ASSESSING THE RELATIONSHIP BETWEEN PLYOMETRIC EXERCISES AND BASIC MOTOR SKILL PROFICIENCY IN SECONDARY SCHOOL ATHLETIC POPULATION

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Keywords

Plyometric exercises, agility, balance, sprinting speed, leg power, motor skill proficiency

Abstract

Research Problem:
Many secondary school training programmes in Nigeria do not systematically incorporate plyometric routines, which creates uncertainty about their influence on motor skill development among school-aged athletes. This study investigates the relationship between plyometric exercise participation and basic motor skill proficiency among secondary school athletes in Egor Local Government Area, Edo State, Nigeria. Plyometric training, characterized by rapid stretch-shortening cycles, enhances explosive power, neuromuscular efficiency, agility, balance, sprint speed, and leg powerkey foundational skills often underdeveloped in Nigerian youth due to informal physical education programs.
Methods/theory:
A correlational design was employed with 174 student-athletes (aged 13-18) from three public secondary schools, primarily in football (43.1%) and track and field (35.1%). Data collection utilized a researcher-designed proforma and standardized tests: shuttle run for agility, stork stand for balance, 30-meter sprint for speed, and vertical jump for leg power. Instruments showed high reliability (0.81-0.90 via test-retest). Pearson correlation and multiple regression analyses were conducted at $p<0.05$ significance using SPSS 27, grounded in motor learning, stretch-shortening cycle, and neuromuscular adaptation theories.
Results:
Findings revealed significant positive relationships across all motor skills. Frequency of plyometric exercises correlated strongly with overall proficiency ($r=0.723$, $p=0.025$). Regression models confirmed

predictions: agility (R=0.677, R²=0.864, p=0.001), balance (R=0.533, R²=0.707, p=0.000), sprint speed (R=0.187, R²=0.740, p=0.001), and leg power (R=0.176, R²=0.745, p=0.001), rejecting all null hypotheses.. Results align with global evidence (e.g., Michailidis 2013; Chaouachi et al. 2017), affirming plyometrics' role in youth athletic development amid local research gaps.

Conclusion:

The study underscores plyometrics as a low-cost, effective intervention for Nigerian school sports, enhancing performance and injury prevention via proprioceptive gains.

Contribution to Knowledge:

The study provides localized evidence addressing a research gap where prior work focused on university athletes or international samples. It demonstrates plyometrics as a low-cost, effective intervention for enhancing youth athletic development, injury prevention via proprioception, and foundational skills in informal physical education settings.

Recommendation:

These include longitudinal trials, supervised vs. unsupervised comparisons, and sport-specific analyses to optimize integration into curricula, fostering long-term athlete development.

Introduction

Plyometric training is a conditioning technique that improves explosive power, neuromuscular coordination, and speed via rapid stretch-shortening cycles, which boost force generation through swift eccentric-concentric transitions. This enhances sprinting, leaping, and directional change performance in young athletes.

Plyometric exercises enhance neuromuscular efficiency, lower-limb strength, and movement control, which are crucial for optimal performance in various sports. Research conducted by Michailidis (2013) and Faigenbaum and Myer (2010) indicates that sports programs featuring systematic plyometric exercises frequently yield quantifiable improvements in speed, balance, and jumping ability in teenagers. Notwithstanding this data, systematic plyometric drills are not uniformly executed in numerous Nigerian secondary schools.

Student-athletes frequently depend on unstructured training activities that insufficiently address balance, coordination, or explosive strength. Consequently, numerous adolescents experience difficulties with agility, control, and sprint acceleration during competitive play, despite their active participation in sports. Notwithstanding data from Chaouachi et al. (2017) and Patel et al. (2023), secondary school physical education programs in Nigeria infrequently incorporate scientific training approaches that explicitly target these movement skills.

This study investigated the correlation between involvement in plyometric exercises and fundamental motor skill competency among secondary school athletes in the Egor Local Government Area of Edo State. This research offers localised evidence from a

Nigerian sample, so enhancing the expanding worldwide literature that endorses plyometric training as a cost-effective and highly efficient approach for improving youth athletic performance.

Statement of the Problem

The research dilemma is that, despite the acknowledged advantages of plyometric training, several secondary school athletes in Nigeria lack exposure to systematic or progressive plyometric exercises. Fundamental motor abilities, including agility, balance, sprinting velocity, and leg strength, are crucial for athletic performance; nevertheless, physical education curricula often prioritise general fitness over specialised skill enhancement. Consequently, student-athletes may not be acquiring the requisite levels of motor skill mastery essential for improving their athletic performance and general physical competence.

