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RESEARCH ARTICLE

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Test Anxiety and Academic Achievement among Secondary School Students: Dimensional Profiles, Gender Differences, and Associations with Prior Achievement

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Abstract: Examination results shape secondary school students' educational pathways, and test anxiety is widely believed to undermine achievement. Evidence from recent studies, however, is mixed, and little is known about how different dimensions of test anxiety relate to achievement among secondary students in Azad Jammu and Kashmir, Pakistan. To describe the levels of five dimensions of test anxiety among Grade 9 students, compare test anxiety and achievement across gender, and examine the association between test anxiety (overall and by dimension) and prior academic achievement. In this cross-sectional correlational study, 120 Grade 9 students (71 male, 49 female) were randomly selected from a population of 259 in Tehsil Tarkhal, District Sudhnoti. A 25-item, five-point questionnaire measured worry, test-irrelevant thinking, bodily symptoms, tension, and perceived control ($\alpha = .72-.94$). Achievement was students' Grade 8 marks, grouped into three bands. Analyses used descriptive statistics, reliability analysis, correlation/regression, a t test, and a chi-square test. Bodily symptoms had the highest mean ($M = 3.79$), followed by test-irrelevant thinking (3.61), tension (3.59), and worry (3.40); perceived control had the lowest (2.78). Overall test anxiety was slightly higher among female ($M = 3.50$) than male students ($M = 3.39$). Female students had higher prior achievement than male students, $t(83) = 3.43, p < .001, d = 0.67$. Overall test anxiety was not significantly associated with achievement, $r = -.08, p = .36$, and no individual dimension showed a significant association ($|r| \leq .14$, all $p \geq .13$). Students reported pronounced bodily and cognitive symptoms of test anxiety, yet these were not reliably related to Grade 8 marks. The findings align with recent work questioning a simple anxiety-to-performance pathway and point to the need for longitudinal designs with concurrent performance measures.

Keywords: Test Anxiety, Academic Achievement, Perceived Control, Cognitive Interference, Gender Differences, Secondary Education

Introduction

Education, a significant contributor to national progress (Adnan Ali & Khan, 2023; Adnan et al., 2024), and achieving its goals require an effective evaluative system. In this regard, examinations are central to education, particularly to secondary education (Adnan et al., 2026), as their results determine students' access to higher education and shape their future career pathways.

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They also tend to be perceived as high-stakes events, and many students experience test anxiety, a type of anxiety that is specific to the test and is manifested through physiological, cognitive and behavioral responses to evaluative situations (Zeidner, 1998). Test anxiety distinguishes itself from general anxiety in that it is caused by academic assessment (Spielberger & Vagg, 1995) and is usually defined as consisting of worry, somatic tension and nervousness, and intrusive, task-irrelevant thoughts (Liebert & Morris, 1967; Wine, 1980).

Test anxiety has been shown to be related to poorer performance in a long line of research. Cassady and Johnson (2002) stated that cognitive test anxiety has a negative effect on performance due to the use of worry in working memory, and Chapell et al. (2005) reported that test anxiety had a negative correlation with academic performance among university students. In a recent and extensive meta-analysis, von der Embse et al. (2018) found that test anxiety negatively affects performance outcomes. The evidence is not as consistent for more recent dates. In 309 medical students, Theobald et al. (2022) reported that test anxiety was not a predictor of exam performance beyond prior knowledge, making this finding unlikely to be accounted for by the notion that test anxiety interferes with recall during a test. The secondary-school studies conducted in Nigeria show a significant negative correlation in Biology (Nwuba et al., 2024) and a negative but non-significant correlation in Mathematics (Onoshakpokaiye & Okigbo, 2023). In addition, reviewers indicate that the causation of the relationship is unclear, as poor performance can also cause anxiety (Shi & Yuan, 2025), and previous school performance has been studied as a predictor for later test anxiety during the shift to secondary school (Plante et al., 2022).

There are 2 constructs that have been suggested to account for the time at which anxiety becomes harmful. The confusing or distracting thoughts that compete for attention during assessments are known as cognitive interference (Wine, 1980). In control-value theory, perceived control is one of the appraisal processes that is linked to achievement emotions, including anxiety (Pekrun, 2006); the control antecedents of test anxiety components are examined empirically (Roos et al., 2021). It remains unclear if anxiety is linked to achievement in the sample, and which specific components of it, in the context of a sample in which evidence of such a link is limited, especially in South Asian secondary-school contexts.

