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Comparative Effects of Positive and Negative Academic Emotions on Students' Academic Performance in Secondary School Physics in Odeda Local Government Area, Ogun State, Nigeria

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Abstract: *Students' academic emotions are feelings or perceptions associated with students' experience during teaching-learning sessions, which could be positive or negative. This study examines the level of students' positive and negative academic emotions, relationship between positive and negative emotions with regards to academic performance, and predictive strength of positive and negative emotions on students' academic performance in secondary school Physics. The study adopted a descriptive-quantitative design with 300 physics students as study samples, using simple random sampling. Data were collected using Physics academic performance sheets and students' academic emotion scale with reliability coefficient, $\alpha = 0.81$, analyzed using descriptive, correlation, and regression statistics. The results revealed that: (i) students exhibited moderate positive academic emotions (enjoyment, interest, confidence) and low negative academic emotions (anxiety, boredom, frustration); (ii) positive emotions significantly and positively correlated to students' performance ($r = 0.54$, $p<0.05$), while negative emotions significantly and negatively correlated to students' performance ($r = -0.49$, $p<0.05$); (iii) positive and negative academic emotions jointly and significantly predicted students' performance, $F(2, 297) = 66.25$, $p<0.05$, $R^2 = 0.398$, with positive emotions having a stronger positive predictive power ($\beta = 0.51$, $t = 8.95$, $p<0.05$) on students' performance than negative emotions ($\beta = -0.33$, $t = -6.20$, $p<0.05$). This study concludes that positive academic emotions were stronger in predicting academic performance than the negative academic emotions. It is therefore recommended that teachers should undergo training workshops on strategies for creating emotionally supportive classrooms and its effective application.*

Keywords: academic emotions, positive emotions, negative emotions, academic performance, physics, secondary school.

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INTRODUCTION

Students' Academic Emotion is a salient educational factor with strong potentials to significantly influence learning outcomes because it is crucial to the overall teaching-learning effectiveness and quality of educational output. In contemporary classrooms characterized by learners who differ in abilities, backgrounds and learning styles, the ability of a teacher to integrate effective emotional awareness is highly essential. This is because teaching-learning process is not only a cognitive activity but also an emotional experience for students.

Students' academic emotions are feelings associated with students' experience during teaching-learning activities, which varies significantly from feelings such as enjoyment, joy, hope, interest, confidence, relaxation, enthusiasm, pride; to anger, shame, frustration, anxiety, nervousness, despair, depression, hopelessness, and boredom. Academic emotions according to Pekrun et al., (2011) are affective responses during learning and performance-related activities, usually in form of emotions like anxiety, boredom, and enjoyment. Academic emotions can be classified into positive emotions such as learning enjoyment, hope of success and pride; and negative emotions such as anger, boredom, anxiety, hopelessness and shame (Pekrun, 2006; Pekrun et al., 2007; Kohoulat, 2016; Kohoulat, 2017; Pekrun et al., 2023). These emotions (positive or negative) have the ability to increase or decrease the students' class attention to academic details, concentration, learning desire, cognitive ability, retentive memory, motivation, as well as academic performance.

Academic emotion and its influence on its students' academic performance are better explained by the Control–Value Theory (CVT) of achievement emotions (Pekrun, 2006, 2024; Pekrun & Perry, 2014). The CVT sees academic emotion as an affective arousal resulting from students' control–value appraisals which relates directly to individuals' perceptions of control over and personal value of emotions such as joyful feeling, boredom, pride or shame in relation to academic outcomes, success or failure in academic settings such as classrooms, exams or self-study (Pekrun, 2006; Pekrun et al., 2017). Pekrun (2018) acknowledged students' academic emotions as being basically influenced by their achievement, control-related appraisals (such as competence beliefs, e.g., self-concept), and value appraisals (beliefs about the intrinsic or extrinsic worth of a subject area, e.g., achievement outcomes). Ma et al. (2025) opined that learners' academic emotions are influenced by their perceptions of control and value regarding academic activities and outcomes, and as well have a significant impact on students' learning attitudes, academic performance, and the development of their physical and mental health. Achievement emotions such as enjoyment and non-test-specific anxiety are also important predictors of student success (Putwain et al., 2020).