Notwithstanding the established advantages of plyometric exercise, empirical data from Nigeria, specifically the Egor Local Government Area, is limited. The lack of context-specific data limits the creation of evidence-based training procedures by coaches and physical educators. This study examines the relationship between participation in plyometric exercises and fundamental motor skill competency among secondary school athletes in the Egor Local Government Area of Edo State.

Research Questions

1. Is there a relationship between the frequency of plyometric exercises and overall motor skill proficiency among secondary school students?

2. Is there a relationship between plyometric exercises and agility, as measured by shuttle run time, among secondary school students?

3. Is there a relationship between plyometric exercises and balance skills, as measured by the stork stand test in secondary school athletic population?

4. Is there a relationship between plyometric exercises and sprinting speed, as measured by 30-meter sprint time, among secondary school athletic population?

5. Is there a relationship between plyometric exercises and leg power, as measured by vertical jump height, among secondary school athletes?

Hypotheses

1. There is no significant relationship between the frequency of plyometric exercises and overall motor skill proficiency among secondary school students.

2. There is no significant relationship between the plyometric exercises and agility, as measured by shuttle run time among secondary school students.

3. There is no significant relationship between plyometric exercises and balancing skills, as measured by the stork stand test among secondary school students.

4. There is no significant relationship between plyometric exercises and sprinting speed measured by 30-meter sprint time in secondary school athletic population.

5. There is no significant relationship between plyometric exercises and leg power measured by vertical jump height among secondary school athletes.

Review of Related Literature

Plyometric training is widely acknowledged as a practice that improves explosive power, reaction speed, and neuromuscular efficiency in athletes of all ages. The stretch-shortening cycle allows muscles to temporarily store elastic energy prior to its release during

powerful contraction. This technique enables athletes to generate greater power with reduced effort and elucidates why plyometric activities enhance dynamic movement performance.

Studies regularly show the efficacy of plyometric activities in enhancing lower-limb strength and movement coordination. Michailidis (2013) indicated that teenagers engaged in plyometric exercises had enhanced muscle reactivity and increased sprint acceleration. Faigenbaum and Myer (2010) underscore that rapid stretch-shortening actions activate fast-twitch fibres essential for explosive sports performance.

Plyometric practices improve neuromuscular timing and motor control in addition to muscle strength. Makaruk and Bedoya have demonstrated that repetitive jumping and landing exercises enhance response time and increase coordination between the legs and core. This advantage is especially significant in games that necessitate rapid directional shifts, such as football, basketball, and volleyball.

Fundamental motor skills, encompassing agility, balance, sprinting speed, and leg strength, are regarded as the cornerstone of athletic achievement. When these skills are inadequately developed, athletes may encounter difficulties with speed-oriented tasks despite possessing inherent potential. Plyometric exercises focus on these fundamental components by conditioning the muscles and neurological system to generate force swiftly and sustain control under duress.

Numerous research validate the robust correlation between plyometrics and agility. Talukdar et al. (2021) discovered that teenagers participating in structured plyometric programs exhibited markedly improved shuttle-run timings and enhanced directional speed. The research ascribed the enhancement to accelerated neuromuscular activation and improved synchronisation of muscle units during movement.

Plyometric training also affects balance, another crucial motor ability. Chaouachi et al. (2017) indicated that repeated jump landing sequences activate proprioceptive receptors in the lower limbs. With time, athletes enhance their ability to stabilise their bodies during abrupt halts, irregular landings, and dynamic postural adjustments.

Plyometric training significantly enhances sprinting performance. Shimpi discovered that athletes participating in jump-based conditioning programs exhibited decreased ground contact time and enhanced acceleration. This enhancement was associated with heightened tendon stiffness and augmented elastic force release.

The height of the vertical jump, indicative of leg power, markedly improves with prolonged engagement in plyometric activities. Almeida et al. (2020) reported enhancements in jump height in young athletes who engaged in bounding and explosive jump training regimens. Given that jump height is an established measure of leg power, this substantiates the case for incorporating plyometrics into juvenile training programs.

