worry and physiological subscale. We concluded that test preparation strategies could be more associated with the worry subscale than the affective-physiological subscale. Furthermore, test preparation strategies involving monitoring and regulation could be associated to physiological indicators of test anxiety.

1. Introduction

Test anxiety has been widely discussed in the literature with its deleterious impacts on students' academic success and life satisfaction acknowledged [1–5]. It is predominantly considered context-specific encompassing “negative physiological, affective and cognitive responses to a test or assessment, where symptoms such as rapid heart rate and breathing, and worry about underperforming, occur before, during or after an assessed performance” [6, p. 4]. This perspective on test anxiety aligns with current understanding that test anxiety is multidimensional in nature, including worry, cognitive, tension, and physiological components [7].

Researchers have reported that between 25% and 40% of students exhibit test anxiety [8–10]. More so, prior research

studies have identified several factors as potential predictors of students' test anxiety. For instance, some researchers have found such factors as poor academic achievement, teacher attributes, the nature of tests, parental, peer, and teacher pressure, and sociodemographic variables as its predictors [11–15]. These studies revealed that test anxiety is elevated when these factors interfere to aggravate the perception of tests as threatening. Apart from academic pressure on students that may lead to test anxiety, an important model that can explain test anxiety is the skills deficit model [16]. This looks at the skills the students possess that can impact their test-taking confidence. Where these skills are deficient, students may be anxious about tests. Test preparation strategies could be significant to understanding the confidence with which students can face their tests/examinations. This is predicated on the fact

that test anxiety has been explained from the point of students' inability to work through course materials [17].

The overall importance of test preparation strategy on students' academic success has been underscored since it relates positively to their confidence in test-taking [18]. Current evidence shows that the adoption of different test preparation strategies could relate to achievement differences in test scores [19, 20]. On the other hand, students who are unprepared are likely to lose confidence in their ability to take exams [21]. Test preparation strategies are cognitive and metacognitive strategies used in learning situations to perform operations in knowledge according to specific objectives of the test content [21, 22]. Also, Biçak [18] added test preparation that occurs among peers in his conceptualization. We, therefore, theorized that test preparation strategies could foster content mastery leading to low test anxiety since test-taking confidence can buffer against test anxiety [23]. Dodeen [22] noted that one of the advantages of the use of test preparation strategies is the reduction of test anxiety among students.

Students' demographic variables such as gender, age, and parental level of education could potentially impact students' test anxiety, though research in this direction is still inconclusive [24]. Regarding gender, research has shown that female and male students significantly differ in test anxiety with female students having higher test anxiety scores than their male counterparts [5, 10, 25–27]. On the other hand, Wen et al. [28] found that male students may have higher test anxiety than their female counterparts, whereas some researchers have found no significant differences in test anxiety among male and female students [2, 29]. Also, researchers have investigated the impact of age on test anxiety. Older children have been found to be more test anxious than their younger counterparts [30]. School psychologists were, however, divided over the observed significant differences in test anxiety based on age [31]. Differences in findings could point to the need for further studies to ascertain the impact of age on test anxiety.

More so, family-related factors such as low family socioeconomic status have been documented to impact on students' test anxiety [32]. Chen [33] found that mothers' level of education was positively related to students' test anxiety, whereas the level of education of the fathers was not significantly related to students' test anxiety. Based on how Chen [33] coded his data, his finding indicated that the lower the level of education of mothers, the higher the test anxiety of the students. Flowing from the above, we considered that the relationship between students' test anxiety and their test preparation strategies could be impacted by these sociodemographic variables (gender, age, and parental level of education). This will help us to understand how these variables interact to influence the relationships. This will unpack how the relationship could change as a result of any of the sociodemographic variables being factored into the model. This is very pertinent given that not much is known about the impact of these variables on students' test preparation strategies. Though researchers have exerted efforts in understanding the predictors of test anxiety, there is still a gap in the literature on how test preparation strategies of students

could be associated with test anxiety. Consequently, framed within the skills deficit model which presents test anxiety as a concomitant of poor study skills [16, 34], we set out in our study to understand how students' test preparation strategies could relate to their test anxiety as well as the change that may occur in this relationship when their sociodemographic variables are factored in. This is imperative given that students' test preparation skills have not been considered in the efforts to understand factors that affect students' test anxiety in the existing body of literature, thereby making it difficult for researchers to derive any concrete generalization about how different variables relate to students' test anxiety. We specifically pose the following questions:

- (1) Do students' test preparation strategies (cognitive, metacognitive, and social preparation strategies) significantly relate to their test anxiety (worry, cognitive, tension, and physiological test anxiety)?
- (2) Do students' test preparation strategies (cognitive, metacognitive, and social preparation strategies) significantly relate to their test anxiety (worry, cognitive, tension, and physiological test anxiety) after controlling for gender, age, and parental level of education?

Flowing from these research questions, we hypothesized that

- (H1) Students' test preparation strategies (cognitive, metacognitive, and social preparation strategies) will be significantly related to their test anxiety (worry, cognitive, tension, and physiological test anxiety).
- (H2) The relationship between students' test preparation strategies (cognitive, metacognitive, and social preparation strategies) and test anxiety (worry, cognitive, tension, and physiological test anxiety) will be affected when gender, age, and parental level of education are controlled for.

2. Methods

2.1. Research Design, Participants, and Setting. We employed a cross-sectional research design in our study since we aimed at investigating the behavioral characteristics dominant among our population by sampling a cross-section of the population at a point in time [35, 36]. Two hundred and forty-eight secondary school students (males = 98; females = 150) in senior secondary school class II (SS II) participated in this study. The multistage sampling technique was adopted in our study. First, two public secondary schools were randomly sampled within the Awka metropolis. At the second stage, we purposively sampled students in SS II classes in the two schools (School A = 40%; School B = 60%). Students in SS II class—the penultimate class in senior secondary school in Nigeria—undergo intense academic training necessary for them to succeed in their external examinations in SS III. Students excelling in their examinations in this class is greatly emphasized given that they are preparing to enter their final year where they would be partaking in the West African Senior

School Certificate Examination and the National Examination Council's Senior School Certificate Examination which are high-stake examinations. These two schools are public secondary schools with the same curriculum. Government schools in Anambra State are controlled by the state government. However, the students that were included in the study were students who voluntarily opted for the study after we explained the essence of the study.

Our data collection process followed the ethical standards for data collection in behavioral sciences and is consistent with the 1964 Helsinki Declaration. During data collection process, we discussed the essence of the study with the school authorities and the school counselors and obtained their permission to conduct the study. We obtained written permissions of the parents and the students. We ensured that participation was voluntary by providing opportunities for our respondents to opt-out of the study if a respondent so desired. During the data collection, the two questionnaires were distributed to the students during the school hour with the help of their classroom teachers. Included in the questionnaire were students' demographic variables such as gender, age, parental level of education, primary place of residence, and type of school residence (residential and nonresidential). The questionnaires were framed in English language given that it is the language of instruction in secondary schools in Nigeria. We instructed them to pay careful attention to each item and respond in an honest manner to the items. Responses were to reflect individual experiences since there are no right or wrong answers. Students spent ~20 min to complete the questionnaires. A face-to-face method of data collection was adopted.

2.2. Instruments. Our participants completed the multidimensional test anxiety scale (MTAS) [7] and the test preparation strategies scale (TPSS) [18]. The demographic variables were single-item responses provided in section A of the survey questionnaire. Students were asked to respond to the options that best describe them with regard to gender, primary place of residence, type of school residence, and parental level of education. They were asked to write down their ages in the space provided for them.

MTAS is a 16-item self-report scale. It is a 5-point scale (1 = "strongly disagree," 3 = "neither," 5 = "strongly agree") in which a higher score represents higher test anxiety. It consists of two cognitive subscales and affective-physiological subscales with four items each. The cognitive subscales consist of worry (e.g., "I am afraid of writing the wrong answer during a test/exam") and cognitive interference (e.g., "I forget facts I have learnt during tests/exams"). The two affective-physiological subscales are tension (e.g., "I feel tense before taking a test/exam") and physiological indicators (e.g., "My heart races when I take a test/exam"). Putwain et al. [7] reported that MTAS has strong internal consistency ($\alpha = 0.85-0.91$), factorial validity (items loading on target factors $\lambda = 0.46-0.92$), and predictive. Also, von der Embse et al. [37] reported adequate confirmatory factor analysis of the instrument supporting the construct validity of MTAS. In the current study, we obtained internal consistency values for the four subscales of MTAS; ($\alpha = 0.61-0.73$); and total test anxiety ($\alpha = 0.86$).