Empirical studies over years have found that positive emotions like enjoyment, hope, pride generally correlated with higher academic achievements, while negative emotions like anxiety, boredom, shame, anger, and hopelessness related to lower academic achievements (Davari et al., 2022; Mega et al., 2014; Pekrun et al., 2017; Shao et al., 2020; Cocoradă, 2016; Hayat et al. 2018). Tze et al. (2016) in a meta-

analysis to explore the link between boredom and educational outcomes identified a moderately negative average correlation between boredom and overall performance (r = - 0.24), alongside unfavorable correlations with academic motivation and study learning approaches. Similarly, Loderer et al. (2020) conducted a meta-analytical assessment of emotions in technology-related contexts observed a slight positive average correlation between enjoyment and learning outcomes (r = 0.18). Turnquest et al. (2023) in their study result that both academic emotions (anxiety and enjoyment emotions) predicted students' end of term academic performance. Camacho-Morles, et al., 2021 in their meta-analysis study observed a positive relationship between learning enjoyment emotion and academic performance ($\rho = 0.27$), while negative relationship were observed between anger emotion and academic performance ($\rho = -0.35$) and as well as between boredom emotion and academic performance ($\rho = -0.25$). Aqsa et al. (2024) in their study on the relationship between students' academic emotions and their achievement at secondary level found that positive emotions, such as enjoyment and pride, are associated with higher academic achievement, while negative emotions, such as anxiety and frustration, correlate with lower performance. They further observed that positive academic emotions, such as interest, enjoyment, and enthusiasm, are associated with higher levels of motivation and engagement in learning. Xie et al., (2025) in a meta-analysis study of the effects of academic emotions on learning outcomes revealed a significant relationship between positive emotions and performance ($r = 0.24$) and a significant effect of negative emotions ($r = -0.25$). Jing Tan, Jie Mao, Yizhang Jiang & Ming Gao (2021) in their study reported that academic emotions can improve learning effects, further concluding that positive academic emotions are better than negative academic emotions at improving academic performance. Research studies across middle school and university by Liu et al. (2025) indicated a significantly positively relationship ($r = 0.161 - 0.460$, $p < 0.01$) between positive emotions and academic performance in English, and a significantly inversely relationship ($r = -0.395$ to -0.150, $p < 0.01$) between negative emotions and academic performance in English. Finding by Acatrinei (2024) indicated that students' academic emotions (positive emotions) had the strongest impact on students' performances than motivation.

Statement of the Problem

Students' academic performance in physics has remained a major concern in many secondary schools, as evidenced by persistence poor results in both internal and external examinations. Observations based on professional experience suggest that factors beyond cognitive ability and instructional quality may also be influencing students' learning outcomes. One of such factor is students' academic emotions (positive - interest, enjoyment, etc; negative - anxiety, frustration, boredom etc) which have been found to significantly influence their motivation, cognitive processing, and overall academic performance.

Although previous studies have established that students' academic emotions influence students' achievement, but there is still limited empirical clarity on the comparable strength of positive and negative academic emotions, particularly in the context of physics learning. As students simultaneously experience both types of emotions, it remains unclear which has a more dominant effect on their academic performance, with most existing studies tending to examine either positive or negative emotions independently, without providing a comparative analysis of their relative predictive power. This therefore creates the need for this study, with a view to providing evidence-based insights on how these factors

individually and collectively influence students' performance, which can then be used by teachers and stakeholders in designing emotionally supportive learning environments that can enhance students' performance in secondary school Physics.

Purpose of the Study

The main purpose of this study is to examine the extent to which positive and negative academic emotions predict students' academic performance in secondary school Physics within Odeda Local Government area, Abeokuta, Ogun state, Nigeria. It also seeks to evaluate the level of students' positive and negative academic emotions, as well as, the relationship between positive and negative academic emotions in relation to students' academic performance in secondary school physics within the Local Government area.