Neurological development also contributes significantly. Faigenbaum and Myer emphasise that plyometric exercises enhance neuromuscular connectivity in teenagers, resulting in faster reflexes and increased postural stability. This is particularly crucial during adolescence when coordination remains in development.

Proprioceptive improvements enhance both performance and injury avoidance. Patel et al. (2023) observe that athletes possessing enhanced proprioceptive awareness are less prone to losing balance or sustaining joint sprains during rapid movements. Plyometrics enhance joint stability via repetitive impact and force redirection.

Contradictory research indicates that outcomes may differ when programs are inadequately designed or improperly executed. Athletes lacking enough supervision or foundational strength may encounter negligible progress or the potential for damage. These divergent perspectives underscore the significance of systematic and progressive plyometric training over informal jumping exercises.

Despite substantial worldwide evidence endorsing the efficacy of plyometric training, there is a paucity of studies undertaken in Nigerian secondary schools. Local study frequently emphasises university athletes instead of teenagers at public schools. This gap engenders ambiguity regarding the responses of younger groups to systematic plyometric exposure.
This research offers empirical evidence from public secondary schools in the Egor Local Government Area in Edo State. The study provides practical insights for school coaches, physical educators, and policymakers aiming to enhance motor performance in school-aged athletes by assessing agility, balance, sprinting speed, and leg power.

Theoretical Framework.

This work is theoretically grounded in motor learning principles, which elucidate how repetitive practice results in enduring enhancements in movement skills and physical performance (Schmidt &Wrisberg, 2008). Motor learning theory posits that skill acquisition is not instinctive; rather, it arises from organised and intentional movement experiences (Fitts & Posner, 1967). Through the repetitive execution of plyometric drills, students' brains and muscles progressively enhance their movement coordination, a phenomenon extensively documented in motor learning literature (Schmidt &Wrisberg, 2008).

Motor learning posits that athletes enhance their movement skills by continuous engagement in workouts that test coordination, balance, and power (Schmidt &Wrisberg, 2008). Plyometric exercises necessitate exact synchronisation among the leg, core, and upper body muscles, aligning with the stretch-shortening cycle (SSC) idea posited by Komi (2000). Each jump or hop necessitates the body's rapid absorption of force and its controlled redirection, utilising the stretch-shortening cycle to improve performance (Komi, 2000). Through the repetition of these movements, athletes refine the body mechanics necessary for generating powerful, rapid, and stable actions, indicative of brain adaptation (Sale, 1988). The second theoretical foundation for the study is the stretch-shortening cycle (SSC) theory, which elucidates the mechanism by which muscles accumulate elastic energy during rapid stretching and subsequently release that energy during contraction (Komi, 2000). Plyometric exercises are structured around this cycle, enabling athletes to harness stored energy for enhanced power in their actions (Komi, 2000).

The long-term athlete development theory supports plyometric training, positing that young athletes must acquire robust fundamental movement skills prior to advancing to sophisticated sport tactics (Balyi& Way, 2009). Plyometric workouts develop crucial elements including speed, balance, and power, which underpin sport-specific skills such as kicking, dribbling, shooting, or rapid acceleration (Balyi& Way, 2009).Plyometric practices confer enduring advantages to young athletes by establishing a robust physical foundation for subsequent success.
In summary, the amalgamation of motor learning theory, stretch-shortening cycle theory, neuromuscular adaptation theory, proprioceptive development theory, dynamic systems theory, physiological adaptation theory, and long-term athlete development theory offers a thorough framework for

comprehending the impact of plyometric training on adolescent athletes. Plyometric exercises enhance neuromuscular coordination, proprioception, muscular power, and reaction speed; hence, plyometric training provides a pragmatic and evidence-based approach to fortifying fundamental motor skills.

Methodology

A correlational research design was employed to ascertain the association between involvement in plyometric exercises and competency in motor skills. The demographic comprised secondary school students from Egor Local Government Area who actively engaged in school athletics. A multi-stage sampling method was employed to choose 174 student-athletes aged 13 to 18 from three public secondary schools.

Data were gathered with a researcher-developed proforma for data collecting and standardised motor skill evaluations. Agility was evaluated by the shuttle-run test, balance was determined using the stork-stand test, sprint speed was quantified via the 30-meter sprint, and leg power was tested by measuring vertical leap height. The instruments' reliability was confirmed by a pilot research involving 20 kids from a nearby school, yielding test–retest correlations between 0.81 and 0.90. Ethical approval was secured from school administration, and parental consent was acquired for all participants.Data were analysed via Pearson Product Moment Correlation and simple linear regression at a significance threshold of 0.05.

