Peer Influence and Academic Achievement in Biology among Senior Secondary Two Students in Abuja Municipal Area Council, Nigeria

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ABSTRACT

This study examined the relationship between peer influence and academic achievement in Biology among Senior Secondary Two (SS2) students in the Abuja Municipal Area Council (AMAC), Federal Capital Territory, Nigeria. It was guided by four research questions and four null hypotheses addressing four indices of peer influence: study habits, examination preparation, class attendance and group participation. A descriptive correlational survey design was adopted; because the design is non-experimental and all measures were taken concurrently, the findings are reported throughout as associations and no causal inference is drawn. From a target population of 390 SS2 Biology students across three purposively selected schools, a target sample of 197 was drawn using Yamane's (1967) formula with proportionate stratified random sampling; 170 usable questionnaires were returned and analysed (86.3% usable-response rate). Data were collected with the researcher-developed Peer Influence and Academic Achievement Questionnaire (PIAAQ), a 40-item, four-point scale (Cronbach's alpha = .78–.84 across subscales in the pilot; .74–.85 in the main study), and achievement was operationalised as a 100-point Biology Achievement Total drawn from official school records, combining the continuous-assessment component (40 marks) and the end-of-term Biology examination (60 marks). Research questions were answered using mean and standard deviation against a 2.50 criterion; the null hypotheses were tested with the Pearson Product-Moment Correlation Coefficient (t-distribution, alpha = .05, df = 168), with 95% confidence intervals obtained by Fisher's r-to-z transformation, and a hierarchical multiple regression was used to estimate the independent contribution of each index while controlling for gender, age and school. The descriptive extent of peer influence was low across all four indices (grand means 2.33–2.44), yet each index was significantly and positively associated with Biology achievement: study habits ($r = .314$, 95% CI [.172, .444]), examination preparation ($r = .334$, 95% CI [.193, .462]), class attendance ($r = .583$, 95% CI [.474, .675]) and group participation ($r = .371$, 95% CI [.234, .494]); all four null hypotheses were rejected, and Williams's test for dependent correlations confirmed class attendance as significantly the strongest correlate (all $p \leq .005$). In the hierarchical regression, student characteristics accounted for 4.1% of the variance (ns) while the four indices added a further 38.9%, $\Delta F(4, 161) = 27.42$, $p < .001$; class attendance was the only index with a substantial independent association ($\beta = .461$, $sr^2 = 18.0\%$), examination preparation ($\beta = .129$) and group participation ($\beta = .159$) retained small significant associations, and study habits did not remain significant ($\beta = .122$, $p = .063$). The study concluded that peer influence, though not perceived as a dominant force, is significantly and positively associated with Biology achievement in the schools studied, and recommended, as association-informed measures whose effectiveness remains to be tested experimentally, structured peer study groups, peer-led revision, a peer attendance buddy system and structured small-group discussion.

Keywords: peer influence, academic achievement, biology education, study habits, class attendance

INTRODUCTION

Biology is one of the core science subjects at the senior secondary level in Nigeria and serves as a prerequisite for careers in medicine, pharmacy, nursing, agriculture, veterinary science and the biological sciences more broadly. Achievement in Biology at the SS2 stage is particularly important because it establishes the academic basis for the final external examinations in SS3. Despite this importance, results from the West African Examinations Council (WAEC) and the National Examinations Council (NECO) have consistently shown patterns of poor achievement in Biology across secondary schools in Nigeria. While inadequate teaching

resources, large class sizes and individual learning challenges also contribute to this pattern, the relationship between peer factors and Biology performance remains comparatively under-investigated, particularly within the Abuja Municipal Area Council (AMAC).

Academic achievement refers to the extent to which students attain their educational goals, typically measured through test scores, grade point averages and examination results (Ogundiwin, Adewumi, Olumide, & Fasanya, 2025). As Harris (1998) provocatively observed, who a student sits next to in class may matter as much as who stands at the blackboard. Peer influence, the process by which individuals' attitudes, behaviours and beliefs are shaped by interaction with others of similar age or social status, is widely characterised as a double-edged sword, associated with academic excellence in some contexts and with disengagement in others (Pyakurel & Paudel, 2025).

AMAC, the most urbanised of the six area councils of the Federal Capital Territory, hosts secondary schools serving students of varied socioeconomic and cultural backgrounds. Three schools were purposively selected for this study, Oasis International College, Parliament International School and Premier International School, each presenting a distinct peer environment. This study operationalised peer influence through four indices: study habits, the routines peers model around scheduling, note review and active reading; examination preparation, the collaborative revision, quizzing and syllabus coverage peers encourage before tests; class attendance, the punctuality and regularity norms peers reinforce; and group participation, the active engagement peers foster in classroom discussion and collaborative activity. Each index was examined for its relationship with Biology achievement among SS2 students across the three schools.

Statement of the Problem

The poor achievement of secondary school students in Biology remains a recurring concern in Nigeria, limiting access to science-related careers and hindering national development. Government interventions, curriculum reform, teacher training and laboratory upgrades, have not resolved the problem, and the search for solutions has largely focused on institutional factors such as inadequate facilities and large class sizes, overlooking the role of peer influence. During adolescence, peers exert a powerful influence on academic behaviour and attitudes, yet the extent to which peer-related study habits, examination preparation, class attendance and group participation are associated with Biology achievement remains underexplored in AMAC. This study therefore investigated the relationship between these four peer-influence indices and academic achievement in Biology among SS2 students in AMAC.

