



Imagery and Self-Efficacy as Predictors of Mental Toughness among Secondary School Athletes in South-West, Nigeria

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ABSTRACT

Background: Mental toughness enables athletes to endure adversity and persist through difficult competitive situations, and it is widely regarded as a significant determinant of athletic performance. However, research examining the relationship between mental toughness, imagery, and self-efficacy among athletes at the secondary education level remains limited, particularly within the Nigerian context.

Objective: This study examined the association between imagery and self-efficacy on the mental toughness of secondary school athletes in South-west Nigeria.

Methods: The Psycho-neuromuscular Theory and the Triple Code Theory provided the theoretical framework for the study, and a correlational research design was adopted. A total of 360 respondents were selected from a population of 1,213 athletes through a multistage sampling procedure, via Yamane's 1967 Formula. Data were collected using the Sport Imagery Questionnaire for Children (SIQ-C) ($\alpha = 0.72$), the Self-efficacy Scale ($\alpha = 0.74$), and the Sports Mental Toughness Questionnaire ($\alpha = 0.71$). Descriptive statistics (frequency counts and percentages) were used to summarise demographic data, while Pearson Product-Moment Correlation and multiple regression were used to test the study hypotheses.

Results: Findings revealed a significant relationship between imagery variables, self-efficacy variables, and mental toughness [$F(2, 357) = 143.064$, $R = .667$ and $R^2 = .445$, motivational general-mastery ($\beta = .107$, $t = 2.161$, $p < .05$), motivational general-arousal ($\beta = .302$, $t = 6.535$, $p < .05$), cognitive-specific imagery ($\beta = .218$, $t = 4.094$, $p < .05$), and cognitive-general imagery ($\beta = .275$, $t = 5.426$, $p < .05$) had a significant individual contribution on mental toughness, whereas motivational-specific imagery did not ($\beta = -.017$, $t = -0.500$, $p > .05$).

Conclusion: The study concludes that there exists a substantial and predictive association between imagery and self-efficacy and secondary school athletes' mental toughness.

Unique Contribution: This study fills a gap by providing insights into how imagery and self-efficacy jointly shape secondary school athletes' mental toughness in the Sub-Saharan African context.

Key Recommendations: It is recommended that coaches and sport psychologists organise periodic intervention training programmes for secondary school student-athletes to preserve and strengthen their self-efficacy and imagery capacities.

Keywords: Athletes, Imagery, Mental Toughness, Self-Efficacy and Sports Psychology



INTRODUCTION

Mental toughness is widely regarded as one of the most important psychological attributes underpinning success in competitive sport, enabling athletes to persevere through adversity, sustain focus, and maintain confidence even after setbacks (Demir et al., 2025). Because of its association with competitive outcomes, researchers have become increasingly interested in identifying the specific psychological mechanisms, such as imagery and self-efficacy, through which mental toughness can be cultivated and strengthened among athletes (Vella-Fondacaro & Romano-Smith, 2023).

Imagery, the mental simulation of performance scenarios in the absence of direct sensory input, has been consistently linked to improvements in athletes' confidence and self-efficacy, their belief in their own capability to execute a successful course of action and achieve a desired outcome (Khodabandelou & Salehian, 2023). Structured imagery practice has been shown to enhance skill execution, reduce competitive anxiety, and support emotional regulation, while self-efficacy independently predicts training adherence, goal-striving, and overall athletic performance (Volgemute et al., 2025). Together, these constructs are increasingly understood not as peripheral mental skills but as central psychological mechanisms through which athletes build and sustain the mental toughness required to perform under pressure (Rahimi et al., 2025).

Despite this growing body of evidence, most research on the relationship between imagery, self-efficacy, and mental toughness has focused on elite, collegiate, or adult athletes in Western and Asian sporting contexts, leaving a notable gap in understanding these dynamics among younger, developmentally distinct populations such as secondary school athletes in Africa (López-Torres et al., 2024). This gap is particularly significant in South-west Nigeria, where secondary school sport plays a prominent role in youth development, yet little empirical attention has been paid to how imagery and self-efficacy jointly shape young athletes' mental toughness. It is against this background that the present study was conceived to examine the association between imagery and self-efficacy and the mental toughness of secondary school athletes in South-west Nigeria. Thus, the current study fills this gap by providing empirical evidence regarding the association among these variables and the sample within the specified context.