TPSS is a 17-item self-report scale developed to assess students' test preparation strategies. It consists of the cognitive test preparation strategies subscale (seven items, e.g., "I make an outline of the things to study while preparing for exams"), the metacognitive test preparation strategies subscale (seven items, e.g., "I go back and try to identify the subjects which I did not understand while preparing for exams"), the social test preparation strategies subscale (three items, e.g., "I prepare for exams studying together with my friends"). Biçak [18] reported the internal consistencies of the subscales ($\alpha = 0.58-0.74$). In our current study, we report higher internal consistencies of the subscales ($\alpha = 0.72-0.77$).

2.3. Data Analysis. We employed SPSS version 28 for the step-wise hierarchical multiple regression analysis. We analyzed the components of the test anxiety to help unbundle the relationships with the components of test preparation strategies. The components of the test anxiety serve as the criterion variable, whereas the components of test preparation strategies and the sociodemographic variables served as the independent variables. The categorical variables were dummy coded.

3. Results

Analysis of the demographic variables indicated that the age range was from 14 to 18 years ($M = 15.99$, $SD = 0.85$); parental level of education consists of Fathers' level of education (no education, $n = 3$, 1.3%, primary/secondary education, $n = 120$, 51.3%, tertiary education $n = 111$, 47.4%), Mothers' level of education (no education, $n = 6$, 2.6%, primary/secondary education, $n = 109$, 46.8%, tertiary education, $n = 118$, 50.6%); urban dwellers ($n = 128$, 59%), rural dwellers ($n = 89$, 41%); day students ($n = 164$, 69.2%), boarding students ($n = 73$, 30.8%). Thereafter, we conducted the bivariate relationships among the variables as presented in Table 1.

Table 1 shows that gender is significantly related to cognitive test anxiety and tension test anxiety, age is negatively related to tension test anxiety, mothers' level of education is significantly and negatively related to physiological indicators whereas fathers' level of education is significantly and negatively related to cognitive test anxiety. Cognitive test preparation is negatively related to cognitive test anxiety subscale, whereas metacognitive test preparation is significantly and negatively physiological test anxiety indicators. Social test preparation has no significant relationship with any dimension of test anxiety.

Table 2 shows that test preparation strategies had joint significant relationship with students' worry test anxiety subscale after controlling gender, age, and parental level of education (mothers' and fathers' levels of education). We entered gender, age, and parental level of education (mothers' and fathers' levels of education) as predictors in model 1. This model was not statistically significant, $F(6, 190) = 1.613$; $p > 0.05$. All the predictor variables in model 1 made no significant individual contribution to the model. However, model 2 was statistically significant, $F(9, 190) = 2.761$; $p < 0.05$ after entering the test preparation strategies (cognitive test preparation, metacognitive test preparation, social test preparation) as

TABLE 1: Bivariate relationship among the variables.

S/N	Variables	1	2	3	4	5	6	7	8	9	10	11
1	Gender	–	–0.446**	0.052	–0.101	0.062	0.091	–0.001	0.121	0.147*	0.199**	0.122
2	Age		–	–0.112	–0.093	–0.066	–0.085	–0.006	–0.062	–0.082	–0.157*	–0.057
3	Mothers' levels of education			–	0.368**	–0.025	0.082	0.066	–0.090	–0.064	–0.023	–0.143*
4	Fathers' levels of education				–	0.060	–0.010	0.003	–0.109	–0.134*	–0.048	–0.030
5	Cognitive test preparation					–	0.617**	0.355**	–0.220**	–0.180**	–0.041	–0.072
6	Metacognitive test preparation						–	0.443**	–0.170*	–0.132	–0.081	–0.175**
7	Social test preparation							–	–0.067	–0.088	–0.006	–0.075
8	Worry test anxiety subscale								–	0.597**	0.577**	0.503**
9	Cognitive test anxiety subscale									–	0.559**	0.469**
10	Tension test anxiety subscale										–	0.509**
11	Physiological test anxiety subscale											–
	Mean	–	15.99	–	–	24.86	25.42	10.66	13.63	13.88	13.42	11.37
	SD	–	0.85	–	–	5.64	5.12	3.00	3.44	3.56	3.55	3.57
	Kurtosis	–	–0.195	–	–	0.295	–0.098	–0.653	–0.565	–0.207	–0.148	–0.485
	Skewness	–	0.016	–	–	–0.529	–0.216	–0.302	–0.099	–0.487	–0.326	0.088