Theoretical Framework

This study was anchored on three complementary theories. Because a combined framework can obscure what each theory separately contributes, the account below states, for each theory, the specific PIAAQ subscale and item content it was used to justify, the prediction it generates for the analysis, and the explanatory limit it carries in a correlational design.

Bandura's (1977) Social Learning Theory holds that behaviour is substantially acquired through attention, retention, reproduction and motivation, and that observers most readily reproduce behaviour modelled by others of similar status. In this study the theory underwrites the Study Habits and Class Attendance subscales, whose items were written to capture the observation and imitation of classmates' visible routines rather than attitudes towards Biology; the sample item "My classmates' habit of reviewing their notes regularly motivates me to do the same" asks the respondent to report modelling directly. Its testable prediction is ordinal: the more behaviourally visible the peer conduct an index measures, the stronger its association with achievement should be, which places attendance above the other three indices. Its distinctive limit is that it explains how an observed behaviour is acquired but not how students come to observe those particular peers, so on its own it cannot exclude selection, in which already-successful students choose more studious classmates.

Festinger's (1954) Social Comparison Theory proposes that individuals evaluate their abilities against similar others when objective standards are unavailable. It corresponds to the Examination Preparation subscale, whose items index joint revision, peer quizzing and the checking of syllabus coverage against classmates; each is an

occasion on which a student's standard of preparation becomes visible relative to others. Its contribution is distinct from Bandura's: where Social Learning Theory explains the transmission of a routine, Social Comparison Theory explains its calibration, predicting an association driven by the diagnostic information that comparison supplies rather than by imitation as such. Its distinctive limit is directional ambiguity, since upward comparison may either mobilise effort or discourage a student who judges the gap unbridgeable, and a self-report of perceived peer influence cannot separate these two outcomes.

Deci and Ryan's (1985) Self-Determination Theory identifies autonomy, competence and relatedness as basic psychological needs. It is the framework attached to the Group Participation subscale, whose items measure willingness to contribute to classroom discussion and collaborative activity when classmates are supportive. It supplies what neither of the other two theories does, a motivational account of persistence: modelling explains acquisition and comparison explains evaluation, but relatedness explains why a student continues to engage with demanding Biology content over time. Its prediction is that participation relates to achievement through sustained engagement rather than through any specific transmitted routine. Its limit here is that motivation was not measured; relatedness is inferred from reported participation, so the mechanism is proposed rather than demonstrated.

Taken together, the three theories are complementary rather than interchangeable, and they are unevenly served by the present design. Social Learning Theory carries most of the explanatory weight for the two behavioural indices, Social Comparison Theory for the evaluative index and Self-Determination Theory for the motivational index. Where they overlap (group study involves modelling, comparison and relatedness at once), the data collected here cannot adjudicate between them. The framework therefore yields predictions about the ordering and relative magnitude of the four associations, which the analysis can test, but not about the mechanisms producing them, which would require the longitudinal or experimental evidence recommended in the final section.

Empirical Review

Several Nigerian and international studies have examined components of peer influence in relation to academic performance, though rarely as an integrated set of indices within a single subject. Agbajeola (2024) found that peer pressure and internet addiction significantly predicted senior secondary students' academic performance in Ogun State. Rao and Prasad (2024) reported that study habits significantly predicted achievement among Indian secondary students ($R = .234$), while Williams and Johnson (2025) found a moderate correlation between daily study hours and GPA ($r = .42$) among United States high-schoolers. Chua, Goh and Wong (2025) demonstrated that collaborative examination preparation significantly improved performance among Malaysian students, a pattern corroborated by Stankov, Morony and Lee (2025) in Australia. Adeyemi (2014) and Uwah and Ekpo (2024) both reported a strong positive correlation ($r = .72$) between class attendance and academic achievement among Nigerian secondary students, while Ofem, Ebuara and Arop (2024) identified attendance as the strongest of several school-factor predictors (beta = .43). Okonkwo and Eze (2022) and Adebayo and Ogunleye (2022) both found that classroom and cooperative participation significantly improved academic performance in Nigerian contexts. While each of these studies supports one or two components of peer influence, none examined study habits, examination preparation, class attendance and group participation together in relation to Biology achievement specifically, nor within the AMAC context, a gap the present study addresses.

Purpose and Hypotheses

The study examined the relationship between peer influence and Biology academic achievement among SS2 students in AMAC through four objectives: to examine the relationship between (a) study habits, (b) examination preparation, (c) class attendance and (d) group participation, and Biology achievement. Correspondingly, four null hypotheses were tested at the 0.05 level of significance: H01, there is no significant relationship between study habits and Biology achievement; H02, there is no significant relationship between examination preparation and Biology achievement; H03, there is no significant relationship between class attendance and Biology achievement; and H04, there is no significant relationship between group participation and Biology achievement.

In addition to these four hypotheses, a supplementary analytic question was addressed: how much of the variance in Biology achievement do the four indices jointly account for, and what independent contribution does each make when the other three and selected student characteristics (gender, age and school) are held constant? This question is answered by the hierarchical multiple regression reported in Table 7 and is framed as an estimation rather than a null-hypothesis question.