LITERATURE REVIEW

Relationship among Imagery, Self-Efficacy and Mental Toughness

Imagery, self-efficacy, and mental toughness are interconnected psychological constructs that significantly shape athletic performance and psychological resilience (Volgemute et al., 2025). Imagery, the mental simulation of performance scenarios, has consistently been shown to enhance both self-efficacy and mental toughness, and athletes who engage in structured imagery practice tend to report greater confidence in their abilities (Ananomo, 2018). Imagery has been found to positively impact athletes' sense of capability and focus, self-efficacy, greater resilience, and stronger match preparation (Andreato et al., 2022; Ardiyanto et al., 2021; Di Corrado et al., 2019; Khodabandelou & Salehian, 2023; Mlambo et al., 2021; Rahimi et al.,



2025; Simonsmeier et al., 2021). These studies indicate that athletes with higher self-efficacy showed greater consistency in pursuing their goals and were better able to manage internal and external pressure, a pattern consistent with theoretical accounts suggesting that belief in one's capabilities strengthens psychological endurance and emotional resilience during competition.

Prediction of Imagery and Self-Efficacy on Mental Toughness of Athletes

Evidence indicates that cognitive-specific imagery interventions can enhance soccer skill performance in youth athletes, with younger athletes tending to benefit more from imagery training than older ones (Liu et al., 2025). Combining imagery practice with other forms of psychological training is considerably more effective than imagery practice alone (Bedir & Erhan, 2021; Volgemute et al., 2025), and more recent work suggests that pairing virtual reality with imagery practice has a stronger effect on shooting performance and muscle activation than combining imagery with video observation (Bedir & Erhan, 2021).

In the study by López-Torres et al. (2024), elite endurance runners found that athletes who practised imagery more frequently scored significantly higher on measures of mental toughness, particularly confidence and consistency. In a related study of Iranian adolescent athletes, Rahimi et al. (2025) found that self-efficacy significantly predicted mental toughness, which in turn played a protective role against competitive anxiety, a pattern consistent with Bandura's contention that self-efficacy shapes thought processes, motivation, and emotional states that are central to mental toughness. Elsewhere, mental toughness has been positively associated with self-concept and is particularly elevated among individuals with strong goal commitment (Di Mauro et al., 2026). This current study extends the literature by examining the contribution of imagery and self-efficacy in predicting secondary school students' mental toughness in sports in an under-resourced setting.

THEORETICAL FRAMEWORK

The Psychoneuromuscular Theory and Triple Code Theory were considered for this study.

Psychoneuromuscular Theory

This theory, first proposed by Jacobson (1932), provides a direct theoretical link between imagery and the other constructs examined in this study. It holds that when an athlete vividly imagines performing a movement, the brain sends low-level neuromuscular impulses to the same muscles that would be activated during the actual physical execution of that movement, effectively rehearsing the skill without physical practice. Applied to the present study, this theory explains how imagery, one of the study's core independent variables, can directly strengthen an athlete's physical readiness and confidence in their own competence, which is the essence of self-efficacy. As secondary school athletes in South-west Nigeria repeatedly and vividly rehearse competition scenarios in their minds, the resulting sense of physical preparedness and mastery is expected to translate into greater self-belief and composure under pressure, both of which are foundational components of mental toughness. The theory therefore supports the study's underlying assumption that imagery does not merely exist as an abstract mental exercise but has a tangible, physiological pathway through which it can enhance self-efficacy and, ultimately, the mental toughness the athletes display in competition.



Triple Code Theory

Proposed by Ahsen (1984) and closely related to Lang's (1979) Bio-Informational Theory, this theory explains imagery as being composed of three interacting elements: the image itself (how vivid and realistic it is), the somatic response it produces (physiological reactions such as increased heart rate), and the personal meaning the athlete attaches to the image. This theory is particularly relevant to the title because it accounts for why imagery affects different secondary school athletes' self-efficacy and mental toughness to varying degrees; the same imagery exercise can be experienced, interpreted, and internalised differently by each athlete. An athlete who attaches strong personal significance to an image of successfully executing a skill or overcoming a difficult opponent is more likely to experience heightened self-efficacy and resilience than one for whom the same image carries little emotional weight. In this way, the Triple Code Theory helps explain the individualised nature of the association between imagery and self-efficacy on mental toughness that this study set out to investigate, reinforcing the rationale for examining these constructs specifically among secondary school athletes, whose imagery use and personal meaning-making are still developing.