Purpose and Objectives

This study examines test anxiety and prior academic achievement among Grade 9 students in Tehsil Tarkhal, District Sudhnoti. The objectives were to:

1. Describe levels of five test anxiety dimensions (worry, test-irrelevant thinking, bodily symptoms, tension, and perceived control).
2. Describe students' academic achievement and compare it across gender.
3. Compare test anxiety between male and female students.
4. Examine the association between test anxiety, overall and by dimension, and academic achievement.

Hypotheses

H1: Overall test anxiety is negatively associated with academic achievement (Cassady & Johnson, 2002; von der Embse et al., 2018).

H2: Female students report higher test anxiety than male students (Putwain & Daly, 2014); this was examined descriptively.

Associations between individual anxiety dimensions and achievement were examined as an exploratory research question.

Significance

The study provides dimension-level evidence on test anxiety from an under-researched region, and its findings can inform school counselors and teachers who design anxiety-reduction and examination-preparation programs.

Literature Review

Conceptualization and Dimensions of Test Anxiety

Test anxiety is a particular kind of academic anxiety where students perceive examinations as threatening and respond with emotional, physiological, and cognitive reactions (Spielberger & Vagg, 1995; Zeidner, 1998). Liebert and Morris (1967) separated a *worry* component (negative thoughts, fear of failure) from an *emotionality* component (physiological arousal and tension). Wine (1980) emphasized cognitive interference: highly anxious students divide attention between the task and self-focused worry, leaving fewer resources for retrieval and problem solving. Here, the instrument utilized operationalizes five dimensions: worry, test-irrelevant thinking, bodily symptoms, tension, and perceived control.

Convergent and Divergent Evidence of Test Anxiety and Achievement

A negative relationship between test anxiety and test performance is often found in meta-analytic and primary studies (Cassady & Johnson, 2002; Chapell et al., 2005; von der Embse et al., 2018). In Pakistan, Khalid and Hasan (2009) found, in a sample of 187 undergraduates, that high achievers had less test anxiety than low achievers. Among secondary students, Nwuba et al. (2024) reported that test anxiety correlated negatively with achievement in Biology irrespective of gender in a sample of 392 students, whereas Onoshakpokaiye and Okigbo (2023) found a negative but non-significant correlation between test anxiety and Mathematics performance among 1,650 students. Theobald et al. (2022) showed that test anxiety did not predict exam performance once knowledge was controlled, and that high trait test anxiety predicted smaller knowledge gains during preparation. Findings such as this indicate that the anxiety-achievement relationship is a function of the measure used, the sample studied, and the variable controlled.

Direction of the Relationship

Test anxiety is often assumed to cause poor performance, but poor performance histories may lead to increased test anxiety (Shi & Yuan, 2025). Plante et al. (2022) examined the relation between pre-school performance and post-school test anxiety for the transition to secondary school. Association patterns should be read with consideration to both directions when there is a measure of achievement preceding the measure of anxiety, as in the present study.

Cognitive Interference and Perceived Control

The Cognitive-Attentional Theory proposes that worry and intrusive thoughts deplete the cognitive resources from the task (Wine, 1980). Based on control-value theory, achievement emotions are hypothesized to be influenced by perceived control of achievement outcomes and task value, with low control increasing anxiety (Pekrun, 2006). Roos et al. (2021) investigated the control antecedents of the separate components of test anxiety and their impact on test performance. These perspectives imply that cognitive and control-related dimensions and facets should be considered separately and are not combined into one anxiety score.