**Correlation is significant at the 0.01 level (2-tailed). *Correlation is significant at the 0.05 level (2-tailed).

TABLE 2: Hierarchical regression analysis for test preparation strategies and worry test anxiety.

Model	Unstandardized coefficients		Standardized coefficients	<i>t</i>	Sig.
	<i>B</i>	Std. error	β		
(Constant) $R = 0.224^a$; $R^2 = 0.050$, $p > 0.05$	15.691	5.473		2.867	0.005
Age	–0.125	0.354	–0.030	–0.353	0.725
Gender = male	–0.963	0.608	–0.135	–1.584	0.115
1 Mothers' levels of education = no education	0.314	1.808	0.013	0.174	0.862
Mothers' levels of education = primary education/secondary education	0.575	0.557	0.083	1.032	0.303
Fathers' levels of education = no education	5.062	2.477	0.148	2.044	0.042
Fathers' levels of education = primary education/secondary education	–0.132	0.562	–0.019	–0.234	0.815
(Constant) $R = 0.347^b$; $R^2 = 0.121$, $p < 0.05$; $\Delta R^2 = 0.071$, $\Delta F = 4.855$, $p < 0.05$	20.588	5.647		3.646	<0.001
Age	–0.154	0.346	–0.037	–0.446	0.656
Gender = male	–1.134	0.596	–0.159	–1.904	0.059
Mothers' levels of education = no education	0.124	1.779	0.005	0.070	0.944
2 Mothers' levels of education = primary education/secondary education	0.715	0.545	0.103	1.312	0.191
Fathers' levels of education = no education	4.770	2.405	0.140	1.983	0.049
Fathers' levels of education = primary education/secondary education	–0.149	0.548	–0.021	–0.272	0.786
Cognitive test preparation	–0.142	0.056	–0.226	–2.553	0.012
Metacognitive test preparation	–0.068	0.063	–0.096	–1.074	0.284
Social test preparation	0.078	0.094	0.066	0.832	0.407

Note: ^a*R* for model 1; ^b*R* for model 2.

predictors. The total variance explained by the model was 34.7%. It explained additional 7.1% of variance in students' worry test anxiety subscale after controlling gender, age, and parental level of education (mothers' and fathers' levels of education), ($\Delta R^2 = 0.071$, $F(3, 181) = 4.855$; $p = 0.003$). In model 2, only fathers' level of education with respect to those with no education and those with primary/secondary school education ($\beta = 0.140$, $t = 1.983$, $p = 0.049$) and cognitive test preparation strategies ($\beta = -0.226$, $t = -2.553$, $p = 0.012$)

made statistically significant individual contributions in the model accounting for 14% and 22.6% of our respondents variances in worry test anxiety subscale.

Table 3 shows that test preparation strategies had no joint significant relationship with students' cognitive test anxiety subscale after controlling gender, age, and parental level of education (mothers' and fathers' levels of education). We entered gender, age, and parental level of education (mothers' and fathers' levels of education) as predictors in

TABLE 3: Hierarchical regression analysis for test preparation strategies and cognitive test anxiety.