METHODOLOGY

Research Design

The study adopted a descriptive correlational survey design, a non-experimental design used to describe the characteristics of a defined population and to establish the strength and direction of relationships between naturally occurring variables without manipulation (Miksza, Reimer, & Powell, 2023; Orodho, 2009). This design was appropriate because it enabled standardised data collection from SS2 Biology students across three schools and permitted examination of the relationship between each peer-influence index and Biology achievement without experimental intervention.

The design supports statements of association only. All variables were measured concurrently and none was manipulated, so an observed correlation between a peer-influence index and Biology achievement is equally consistent with three accounts: that peer influence contributes to achievement, that achievement shapes the peers a student associates with and how that student perceives them, and that both are products of an unmeasured third variable such as home academic support, prior attainment or general ability. Accordingly, the findings are described throughout this report as relationships, associations or correlates, and no wording is used that would imply that peer influence produces improved achievement.

Population, Sample and Sampling Technique

The study was conducted in three secondary schools in AMAC: Oasis International College, Parliament International School and Premier International School, selected for their location, enrolment of SS2 Biology students, accessibility and institutional diversity. The target population comprised all 390 SS2 Biology students enrolled across the three schools during the 2025/2026 academic session (Table 1). The sample size was determined using Yamane's (1967) formula at a 5% margin of error, yielding a minimum required sample of 197, which was allocated proportionately across schools using proportionate stratified random sampling with school as the stratifying variable (Table 2), and further stratified by gender within each school using simple random sampling (balloting).

The selection of the three schools was purposive rather than random, on four criteria applied in advance. First, each enrols a full SS2 Biology stream of comparable size (115–140 students), so that proportionate allocation would yield workable stratum sizes in every school rather than a single dominant stratum. Second, each maintains complete and retrievable Biology continuous-assessment and end-of-term examination records for the session, which was a precondition for the achievement measure adopted and which not every school approached could supply. Third, the three differ in intake and institutional character while operating within the same urban area council, so that the peer environment could be observed across more than one school culture rather than within a single institution.

Fourth, all three were accessible to the researchers and their principals granted permission within the data-collection window. The first three criteria are substantive and the fourth is pragmatic; taken together they define a sample selected for record availability and institutional contrast, not a probability sample of AMAC schools.

Randomisation was applied within schools rather than across them: stratum sizes were allocated proportionately (Table 2) and individual respondents were drawn by balloting. Statistical inference therefore extends to SS2 Biology students in the three participating schools; extension to AMAC or to the Federal Capital Territory as a whole is provisional and would require replication on a randomly selected multi-school sample, a point returned to under Limitations.

Table 1. Population of SS2 Biology Students by School

School	Population
Oasis International College	140
Parliament International School	135
Premier International School	115
Total	390

Table 2. Proportionate Sample Allocation by School

School	Population (N_h)	Proportion	Sample (n_h)
Oasis International College	140	0.359	71
Parliament International School	135	0.346	68
Premier International School	115	0.295	58
Total	390	1	197

Instrumentation

Data were collected with the researcher-constructed Peer Influence and Academic Achievement Questionnaire (PIAAQ), comprising Section A (bio-data: school, gender, most recent Biology continuous-assessment and end-of-term examination scores) and Section B (40 items across four ten-item subscales, Study Habits, Examination Preparation, Class Attendance and Group Participation, each rated on a four-point Likert scale: Strongly Agree = 4, Agree = 3, Disagree = 2, Strongly Disagree = 1). A sample item from the Study Habits subscale reads, "My classmates' habit of reviewing their notes regularly motivates me to do the same." Academic achievement was operationalised using students' Biology continuous-assessment and end-of-term examination scores obtained from official school records.

Because the composition of this achievement measure is central to interpreting the results, it is set out in full. Each participating school follows the standard Nigerian secondary-school assessment structure for the term, in which continuous assessment carries 40 marks and the end-of-term subject examination carries 60 marks. The continuous-assessment component is the school's own aggregate of within-term class tests, assignments and practical work, entered by the Biology teacher; the examination component is the single end-of-term Biology paper.

For each respondent the two components were summed, without reweighting or standardisation, to give a Biology Achievement Total on a 100-point scale, and it is this total that was entered into every correlational and regression analysis reported below. Observed totals ranged from 22 to 86 (M = 58.28, SD = 12.35). Although Section A of the PIAAQ asked respondents to enter their most recent Biology scores, the values used in analysis were those held in the official school records; the Section A entries served only to match each questionnaire to the correct record and to flag discrepancies for checking, so achievement was not a self-reported variable.

Two features of the measure should be borne in mind: each school sets and marks its own papers, so the composite reflects performance against a common assessment structure rather than a common instrument; and it covers a single subject in a single term, so it indexes current standing rather than cumulative attainment.

Five of the 40 items were negatively worded and were reverse-scored before subscale scores were computed: SH7 on the Study Habits subscale, EP6 on Examination Preparation, ATT2 and ATT9 on Class Attendance, and GP6 on Group Participation. After this recoding a higher score denotes greater perceived peer influence on every subscale. Each subscale score is the mean of its ten recoded items and therefore ranges from 1.00 to 4.00, which makes the criterion mean of 2.50 directly comparable across the four indices and makes the subscale means reported in Table 4 comparable with one another. The reliability coefficients in Table 3 were computed on the recoded items.