Gender Differences

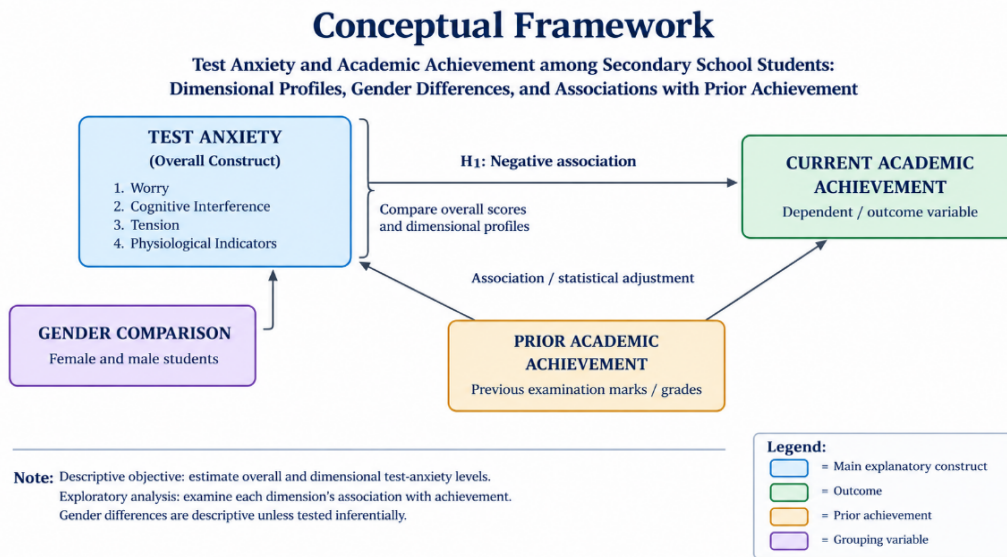
Female students tend to have a higher level of test anxiety than male students. In a sample of English secondary school students, Putwain and Daly (2014) found that female students had higher test anxiety levels than males. The same pattern, and any gender difference in achievement, with Grade 9 students in AJ&K is explored here.

Conceptual Framework

The conceptual model of the present study places test anxiety as the major explanatory variable while academic achievement is the dependent variable in secondary school students. It also includes the dimensional profiles of test anxiety, gender differences, and previous academic achievement to give a more complete picture of the relationship(s) being examined. The framework is based on the multi-dimensional

account of test anxiety presented by Putwain et al. (2021), who suggest four related dimensions: worry, cognitive interference, tension, and physiological indicators.

Figure 1



In the stated conceptual model, worry is concerned students' concerns over examination results, failure, and the implications of failure. Cognitive interference refers to intrusive thoughts and concentration or information retrieval problems that can arise while taking exams. Tension is the students' own perceived nervousness and anxiety in evaluative situations, while physiological signs are bodily reactions that can accompany test anxiety, such as a pounding heart or a tightened throat. These are related, but unique components of test anxiety and can be studied separately or as a single measure of test anxiety, depending on the measurement model used (Putwain et al., 2021).

In the framework, the central association is between the total test anxiety and achievement. Past studies indicate that cognitive test anxiety is related to poorer examination performance, but this relationship can be different and weaker in students and/or in the context of the assessment (Cassady & Johnson, 2002). Thus, it is hypothesized that the present study will show that there is a negative correlation between overall test anxiety and academic achievement. This overall relationship is explored as well as whether individual dimensions of test anxiety are related to academic achievement differently. It may be possible to determine from this dimensional approach whether cognitive issues, difficulty focusing, self-reports of tension, or physiological measures are associated differently with students' examination performance.

Gender is used as a grouping variable to analyze if there are any significant differences between female and male students on overall scores of test anxiety and on dimensional profiles. This paper does not presume that there are such distinctions, but it looks at them empirically. Previous academic attainment is also taken into account, as students' past examination performance could be pertinent to their future success and their experience of test anxiety. Therefore, a comparison of prior achievement with current achievement can be used to get a better idea of the relationship between test anxiety and achievement.

Overall, the conceptual framework brings together the analysis of the test anxiety level, dimensional profiles, gender differences, and correlation with previous achievement. It serves as a foundation for the descriptive and correlational analyses of the study, and the relationships among the individual dimensions of anxiety and academic achievement can be explored as questions that were raised. The proposed study is observational, and therefore is an association study.

Methodology

Design

A Quantitative Cross-Sectional and Correlational research design was used to measure the relationship between test anxiety and achievement within the context.

Population and Sample

The population encompassed 259 students of Grade 9 (149 male, 110 female) in public sector secondary schools of Tehsil Tarkhal, District Sudhnoti, AJ&K. A sample of 120 students (46.3% of the population) was drawn by using the simple random sampling technique. The achieved sample contained 71 males (59.2%) and 49 females (40.8%) students (Table 1).