Research Questions

The following research questions guide this study:

1. What level of positive academic emotion (enjoyment, interest, confidence) is exhibited by secondary school physics students in Odeda Local Government area, Abeokuta, Ogun state, Nigeria?
2. What level of negative academic emotion (anxiety, boredom, frustration) is exhibited by secondary school physics students in Odeda Local Government area, Abeokuta, Ogun state, Nigeria?

Hypotheses

H_{01}: There is no significant relationship between positive academic emotions (enjoyment, interest, confidence) and students' academic performance in Physics.

H_{02}: There is no significant relationship between negative academic emotions (anxiety, boredom, frustration) and students' academic performance in Physics.

H_{03}: There is no significant difference in the predictive effects of positive and negative academic emotions on students' academic performance in Physics.

METHODOLOGY

The study adopted a descriptive quantitative research design, conducted within Odeda local government area, Abeokuta, Ogun state, Nigeria. The population of the study comprised all physics students in all public Senior Secondary Schools I-III (SSS I-III) in the local government. The study area was divided into six zones (Obantoko, Alabata, Osiele, Odeda, Olodo, Ilugun) out of which a school each was selected based on the school popularity within the zone to make up six (6) sample schools for the study. Using random sampling technique, three hundred (300) SSS-II physics students were selected from the sample schools as the study sample students in such a way that fifty (50) students were selected from each of the sample schools.

Data collection instruments for this study are Physics Academic Performance Sheets (PAPS), and Students' Academic Emotion Scale (SAES). The PAPS are result sheets containing SSS-II students' physics scores obtained in their third term examination, and thus represents students' academic performance data. The SAES is a self-constructed questionnaire designed to obtain information on students' academic emotions. The SAES contains 15 items on positive emotions (enjoyment, interest and confidence) and another 15 items on negative emotions (anxiety, boredom and frustration) to make up a total of 30 items. The SAES was rated on a 4-point scale of Strongly Agree (SA = 4), Agree (A = 3), Disagree (D = 2), and Strongly Disagree (SD = 1).

The SAES was validated by expert colleagues in test measurement, and evaluation, while its reliability (SAES) was determined by Cronbach's Alpha statistics to yield reliability coefficient value, $\alpha = 0.81$. The instrument (SAES) was personally administered to the sample students by the researchers under strict examination conditions to ensure students' total concentration, and as well avoid communication of ideas among them. Collected data were subjected to statistical analysis with the aid of SPSS statistical software. The null hypotheses were tested using correlation, simple and multiple regression statistics at $\alpha = 0.05$ significance level. The research questions were answered using descriptive statistics (mean and standard deviations) based on the students' mean response (SMR) to the SAES items, which are interpreted as: Very Low Positive Emotion/Very Low Negative Emotion (SMR = 1.00 – 1.59), Low Positive Emotion/Low Negative Emotion (SMR = 1.60 – 2.19), Moderate Positive Emotion/Moderate Negative Emotion (SMR = 2.20 – 2.79), High Positive Emotion/High Negative Emotion (SMR = 2.80 – 3.39), Very High Positive Emotion/Very High Negative Emotion (SMR = 3.40 – 4.00).

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RESULTS

Research Question 1: What level of positive academic emotions (enjoyment, interest, confidence) are exhibited by secondary school physics students in Odeda Local Government area, Abeokuta, Ogun state, Nigeria?

Table 1: Students' response results on positive emotions in Students' Academic Emotion Scale