Model	Unstandardized coefficients		Standardized coefficients	t	Sig.
	B	Std. error	β		
(Constant) $R = 0.215^a$; $R^2 = 0.046$, $p > 0.05$	16.672	5.608		2.973	0.003
Age	-0.183	0.362	-0.044	-0.506	0.614
Gender = male	-0.810	0.627	-0.112	-1.292	0.198
1 Mothers' levels of education = no education	-1.433	1.857	-0.058	-0.772	0.441
Mothers' levels of education = primary education/secondary education	0.587	0.582	0.082	1.008	0.315
Fathers' levels of education = no education	3.001	2.080	0.106	1.443	0.151
Fathers' levels of education = primary education/secondary education	0.279	0.587	0.039	0.474	0.636
(Constant) $R = 0.288^b$; $R^2 = 0.083$, $p > 0.05$; $\Delta R^2 = 0.037$, $\Delta F = 2.376$, $p > 0.05$	21.673	5.906		3.670	<0.001
Age	-0.268	0.360	-0.064	-0.745	0.457
Gender = male	-0.856	0.622	-0.118	-1.377	0.170
Mothers' levels of education = no education	-1.610	1.865	-0.066	-0.863	0.389
Mothers' levels of education = primary education/secondary education	0.675	0.586	0.095	1.153	0.251
2 Fathers' levels of education = no education	2.862	2.060	0.101	1.389	0.167
Fathers' levels of education = primary education/secondary education	0.290	0.587	0.041	0.494	0.622
Cognitive test preparation	-0.086	0.058	-0.136	-1.479	0.141
Metacognitive test preparation	-0.045	0.066	-0.063	-0.676	0.500
Social test preparation	-0.034	0.098	-0.028	-0.349	0.727

Note: ^aR for model 1; ^bR for model 2.

TABLE 4: Hierarchical regression analysis for test preparation strategies and tension test anxiety.

Model	Unstandardized coefficients		Standardized coefficients	t	Sig.
	B	Std. error	β		
(Constant) $R = 0.258^a$; $R^2 = 0.067$, $p < 0.05$	23.606	5.799		4.071	<0.001
Age	-0.630	0.375	-0.145	-1.680	0.095
Gender = male	-0.924	0.636	-0.125	-1.454	0.148
1 Mothers' levels of education = no education	-1.298	1.868	-0.052	-0.695	0.488
Mothers' levels of education = primary education/secondary education	0.839	0.577	0.116	1.454	0.148
Fathers' levels of education = no education	0.166	2.090	0.006	0.080	0.937
Fathers' levels of education = primary education/secondary education	-0.136	0.580	-0.019	-0.235	0.815
(Constant) $R = 0.301^b$; $R^2 = 0.090$, $p < 0.05$; $\Delta R^2 = 0.024$, $\Delta F = 1.540$, $p > 0.05$	25.722	6.127		4.198	<0.001
Age	-0.648	0.376	-0.149	-1.723	0.087
Gender = male	-1.062	0.638	-0.144	-1.664	0.098
Mothers' levels of education = no education	-1.799	1.887	-0.072	-0.954	0.342
Mothers' levels of education = primary education/secondary education	0.870	0.580	0.120	1.501	0.135
2 Fathers' levels of education = no education	0.249	2.084	0.009	0.120	0.905
Fathers' levels of education = primary education/secondary education	-0.114	0.581	-0.016	-0.196	0.845
Cognitive test preparation	2.515E-5	0.060	0.000	0.000	1.000
Metacognitive test preparation	-0.121	0.066	-0.168	-1.823	0.070
Social test preparation	0.122	0.100	0.099	1.218	0.225

Note: ^aR for model 1; ^bR for model 2.

model 1. This model was not statistically significant, $F(6, 186) = 1.449$; $p > 0.05$. All the predictor variables in model 1 made no significant individual contribution to the model. Also, model 2 was not statistically significant, $F(9, 186) = 1.780$; $p > 0.05$ after entering the test preparation strategies (cognitive test preparation, metacognitive test preparation, social test preparation) as predictors. In model 2, no predictor made statistically significant individual contributions to the model.

Table 4 shows that test preparation strategies had a joint significant relationship with students' tension test anxiety subscale after controlling gender, age, and parental level of education (mothers' and fathers' levels of education). We entered gender, age, and parental level of education (mothers' and fathers' levels of education) as predictors in model 1. This model had joint statistically significant, $F(6, 187) = 2.156$; $p = 0.049$. All the predictor variables in

TABLE 5: Hierarchical regression analysis for test preparation strategies and physiological test anxiety.

