Gender Differences in Physics Anxiety and Coping Mechanisms: A Quantitative Analysis of Grade 10 Students

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ABSTRACT

Physics anxiety remains a persistent affective barrier in secondary science education, yet empirical evidence from developing-country contexts remains limited. This study examined the level of physics anxiety, coping mechanisms, gender differences, and the relationship between anxiety and coping among 120 Grade 10 students (60 males, 60 females) using a quantitative descriptive–comparative and correlational design. Results indicated a moderate overall level of physics anxiety (M = 3.20), with emotional anxiety emerging as the most pronounced dimension across genders. Independent-samples t-tests revealed no statistically significant gender differences in anxiety levels ($p > .05$). Students reported frequent use of problem-focused coping strategies (M = 3.56) and emotion-focused coping strategies (M = 3.55), while avoidance coping was used less frequently. Pearson correlation analysis demonstrated a statistically significant but moderate positive association between physics anxiety and coping mechanisms ($r = .368$, $p < .001$), indicating increased coping efforts in response to heightened anxiety without implying coping effectiveness. The findings highlight the centrality of emotional responses in physics learning and underscore the need for instructional practices that address affective regulation alongside cognitive support.

Keywords: physics anxiety; coping mechanisms; emotional anxiety; gender; secondary education

INTRODUCTION

Background of Study

Physics is widely perceived by secondary students as one of the most cognitively demanding school subjects due to its abstract concepts, mathematical representations, and problem-solving requirements. Beyond cognitive difficulty, affective factors, particularly anxiety, play a critical role in shaping students' engagement, persistence, and learning outcomes. Physics anxiety refers to feelings of tension, worry, or apprehension specifically associated with physics-related tasks, assessments, and classroom interactions, and has been shown to interfere with conceptual understanding and performance (Mallow et al., 2010).

International research consistently documents moderate to high levels of science-related anxiety among secondary learners, although evidence regarding gender differences remains inconclusive. While some studies report higher anxiety among female students, often attributed to sociocultural expectations and self-efficacy beliefs (Britner & Pajares, 2006), others report minimal or no gender-based variation, suggesting that physics anxiety may represent a shared academic experience rather than a gendered phenomenon (Udo et al., 2004).

In the Philippine context, physics learning challenges are frequently associated with limited instructional resources, weak mathematical foundations, and teacher-centered pedagogical approaches (Eboña & Villagonzalo, 2020). Students respond to these demands through various coping mechanisms, ranging from adaptive strategies such as problem-solving and emotional regulation to maladaptive responses such as avoidance. However, local quantitative studies that simultaneously examine physics anxiety, coping mechanisms, and their interrelationship remain scarce. Addressing this gap, the present study provides empirical

evidence on the affective experiences of Filipino Grade 10 students and situates these findings within established theories of anxiety and coping.

Statement of the Problem

This study aims to quantitatively examine gender differences in physics anxiety and coping mechanisms among Grade 10 students, focusing on the levels of anxiety, types of coping mechanisms, and their uses.

Specifically, this study aims to answer the following questions:

1. Is there a significant difference in the levels of physics anxiety between male and female Grade 10 students?
2. What are the most common coping mechanisms used by male and female Grade 10 students?
3. What is the relationship between the level of physics anxiety and the coping mechanisms employed by the students?

Research Hypothesis

The following hypotheses guide this study:

1. There is no significant difference in the levels of physics anxiety between male and female Grade 10 students.
2. There is no significant relationship between the level of physics anxiety and the coping mechanisms employed by Grade 10 students.

THEORETICAL FRAMEWORK

This study is grounded in Spielberger's Anxiety Theory (1983), which conceptualizes anxiety as an affective state that disrupts cognitive processing, particularly under evaluative conditions. In physics learning contexts, heightened emotional anxiety may constrain working memory resources required for problem-solving and reasoning.

Lazarus and Folkman's (1984) Stress and Coping Theory further explains how individuals respond to perceived stressors through coping efforts that are regulatory rather than inherently effective. Coping mechanisms in this framework represent attempts to manage internal or external demands and should not be interpreted as indicators of successful adaptation. Together, these theories frame physics anxiety as an effective response to academic demands and coping mechanisms as students' context-dependent efforts to regulate this response.

METHODOLOGY

Research Design

A quantitative descriptive–comparative and correlational design was employed to examine physics anxiety, coping mechanisms, gender differences, and the relationship between anxiety and coping.