Table 1
Population and Sample by Gender

Gender	Population <i>N</i>	Sample <i>n</i>	% of sample
Male	149	71	59.2
Female	110	49	40.8
Total	259	120	100.0

Note. Population and sample counts are taken from the study’s sampling records; the achieved gender split (71/49) is the one used in all analyses.

Instrument

Test anxiety was measured with a self-developed questionnaire, comprised of 25 items, five for each of five dimensions: worry (e.g., “During tests I find myself thinking about the consequences of failing”), test-irrelevant thinking (“During tests, my mind wanders to unrelated thoughts”), bodily symptoms (“I have difficulty breathing while taking a test”), tension (“During tests I feel very tense”), and perceived control (“During tests I believe I can receive a good grade”). Items were rated from 1 (Strongly Disagree) to 5 (Strongly Agree). Dimension scores are the mean of the five items; higher scores indicate stronger endorsement. The overall test anxiety score is the mean of the five dimension scores. The items developed by the researcher were on the basis of the test anxiety literature.

Academic Achievement

The student’s grade 8 academic achievement was recorded by the respondent on the questionnaire in three categories (200-400, 400-600, 600-800) and coded 2, 3 and 4, respectively, for analysis. Achievement is therefore pre-grade, self-report, and ordinal.

Validity and Reliability

Content validity was established through the review of the experts in the Department of Education, Mohi-ud-Din Islamic University, AJ&K. To estimate internal consistency, a pilot study with 20 respondents (10 male, 10 female) was conducted, which also formed part of the main sample. The Cronbach’s Alpha ranged from .72 to .94 (Table 2), which is acceptable to excellent (Nunnally & Bernstein, 1994).

Procedure and Ethics

Permission was granted by the heads of the participating institutions, and the questionnaire was administered personally. The participants were briefed on the objectives of the study and assured of confidentiality.

Data Analysis

The data were analyzed using SPSS. Anxiety dimensions and achievement were summarized using descriptive statistics. Simple linear regression was used to estimate the achievement–anxiety relationships ($r =$

standardized coefficient). The test statistics of the regressions were calculated for the intercept and the predictor, so the predictor t was recomputed as B/SE with 118 degrees of freedom, and the 95% confidence interval for each r was obtained by using the Fisher z transformation. Gender differences in achievement were statistically analyzed from the reported frequency distribution by applying the following tests: Welch's t test, chi-square test of independence, and Mann–Whitney U test. A significance level of .05 was used.

Results

Levels of Test Anxiety

The Bodily Symptoms had the highest mean ($M = 3.79$) followed by test-irrelevant thinking ($M = 3.61$), tension ($M = 3.59$) and worry ($M = 3.40$), as indicated in the table 2. Students' mean ($M = 2.78$) was the lowest, suggesting that they felt moderately low about getting a good grade. The mean total score on the test anxiety was 3.43.

Table 2

Means and Reliability of the Test Anxiety Dimensions (N = 120)

Dimension	Items	M	Cronbach's α
Worry	5	3.40	.78
Test-irrelevant thinking	5	3.61	.81
Bodily symptoms	5	3.79	.94
Tension	5	3.59	.76
Perceived control	5	2.78	.72
Overall test anxiety	25	3.43	—

Note. Scale range 1-5. Reliability is from the pilot sample ($n = 20$). The overall score is the mean of the five dimension means.

Academic Achievement and Gender

Most students (62.5%) fell in the 400–600 band, 19.2% in the 200–400 band, and 18.3% in the 600–800 band (Table 3). Female students had higher achievement ($M = 3.22$, $SD = 0.69$) than male students ($M = 2.83$, $SD = 0.51$), Welch t (83) = 3.43, $p < .001$, $d = 0.67$, a medium-to-large difference. The distribution also differed by gender, χ^2 (2, $N = 120$) = 18.75, $p < .001$, Cramér's $V = .40$; 36.7% of female but only 5.6% of male students were in the highest band. A Mann–Whitney test agreed, $U = 2294$, $p < .001$.