	Items on Positive emotions	(N = 300)		
S/N	(A). Enjoyment	MSR	SD	Remark
1.	I enjoy attending my physics classes.	2.81	0.75	HPE
2.	I find physics classes pleasurable.	2.63	0.79	MPE
3.	I enjoy participating in physics discussion activities.	2.74	0.82	MPE
4.	I feel good studying physics.	2.57	0.76	MPE
5.	I enjoy learning new concept in physics.	2.65	0.85	MPE
	Mean Response, MR_{EE} (Enjoyment Emotion)	**2.68**	**0.79**	**MPE**
	(B). Items on Interest Emotion	MSR	SD	Remark
6.	I am curious to learn more about physics.	2.72	0.63	MPE
7.	I find physics classes interesting.	2.54	0.71	MPE
8.	I concentrate and pay attention during physics classes.	2.65	0.73	MPE
9.	I feel eager to participate in learning activities.	2.56	0.74	MPE
10.	I feel that interest in solving difficult concept in physics.	2.48	0.77	MPE
	Mean Response, MR_{IE} (Interest Emotion)	**2.59**	**0.72**	**MPE**
	(C). Items on Confidence Emotion	MSR	SD	Remark
11.	I believe I can excel in physics.	2.53	0.72	MPE
12.	I am confident I can understand difficult topics in physics.	2.46	0.76	MPE
13.	I feel confident answering questions on physics.	2.43	0.82	MPE
14.	I am confident in explaining physics concept to others.	2.48	0.83	MPE
15.	I am confidence I can solve difficult problems in physics.	2.45	0.76	MPE
	Mean Response, MR_{CE} (Confidence Emotion)	**2.47**	**0.78**	**MPE**
	Grand Mean, GM_{PE} (Positive Emotions)	**2.58**	**0.76**	**MPE**

MSR: Mean Score Response; VHPE: Very High Positive Emotion; HPE: High Positive Emotion; MPE: Moderate Positive Emotion; LPE: Low Positive Emotion; VLPE: Very Low Positive Emotion.
Data Source: Field Study, 2026.

Table 1 showed the students' responses regarding their positive emotions in students' academic emotion scale. The mean students' responses on enjoyment (MR_{EE} = 2.68, SD = 0.79), interest (MR_{IE} = 2.59, SD = 0.72), and confidence (MR_{CE} = 2.47, SD = 0.78) indicate moderate positive emotions on enjoyment, interest, confidence. By implications, table 1 results showed that the students exhibited a moderate positive emotions (GM_{PE} = 2.58, SD = 0.76) which is generally influenced by their level of enjoyment and interest in physics, as reflected in their response to: 'I enjoy attending my physics classes (MSR = 2.81, SD =

0.75)', I enjoy participating in physics discussion activities, (MSR = 2.74, SD = 0.82)', and 'I am curious to learn more about physics (MSR = 2.72, SD = 0.63)'.

Research Question 2: What level of negative academic emotions (anxiety, boredom, frustration) are exhibited by secondary school physics students in Odeda Local Government area, Abeokuta, Ogun State, Nigeria?

Table 2: Students' response results on negative emotions in Students' Academic Emotion Scale

	Items on Negative emotions	(N = 300)		
S/N	(A). Items on Anxiety Emotion	MSR	SD	Remark
1.	I feel nervous before and during tests or exams.	2.17	0.82	LNE
2.	I get anxious when I do not understand the topic taught.	2.06	0.77	LNE
3.	I feel uncomfortable participating in class discussions.	2.16	0.87	LNE
4.	I feel afraid or uneasy when questions are asked in class.	2.20	0.84	MNE
5.	I get overwhelmed or stressed up while studying physics.	2.11	0.73	LNE
	Mean Response, MR_{AE} (Anxiety Emotion)	**2.14**	**0.81**	**LNE**
	(B). Items on Boredom Emotion	MSR	SD	Remark
6.	I get bored most times in physics classes.	2.25	0.79	MNE
7.	I easily lose interest during physics classes.	2.32	0.86	MNE
8.	I feel mentally tired during physics classes.	2.45	0.92	MNE
9.	It is difficult for me to concentrate during physics classes.	2.38	0.84	MNE
10.	I feel that physics classes are dull.	2.30	0.98	MNE
	Mean Response, MR_{BE} (Boredom Emotion)	**2.34**	**0.88**	**MNE**
	(C). Items on Frustration Emotion	MSR	SD	Remark
11.	I feel frustrated when I do not understand a topic taught.	2.15	0.71	LNE
12.	I get frustrated when unable to answer some questions.	1.88	0.84	LNE
13.	I feel frustrated when I obtained low scores.	2.10	0.70	LNE
14.	I feel like giving up when the questions are too challenging.	2.06	0.74	LNE
15.	I feel frustrated when studying physics.	2.03	0.68	LNE
	Mean Response, MR_{FE} (Frustration Emotion) 2.044	**1.98**	**0.73**	**LNE**
	Grand Mean, GM_{NE} (Negative Emotions)	**2.15**	0.81	**LNE**

MSR: Mean Score Response; VHNE: Very High Negative Emotion; HNE: High Negative Emotion; MNE: Moderate Negative Emotion; LNE: Low Negative Emotion; VLNE: Very Low Negative Emotion.
Data Source: Field Study, 2026.