Together, the two theories offer complementary explanations for the study's title: the Psychoneuromuscular Theory accounts for the *physiological* mechanism by which imagery may enhance self-efficacy and mental toughness, while the Triple Code Theory accounts for the *psychological and interpretive* mechanism by which imagery's effects vary from one athlete to another. Both perspectives converge to justify the study's central premise that imagery and self-efficacy are meaningfully and perceptibly related to the mental toughness of secondary school athletes in South-west Nigeria.

RESEARCH HYPOTHESES

The following null hypotheses were tested:

H01: There is no significant relationship between imagery variables (motivational-specific, motivational general-mastery, motivational general-arousal, cognitive-specific, and cognitive-general) and mental toughness among secondary school athletes in South-west Nigeria.

H02: There is no significant relationship between self-efficacy variables (general and social self-efficacy) and mental toughness among secondary school athletes in South-west Nigeria.

H03: There is no significant joint prediction between the combined imagery variables and mental toughness among secondary school athletes in South-west Nigeria.

H04: There is no significant individual prediction between each imagery variable and mental toughness among secondary school athletes in South-west Nigeria.

H05: There is no significant joint prediction between the combined self-efficacy variables and mental toughness among secondary school athletes in South-west Nigeria.

H06: There is no significant individual prediction between each self-efficacy variable and mental toughness among secondary school athletes in South-west Nigeria.



METHODS AND PROCEDURES

This study adopted a correlational research design of the non-experimental type. Correlational research examines the relationship between two or more variables without manipulation or control of those variables by the researcher (Shao et al., 2023). The population comprised secondary school athletes drawn from the South-West states of Nigeria, and 360 respondents were selected from 1,213 athletes using a multistage sampling procedure, via Yamane's 1967 Formula. First, the purposive sampling technique was used to select a State in the South-West region (Oyo State), as it was the State approved by the ethics committee of the researchers' institution. The simple random technique was used to select two metropolises and ten secondary schools in the selected metropolis. Students (athletes) who voluntarily participated in the study were the sample.

Athletes' imagery ability was assessed using the Sport Imagery Questionnaire for Children (SIQ-C), a 21-item instrument developed by Hall et al. (2009) and adapted for children aged 7–14 years. Yet, with our adaptation, the instrument was deemed appropriate for ages slightly higher than the original age grade. Self-efficacy was measured using the Self-Efficacy Scale, a 17-item, 5-point Likert-type instrument originally developed by Sherer et al. (1982; original $\alpha = 0.74$). Mental toughness was assessed using the 14-item Sports Mental Toughness Questionnaire developed by Golby et al. (2007). For the present sample, internal consistency was acceptable across all three instruments: the SIQ-C yielded $\alpha = 0.72$, the Self-Efficacy Scale yielded $\alpha = 0.74$, and the Sports Mental Toughness Questionnaire yielded $\alpha = 0.71$, all exceeding the conventional 0.70 threshold for group-level analysis.

The instruments were printed (400 copies each) and administered to respondents by the researchers together with two research assistants over three months. Of the instruments administered, 90% were successfully retrieved and used in the analysis. The study strictly followed the Declaration of Helsinki and its associated ethical norms. Ethical approval was obtained from the Research Ethics Committee of the Faculty of Education, University of Ibadan, Ibadan, Nigeria (UI/FED/PHE/07/2021/312). Participation was entirely voluntary, and informed consent was obtained from all respondents.

Descriptive statistics (frequency counts and percentages) were used to summarise respondents' demographic characteristics. Pearson Product-Moment Correlation and multiple regression analysis were used to examine the relationships and predictive contribution of imagery and self-efficacy (independent variables) on mental toughness (dependent variable), at a significance threshold of $p < 0.05$. Regression assumptions were checked prior to analysis: multicollinearity was assessed using variance inflation factors (all values were below 10, indicating acceptable independence among predictors); normality of residuals was assessed via visual inspection of Q–Q plots; and homoscedasticity was verified through examination of standardised residuals plotted against fitted values.