Participants and Locale

The participants were 120 Grade 10 students (60 males and 60 females) from Kimamon National High School, Davao del Norte, Philippines. Stratified random sampling ensured proportional gender representation.

Research Instrument

Data were collected using a researcher-developed questionnaire consisting of two scales: a Physics Anxiety Scale (10 items) and a Coping Mechanisms Scale (10 items), rated on a 5-point Likert scale. While the instrument demonstrated acceptable internal consistency, no factor analysis or external construct validation was conducted, which limits claims regarding measurement precision.

Data Analysis

Descriptive statistics, independent-samples t-tests, and Pearson product–moment correlation were used to analyze the data.

Ethical Considerations

The study followed ethical standards, including informed consent, voluntary participation,

confidentiality, and compliance with the Data Privacy Act of 2012.

RESULTS AND DISCUSSION

This chapter presents the results of the study on physics anxiety and coping mechanisms among Grade 10 students. It discusses the level of physics anxiety, the coping mechanisms commonly used by students, and the relationship between anxiety and coping mechanisms.

The level of physics anxiety among Grade 10 students was examined across emotional, cognitive, and physical dimensions, and comparisons were made between male and female students.

Table 1 presents the mean scores and the independent-samples t-test result for physics anxiety across gender.

Table 1 Mean Scores and t-Test Results of Physics Anxiety Across Gender

Variable	Male Mean (n=60)	Female Mean (n=60)	T-Value	P-Value	Interpretation
Emotional Anxiety	3.40	3.46	-0.483	0.630	Not Significant
Cognitive Anxiety	3.08	3.09	-0.126	0.900	Not Significant
Physical Anxiety	3.07	2.96	0.735	0.464	Not Significant
Overall Physics Anxiety	**3.20**	**3.20**	**0.030**	**0.976**	**Not Significant**

As shown in Table 1, both male and female students exhibit a moderate level of overall physics anxiety, with emotional anxiety emerging as the most prominent dimension. No statistically significant gender differences were observed across all anxiety dimensions ($p > .05$), indicating that physics anxiety is a shared academic experience among students.

The study also examined the coping mechanisms employed by Grade 10 students in dealing with physics-related anxiety.

Table 2 summarizes the coping mechanisms employed by Grade 10 students, along with their corresponding mean scores.

Table 2 Common Coping Mechanisms Used by Grade 10 Students

Rank	Coping Mechanism	Mean Score	Standard Deviation	Verbal Interpretation
1	**Problem-focused**	3.56	0.68	Often Used
2	**Emotion-focused**	3.55	0.74	Often Used
3	**Avoidance Coping**	2.93	0.90	Sometimes Used

Table 2 shows that students most frequently employed problem-focused and emotion-focused coping mechanisms, while avoidance coping was used less often. This pattern suggests a preference for adaptive coping approaches when dealing with physics-related stress.

To determine whether physics anxiety is associated with students' coping responses, a Pearson correlation analysis was conducted.

Table 3 shows the Pearson correlation between physics anxiety and coping mechanisms.

Table 3 Relationship Between Physics Anxiety and Coping Mechanisms

Variables Correlated	Pearson r	P-Value	Decision on H_0	Strength of Relationship
Physics Anxiety & Coping Mechanisms	**0.368**	**< 0.001**	Reject Null	Moderate Positive

As shown in Table 3, a statistically significant but moderate positive relationship exists between physics anxiety and coping mechanisms ($r = .368$, $p < .001$). This indicates that as students' anxiety increases, their use of coping mechanisms also increases, reflecting greater regulatory effort rather than coping effectiveness.

CONCLUSION

The study demonstrates that Grade 10 students experience moderate physics anxiety, predominantly emotional in nature, with no significant gender differences. Students commonly employ adaptive coping strategies, particularly problem-focused and emotion-focused approaches. The observed moderate positive relationship between anxiety and coping suggests that increased anxiety prompts greater coping activity, although the effectiveness of these efforts cannot be inferred. These findings underscore the importance of addressing affective dimensions of physics learning alongside cognitive instruction.

RECOMMENDATIONS

Physics instruction should integrate strategies that explicitly address emotional anxiety, such as structured feedback, scaffolded problem-solving, and low-stakes assessments. Teachers should guide students in evaluating the appropriateness of different coping strategies for specific learning demands. Future research should employ validated instruments and mixed methods designs to examine how coping mechanisms influence learning outcomes over time.

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