Validity and Reliability of the Instrument

The PIAAQ underwent face and content validation by three experts: two senior lecturers in Educational Psychology/Guidance and Counselling and one experienced SS2 Biology teacher, who reviewed the instrument for clarity, item appropriateness and construct coverage. A pilot study involving 30 SS2 Biology students from two AMAC schools not included in the main study yielded Cronbach's alpha coefficients ranging from .78 to .84 across subscales (overall scale alpha = .84), exceeding the conventional 0.70 threshold (Nunnally, 1978; Hussey, Alsalti, Bosco, Elson, & Arslan, 2025). Internal consistency was reconfirmed on the full main-study sample (N = 170): Study Habits alpha = .77, Examination Preparation alpha = .79, Class Attendance alpha = .77, Group Participation alpha = .74, and overall scale alpha = .85 (Table 3).

Table 3. Reliability Coefficients of the PIAAQ Subscales

Subscale	Pilot alpha (n = 30)	Main-study alpha (N = 170)
Study Habits	0.81	0.77
Examination Preparation	0.79	0.79
Class Attendance	0.83	0.77
Group Participation	0.78	0.74
Overall Scale	0.84	0.85

Procedure

Following formal letters of introduction from the Department of Educational Psychology, Bingham University, to the principals of the three selected schools, the PIAAQ was administered on the spot in each classroom and retrieved immediately on completion. Students were informed of the study's purpose and assured of confidentiality before administration. Of the 197 questionnaires distributed, 170 were returned complete and usable (86.3% usable-response rate).

Method of Data Analysis

Research questions were answered using the mean and standard deviation of responses, benchmarked against a criterion mean of 2.50 (the midpoint of the four-point scale): a subscale mean at or above 2.50 indicated a high extent of peer influence, and a mean below 2.50 indicated a low extent. The four null hypotheses were each tested on the full sample (N = 170) using the Pearson Product-Moment Correlation Coefficient (r) between the relevant subscale score and the Biology Achievement Total score, with significance evaluated using the t-distribution at the 0.05 level (df = n - 2 = 168; critical t = 1.974). Pearson r was preferred over the Chi-square test of independence because both peer-influence and achievement scores are continuous variables, and collapsing them into categories would discard information and reduce statistical power (Obilor & Amadi, 2018).

Coefficients were interpreted using Cohen's (1988) conventional benchmarks for the behavioural sciences, by which r values of approximately .10, .30 and .50 denote small, moderate and large associations respectively.

Two further analyses complemented these procedures. First, a 95% confidence interval was computed for each correlation using Fisher's r-to-z transformation, with the standard error of z given by $1/\sqrt{(N-3)} = .077$ and the interval limits back-transformed to the r metric, so that the precision of each estimate and not merely its statistical significance can be judged (Cumming, 2014). Intervals are reported alongside each coefficient in Table 5. Second, because the four peer-influence indices are themselves intercorrelated, bivariate coefficients cannot establish whether each index is related to achievement independently of the others. A hierarchical multiple regression was therefore conducted on the Biology Achievement Total, entering student characteristics at Step 1 (gender, age and school, the last dummy-coded with Oasis International College as the reference category) and the four peer-influence subscale scores as a block at Step 2. The change in R^2 at Step 2 tests the joint contribution of peer influence over and above those characteristics, and the standardised coefficients index the contribution of each index with the other three and the controls held constant. Multicollinearity was assessed by tolerance and the variance inflation factor (criteria: tolerance > .10, VIF < 10), independence of residuals by the Durbin–

Watson statistic, and linearity, normality and homoscedasticity by inspection of the residual scatterplot and normal probability plot (Tabachnick & Fidell, 2019). Zero-order intercorrelations among all study variables are reported in Table 6 and the regression results in Table 7.

A third addition concerns the comparison of the four coefficients with one another. Because all four correlations share the achievement variable, they are dependent, and the difference between any two of them cannot be judged by inspecting whether their confidence intervals overlap, a procedure that is conservative and can mislead in either direction. Williams's modification of Hotelling's test for dependent correlations sharing a common variable (Steiger, 1980) was therefore used to test whether the class-attendance coefficient was significantly larger than each of the other three, with df = n − 3 = 167.

RESULTS

Of the 197 questionnaires targeted for distribution, 170 usable, correctly completed questionnaires were returned (Oasis International College = 61, Parliament International School = 59, Premier International School = 50), an overall usable-response rate of 86.3%. Respondents comprised 90 males (52.9%) and 80 females (47.1%); ages ranged from 14 to 17 years, with a mean of 15.39 years (SD = 0.80). Biology Achievement Total scores ranged from 22 to 86, with a mean of 58.28 (SD = 12.35), and the distribution showed no gross outliers or marked violation of linearity or homoscedasticity, supporting the use of the Pearson correlation for hypothesis testing.

Descriptive Extent of Peer Influence

Table 4. Grand Means and Standard Deviations of Peer-Influence Subscales (N = 170)

Subscale	Grand Mean	SD	Decision (criterion = 2.50)
Study Habits	2.4	0.58	Low
Examination Preparation	2.35	0.6	Low
Class Attendance	2.44	0.6	Low (borderline)
Group Participation	2.33	0.57	Low

As shown in Table 4, all four subscale grand means fell below the criterion mean of 2.50, indicating that respondents did not, on average, perceive peers as strongly shaping their study habits, examination preparation, class attendance or group participation in Biology. Class attendance recorded the highest grand mean (2.44), closest to the criterion, while group participation recorded the lowest (2.33).