RESULTS AND DISCUSSION

Socio-Demographic Characteristics of the Respondents

Table 1 presents the socio-demographic characteristics of the respondents. Concerning age, 58 (16.1%) respondents were below 12 years, 96 (26.7%) were aged 12–14 years, 90 (25.0%) were aged 15–17 years, and 116 (32.2%) were aged 18 years and above, indicating that the largest single age band was the oldest group. By gender, 166 (46.1%) respondents were male and 194 (53.9%) were female, indicating that the majority of respondents were female. By class, 22 (6.1%) were in JSS 1, 46 (12.8%) in JSS 2, 46 (12.8%) in JSS 3, 130 (36.1%) in SS 1, and 116 (32.2%) in SS 2, indicating that the largest proportion of respondents were in SS 1. By sport, 88 (24.4%) respondents played football, 99 (27.5%) competed in athletics, 33 (9.2%) played basketball, 75 (20.8%) played volleyball, and 65 (18.1%) played table tennis, indicating that athletics was the most commonly reported sport.

Table 1. Distribution of Respondents by Socio-Demographic Characteristics

Variable	Category	Frequency	Percent (%)
Age	Below 12 years	58	16.1
	12–14 years	96	26.7
	15–17 years	90	25.0
	18 years and above	116	32.2
	Total	360	100.0
Gender	Male	166	46.1
	Female	194	53.9
	Total	360	100.0
Class	JSS 1	22	6.1
	JSS 2	46	12.8
	JSS 3	46	12.8
	SS 1	130	36.1
	SS 2	116	32.2
	Total	360	100.0
Sport	Football	88	24.4
	Athletics	99	27.5
	Basketball	33	9.2
	Volleyball	75	20.8
	Table tennis	65	18.1
	Total	360	100.0

HO1: Imagery Variables and Mental Toughness

Table 2 shows a significant positive relationship between mental toughness and motivational general-mastery ($r = .57$, $p < .05$), mental toughness and motivational general-arousal ($r = .65$, $p < .05$), mental toughness and cognitive-specific imagery ($r = .64$, $p < .05$), and mental toughness and cognitive-general imagery ($r = .67$, $p < .05$). These results indicate a correlation between imagery variables and athletes' mental toughness, and HO1 is therefore rejected for these variables. However, this should be interpreted with caution, as motivational-specific imagery has $r = -.005$ and is not significant.



Table 2: Relationship between Imagery Variables and Mental Toughness

Variable	Mean	SD	1	2	3	4	5	6
Mental Toughness	11.05	2.81	1					
Motivational-Specific	37.20	4.88	-.01	1				
Motivational General-Mastery	14.14	3.56	.57*	.09	1			
Motivational General-Arousal	10.60	2.77	.65*	-.00	.50*	1		
Cognitive-Specific	14.10	3.65	.64*	.067	.69*	.56*	1	
Cognitive-General	24.67	5.48	.67*	-.04	.58*	.630*	.64*	1

*Significant at $p < 0.05$

HO2: Self-Efficacy Variables and Mental Toughness

As shown in Table 3, general self-efficacy was weakly and negatively associated with mental toughness ($r = -.14$, $p < .05$), while social self-efficacy was positively associated with mental toughness ($r = .66$, $p < .00$). Both relationships were statistically significant, and H02 is therefore rejected. The positive relationship between social self-efficacy and mental toughness suggests that athletes who feel more confident navigating interpersonal and social demands, such as team dynamics, audience expectations, and peer relations, tend to report greater mental toughness. The negative relationship for general self-efficacy, by contrast, points to a more complex interplay between broad self-belief and mental toughness in this sample, and is discussed further below.

Table 3: Relationship Between Self-Efficacy Variables and Mental Toughness

Variable	Mean	SD	1	2	3
Mental Toughness	11.05	2.81	1		
General Self-Efficacy	55.67	9.93	-.14*	1	
Social Self-Efficacy	21.76	5.12	.66*	-.08	1

Note. * $p < .05$.

H03: Joint Contribution of Imagery Variables on Mental Toughness

As shown in Table 4, the regression model was statistically significant, $F(5, 354) = 97.83$, $p < .001$. The combined imagery variables accounted for 57.4% of the variance in mental toughness, and the predictors explain 58.0% of the variance (adjusted $R^2 = .57$; $R = .76$; $R^2 = .58$), indicating a significant joint relationship between the combined imagery variables and mental toughness. H03 is therefore rejected. Standardised coefficients and significance levels for individual predictors are presented in Table 5.

