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RELATIONSHIP BETWEEN STUDENTS' ADVERSITY QUOTIENT AND PHYSICS ACHIEVEMENT IN PLATEAU STATE SECONDARY SCHOOLS

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ABSTRACT
This study examined the relationship between students' adversity quotient and physics achievement in Plateau State secondary schools. Guided by three research questions, and corresponding null hypotheses tested at 0.05 alpha level, the study was grounded in Adversity Quotient Theory by Stoltz (1997), adopted correlational survey research design, with a population of 22,959 students in 2024/2025 academic session. Using Taro Yamane's formula, 387 students were sampled through multi-stage sampling technique. Data were collected using two validated instruments namely: Physics Students' Adversity Quotient Questionnaire (PSAQQ) and Physics Students' Academic Achievement Proforma (PSAAP), with Cronbach's alpha reliability of 0.82 for PSAQQ. Mean and Standard deviation, linear and multiple regression were used to answer the research questions and test the null hypotheses respectively. Findings showed that control and ownership components of AQ had significant low positive relationship with Physics academic achievement ($r= 0.18$, $p<0.05$). The composite of the relationship indicated by the multiple linear regression model summary ($r=0.20$, adjusted $R^2=0.29$) revealing a significant predictive relationship $F(2, 384)=3.85;p<0.05$). It was concluded that adversity quotient components of control and ownership had a meaningful relationship with physics achievement in Plateau State secondary schools. Based on the results it was recommended that control and ownership AQ components should be utilized by physics educators in their quest to enhance academic achievement.

Key Words: Adversity Quotient, Academic achievement, secondary school physics.

Introduction

In the twenty-first century digital era, science education remains indispensable, as it equips learners with the competencies required for sustained technological advancement. In recognition of the strategic importance of science particularly Physics in national development, the National Policy on Education (Federal Republic of Nigeria (FRN), 2013) emphasizes Science, Technology, Engineering, and Mathematics (STEM) education as a means of enhancing scientific literacy. The policy prescribes a 60% admission quota into STEM-related disciplines in higher education, leaving 40% for other fields (Ndakogi, 2019; FRN, 2013), reflecting responsiveness to global technological trends (Knowles et al., 2018). Despite this policy direction, the expected outcomes have not been fully realized, as enrolment in STEM fields, especially Physics, remains relatively low. This trend has been attributed partly to the difficult and abstract nature of some concepts in the subject as well as the mathematical quantitative contents (Okoronka, 2018).

Physics education plays a central role in fostering scientific literacy and preparing students for careers in science and technology. As a foundational science, Physics profoundly influences human existence through the study of matter, energy, and their interactions. Onah (2023) asserts that a lack of understanding of Physics would significantly hinder humanity's capacity to explore and interpret the universe. Furthermore, Physics knowledge underpins the development of tools and technologies integral to everyday life, including domestic and industrial applications such as cooking devices, vacuum cleaners, and television systems. At the senior secondary school level, the subject encompasses key branches such as mechanics, optics, waves, electricity or electromagnetism, and nuclear Physics, all of which require sustained academic engagement.

Notwithstanding its significance, students' enrolment and achievement in Physics do not adequately reflect its importance. For instance, data from Plateau State between 2013 and 2022 indicate that, on average, only six out of ten students obtained credit passes in physics subject, while four out of ten failed (Plateau State Ministry of Education, 2024). Although this achievement may appear moderately satisfactory, further improvement is necessary for the state to strengthen its position in STEM-related programmes and careers within Nigeria. Persistent challenges in low enrolment and poor academic achievement in physics have been attributed partly to the difficult and abstract nature of some concepts in the subject as well as the mathematical/quantitative nature of the subjects (Okoronka, 2018).