Tests of Hypotheses

Table 5. Summary of Pearson Correlation, Confidence Intervals and t-test Results (N = 170, df = 168, critical t = 1.974, alpha = .05)

Hypothesis	Relationship	r	r^2 (%)	95% CI for r	t-cal	p	Decision
H01	Study Habits × Achievement	0.314	9.9	[.172, .444]	4.289	<.001	Rejected
H02	Exam. Preparation × Achievement	0.334	11.2	[.193, .462]	4.597	<.001	Rejected
H03	Class Attendance × Achievement	0.583	34.0	[.474, .675]	9.309	<.001	Rejected
H04	Group Participation × Achievement	0.371	13.8	[.234, .494]	5.181	<.001	Rejected

Note. Confidence intervals were computed by Fisher's r-to-z transformation ($SE_z = 1/\sqrt{167} = .077$) and back-transformed to the r metric. r^2 is reported as the percentage of shared variance and does not imply that peer influence accounts for that variance causally.

As shown in Table 5, all four calculated t-values exceeded the critical t-value of 1.974 at df = 168 ($p < .001$), so all four null hypotheses were rejected. Peer-related study habits were positively and moderately associated with Biology achievement ($r = .314$, 95% CI [.172, .444]), as were peer-related examination preparation ($r = .334$, 95% CI [.193, .462]) and group participation ($r = .371$, 95% CI [.234, .494]). Class attendance produced the strongest association of the four indices ($r = .583$, 95% CI [.474, .675]). The intervals convey the precision of these estimates. Each excludes zero, consistent with the significance tests, but the intervals for the three moderate indices are wide: the corresponding population values could plausibly be as low as about .17 to .23 or as high as about .44 to .49, so the small differences among these three coefficients should not be over-interpreted, and the ordering of study habits, examination preparation and group participation is not established by these data.

Whether class attendance is genuinely the strongest correlate cannot be settled by inspecting the intervals, since the four coefficients share the achievement variable and are therefore dependent: the class-attendance interval clears those for study habits and examination preparation but overlaps that for group participation at its margin. Williams's test for dependent correlations resolves the comparison directly. The class-attendance coefficient is significantly larger than that for study habits, $t(167) = 3.34$, $p = .001$, than that for examination preparation, $t(167) = 3.23$, $p = .002$, and than that for group participation, $t(167) = 2.86$, $p = .005$. Class attendance can therefore be described as the strongest of the four correlates rather than merely the numerically largest, a conclusion the regression reported below independently supports.

Relative Contribution of the Peer-Influence Indices

Because the four indices were measured on the same respondents and are conceptually overlapping, the bivariate coefficients in Table 5 cannot show whether each index is associated with achievement independently of the other three. Table 6 reports the zero-order intercorrelations among all study variables, and Table 7 the hierarchical multiple regression of the Biology Achievement Total on student characteristics (Step 1) and the four peer-influence indices (Step 2).

Table 6. Means, Standard Deviations and Zero-Order Intercorrelations Among Study Variables (N = 170)

Variable	M	SD	1	2	3	4	5
1. Study Habits	2.40	0.58	1.00	.276	.193	.325	.314
2. Examination Preparation	2.35	0.60	.276	1.00	.258	.285	.334
3. Class Attendance	2.44	0.60	.193	.258	1.00	.301	.583
4. Group Participation	2.33	0.57	.325	.285	.301	1.00	.371
5. Biology Achievement Total	58.28	12.35	.314	.334	.583	.371	1.00

Note. N = 170. Subscale scores are means of ten items on a 1–4 scale; the Biology Achievement Total is on a 100-point scale. All correlations with the Biology Achievement Total are significant at $p < .001$ and reproduce the coefficients in Table 5. All six intercorrelations among the peer-influence indices are significant at $p < .05$.

Table 7. Hierarchical Multiple Regression Predicting Biology Achievement Total (N = 170)

Predictor	B	SE B	β	t	p	95% CI for B	VIF
Step 1: Student characteristics							
Gender (1 = female)	1.331	1.484	.054	0.897	.371	[−1.60, 4.26]	1.02
Age (years)	0.059	0.922	.004	0.064	.949	[−1.76, 1.88]	1.01
School: Parliament Int'l (vs Oasis)	2.456	1.804	.095	1.361	.175	[−1.11, 6.02]	1.37
School: Premier Int'l (vs Oasis)	0.689	1.832	.026	0.376	.707	[−2.93, 4.31]	1.30

Predictor	B	SE B	β	t	p	95% CI for B	VIF
Step 2: Peer-influence indices							
Study Habits	2.582	1.379	.122	1.872	.063	[−0.14, 5.31]	1.20
Examination Preparation	2.656	1.334	.129	1.991	.048	[0.02, 5.29]	1.18
Class Attendance	9.542	1.340	.461	7.118	<.001	[6.90, 12.19]	1.19
Group Participation	3.459	1.454	.159	2.380	.018	[0.59, 6.33]	1.27
Model summary: R^2 (Step 1)	.041	R^2 (Step 2)	.430	ΔR^2	.389	F(4, 161)	27.42

Note. N = 170. School is dummy-coded with Oasis International College as the reference category; gender is coded 1 = female. Adjusted R^2 for the full model = .401. The change at Step 2 was significant, $\Delta F(4, 161) = 27.42$, $p < .001$, as was the full model, $F(8, 161) = 15.16$, $p < .001$.