Table 3

Distribution of Achievement (Grade 8 Marks Band) by Gender

Marks band (code)	Male n (%)	Female n (%)	Total n (%)
200–400 (2)	16 (22.5)	7 (14.3)	23 (19.2)
400–600 (3)	51 (71.8)	24 (49.0)	75 (62.5)
600–800 (4)	4 (5.6)	18 (36.7)	22 (18.3)
Total	71 (100)	49 (100)	120 (100)
M (SD) of coded band	2.83 (0.51)	3.22 (0.69)	2.99 (0.61)

Note. Means and standard deviations were computed from the frequency distribution with band codes 2, 3, and 4.

Gender Differences in Test Anxiety

The female students had a slightly higher score on overall test anxiety ($M = 3.50$) than the male students ($M = 3.39$) (Table 4). This is in the direction forecasted by H2. No significance test could be conducted because no dispersion statistics were available and the difference is a descriptive tendency; H2 is assumed to be consistent with the data but has not been tested.

Table 4
Overall Test Anxiety by Gender

Gender	<i>n</i>	<i>M</i>
Male	71	3.39
Female	49	3.50

Note. Unrounded means: male 3.3859, female 3.5029; difference (female – male) = 0.1170.

Test Anxiety and Academic Achievement

Overall test anxiety showed a small negative association with achievement that was not statistically significant, $r = -.084$, $R^2 = .007$, $t(118) = -0.92$, $p = .36$, 95% CI $[-.26, .10]$ (Table 5). They thus did not support H1: the sign was as predicted; however, the association was very weak and statistically indistinguishable from zero. Of the dimensions, only tension ($r = -.14$, $p = .13$) and bodily symptoms ($r = -.10$, $p = .29$) had large enough negative values to be of interest, worry had a near zero negative ($r = -.04$, $p = .66$), and test-irrelevant thinking ($r = .01$, $p = .90$) and perceived control ($r = .02$, $p = .82$) had essentially no values. The highest single contribution was from one dimension, accounting for more than 1.9% of the variance in achievement.

Table 5
Associations Between Achievement and Test Anxiety Scores (N = 120)

Anxiety score	<i>B</i>	<i>SE</i>	<i>r</i> (β)	<i>t</i>	<i>p</i>	95% CI for <i>r</i>	<i>R</i> ²
Worry	-.080	.182	-.040	-0.44	.66	$[-.22, .14]$	.002
Test-irrelevant thinking	.014	.108	.012	0.13	.90	$[-.17, .19]$	.000
Bodily symptoms	-.116	.110	-.097	-1.05	.29	$[-.27, .08]$	.009
Tension	-.174	.114	-.139	-1.53	.13	$[-.31, .04]$	.019
Perceived control	.017	.075	.021	0.23	.82	$[-.16, .20]$	.000
Overall test anxiety	-.068	.074	-.084	-0.92	.36	$[-.26, .10]$	.007

Note. Simple regressions with achievement (coded 2–4) entered as the predictor of each anxiety score, as in the SPSS output; in simple regression, β equals r . *B*, *SE*, and β are from the SPSS output; $t = B/SE$ ($df = 118$), p is two-tailed, and confidence intervals use the Fisher z transformation. Negative r indicates higher achievement with lower anxiety.

Discussion

This study depicted test anxiety among 9th-grade students and explored the relationship between prior achievement and test anxiety. The students reported high degrees of physical symptoms, high levels of test-irrelevant thinking and high levels of tension, and moderate to low levels of perceived control. The current profile falls into the multidimensional accounts of test anxiety (Spielberger & Vagg, 1995; Zeidner, 1998).

Test Anxiety and Achievement

This was not the case with overall test anxiety; there was no significant correlation with achievement ($r = -.08$, $p = .36$), nor was any of the five dimensions. This contradicts the general finding of negative correlation in the literature (Cassady & Johnson, 2002; Chapell et al., 2005; von der Embse et al., 2018) and also with the findings of Nigerian Biology students (Nwuba et al., 2024) that reported significant negative correlations among the Biology students in Nigeria. It is similar to the negative and non-significant correlation observed in Mathematics (Onoshakpokaiye & Okigbo, 2023) as well as the report of the absence of anxiety predicting exam performance after controlling for knowledge level (Theobald et al., 2022). There are five features of the present study that may account for the weak association. Second, achievement was measured in Grade 8 marks prior to the Grade 9 anxiety assessment, thus confounding the design by suggesting that the anxiety measured at Grade 9 was not influencing grades 8 and 9 but rather impacting grades 9 and 10;