Academic achievement is conceptualized as the measurable outcomes that indicate the extent to which educational objectives have been attained. Onah (2023) defines it as performance outcomes reflecting learners' attainment of educational goals, particularly at the secondary and tertiary levels. Similarly, Achor (2017) views academic achievement as a comprehensive construct that denotes the level of accomplishment of institutional educational objectives, often represented through grades such as cumulative grade point averages. These perspectives suggest that academic achievement encompasses observable learning outcomes, including changes in knowledge, skills, attitudes, and behavior, typically assessed through examinations, tests, and other evaluative measures. Multiple factors contribute to students' academic performance in Physics, including teacher-related variables, learner characteristics, environmental conditions, and perceptions of the subject (Okoronka & Onuoha, 2017; Akinbote, 1993). However, the persistence of low achievement despite various interventions predicates that these factors may not fully explain the phenomenon. The observation that some students excel under similar conditions highlights the need to examine intrinsic learner variables, such as Adversity Quotient (AQ). AQ encompasses dimensions such as control and ownership, where control refers to a learner's ability to regulate choices and maintain academic focus, while ownership reflects the extent to which individuals

accept responsibility for their actions and outcomes. Learners who demonstrate higher levels of control and ownership are more likely to achieve academically (Stoltz, 1997).

Understanding the determinants of academic achievement remains essential for educators and policymakers. Among these determinants, individual resilience, coping strategies, learning environments, and socio-economic factors play significant roles. One relatively underexplored factor is Adversity Quotient (AQ), which influences success across diverse domains, Stoltz (1997) defines AQ as an individual's capacity to withstand challenges, overcome obstacles, and remain focused on goals without being overwhelmed by difficulty, obstacles and challenges. Given contemporary societal challenges including economic pressures, health crises, and security concerns such as banditry and terrorism (Fwangle, 2025), students' adversity quotient may significantly influence their academic outcomes, particularly in demanding subjects like Physics.

Adversity quotient comprises four dimensions; Control, Ownership, Reach, and Endurance (CORE) as proposed by Stoltz (1997). This study focuses on two of these dimensions: control and ownership. Singh and Parveen (2018) describe the control dimension as the extent to which individuals perceive their ability to influence circumstances, while Matore et al. (2020) interpret it as the capacity to manage and respond effectively to challenging situations. Individuals with high control tend to exhibit resilience, optimism, and a strong recovery capacity following setback, whereas those with low control often demonstrate negative dispositions and limited perseverance. Empirical evidence indicates that the control dimension of AQ is significantly associated with academic performance. For example, Mwivanda and Kingi (2019) reported a positive relationship between control and students' academic performance in Kenyan secondary schools, suggesting that higher control enhances performance. Conversely, Wang et al. (2021) found a negative correlation between control and coping styles among students in Macao, indicating inconsistencies in empirical findings.

The ownership dimension, on the other hand, relates to an individual's recognition of responsibility for challenges and their consequences (Matore et al., 2020). Espanola (2016) found that ownership was the only AQ component significantly correlated with academic performance, while Mohd and Mohd (2020) reported high levels of ownership among pre-service teachers. These findings suggest that ownership plays a critical role in fostering accountability and academic success. Despite growing recognition of AQ as a determinant of academic performance, existing studies present mixed findings regarding its relationship with achievement (Mwivanda & Kingi, 2019; Wang et al., 2021). Furthermore, there was limited empirical evidence examining the specific contributions of control and ownership dimensions to students' academic achievement in Physics within the study area. Consequently, this study seeks to determine the relationship between control and ownership AQ components and physics achievement in Plateau State secondary school students in Nigeria.

Statement of the Problem

Students' persistent underachievement in Physics, despite its strategic importance in scientific and technological development, remains a critical educational concern in Plateau State. Although prior research has emphasized external determinants such as the quantitative nature of the subject (Okoronka, 2018), while some internal factors as; lack of interest of students in the learning process and attitude towards Physics (Usman & Jilang, 2018; Ejiga & Shie, 2023). These explanations have not sufficiently accounted for variations in students' achievement, particularly given that some learners excel under similar conditions. This inconsistency predicted the need to cross-examine internal learner characteristics further, notably Adversity Quotient (AQ), which captures individuals' capacity to respond effectively to challenges (Stoltz, 1997). While AQ has

been identified as a predictor of academic success, empirical evidence regarding its relationship especially across its core dimensions of control and ownership remains inconclusive and, at times, contradictory (Mwivanda & Kingi, 2019; Wang et al., 2021).