Table 4: Joint Contribution of Imagery Variables to Mental Toughness (ANOVA)

Model	Sum Squares	df	Mean Square	F	Sig.	Remark
Regression	1648.26	5	329.65	97.83	.00	Significant
Residual	1192.84	354	3.37			
Total	2841.10	359				

HO4: Relative Contribution of Individual Imagery Variables

Table 5 shows the unstandardised (B) and standardised (β) regression coefficients for each imagery variable. Motivational general-mastery ($\beta = .11$, $t = 2.16$, $p < .05$), motivational general-arousal ($\beta = .30$, $t = 6.54$, $p < .05$), cognitive-specific imagery ($\beta = .22$, $t = 4.01$, $p < .05$), and cognitive-general imagery ($\beta = .28$, $t = 5.43$, $p < .05$) each had a significant individual association on mental toughness, whereas motivational-specific imagery did not ($\beta = -.02$, $t = -0.50$, $p > .05$). HO4 is therefore rejected for motivational general-mastery, motivational general-arousal, cognitive-specific, and cognitive-general imagery, but retained for motivational-specific imagery.

Table 5: Relative Contribution of Imagery Variables to Mental Toughness

Variable	B	SE	β	T	Sig.
(Constant)	1.11	.89		1.27	
Motivational-specific	-.00	.02	-.02	-0.50	.62
Motivational general-mastery	.09	.04	.11	2.16	.03
Motivational general-arousal	.31	.05	.30	6.54	.00
Cognitive-specific	.17	.04	.22	4.10	.00
Cognitive-general	.14	.03	.28	5.43	.00

*Significant at $p < 0.05$

HO5: Joint Contribution of Self-Efficacy Variables to Mental Toughness

As shown in Table 6, the combined self-efficacy variables significantly predicted mental toughness, $F(2, 357) = 143.06$, $p < .00$, with a multiple correlation of $R = .67$ and $R^2 = .45$ (adjusted $R^2 = .44$). As such, the model explains 44.5% of the variance, with 44.2% after adjustment. This indicates that general and social self-efficacy jointly accounted for approximately 44.2% of the variance in mental toughness among the sampled athletes. HO5 is therefore rejected.



Table 6: Joint Contribution of Self-Efficacy Variables on Mental Toughness (ANOVA)

Model	Sum of Squares	df	Mean Square	F	Sig.	Remark
Regression	1264.01	2	632.01	143.06	.00	Significant
Residual	1577.09	357	4.42			
Total	2841.10	359				

***Significant at $p < 0.05$**

H06: Relative Contribution of Individual Self-Efficacy Variables

Table 7 shows that general self-efficacy ($\beta = -.09$, $t = -2.26$, $p = .03$) and social self-efficacy ($\beta = .65$, $t = 16.53$, $p < .00$) each had a significant individual association with mental toughness. H06 is therefore rejected.

Table 7: Relative Contribution of Self-Efficacy Variables to Mental Toughness

Variable	B	SE	β	t	Sigs.
(Constant)	4.64	.82		5.66	.00
General self-efficacy	-.03	.01	-.09	-2.26	.03
Social self-efficacy	.36	.02	.65	16.53	.00

***Significant at $p < 0.05$**

DISCUSSION

This study examined the relationship between imagery and self-efficacy variables and mental toughness among secondary school athletes. Findings revealed a significant association between motivational general-mastery, motivational general-arousal, cognitive-specific imagery, cognitive-general imagery, and mental toughness (except for motivational-specific imagery, which was non-significant [$r = -.005$, $p > .05$]). In this study's context, sport is often perceived as a demonstration of strength, a cultural framing that may have shaped the sampled athletes' use of general imagery. Moreover, possible measurement, developmental, or statistical explanations may be plausible. These findings align with those of Ardiyanto et al. (2021), who similarly reported a positive effect of imagery on athletic outcomes and psychological well-being. Yet, while their study used a small sample of junior Tennis players, this study used a larger sample of general school sports participants.

The study also found a significant association between each of general and social self-efficacy and mental toughness among respondents, although the two operated in different directions. This suggests that general self-efficacy may help athletes manage internal obstacles and stressors, while social self-efficacy enables them to navigate external demands such as interpersonal conflict, audience expectations, and team dynamics. The positive association between social self-efficacy and mental toughness is broadly consistent with the view that self-efficacy supports athletes' capacity to manage the psychological demands of competitive sport, and corroborates findings by Rahimi et al. (2025), which report a meaningful relationship between self-efficacy and athletes' mental toughness. The negative relationship observed for general self-efficacy is less straightforward and diverges from some of this prior work; it may reflect the specific composition of this sample or the particular items comprising the general self-efficacy subscale, and warrants further investigation rather than firm interpretation at this stage.