Step 1, containing gender, age and school, accounted for 4.1% of the variance in Biology achievement and was not significant, $F(4, 165) = 1.77$, $p = .137$; no control variable was individually significant. Entering the four peer-influence indices at Step 2 raised the explained variance to 42.9% (adjusted $R^2 = .401$), a change of 38.9 percentage points, $\Delta F(4, 161) = 27.42$, $p < .001$, and the full model was significant, $F(8, 161) = 15.16$, $p < .001$. The peer-influence block therefore accounts for almost all of the explained variance, and does so independently of the student characteristics measured here.

Within that block the four indices contribute very unequally. Class attendance is dominant ($\beta = .461$, $t = 7.12$, $p < .001$); its squared semipartial correlation indicates that it uniquely accounts for 18.0% of the variance in achievement, more than eight times the unique contribution of any other index. Group participation ($\beta = .159$, $p = .018$, $sr^2 = 2.0\%$) and examination preparation ($\beta = .129$, $p = .048$, $sr^2 = 1.4\%$) retain small but significant independent associations. Study habits does not: its coefficient falls to $\beta = .122$ and is no longer significant at the .05 level ($p = .063$, $sr^2 = 1.2\%$), with a confidence interval for B that includes zero.

This attenuation is the most consequential result of the multivariate analysis and it qualifies the bivariate finding for H01. Study habits correlated .314 with achievement on its own, but it also correlates .325 with group participation and .276 with examination preparation (Table 6), and once those overlaps are partialled out little independent association remains. The defensible reading is not that peer-related study habits are unrelated to achievement, since the zero-order association is real and the partial coefficient remains positive and of a magnitude similar to the two that do reach significance, but that this sample cannot separate its contribution from those of the indices alongside which it varies. A weaker form of the same caution applies to examination preparation and group participation, whose significance is marginal.

Multicollinearity does not account for this pattern. All variance inflation factors lay between 1.01 and 1.37 and all tolerances exceeded .72, well inside the stated criteria, so the standard errors are not inflated by redundancy among the predictors. The remaining assumptions were also satisfied: the Durbin–Watson statistic was 1.81, indicating independent residuals; the Shapiro–Wilk test on the residuals was non-significant, $W = .989$, $p = .215$; and the Breusch–Pagan test gave no evidence of heteroscedasticity, $LM = 2.57$, $p = .958$. As with the correlations, these coefficients are partial associations rather than causal effects, and the covariates available here do not include prior attainment, which remains the most plausible unmeasured confounder of the attendance result.

Major Findings

1. Peer-related study habits are significantly, positively and moderately associated with Biology achievement among SS2 students in the three schools studied ($r = .314$, 95% CI [.172, .444]).

2. Peer-related examination preparation is significantly, positively and moderately associated with Biology achievement ($r = .334$, 95% CI [.193, .462]).

3. Peer-related class attendance is significantly, positively and strongly associated with Biology achievement, and Williams's test for dependent correlations confirms that it is significantly stronger than each of the other three indices (all $p \leq .005$) ($r = .583$, 95% CI [.474, .675]).

4. Peer-related group participation is significantly, positively and moderately associated with Biology achievement ($r = .371$, 95% CI [.234, .494]).

5. With gender, age and school controlled, the four indices jointly account for a further 38.9% of the variance in Biology achievement, $\Delta F(4, 161) = 27.42$, $p < .001$, while the student characteristics alone account for 4.1% and are not significant.

6. Class attendance is the only index with a substantial independent association ($\beta = .461$, uniquely accounting for 18.0% of the variance). Examination preparation ($\beta = .129$) and group participation ($\beta = .159$) retain small significant associations, and study habits does not retain a significant independent association ($\beta = .122$, $p = .063$) once the other three indices are controlled.

7. The descriptive extent of peer influence was low on all four indices, so these associations were observed in a sample that did not, on average, perceive peers as a dominant influence on its academic behaviour.

8. Because the design is correlational and all peer-influence measures were self-reported at a single sitting, these findings identify associations and do not establish that peer influence produces changes in Biology achievement.

DISCUSSION

The significant positive association between peer-related study habits and Biology achievement ($r = .314$, 95% CI [.172, .444]) is consistent with Rao and Prasad (2024), who reported a smaller effect among Indian students ($R = .234$), and with Williams and Johnson (2025), whose United States sample produced a comparable coefficient ($r = .42$); the overlapping intervals mean the present estimate is not reliably distinguishable from either. The coefficient sits between the two figures, plausibly because it isolates the specifically peer-referenced component of study habits rather than study habits in general, while Nigerian students' routines are also shaped by parental and teacher expectations (Olowe & Olowe, 2021). Social Learning Theory (Bandura, 1977) offers one reading of the association, in which classmates who model organised study routines make those routines available for observation and imitation. The data are equally compatible with the reverse ordering, in which students who already study effectively gravitate towards similarly organised classmates and report more peer influence as a result; nothing in the present design distinguishes the two.

The association between peer-related examination preparation and achievement ($r = .334$, 95% CI [.193, .462]) aligns with Chua, Goh and Wong (2025) and Stankov, Morony and Lee (2025). Social Comparison Theory (Festinger, 1954) supplies a plausible interpretation: joint revision allows students to compare their understanding against peers and to identify gaps before an examination rather than during it. This interpretation is offered as a candidate mechanism, not as a finding; the present data establish that the two variables covary and cannot show that joint revision generated the higher scores. It is worth noting that Chua, Goh and Wong (2025) worked with an experimental manipulation of collaborative preparation, whereas the present study did not, so the convergence between the studies is one of direction rather than of evidential status.