Furthermore, there is a notable lack of context-specific studies examining these relationships within Physics education in Plateau State. Consequently, the central problem addressed in this study is the lack of empirical clarity regarding the extent to which control and ownership dimensions of AQ predict students' academic achievement in Physics. Addressing this gap is essential for advancing both theoretical understanding and evidence-based educational interventions. Thus, against this backdrop was the need to conduct this research on relationship between students' adversity quotient and physics achievement in Plateau State secondary schools.

Objectives of the Study

The study was guided by the following objectives:

i. To examine the relationship between the control component of AQ and students' academic achievement in Physics.
ii. To determine the relationship between the ownership component of AQ and students' academic achievement in Physics.
iii. To investigate the relationship of AQ (control and ownership) components and students' academic achievement in Physics.

Research Questions

1. What is the level of control among students offering Physics in secondary schools in Plateau State?
2. What is the level of ownership among students offering Physics in secondary schools in Plateau State?
3. What is the mean academic achievement score of students offering Physics in secondary schools in Plateau State?

Hypotheses

H_{01}: There is no significant relationship between control AQ and students' academic achievement in Physics among secondary schools in Plateau State.

H_{02}: There is no significant relationship between ownership AQ and students' academic achievement in Physics among secondary schools in Plateau State.

H_{03}: There is no significant relationship between AQ (control and ownership) and students' academic achievement in Physics among secondary schools in Plateau State.

Literature Review

This study was anchored on the Adversity Quotient Theory (AQT) proposed by Stoltz (1997), which posits that individuals who maintain focus in the face of difficulty/obstacles can transform challenges into opportunities. AQ measures resilience and the ability to cope effectively with difficulties through four dimensions: Control, Ownership, Reach, and Endurance. These dimensions collectively explain how individuals respond to stress and challenges. AQ can be enhanced through self-awareness, sensitive regulation, problem-solving skills, and social support (Hidayati & Tarufik, 2020). When students consciously regulate their academic choices and accept responsibility for their outcomes, their academic performance may improve. Mohd and Mohd (2020) describe AQ as the capacity to remain composed and effective under challenging conditions, while Merianah (2019) and Srihartini et al. (2021) characterize it as a form of "fighting spirit" that transforms setbacks into opportunities. Tripathi and Bajpai (2022) further conceptualize AQ as the science of human resilience.

The control dimension reflects individuals' perceptions of their ability to influence outcomes (Singh & Parveen, 2018). Empirical studies provide mixed evidence regarding its influence. Mwivanda and Kingi (2019); Tripathi & Bajpai, (2022) and Mwivanda (2021) reported positive relationships between control and academic performance, whereas other studies reported non-significant relationships (Hidayati & Tarufik, 2020) and negative relationship (Wang et al., 2021; Yazon, 2019), suggesting that control may not be a dominant predictor of academic achievement in all situations.

The ownership dimension emphasizes responsibility for one's actions and their consequences. High ownership is associated with problem-solving orientation and accountability, while low ownership may involve misplaced blame (Suryandari & Yuliana, 2023). Empirical studies largely support its positive influence on academic performance (Espanola, 2016; Mwivanda, 2021; Suryandari & Yuliana, 2021), although contradictory findings have also been reported (Wang et al., 2021; Yazon, 2019). Overall, the literature indicates that AQ, particularly its control and ownership dimensions, may influence academic achievement, although findings remain inconclusive. This emphasizes the need for further investigation within specific settings such as relationship between students' adversity quotient and Physics achievement in Plateau State secondary schools.

Methodology

This study adopted a correlational survey research design, appropriate for examining relationships among variables without manipulation (Bhandari, 2022). The study was conducted in Plateau State, Nigeria, which comprises 17 Local Government Areas and is located in the north-central region of the country (NEWMAP, 2019). The population consisted of 22,959 Senior Secondary School III (SSS III) students offering Physics in 311 public secondary schools. A sample of 387 students was determined using Taro Yamane's formula (Yamane, 1973), selected through a multistage sampling technique. Two instruments were employed for data collection: The Physics Students' Adversity Quotient Questionnaire (PSAQQ) and the Physics Students' Academic Achievement Proforma (PSAAP). The PSAQQ was adapted from Stoltz's (1997) Adversity Quotient Profile which assess control and ownership dimensions within the context of Physics learning using a five-point Likert scale modify to levels. The PSAAP was used to obtain students documented academic scores for three academic terms.