Findings

Table 1: Gender Distribution of Respondents

Gender	Frequency	Percentage
Male	94	56.0%
Female	80	44.0%
Total	174	100%

Source: Field Survey,2025 (SPSS 27)

The Gender distribution of athletes in Table 1 shows that out of 174 respondents, 54% (94) where male, while 47% (80) are female. This indicates a higher representation of male athletes, though both genders are adequately represented for analysing the relationship between plyometric exercises and basic motor skill proficiency of the athletes.

Table 2: Sports Participated in by Respondents

Sport	Frequency	Percentage
Football	75	43.1
Handball	5	2.9

Volleyball	19	11
Track and Field	61	35.1
Basketball	7	4
Handball	6	3.4
Hockey	1	0.6
Total	174	100.0

Source: Field survey,2025 (SPSS 27)

Table 2 presents the various sports athletes participated in according to the study on the relationship between plyometric exercises and basic motor skill proficiency. The results show that 75 respondents (43.1%) are football players, 61 respondents (35.1%) are track and field athletes. While 19 students representing 11% are volleyball players. This indicates that the majority of the athletes are football players. The sports distribution allows for a comprehensive analysis of interest of majority of the students sport participation.

Table 3: Secondary schools

	Frequency	**Percentage**
UDSS	58	32.3
Ekosodin	70	40.2
Egor S.S	56	32.1
Total	174	100.0

Source: Field Survey, 2025 (SPSS 27)

Table 3 presents the distribution of athletes based on the schools they attend in the study on the relationship between plyometric exercises and basic motor skill proficiency in secondary school athletic population. The results show that 70 student-athletes (40.2%) attend Ekosodin Secondary school, making up the largest group. University of Benin Demonstration Secondary School (UDSS) student-athletes account for 58 (33.3%) of participants, while 56 student-athletes (32.1%) are students of Egor Secondary School.

The Pearson correlation result showed a significant positive relationship between plyometric exercise frequency and overall motor skill proficiency ($r = 0.723$, $p < 0.05$). This implies that students with higher engagement in plyometric activities performed better on motor skill tests. Therefore, Hypothesis 1 was rejected.

Research Question 1*:* Is there a relationship between the frequency of plyometric exercises and overall motor skill proficiency among secondary school students?

Hypothesis 1:There is no significant relationship between the frequency of

plyometric exercises and overall motor skill proficiency among secondary school students.

Table 4:Descriptive andPearson correlation analysis on relationship between frequency of plyometric exercises and overall motor skill proficiency among secondary school students.

Variables	N	Mean	SD	r-value	p-value	Decision
Frequency of exercise	280	3.21	1.21	.723	0.025	Ho is rejected
Motor skill proficiency	280	3.15	1.03			

Source: Field Survey, 2025 (SPSS 27)

Table 4 presents the descriptive and Pearson correlation analysis on the frequency of plyometric exercises and overall motor skill proficiency among secondary school students. The findings reveal a significant correlation, as indicated by an r-value of 0.723 and a p-value of 0.025. Since the p-value is less than 0.05, the null hypothesis (Ho), which states that there is no significant relationship between frequency of plyometric exercise and motor skill proficiency, is rejected. This suggests that the kind of plyometric exercise the students engage in has a measurable impact on the proficiency of their basic motor skills. Additionally, the mean scores for parental awareness of personal best performance (3.21) and regular practice attendance (3.15) indicate moderate agreement among participants. These results highlight the importance of incorporating plyometric exercises into the regular training regime of the student athletes.

Research Question 2*:* Is there a relationship between plyometric exercises and agility, as measured by shuttle run time, among secondary school students?

Hypothesis 2:There is no significant relationship between the plyometric exercises and agility measured by shuttle run time among secondary school students.