The combined imagery variables, motivational-specific, motivational general-mastery, motivational general-arousal, cognitive-specific, and cognitive-general, jointly and significantly predicted secondary school athletes' mental toughness, consistent with López-Torres et al. (2024), who found that athletes who used imagery more frequently scored significantly higher on measures of mental toughness, particularly confidence and consistency. The combined self-efficacy variables also significantly predicted mental toughness, and both general and social self-efficacy contributed significant unique variance, consistent with Brace et al. (2020), who reported a close association between mental toughness and self-efficacy among elite athletes. Taken together, these findings support the broader empirical literature suggesting that imagery and self-efficacy are associated with skill acquisition, anxiety reduction, and improved emotional regulation, each of which contributes to better sporting performance (Budnik-Przybylska et al., 2023).

These findings are broadly consistent with the study's guiding theoretical framework. The Psychoneuromuscular Theory holds that vivid mental imagery activates the muscles much as physical movement would, thereby strengthening muscle memory and performance; the present findings that athletes who use imagery effectively tend to demonstrate greater mental toughness and resilience, particularly under competitive stress, are consistent with this account. Yet, this serves as possible explanatory frameworks, and not as mechanisms demonstrated by this study. The clear relationship observed between imagery and mental toughness accords with the theory's central premise that well-controlled, vivid imagery transfers into improved performance and supports athletes in managing demanding situations.

The Triple Code Theory offers a complementary explanation, holding that imagery operates through three interacting elements: the image itself, the physical responses it evokes, and the personal meaning the individual attaches to it. Athletes who used vivid, emotionally engaging imagery in this study showed greater self-confidence and mental toughness, consistent with the theory's emphasis on the personal significance of imagery. This suggests that how athletes interpret their mental images, and how they connect those images to their own performance, directly shapes their capacity to cope with competitive challenges.

CONCLUSION

This study examined the relationship among secondary school athletes' imagery, self-efficacy, and mental toughness, and assessed the extent to which imagery and self-efficacy predicted mental toughness. The findings indicate a substantial relationship between imagery and self-efficacy and secondary school athletes' mental toughness, and confirm that both imagery and self-efficacy variables are significantly associated with mental toughness in this population. Based on these findings, the study recommends that:

- a) Coaches in secondary schools in South-west Nigeria should promote high levels of self-efficacy among their athletes by incorporating proposed applications of psychological wellness sessions and intervention training programmes into both short- and long-term training plans, aimed at maintaining and strengthening self-efficacy and imagery use.



- b) School management should engage qualified sport psychologists as part of the coaching team to support the development of athletes' psychological well-being and, in turn, their sporting performance.
- c) Coaches should adopt structured psych-up talks during training and competition, as these may help improve student-athletes' mental toughness and subsequent sporting performance.

LIMITATIONS OF THE STUDY

This study is limited by its cross-sectional design, which can show associations but cannot establish cause and effect; thereby limiting generalization to other populations. Self-report questionnaires, which may be influenced by social-desirability bias or inaccurate recall. A context-specific setting (a single State, out of the several States in Nigeria) may have impacted the results of the study. Future research should improve on these, particularly in further validating the instruments used for the Nigerian context.

DECLARATIONS

Ethical clearance

Ethical approval was obtained from the Research Ethics Committee of the Faculty of Education, University of Ibadan, Ibadan, Oyo State, Nigeria (UI/FED/PHE/07/2021/312). Consent was sought and obtained from the participants in this study. They were made to understand that the exercise was purely for academic purposes, and their participation was voluntary.

Sources of funding

The study was not funded.

Conflict of Interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Authors' Contributions

Ayenigbara, E.T. and Osiesi, M.P. conceived the study, including the design. Ayenigbara, E.T. collated the data, and handled the analysis and interpretation. Ayenigbara, E.T. wrote the initial manuscript. Both authors have critically reviewed and approved the final draft, and are responsible for the content and similarity index of the manuscript.

Data availability statement

The datasets on which conclusions were made for this study are available upon reasonable request.

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