Model	Unstandardized coefficients		Standardized coefficients	<i>t</i>	Sig.
	<i>B</i>	Std. error	β		
(Constant) $R = 0.284^a$; $R^2 = 0.081$, $p < 0.05$	13.170	5.516		2.388	0.018
Age	-0.116	0.356	-0.027	-0.326	0.745
Gender = male	-1.085	0.620	-0.144	-1.749	0.082
1 Mothers' levels of education = no education	-1.174	1.875	-0.046	-0.626	0.532
Mothers' levels of education = primary education/secondary education	1.678	0.569	0.229	2.949	0.004
Fathers' levels of education = no education	-2.177	2.103	-0.074	-1.035	0.302
Fathers' levels of education = primary education/secondary education	-0.510	0.579	-0.070	-0.881	0.379
(Constant) $R = 0.362^b$; $R^2 = 0.131$, $p < 0.05$; $\Delta R^2 = 0.050$, $\Delta F = 3.510$, $p < 0.05$	18.999	5.826		3.261	0.001
Age	-0.237	0.352	-0.055	-0.673	0.502
Gender = male	-1.168	0.611	-0.155	-1.912	0.057
Mothers' levels of education = no education	-2.029	1.867	-0.079	-1.087	0.279
Mothers' levels of education = primary education/secondary education	1.698	0.565	0.232	3.004	0.003
2 Fathers' levels of education = no education	-2.178	2.064	-0.074	-1.055	0.293
Fathers' levels of education = primary education/secondary education	-0.410	0.574	-0.056	-0.714	0.476
Cognitive test preparation	0.009	0.058	0.013	0.152	0.879
Metacognitive test preparation	-0.186	0.066	-0.250	-2.813	0.005
Social test preparation	0.061	0.096	0.049	0.632	0.528

Note: ^a*R* for model 1; ^b*R* for model 2.

model 1 made no significant individual contribution to the model. Also, model 2 made joint significant contribution, $F(9, 187) = 1.963$; $p = 0.046$ after entering the test preparation strategies (cognitive test preparation, metacognitive test preparation, social test preparation) as predictors. There was no significant $\Delta R^2 = 0.024$, $\Delta F = 1.540$ $p = 0.206$. No predictor made statistically significant individual contributions in model 2.

Table 5 shows that test preparation strategies had joint significant relationship with students' physiological test anxiety subscale after controlling gender, age, and parental level of education (mothers' and fathers' levels of education). We entered gender, age, and parental level of education (mothers' and fathers' levels of education) as predictors in model 1. This model was statistically significant, $F(6, 192) = 2.727$; $p = 0.015$. Individually, it was only mothers' level of education with respect to those with primary/secondary school education and those with tertiary education that accounted for significant differences ($\beta = 0.229$, $t = 2.949$, $p = 0.004$). Students' whose mothers' had primary/secondary education had higher scores in the physiological test anxiety subscale than those whose parents had tertiary education. Also, model 2 was statistically significant, $F(9, 192) = 3.061$; $p = 0.002$ after entering the test preparation strategies (cognitive test preparation, metacognitive test preparation, social test preparation) as predictors. The total variance explained by the model was 13.1%. It explained additional 5% of variance in students' physiological test anxiety subscale after controlling gender, age, and parental level of education (mothers' and fathers' levels of education), ($\Delta R^2 = 0.050$, $F(3, 183) = 3.510$; $p = 0.016$). In model 2, only mothers' level of education with respect to those with primary/secondary school education and those with tertiary education ($\beta = 0.232$, $t = 3.004$, $p = 0.003$)

and metacognitive test preparation strategies ($\beta = -0.250$, $t = -2.813$, $p = 0.005$) made statistically significant individual contributions in the model accounting for 23.2% and 25% of our respondents' variances in physiological test anxiety subscale. In the second model, our findings showed that while students' whose mothers' had primary/secondary education had higher scores in the physiological test anxiety subscale than those whose parents had tertiary education, those who reported higher scores in metacognitive test preparation strategies reported lower test anxiety.