Table 5: Multiple regression analysis of the frequency of plyometric exercises and agility, as measured by shuttle run time, among secondary school students.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.677[a]	.864	.754	1.112	.871	4.245	5	278	.001

Source: Field Survey, 2025 (SPSS 27)

Table 5 presents the multiple regression analysis of the frequency of plyometric exercises and agility, as measured by shuttle run time, among secondary school students. The results indicate a strong relationship between frequency of exercise and agility, with an R-value of 0.677 and an R-Square value of 0.864. This means that 87.1% of the variation in in their agility is explained by other factors. The adjusted R-Square value of 0.754 further confirms the reliability of the model. The F-value of 4.245 and a significance value (Sig. F Change = 0.001) that is below the 0.05 threshold lead to the rejection of the null hypothesis (Ho), which posits no significant relationship between frequency of exercises and agility. These results suggest that plyometric exercises will significantly impacts agility of the student-athletes.

ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	26.234	5	5.247	4.232	.001[b]
	Residual	342.374	278	1.236		
	Total	368.608	283			

Source: Field Survey, 2025 (SPSS 27)

The ANOVA results show a significant relationship between frequency of exercise and agility as performed by shuttle run, with an F-value of 4.232 and a p-value of 0.001. This leads to the rejection of the null hypothesis, confirming that plyometric exercise of agility significantly influences basic motor skill proficiency of the students - athletes.

Research Question 3*:* Is there a relationship between plyometric exercises and balance skills, as measured by the Stork Stand test, in the secondary school athletic population?

Hypothesis 3: There is no significant relationship between plyometric exercises and balancing skills measured by the Stork Stand test among secondary school athletic population.

Table 6:Multiple regression analysis on the relationship between plyometric exercises and balance skills, as measured by the Stork Stand test, in the secondary school.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	533[a]	.707	.691	1.215	.716	6.520	5	278	.000

Table 6 presents the multiple regression analysis examining the relationship between plyometric exercises and balance skills, as measured by the Stork Stand test, among the secondary school students. The regression analysis indicates a moderate correlation ($R = 0.533$), with the model accounting for substantial variance in balance performance ($R^2 = 0.716$; Adjusted $R^2 = 0.691$). An F-value of 6.520 with significance at $p = 0.000$ ($p < 0.05$) warrants the rejection of the null hypothesis (H_0), confirming a statistically significant relationship between plyometric exercises and Stork Stand test scores among secondary school athletes.

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	48.857	5	9.771	6.535	.000[b]
	Residual	408.867	278	1.476		
	Total	457.724	283			

Source: Field Survey, 2025

The ANOVA results show a significant relationship between plyometric exercises and basic motor skill of balance of the Stock Stand test, with an F-value of 6.535 and a p-value of 0.000. This leads to the rejection of the null hypothesis, confirming that plyometric exercises significantly impacts balance motor skill.

Research Question 4*:* Is there a relationship between plyometric exercises and sprinting speed, as measured by 30m sprint time, among secondary school athletic population?

Hypothesis 4:There is no significant relationship between plyometric exercises and sprinting speed measured by 30m sprint time in the secondary school athletic population.

Table 7: Multiple regression analysis on relationship between plyometric exercises and sprinting speed, as measured by 30m sprint time, among secondary school athletic population.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.187[a]	.740	.732	1.045	.739	5.730	5	278	.001

The multiple regression analysis in Table 7 examines the relationship between plyometric training and sprinting velocity (30m sprint) among secondary school athletes. An R-value of 0.187 indicates a weak positive correlation, while the coefficient of determination (R^2 = 0.740) suggests the model accounts for 74% of the variance in sprint performance. The Adjusted R^2 of 0.732 confirms model stability. With an F-value of 5.730 and significance at p = 0.001 ($p < 0.05$), the null hypothesis is rejected, demonstrating a statistically significant impact of plyometric exercises on sprinting speed.

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	48.857	5	9.771	6.535	.000[b]
	Residual	408.867	278	1.476		
	Total	457.724	283			

Source: Field Survey, 2025

The ANOVA results show a significant relationship between plyometric exercises and basic motor skill of balance of the Stock Stand test, with an F-value of 6.535 and a p-value of 0.000. This leads to the rejection of the null hypothesis, confirming that plyometric exercises significantly impacts balance motor skill.

Research Question 4*:* Is there a relationship between plyometric exercises and sprinting speed, as measured by 30m sprint time, among secondary school athletic population?

Hypothesis 4:There is no significant relationship between plyometric exercises and sprinting speed measured by 30m sprint time in the secondary school athletic population.