Class attendance produced the strongest association with Biology achievement ($r = .583$, 95% CI [.474, .675]), the same direction as Adeyemi (2014) and Uwah and Ekpo (2024), who each reported $r = .72$ in Nigerian secondary samples, and broadly consistent with Ofem, Ebuara and Arop (2024). The present coefficient is appreciably lower than .72 and its confidence interval excludes that value, a difference plausibly attributable to measurement: the earlier studies correlated achievement with recorded attendance itself, whereas the present index measures perceived peer influence on attendance, which is a narrower construct. Two interpretations are consistent with the ordering observed. Attendance is the most behaviourally observable of the four indices, repeatedly and publicly visible to peers, which would strengthen the modelling mechanism emphasised by Bandura (1977); and attendance is a precondition for the other three indices to operate, since a student frequently

absent from lessons has fewer opportunities to encounter peer-shaped study habits, preparation or participation. Neither interpretation is tested here, and a third remains available throughout: students who are more motivated or better supported at home may both attend more regularly and achieve more highly, with no influence running between the two.

The significant association between group participation and achievement (r = .371, 95% CI [.234, .494]) is in line with Okonkwo and Eze (2022) and Adebayo and Ogunleye (2022). Self-Determination Theory (Deci & Ryan, 1985) offers a coherent reading: peer-supported participation would satisfy the relatedness need, and students who feel accepted by classmates during group discussion may be more willing to contribute, which in turn would be expected to sustain the intrinsic motivation underlying deeper engagement with Biology content. Since motivation was not measured in this study, this remains a theoretical account of an observed association rather than an empirically supported pathway.

The multivariate results temper this four-part picture in one important respect. When all four indices are entered together, only class attendance retains a substantial independent association with achievement, and peer-related study habits ceases to be significant. This does not overturn the rejection of H01, which concerned a bivariate relationship and remains supported, but it does bear on what the four indices should be taken to represent. They are not four channels of equal standing; they are correlated facets of a single peer environment, and in this sample the facet carrying most of the association with achievement is the one that is most behaviourally observable. That ordering is what Social Learning Theory predicts, since attendance is the peer conduct most repeatedly and publicly visible, and it is the one prediction generated by the theoretical framework that these data are able to test. It is equally consistent with the argument that attendance is a precondition for the other three indices to operate: if presence in the lesson is what allows peer-shaped study, preparation and participation to have any purchase, attendance would be expected to absorb much of their apparent association with achievement when all four are modelled at once.

A pattern cutting across all four indices is that the descriptive extent of peer influence was consistently below the criterion mean of 2.50 (Table 4), even though every index was significantly related to achievement (Table 5). This is not a contradiction: the descriptive results establish how strongly respondents perceived peers as shaping their behaviour on average, while the correlational results establish whether the variation that exists across respondents is systematically related to achievement. In this sample, peer influence was not, on average, a dominant force, but where it was present, it was significantly associated with higher Biology achievement, an important distinction for the interventions recommended below.

Two features of the measurement design qualify all four findings and warrant explicit statement. First, the peer-influence indices are self-reports of perceived peer influence rather than observations of peer behaviour, and adolescents completing a questionnaire in their own classroom may respond in the direction they judge socially acceptable. The direction of any such bias is not obvious: describing oneself as heavily influenced by peers may be unappealing, and the uniformly low grand means in Table 4 are compatible with under-reporting, which would attenuate rather than inflate the observed associations. Second, all four predictors were obtained from one instrument completed at one sitting, which raises the prospect of common-method bias, whereby shared response tendencies such as acquiescence or a consistent self-presentational style inflate the associations among measures drawn from a single source (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003).

The design carries partial protection against the second of these. The criterion variable, the Biology Achievement Total, was taken from official school records rather than from the questionnaire, so the predictor–criterion correlations reported in Table 5 do not share a common method. The intercorrelations among the four peer-influence indices, however, do share one, and it is these intercorrelations that determine how much each index is attenuated in the regression reported in Table 7; the partial coefficients in that table are therefore more exposed to common-method inflation than the zero-order coefficients in Table 5. Procedural remedies were confined to assurances of confidentiality and voluntary participation; no marker variable was included and no statistical test for common-method variance was performed. The estimates reported here are accordingly best read as upper bounds on the strength of the peer-influence associations.

CONCLUSION

This study set out to establish whether, and to what degree, four peer-influence indices (study habits, examination preparation, class attendance and group participation) are related to Biology academic achievement among SS2 students in three selected secondary schools in AMAC. The evidence supports the conclusion that peer influence is a genuine, measurable correlate of Biology achievement in this context rather than a peripheral factor. Peers were not the dominant shaping force in students' day-to-day study, revision, attendance or participation behaviour, yet the degree of peer influence reported was consistently and positively associated with achievement, most strongly in the case of class attendance, which was also the only index to retain a substantial independent association when all four were modelled together with student characteristics controlled. The classroom peer environment in the three schools studied presents less as an overwhelming social pressure and more as a modest but consistent academic correlate, a pattern that the anchoring frameworks of Social Learning Theory, Social Comparison Theory and Self-Determination Theory each help to interpret without any of them being tested by the present design. Two qualifications attach to this conclusion and should travel with it. It is a statement of association: the study does not show that increasing peer influence would raise Biology achievement, and the observed pattern is equally consistent with achievement shaping peer perception, or with both being driven by unmeasured factors. And it is a statement about three purposively selected schools in one area council, not about AMAC, the Federal Capital Territory or Nigerian secondary schools generally.