The instruments were validated by experts in educational psychology, measurement and evaluation, and Physics education where Content Validity Index (0.85) and Content Validity Ratio (0.87) indicated acceptable validity (Genareo, 2023). Reliability testing using Cronbach's alpha yielded an overall coefficient of 0.815, with subscale values of 0.789 (control) and 0.705 (ownership), indicating good internal consistency (Taber, 2018). Data were collected with the assistance of trained research assistants following institutional approval. Descriptive statistics of mean and standard deviation with the decision rule based on real limits of numbers of; Very High Level (VHL) 4.50-5.00, High Level (HL) 3.50-4.49, Moderate Level (ML) 2.50-3.49, Low Level 1.50-2.49, Very Low Level 0.10-1.49. were used to answer research questions, while linear and multiple regression analyses were employed to test hypotheses at 0.05 alpha level. The decision rule is based on predefined P-value at 0.05 level of significance; when pre-defined value ($P<0.05$), the decision is to reject the null hypothesis that there is a statistically significant relationship. If the pre-defined value ($P>0.05$), the decision is that the null hypothesis was not rejected, that there is no statistically significant relationship.

Results

The results are presented in order of the objectives, research questions and hypotheses

Research Question One:

What is the level of control among students offering Physics in secondary schools in Plateau State?

Answering Research Question One:

Table 1: Mean and Standard Deviation of Control Level Among Students Offering Physics in Secondary School in Plateau State.

S/N	ITEM (n = 387)	Mean	S. D	Remark
1	I can influence my success in Physics through my actions	3.30	0.83	ML
2	When faced with difficulties in Physics, I feel capable of finding solutions.	3.42	0.95	ML
3	I take initiative to improve my understanding of difficult Physics concepts.	3.10	1.02	ML
4	I am confident in my ability to manage my study time effectively.	3.10	0.88	ML
5	I feel endowed to overcome obstacles in my Physics homework.	3.20	1.14	ML
6	I actively seek feedback on my performance in Physics to make improvements.	3.40	1.02	ML
7	My learning strategies directly impact my Physics results.	3.35	0.97	ML
8	I remain focused on my goals in Physics, even when challenges arise.	3.29	1.06	ML
9	I have control over my learning procedure in Physics.	3.36	1.01	ML
10	I adjust my study techniques in Physics when I encounter difficulties.	3.40	1.13	ML
	Grand Mean	3.29	1.00	ML

Source: (Field Survey Work, 2025)

Table 1 data reveals the mean and standard deviation of the level of control among students' offering Physics in Plateau State secondary schools. The grand mean score is 3.29 with a standard deviation of 1.00, indicating a Moderate Level (ML) of control for Physics academic achievement.

Hypothesis One:

Ho_1: There is no significant relationship between control AQ and students' academic achievement in Physics among secondary schools in Plateau State.

Testing Hypothesis One:

Table 2a: Summary of Linear Regression Analysis of Relationship between Control AQ and Students' Academic Achievement in Physics Among Secondary Schools in Plateau State

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	2205.715	1	2205.715	12.112	.001[b]
	Residual	70111.959	385	182.109		
	Total	72317.674	386			

Source: (Field Survey Work, 2025)

a. Dependent Variable: Students' Academic Achievement

b. Predictors: (Constant), control AQ

The linear regression analysis in Table 2a shows the regression results yielded $F(1,385) = 12.112$, $p = .001$, which is less than the 0.05 level of significance. This indicates that the regression model is statistically significant, control AQ significantly predicts students' academic achievement

in Physics. Therefore, the null hypothesis stating that there is no significant relationship between control AQ and students' academic achievement in Physics is rejected. This implies that control AQ has a meaningful influence on students' achievement in Physics.

Table 2b: Model Summary of Relationship between Control AQ and Students' Academic Achievement in Physics Among Secondary Schools in Plateau State

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.175[a]	.031	.028	13.49478

Source: (Field Survey Work, 2025)

a. Predictors: (Constant), control AQ

The model summary in Table 4b indicates a correlation coefficient R = .175, showing a positive relationship between control AQ and academic achievement. The adjusted R^2 = .028 means that control AQ explains about 2.8% of the variance in students' academic achievement in Physics, while the remaining 96.9% is explained by other factors not included in the model. Thus, although the relationship is statistically significant, its strength is weak.