Table 2 showed the students' responses to the components of negative emotions (anxiety, boredom, frustration) in students' academic emotion scale. The mean students' responses showed MR_{AE} = 2.14, SD = 0.81 on anxiety; MR_{BE} = 2.34, SD = 0.88 on boredom; and MR_{FE} = 1.98, SD = 0.73 on frustration, indicating low negative emotion on anxiety, moderate negative emotion on boredom, and again low negative emotion on frustration. Overall, table 2 results revealed that the students generally exhibited a

low negative academic emotions (GM_{NE} = 2.15, SD = 0.81), which can be said to be majorly influenced by students' responses to: 'I get anxious when I do not understand the topic taught (MSR = 2.06, SD = 0.77)', I get overwhelmed or stressed up while studying physics, (MSR = 2.11, SD = 0.73)', and 'I get frustrated when unable to answer some questions (MSR = 1.88, SD = 0.84)', 'I feel frustrated when I obtained low scores (MSR = 2.10, SD = 0.70)', 'I feel like giving up when the questions are too challenging (MSR = 2.06, SD = 0.74)', I feel frustrated when studying physics (MSR = 2.03, SD = 0.68)'.

Hypothesis 1: There is no significant relationship between positive academic emotions (enjoyment, interest, confidence) and students' academic performance in Physics.

Table 3a: Pearson correlation result for the relationship between positive academic emotions and students' academic performance

Variable	N	r	Sig. (p-value)	Remarks
Positive Emotions	300	0.544	0.001	Positive and Significant relationship
Academic Performance	300			

Data Source: Field Study, 2026.

Table 3a shows the result of Pearson correlation analysis conducted to examine the relationship between positive academic emotions (enjoyment, interest, confidence) and students' academic performance in physics. The result showed a correlation coefficient, r = 0.544 (at $p<0.05$**).** This indicates a moderate positive statistically significant relationship between positive academic emotions and academic performance.

Table 3b: Model summary of simple regression analysis for positive academic emotions- students' performance relationship

Model	R	R^2	Adjusted R^2	Std. Error of the Estimate
1.	0.544	0.296	0.293	6.82

Data Source: Field Study, 2026.

Table 3b shows the model summary results of the regression analysis for the relationship between positive academic emotions (enjoyment, interest, confidence) and students' academic performance in physics. This result showed an R^2 value of 0.296 which indicate that approximately 29.6% of the variation in students' academic performance can be explained by their positive academic emotions.

Hypothesis 2: There is no significant relationship between negative academic emotions (anxiety, boredom, frustration) and students' academic performance in Physics.

Table 4a: Pearson correlation result for the relationship between positive academic emotions and students' academic performance

Variable	N	r	Sig. (p-value)	Remarks
Negative Emotions	300	- 0.486	0.002	Negative and Significant relationship
Academic Performance	300			

Data Source: Field Study, 2026.

Table 4a shows the correlation analysis results regarding the relationship between negative academic emotions (anxiety, boredom, frustration) and students' academic performance in physics. This result showed a correlation coefficient, r = - 0.486 (at $p<0.05$**)** indicating a moderate negative statistically significant relationship between negative academic emotions and academic performance.

Table 4b: Model summary of simple regression analysis for negative academic emotions- students' performance relationship

Model	R	R^2	Adjusted R^2	Std. Error of the Estimate
1.	0.486	0.236	0.233	7.25

Data Source: Field Study, 2026.

Table 4b shows the model summary results of simple regression analysis for the relationship between negative academic emotions (anxiety, boredom, frustration) and students' academic performance in physics. This result showed an R^2 value of 0.236 implying that approximately 23.6% of the variation in students' academic performance can be explained by their negative academic emotions.

Hypothesis 3: There is no significant difference in the predictive effects of positive and negative academic emotions on students' academic performance in Physics.