4. Discussion

We set out to determine the relationship between students' test preparation strategies (cognitive, metacognitive, and social test preparation strategies and their test anxiety (worry, cognitive, tension, and physiological test anxiety subscales)). We decided to unpack the relationships by considering each component of the independent variables and dependent variables. We assumed that this will give a clear direction on how intervention programs could be carried out for students with test anxiety with regard to their test preparation strategies. More so, the fact that adequate test preparation strategies can foster test-taking confidence among students [23], and the lack of studies establishing the association between students' test preparation strategies and test anxiety underscored the importance of our study. We also controlled for gender, age, and parents' level of education given the established impacts these demographic variables may have on students' test anxiety.

Our findings revealed that worry test anxiety component was jointly predicted by students' test preparation strategies after controlling for the sociodemographic variables. Only the

cognitive test preparation strategies made significant individual contribution to the variances in students' responses. Previous findings demonstrated that students' adequate preparation for a test is linked to test-taking confidence [22, 23] and that test-taking confidence reduces test anxiety [38]. Also, Kondo [39] found that test-anxious students reported the adoption of test preparation as strategies to cope with test anxiety. Underlying the mechanism is the knowledge that test preparation leads to mastery of the test material, and this supports our findings in that when students are aware that they have adequate skills to take an examination they are likely to feel less worry about the test. Though there is a joint predictive effect of the subscales of test preparation strategies on worry test anxiety, only the cognitive test preparation strategies subscale was able to make a significant individual contribution to the variances in students' worry about their test. It could be that test preparation strategies that have to do with information comprehension, memorization, storage, and retrieval of information [40] can reduce students' worry about their tests. Conceptually, Putwain et al. [7] have classified worry as a subcomponent of the test anxiety cognitive component. Similarly, researchers have reported that cognitive learning strategies reduced students' test anxiety after training [41]. However, our findings revealed that metacognitive and social test preparation strategies did not significantly predict students' worry test anxiety. Similar studies also have indicated no significant effect of metacognitive learning strategies on students' test anxiety [42]. It could be that underlying students' worrying about their tests is the fear of failure factor precipitated by a perceived lack of strategies that can lead to comprehension and retrieval of information related to the test. Therefore, strategies that are focused on cognitive improvement could be associated with lower test worries. When the gender, age, and parents' level of education were entered in model 1, the predictor variables made no significant joint contributions to the variances in worry test anxiety. In the second model, fathers' level of education accounted for significant differences in students' worry test anxiety, whereas it did not in the first model suggesting a kind of mediation effect, which was not tested in our study. Students' whose fathers had no education worried more about their tests than those whose parents had primary/secondary education. This could be that these fathers may lack the educational resources with which to support their wards during testing situations since higher socioeconomic status is associated with lower test anxiety [32] and that an imbalance in test preparation could expose those whose fathers had no formal education to more worry than those whose fathers had primary/secondary education. Overall, mothers' level of education did not significantly predict students' worry anxiety. This is contrary to our assumption in the sense that studies have shown that mothers who are more educated are more involved in the education of their children than those who are less educated [43]. However, it could be that mothers, irrespective of their levels of education, could be more supportive to students during testing period. For example, studies have shown that mothers are more involved and efficacious in the education of their children than fathers [44].

Also, our findings showed that neither students' test preparation strategies nor the sociodemographic variables made both individual and joint contributions to the variances in students' responses on cognitive test anxiety subscale. Though contrary to our assumption, our findings seem to support the pervasive nature of cognitive interference test anxiety in the learning-testing cycle. Cassady [45] found that being high test anxious is linked to reported lower study skills, perception of tests as threatening, and preparation of less efficacious test notes. It was concluded that cognitive test anxiety results in detrimental behaviors in all phases of learning-testing cycle [45] implying that it could erode the impact of students' test preparation strategies by hampering students' cognitive processing. Our present finding may support recent understanding that worry could differ from cognitive interference test anxiety component [7] since the pattern of relationship differed significantly. When the sociodemographic variables were controlled, there was no significant change in R^2 indicating that the relationship between students' test preparation strategies and their cognitive test anxiety is unaffected by the controlled variables. Consequently, none of the demographic variables is individually associated with students' cognitive test anxiety.