Table 2c: Coefficient of Beta of Relationship between Control AQ and Students' Academic Achievement in Physics Among Secondary Schools in Plateau State

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	49.602	4.834		10.261	.000
	control AIQ	4.198	1.206	.175	3.480	.001

Source: (Field Survey Work, 2025)

a. Dependent Variable: Students' Academic Achievement

The regression coefficient table (Table 2c) further reveals that control AQ has a positive contribution to students' achievement (β = .175, t = 3.480, p = .001). The unstandardized coefficient B = 4.198 indicates that for every one-unit increase in control AQ, students' academic achievement in Physics increases by approximately 4.198 units. The constant value (49.602) represents the predicted achievement score when control AQ is zero. There is a statistically significant but weak positive relationship between control AQ and students' academic achievement in Physics among senior secondary schools in Plateau State. Therefore, the null hypothesis is rejected.

Research Question Two:

1. What is the level of ownership among students offering Physics in secondary schools in Plateau State?

Answering Research Question Two:

Table 3: Mean and Standard Deviation of Ownership Level Among Students Offering Physics in Secondary School in Plateau State.

S/N	ITEM (n = 387)	Mean	S. D	Remark
1	I take responsibility for my learning in Physics, even when the material is difficult.	3.88	0.99	HL
2	When I encounter challenges in Physics, I actively seek solutions.	3.71	0.97	HL
3	My efforts directly impact my performance in Physics.	3.98	0.90	HL
4	I feel empowered to make changes on my study habits when I struggle in Physics.	3.57	1.01	HL
5	I regularly reflect on my performance in Physics to identify areas of improvement.	3.67	1.02	HL
6	My attitudes towards Physics directly affects my learning outcomes.	3.99	1.22	HL
7	I frequently ask for help when I find Physics challenging.	4.31	1.16	HL
8	I set specific goals for my performance and work towards achieving them.	3.45	1.00	ML
9	I understand that my hard work in Physics will lead to improvement.	3.44	0.95	ML
10	I adapt my study techniques in Physics when I encounter difficulties.	3.72	1.19	HL
	Grand Mean	3.77	1.04	HL

Source: (Field Survey Work, 2025)

Table 3 data addressed the level of ownership among students offering Physics. The grand mean score of 3.77 with a standard deviation of 1.04 which corresponds to High Level (HL) of ownership AQ.

Hypothesis Two:

Ho_2: There is no significant relationship between ownership AQ and students' academic achievement in Physics among secondary schools in Plateau State.

Testing Hypothesis Two:

Table 4a: Summary of Linear Regression Analysis of Relationship between Ownership AQ and Students' Academic Achievement in Physics Among Secondary Schools in Plateau State

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	2208.606	1	2208.606	12.128	.001[b]
	Residual	70109.068	385	182.101		
	Total	72317.674	386			

Source: (Field Survey Work, 2025)

a. Dependent Variable: Students' Academic Achievement

b. Predictors: (Constant), ownership AQ

The linear regression analysis presented in Table 4a results shows $F(1,385) = 12.128$, $p = .001$, which is less than the 0.05 level of significance and indicates that ownership AQ

significantly predicts students' academic achievement in Physics. This means the regression model is statistically significant. Consequently, the null hypothesis stating that there is no significant relationship between ownership AQ and students' academic achievement in Physics is rejected. Thus, ownership AQ significantly influences students' achievement in Physics.

Table 4b: Model Summary of Relationship between Ownership AQ and Students' Academic Achievement in Physics Among Secondary Schools in Plateau State

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.175[a]	.031	.028	13.49450

Source: Field Survey Work, (2025)

a. Predictors: (Constant), ownership AQ

The model summary in Table 4b reveals a correlation coefficient of R = .175, indicating a positive relationship between ownership AQ and students' academic achievement. The adjusted R^2 value of .028 implies that ownership AQ accounts for approximately 2.8% of the variance in students' Physics achievement, while the remaining 97.2% of the variation is explained by other variables not included in the model. The adjusted R^2 (.028) confirms that the predictive strength of the model is small but meaningful.