Table 5a: Model summary of multiple regression analysis for positive and negative academic emotions effects on students' performance

Model	R	R^2	Adjusted R^2	Std. Error of the Estimate
1.	0.631	0.398	0.394	6.30

Data Source: Field Study, 2026.

Table 5a revealed the model summary results of multiple regression analysis conducted to examine the joint contributions of positive (enjoyment, interest, confidence) and negative (anxiety, boredom, frustration) academic emotions to students' academic performance. The model showed a combined correlation coefficient, R = 0.631 indicating a strong combined (positive and negative academic emotions) relationship statistically significant relationship between positive and negative academic emotions, and academic performance. The model also showed an R^2 value of 0.398, implying that approximately 39.8% of the variation in students' academic performance is explained jointly by positive and negative academic emotions.

Table 5b: ANOVA results of multiple regression analysis for positive and negative academic emotions effects on students' performance

Source	Sum of Squares	Df	Mean Square	F	Sig.
Regression	5253.60	2	2626.80	66.24	0.001
Residual	7946.40	297	26.75		
Total	13200.00	299			

Data Source: Field Study, 2026.

Table 5b shows the ANOVA results of the multiple regression analysis for the joint influence of positive and negative academic emotions on students' academic performance in physics. The result showed an $F(2, 297) = 62.24$, $p<0.05$, indicating a statistically significant joint relationship between positive and negative academic emotions, and students' academic performance. This implies that both predictors (positive and negative academic emotions) jointly influence students' performance significantly.

Table 5c: Coefficients of multiple regression analysis for the effects of positive and negative academic emotions on students' performance

	Unstandardized Coefficients		Standardized Coefficients		
Predictors	B	Std. Error	Beta	T	Sig.
Constant	41.20	2.10	—	20.60	0.001
Positive Emotions	0.63	0.07	0.51	8.95	0.001
Negative Emotions	- 0.38	0.06	- 0.33	- 6.20	0.001

Data Source: Field Study, 2026.

Table 5c showed the coefficients of multiple regression analysis for the predictive power of positive and negative academic emotions on students' performance. As reflected on Table 3c, the positive emotions ($\beta = 0.51$, $t = 8.95$, $p<0.05$) have statistically significant positive predictive effects on students' academic performance, while the negative emotions ($\beta = - 0.33$, $t = - 6.20$, $p<0.05$) have statistically significant negative predictive effects on students' academic performance. Comparing the predictive ability of both emotions, the result revealed that the positive emotions ($\beta = 0.51$) have a stronger predictive effect on students' academic performance than the negative emotions ($\beta = - 0.33$). This shows that positive emotions contribute more strongly to academic performance than negative emotions, thus indicating a significant difference in the predictive effects of positive and negative academic emotions on students' academic performance in Physics.

DISCUSSIONS

Results from analyses of the research questions showed that physics students in the local government area demonstrated moderate positive academic emotions (enjoyment, interest, confidence) as reflected by $GM_{PE} = 2.58$, $SD = 0.76$, and low negative academic emotions (anxiety, boredom, frustration) as shown by $GM_{NE} = 2.15$, $SD = 0.81$. Correlation and regression analyses results also revealed that positive academic emotions were significantly and positively related to students' academic performance ($r = 0.54$,

$p < 0.05$), and contributed approximately 29.6% ($R^2 = 0.296$) to students' academic performance. This indicates that higher levels of enjoyment, interest, and confidence are associated with improved academic performance in Physics. Field experience has shown that when students are happy with their learning environments, instructional support and achievements, they naturally become interested in knowing more about the subject area which in turn triggers their confidence to succeed leading to more commitment on their part and hence improved academic performance. Similarly, negative academic emotions correlated significantly negative to students' academic performance ($r = -0.49$, $p < 0.05$), and contributed approximately 23.6% ($R^2 = 0.236$) to students' academic performance. This suggests that increased levels of anxiety, boredom, and frustration are associated with decreased academic performance in Physics. Usually students who constantly found it hard coping with the cognitive demands of learning physics, especially due to lack of concept understanding and applications, little to no emotional support received from their learning environment or home, poor instructional support etc, often experienced anxiety, boredom, and frustration emotions which eventually leads to poor academic performance. These results (positive emotion – performance: $r = 0.54$; negative emotion – performance: $r = -0.49$; $p < 0.05$) are further explained by the moderate positive academic emotions and low negative academic emotions exhibited by the students.