if anxiety was primarily manifesting during grades 9 and 10, the effect of anxiety on grades 8 and 9 would not necessarily be captured in the marks awarded in grades 8 and 9 tests (Theobald et al., 2022), and the causal arrow could even run from achievement to anxiety (Plante et al., 2022; Shi & Yuan, 2025). Second, second language achievement was self-reported and measured in just three bands, reducing the variance and increasing possible error. Third, the overall score included 5 dimensions with positively worded perceived control items, which could mask dimension-specific effects. Fourthly, the study had 120 students, which made it possible to detect associations of only $r = .25$ or greater; the confidence intervals here overlap with no association and small negative associations. Fifth, the estimates of reliability were based on limited pilot data.

Dimension-Level Pattern

The coefficients were generally negative for tension and bodily symptoms and close to zero for worry and test-irrelevant thinking, thus providing little evidence for the claim that cognitive dimensions are the best predictors of achievement in this sample. Since none of these differences was statistically significant, they should not be interpreted substantively. These data do not allow for a determination of whether cognitive interference mediates the anxiety–achievement relation, as cognitive-attentional theory suggests (Wine, 1980), or whether perceived control conditions it (Pekrun, 2006; Roos et al., 2021), and further designs that measure performance concurrently are required.

Gender Differences

In this study, female students reported a little more test anxiety, which is consistent with previous research (Putwain & Daly, 2014), though not formally assessed in this study. Female students also had significantly higher prior achievement than male students ($d = 0.67$), with over a third being in the top marks band. Higher levels of anxiety with higher levels of achievement for girls indicates that anxiety and achievement were not just two points on a scale, possibly contributing to the relatively weak association overall. It should be noted that the achieved sample has a gender imbalance, with 59% male and 42% of the population.

Implications

- **Teachers:** High bodily and tension scores indicate that classroom practices like low-stakes practice tests, clear expectations, and constructive feedback may help to decrease unnecessary tension.
- **School Counselors:** The average level of bodily symptoms and low perceived control could be addressed in all students through relaxation and breathing training, cognitive restructuring, and confidence building, with the assistance of School Counselors.
- **Policy Makers:** Psychological well-being may be assessed as a component of school support systems and in addition to an examination-based evaluation. These implications are based on the observed anxiety profile and on previous literature rather than on performance effects since there was no significant anxiety-achievement association in the study.

Limitations

This is a cross-sectional design that does not allow causal inferences, and the anxiety measurement was preceded by achievement (Grade 8 marks). The self-reported, banded and coded ordinal scale for achievement is a simplification. The overall anxiety score was the average mean of all five dimensions with the dimension perceived control, scored positively, thus making the contribution of this dimension the opposite direction; re-analysis with a reverse coded perceived control is recommended. The perceived control items are similar to academic confidence and should be read as such. The questionnaire was developed by the researcher, and the reliability was established by a pilot of 20 individuals who were also part of the main sample; the alpha for bodily symptoms was very high (.94); this represents a possible item redundancy. There were no dispersion statistics and no inferential test of gender differences in anxiety, so this comparison is

only descriptive. The data were all collected from a single district and therefore were self-reported, thereby introducing common method bias (Podsakoff et al., 2003).

Future Research

Future studies should employ current examination performance or school records in addition to prior marks, longitudinal designs to rule out the possibility that anxiety affects performance, which in turn affects anxiety, and reverse score perceived control or conduct a mediated test separately, and use bootstrapped indirect effects (Hayes, 2018) and an interaction term to test mediation by cognitive interference and moderation by perceived control. The evidence would be strengthened by larger multi-district samples, validated multidimensional instruments, and intervention studies that focused on academic control.

Conclusion

Tehsil Tarkhal 9th grade students exhibited high levels of bodily symptoms, tension and test-irrelevant thinking, and moderate to low perceived control. Prior achievement was slightly higher (descriptively) and significantly higher for female students in the area of anxiety. There were no significant links between overall test anxiety or any of the measures and Grade 8 achievement. The findings do not support the assumption of a constant relationship between anxiety and achievement, and emphasize the importance of research on performance conducted at the same time, distinguishing between anxiety factors, and having a longitudinal design.

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