We also found that there was a significant joint relationship between students' test preparation strategies and their tension test anxiety subscale after controlling their sociodemographic variables. No subscale of the test preparation strategies significantly predicted tension test anxiety subscale. However, the addition of gender, age, and parental level of education (mothers' and fathers' levels of education) to the model resulted in a joint significant impact of the predictor variables on the outcome variable. There was no significant change in R^2 . However, none of the sociodemographic variables made an individual contribution to the variances in tension test anxiety subscales. Though there is no study that has examined the relationship between students' test preparation strategies and their test anxiety, we could infer that the association between tension test anxiety component and test preparation strategies could be impacted by students' sociodemographic variables. This could inform intervention programs in which integrative approaches in the management of test anxiety could be adopted.

Finally, there was a significant joint relationship between students' test preparation strategies and their physiological test anxiety subscale after controlling for their sociodemographic variables. The metacognitive test preparation strategies made an individual significant negative contribution to the model. Metacognitive test preparation strategies related negatively to students' physiological test anxiety component. Though there is no previous empirical study on this, similar studies [46] have established that metacognitive beliefs are important factors in test anxiety. We can infer that the monitoring and regulatory strategies in metacognitive test preparation strategy component could be related to lower manifestation of physiological symptoms. Also, gender, age, and parental level of education (mothers' and fathers' levels of education) in model 1 made a joint significant impact of the predictor variables on the outcome variable. Mothers' level of education accounted for

significant differences with students' whose mothers' had primary/secondary education having higher scores in the physiological test anxiety subscale than those whose parents had tertiary education. It could be that those mothers who are more learned could provide higher coping strategies for physiological test anxiety for their children.

Our findings are relevant for intervention programs that may focus on reducing test anxiety through test preparation strategy programs. Our study showed that only cognitive and metacognitive test preparation strategies could individually predict some aspects of test anxiety and that the three test preparation components made significant joint prediction on the worry, tension, and physiological test anxiety components. This could mean that as far as test anxiety management that focused on test preparation is concerned, focus should be on cognitive and metacognitive test preparation strategies. Also, the fact that these strategies are related to different sub-components of test anxiety could support the adoption of integrative approaches in test anxiety management since research evidence shows that particular intervention programs could impact specific components of test anxiety. For example, emotion- and cognitive-oriented intervention programs could affect specific arms of test anxiety [47]. Also, the fact that parental education could relate to some aspects of test anxiety, signifies the need to train parents to support their children in managing test anxiety. Besides, our study has theoretical significance given that we have expanded the understanding on how these test preparation strategies could be related to students' test anxiety while controlling for their gender, age, and parents' test anxiety.

Notwithstanding these significant contributions, our findings are limited by a number of factors. First, the findings of this study are limited to in-school adolescents in secondary schools. This can make it impossible to be generalized to those in-school adolescents in tertiary institutions. Second, the fact that our data are based on self-report questionnaires completed by students may limit the depth of our findings. The integration of other data collection sources could lead to more robust findings. Third, our study being a cross-sectional research study makes it difficult to obtain a causal relationship between test preparation strategies and students' test anxiety. This warrants that future research is focused on conducting a longitudinal research to establish causal relationships.

5. Conclusion

We determined the relationship between students' test preparation strategies and their test anxiety by considering each component of the independent variables and dependent variables. Our findings revealed that cognitive and metacognitive significantly predicted worry and physiological indicators components of test anxiety, respectively. Test preparation strategies were joint predictors of only the worry component of test anxiety. We concluded that test preparation strategies could be more associated with the cognitive subscale (worry test anxiety) of test anxiety than the affective-physiological subscale, and that test preparation strategies involving monitoring and regulation could be associated with physiological

indicators of test anxiety, especially when mothers' education is considered. Also, students' sociodemographic variables could jointly impact on the associations between test preparation strategies and the affective-physiological subscale component of test anxiety.

Data Availability

Data available on request from the corresponding author.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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