Table 4c: Coefficient of Beta from Relationship between Ownership AQ and Students' Academic Achievement in Physics Among Secondary Schools in Plateau State

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	51.662	4.246		12.167	.000
	ownership AIQ	3.678	1.056	.175	3.483	.001

Source: (Field Survey Work, 2025)

a. Dependent Variable: Students' Academic Achievement

The coefficient table (Table 4c) shows that ownership AQ positively contributes to students' academic achievement ($\beta = .175$, $t = 3.483$, $p = .001$). This standardized coefficient indicates that a one standard deviation increase in ownership AQ leads to a 0.175 standard deviation increase in students' achievement in Physics. The unstandardized coefficient B = 3.678 further implies that each one-unit increase in ownership AQ increases students' achievement score by approximately 3.678 units. The constant value (51.662) represents the expected achievement score when ownership AQ is zero. Therefore, the null hypothesis is rejected since ownership is significant.

Research Question Three:

What is the mean academic achievement score of students offering Physics in secondary schools in Plateau State?

Answering Research Question Three:

Table 5: Mean and Standard Deviation of Academic Achievement Score of Students offering Physics in Secondary School in Plateau State

Variable	N	Mean	S. D
students' academic achievement	387	56.3514	13.75302

Source: (Field Survey Work, 2025)

Table 5 data reports the mean academic achievement score among students offering Physics in senior secondary schools in Plateau State. With a sample size of 387 students, the mean academic achievement score is 56.35, with a standard deviation of 13.75. This shows that on average, students' achievement in Physics is moderate, but there is a considerable variation in their academic achievement levels as indicated by the standard deviation with a wide dispersion of scores around the mean, highlighting differences in students' academic performance in Physics.

Hypothesis Three:

Ho_5: There is no significant relationship between AQ (control and ownership) and students' academic achievement in Physics among secondary schools in Plateau State.

Testing Hypothesis Three:

Table 6a: Summary of ANOVA from Multiple Regression Analysis of Relationship between Adversity Quotient (Control and Ownership) and Students' Academic Achievement in Physics

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	2802.369	2	700.592	3.850	.004[b]
	Residual	69515.306	384	181.977		
	Total	72317.674	386			

Source: (Field Survey Work, 2025)

a. Dependent Variable: Students' Academic Achievement

b. Predictors: (Constant), Control, Ownership.

The analysis results in Table 6a summarize an ANOVA-based multiple linear regression analysis used to determine if there is a significant predictive relationship between students' adversity quotient (control and ownership) and academic achievement in Physics. The results showed that $F(2, 384) = 3.850$, $P = 0.004 < 0.05$. As the P-value (0.004) is below the 0.05 significance threshold and therefore, the null hypothesis was rejected.

Table 6b: Model Summary from Multiple Regression Analysis of Relationship between Adversity Intelligence Quotient (Control and Ownership) and Students' Academic Achievement in Physics

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.197[a]	.039	.029	13.48989

Source: (Field Survey Work, 2025)

a. Predictors: (Constant), Control, Ownership.

Table 6b presents a model summary illustrating how the independent variable explains the variance in the dependent variable. The results indicate that 2.9% of the variation in academic achievement can be attributed to adversity quotient (control, and ownership). The r-value of 0.197[a] indicates a weak positive relationship between adversity quotient and academic achievement.

Table 6c: Coefficients of Beta from Multiple-Linear Regression Analysis of Relationship between Adversity Quotient (Control and Ownership) and Students' Academic Achievement in Physics

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	46.098	5.259		8.766	.000
	Control AIQ	1.804	1.792	.075	1.007	.315
	Ownership AIQ	1.569	1.701	.075	.923	.357

Source: (Field Survey Work, 2025)

a. Dependent Variable: Students' academic achievement

Table 6c presents the individual contributions of Control and Ownership components of AQ to students' academic achievement in Physics when all variables are considered together in a multiple regression model. The constant value (B = 46.098, t = 8.766, p = .000) represents the predicted academic achievement score when all the AQ dimensions are held at zero.