These findings are consistent with previous studies such as that of Camacho-Morles et al. (2021), Dai (2025), Liu et al. (2025), Pekrun et al. (2017), Tan et al., (2021). Camacho-Morles et al. (2021) in a meta-analysis of 68 studies found that positive academic emotions (e.g., enjoyment) are significantly positively related to academic performance ($\rho = 0.27$), while negative emotions (e.g., anger, boredom) negatively predict performance. Dai (2025) through his research showed that positive academic emotions (e.g., enjoyment, interest, confidence) are associated with improved exam performance, due to enhanced attention, motivation, and cognitive flexibility. Liu et al. (2025) in their study results revealed that achievement emotions significantly influence students' English performance, with positive emotions enhancing performance through improved engagement and emotion regulation. Pekrun et al. (2017) in a longitudinal study showed that positive academic emotions (e.g., enjoyment, pride) significantly predicted students' subsequent academic achievement, while negative emotions predicted lower achievement over time. Tan et al., (2021) conducted a systematic review studies and revealed that positive academic emotions significantly improve learning outcomes, while regulation of emotions enhances students' academic performance.

In addition, multiple regression analysis conducted in this study also showed that positive and negative academic emotions significantly predicted students' academic performance, $F(2, 297) = 66.25$, $p < 0.05$, $R^2 = 0.398$, with positive academic emotions having a stronger positive predictive power ($\beta = 0.51$, $t = 8.95$, $p < 0.05$) on students' performance than negative academic emotions with lower negative predictive power ($\beta = -0.33$, $t = -6.20$, $p < 0.05$). These results aligned with the findings of previous research studies. For example, Camacho-Morles et al. (2021) in addition to observing that both positive and negative academic emotions are positively and negatively related to academic performance, their **m**eta-analysis studies also showed that positive emotions (e.g., enjoyment) have a more consistent and stronger positive relationship with academic performance (enjoyment: $\rho = 0.27$) while the negative emotions

considered are weak or inconsistent predictors (anger: $\rho = -0.35$, boredom: $\rho = -0.25$, frustration: $\rho = -0.02$). Gordillo-Leon et al. (2026) in a systematic review studies found that positive affect shows a clear and consistent direction of effect with a statistically significant association with academic performance ($r = 0.27$), while negative affect showed an inconsistent direction of effect and a weak non-significant association with academic performance ($r = -0.11$). Tan et al. (2021) in addition to showing that positive academic emotions promote learning outcomes, further revealed that positive academic emotions are better than negative academic emotions in improving academic performance. Loderer et al. (2020) in a meta-analytical study discovered that positive emotions show stronger beneficial effects on performance compared to the detrimental effects of negative emotions.

CONCLUSION

This study highlights the predictive ability of positive and negative academic emotions on students' academic performance in secondary school physics. Students' positive emotional indices were observed to be stronger than their negative emotional indices, thus accounting for the observed moderate positive academic emotions compared to observed low negative academic emotion, as well as, the observed stronger predictive strength of the positive emotions ($r = 0.544$, $R^2 = 0.296$, $\beta = 0.51$, $t = 8.95$, $p < 0.05$) compared to the negative emotions ($r = -0.486$, $R^2 = 0.236$, $\beta = -0.33$, $t = -6.20$, $p < 0.05$). Overall, this study emphasis the importance of creating an emotionally supportive learning environments capable of fostering motivation, improving students' cognitive ability and hence their academic performance in secondary school Physics.

Recommendations

Based on the finding of this study, the following recommendations were made:

1. Training workshops and seminars should be organized for teachers on educational strategies for creating emotionally supportive classrooms and its effective applications.
2. Teachers should intensify greater effort in building positive academic emotions (enjoyment, interest and confidence) both within classrooms and in students.
3. Teachers should intensify greater effort in managing students' negative emotions (anxiety, boredom, frustration) both within classrooms and in students.

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