RECOMMENDATIONS

The following recommendations are derived from the associations reported above and are offered as measures worth introducing and evaluating, not as interventions whose effectiveness this study has demonstrated. Each is stated in a form that would permit its effect to be assessed.

1. Biology teachers and school counsellors may consider organising structured peer study groups, with assigned roles and a fixed weekly meeting time, so that opportunities for positive study modelling are deliberately created; where introduced, achievement should be compared with that of non-participating classes before the practice is generalised. This measure has the weakest evidential support of those listed here, since the independent contribution of peer-related study habits was not significant once the other indices were controlled, and it should accordingly be treated as exploratory.

2. Schools may institute peer-led revision sessions ahead of assessments, using past questions as shared material, so that peer-supported preparation is available to all students rather than only to those with well-organised friendship groups.

3. School administrators may consider a peer attendance buddy system alongside existing individual attendance registers, given that attendance showed the strongest association with achievement; because that association may partly reflect student characteristics rather than peer influence, any such scheme should be monitored against recorded attendance and achievement rather than assumed to be effective.

4. Biology teachers may incorporate structured small-group discussion segments of clearly bounded duration into regular lesson delivery.

5. School counsellors may conduct targeted sensitisation sessions on the academic benefits of positive peer engagement, given the comparatively low descriptive extent of peer influence observed.

6. Education authorities in the FCT may consider commissioning a larger, randomly sampled study across area councils before any of these measures is adopted as policy, since the present evidence base is three purposively selected schools.

Limitations and Suggestions for Further Research

This study is subject to several limitations, which are grouped below by design, measurement and sampling.

Design. The descriptive correlational design establishes association rather than causation. All variables were measured concurrently and none was manipulated, so the reported coefficients cannot distinguish peer influence contributing to achievement from achievement shaping peer association and perception, nor from the operation of unmeasured third variables such as prior attainment, general ability, home academic support or teacher quality. The hierarchical regression in Table 7 controls for gender, age and school, but these are a limited set of covariates and residual confounding is likely.

Measurement. The four peer-influence indices relied on self-report and may be subject to social-desirability bias, since respondents completed the questionnaire in their own classrooms and may have adjusted responses towards what they judged acceptable. All four predictors came from a single instrument administered at a single sitting, so common-method variance may have inflated the intercorrelations among them and, by extension, the partial coefficients in Table 7; no marker variable was included and no statistical test for common-method variance was conducted. Achievement was drawn from school records rather than self-report, which protects the predictor–criterion correlations from this particular problem, but each school set and marked its own papers, so the Biology Achievement Total reflects a common assessment structure rather than a common instrument and is not strictly comparable across schools. Achievement was also measured in a single subject in a single term, so it indexes current standing rather than cumulative attainment, and the findings should not be generalised to other subjects without further study. Class attendance was indexed by perceived peer influence on attendance rather than by attendance registers, and peer interaction was not measured directly by sociometric or observational means.

Sampling. The study was confined to three purposively selected schools within one of the six area councils of the Federal Capital Territory. The sample of schools is therefore not a probability sample, and although respondents were selected randomly within schools, statistical inference extends only to SS2 Biology students in those three schools. Generalisation to AMAC, to the FCT or to Nigerian secondary schools more widely is not supported without replication. The realised sample of 170 also fell below the target of 197, and although the 86.3% usable-response rate is high, the characteristics of the 27 non-respondents are unknown.

Suggestions for further research. Several of these limitations point directly to the design of subsequent studies. A longitudinal design, measuring peer influence at the start of a session and achievement at its end, would establish temporal ordering and allow prior attainment to be controlled, addressing the principal weakness of the present design. An experimental or quasi-experimental trial of a structured peer study-group intervention, with randomly assigned classes and a non-participating comparison group, would be required before any causal claim, or any of the recommendations above, could be regarded as evidence-based. A larger and more diverse sample, randomly drawn across the six area councils of the FCT and ideally across states, would establish whether the pattern reported here holds beyond three urban schools. Objective measures would strengthen the evidence considerably: attendance taken from official registers rather than perception, peer interaction assessed by sociometric peer nomination or classroom observation, and achievement measured with a common Biology instrument administered across schools. Multi-informant data, adding teacher ratings of student engagement to student self-report, together with a marker variable or a Harman-type test, would allow common-method variance to be assessed rather than merely acknowledged. Further work could also examine whether the pattern found for Biology extends to Physics and Chemistry, and whether the strength of these associations differs by gender, school type or ability band.

Ethical Considerations

Institutional clearance was obtained through formal letters of introduction issued by the Department of Educational Psychology, Bingham University, to the principals of the three participating schools, and administration proceeded only after each school granted permission. Respondents were informed of the study's purpose before administration and assured that their responses would be treated confidentially and used solely for research purposes; participation was voluntary. As respondents were minors, permission was obtained through the schools acting in loco parentis, consistent with standard practice for classroom-based educational research of this kind.

Conflict Of Interest

The author declares no conflict of interest in connection with this study.

Data Availability

The de-identified dataset generated and analysed during this study is available from the corresponding author upon reasonable request. Full disclosure of respondent-level school records is restricted to protect student confidentiality.

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