For the individual predictors, Control AQ recorded a standardized coefficient of β = .075, t = 1.007, p = .315. Since the p-value is greater than 0.05, Control AQ does not significantly contribute to predicting students' academic achievement in Physics when other AQ dimensions are controlled for. This indicates that its independent predictive power in the combined model is weak and not statistically meaningful. Similarly, Ownership AQ showed β = .075, t = .923, p = .357. The p-value is also greater than 0.05, meaning Ownership AQ does not significantly predict students' academic achievement in Physics in the presence of other AQ variables.

Discussion of Findings

This study investigated the relationship between the control and ownership dimensions of adversity quotient and students' physics achievement in Plateau State secondary schools. The findings revealed that students exhibited a moderate level of control, with the standard deviation indicating variability across low, moderate, and high levels. Despite this moderate disposition, control demonstrated a weak but statistically significant positive relationship with academic achievement in Physics, although it accounted for a relatively small proportion of variance. This suggests that students' perception of their capacity to influence academic outcomes through deliberate effort and strategic engagement contributes positively, is modestly, to their achievement in Physics.

The finding aligns with the Adversity Quotient Theory proposed by Stoltz (1997), which identifies control as a fundamental dimension of resilience, enabling individuals to perceive challenges as manageable rather than overwhelming. Students with a higher sense of control are more likely to regulate their learning behaviors, seek clarification when necessary, and persist in addressing complex Physics tasks. The result is consistent with previous studies that reported positive relationships between adversity quotient and academic achievement (Mwivanda & Kingi, 2019; Suryandari & Yuliana, 2021; Tripathi & Bajpai, 2022). However, it contrasts with findings by Wang et al. (2021) and Yazon (2019), who reported negative relationships between adversity quotient and students' coping styles. Additionally, Hidayati and Taufik (2020) found no significant relationship, indicating variability in empirical outcomes across contexts.

The ownership dimension recorded a high mean level, suggesting that students generally accept responsibility for their academic outcomes. The analysis further revealed a weak but statistically significant positive relationship between ownership and academic achievement in Physics. This implies that students who take responsibility for both successes and failures tend to achieve better academic outcomes. From a theoretical perspective, ownership reinforces an internal locus of control, encouraging students to adjust their learning strategies in response to academic challenges. This finding is consistent with studies that reported significant relationships between ownership and academic performance (Espanola, 2016; Mwivanda, 2021; Suryandari & Yuliana, 2021). Conversely, it differs from studies that identified negative relationships (Wang et al., 2021; Yazon, 2019), suggesting that related factors not examined in this study may have strong influence on academic achievement outcomes of students.

When the control and ownership dimensions were examined jointly using multiple linear regression analysis, the model was statistically significant; however, the total variance explained remained relatively low. This indicates that while these dimensions are collectively associated with academic achievement in Physics, their predictive strength is limited. The weak overall

relationship suggests that other variables, not included in this study, may exert a stronger influence on students' academic achievement. Furthermore, although the individual regression coefficients were not statistically significant when considered simultaneously, both control and ownership contributed equally to the model, each accounting for approximately 7.50% of the predictive variance. This further supports the notion that additional factors beyond adversity quotient dimensions of control and ownership may play an important role in determining academic outcomes. Overall, the findings indicate that Plateau State secondary school students possess moderate to high levels of resilience-related attributes. While the control and ownership dimensions of adversity quotient are significantly related with academic achievement in Physics, their practical contribution remains modest.

Conclusion

The study established that the control and ownership dimensions of adversity quotient are significantly related to students' Physics achievement in Plateau State secondary schools. These findings showed that resilience-related attributes, particularly the ability to regulate one's actions and accept responsibility for outcomes, contribute to improved academic achievement. Consequently, adversity quotient can be considered an important, though not dominant, factor in enhancing students' persistence, accountability, and adaptive coping strategies in learning Physics.

Recommendations

Based on the findings of this study, the following recommendations are made:

1. Physics educators should integrate strategies that foster the development of adversity quotient, particularly the control and ownership dimensions, into the teaching and learning process in order to enhance students' academic achievement.
2. Educational stakeholders should design and implement targeted interventions aimed at strengthening students' adversity quotient components, given their significant though modest relationship with academic achievement, to support improved learning outcomes in Physics.

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