Table 8: Multiple regression analysis on relationship between plyometric exercises and

sprinting speed, as measured by 30m sprint time, among secondary school athletic population.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.187[a]	.740	.732	1.045	.739	5.730	5	278	.001

The results from the multiple regression analysis in Table 8 explore the relationship between plyometric exercises and sprinting speed, as measured by 30m sprint time, among secondary school athletic population. The R-value of 0.187 indicates a weak but positive relationship between plyometric exercises and sprinting speed based on 30-meter sprint time. The R-Square value of 0.740 suggests that 74.% of the variance in the speed test can be explained by the model, which includes 30m sprint test. The Adjusted R-Square value of 0.732 indicates that the model is reliable, accounting for the number of predictors used. The F-value of 5.730 with a p-value of 0.001 shows a significance ($p < 0.05$), which leads to the rejection of the null hypothesis. This suggests that there is a statistically significant relationship between plyometric exercises and speed, which is indicative that plyometric exercises impact the sprinting speed, as measured by 30m sprint time, among secondary school athletic population.

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	12.120	5	2.424	5.720	.001[b]
	Residual	302.452	278	1.092		
	Total	314.572	280			

Source: Field Survey, 2025

The ANOVA results show an F-value of 5.731 and a p-value of 0.001, which is highly significant ($p < 0.05$). With this the null hypothesis is hereby rejected, indicating a significant relationship between plyometric exercises and basic motor skill proficiency of student-athletes among the secondary school athletic population.

Research Question 5*:* Is there a relationship between plyometric exercises and leg power, as measured by vertical jump height, among secondary school athletes?

Hypothesis 5: There is no significant relationship between plyometric exercises and leg power measured by vertical jump height among secondary school athletes.

Table 9: Multiple regression analysis on relationship between plyometric exercises and leg power, as measured by vertical jump height, among secondary school athletes.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.176[a]	.745	.740	1.045	.739	5.741	5	278	.001

Source: Field Survey, 2025

The multiple regression analysis in Table 8 investigates the predictive relationship between plyometric training and lower extremity power output, measured via vertical jump height, among secondary school athletes. The R-value of 0.176 indicates a modest positive correlation between plyometric protocols and leg power. The coefficient of determination ($R^2 = 0.745$) demonstrates that approximately 75% of variance in the criterion variable is explained by the model, with the Adjusted R^2 of 0.740 confirming adequate model reliability. The F-statistic of 5.741 ($p = 0.001$) reveals statistical significance ($p < 0.05$), warranting rejection of the null hypothesis. These findings provide empirical evidence that plyometric training exerts measurable influence on vertical jump performance outcomes.

Discussion of Findings

The results indicated a substantial correlation between plyometric workouts and fundamental motor skill performance among secondary school athletes in the Egor Local Government Area. This corroborates the findings of Michailidis (2013) and Makaruk (2014), who established that plyometric training improves muscle flexibility and movement efficiency. The robust positive link with agility corroborates the findings of Talukdar et al. (2021), who observed that teenagers engaged in jump-oriented programs exhibited enhanced agility. Shimpi (2020) elucidates that repetitive stretch-shortening activities enhance neuromuscular firing patterns, facilitating agility and directional control.

Plyometric training strongly predicted Stork Stand performance by improving proprioceptive control and stability. Chaouachi et al. (2017) corroborated this by indicating that plyometric exercises activate neuromuscular receptors. Patel et al. (2023) stated that exercises such as bounding enhance stabilising muscles, hence preventing loss of control. The enhancement in sprinting speed corroborates Shimpi's (2020) findings, which ascribed increased acceleration to enhanced muscular flexibility. Furthermore, leg power and vertical jump performance improved, aligning with Almeida et al. (2020), who noted analogous enhancements in juvenile athletes employing structured plyometric regimens.

The research corroborates the premise that neuromuscular adaptation transpires via high-intensity exercise. Faigenbaum and Myer (2010) highlighted that youth athletes derive long-term advantages when these activities are integrated at an early stage. The findings further substantiate proprioceptive development theory; fortifying receptors in the lower extremities improves dynamic balance, corroborating the research of Chaouachi et al. (2017) and Patel et al. (2023). The result underscores the significance of systematic training, as Kavanagh et al. (2023) and Siddiqui et al. (2024) indicated that students devoid of targeted motor-skill instruction frequently demonstrate inadequate

coordination. These findings offer scientific rationale for the incorporation of plyometrics into Nigerian school sports curricula to enhance agility, balance, speed, and power effectively.

Conclusion

This study aimed to evaluate the correlation between plyometric workouts and fundamental motor skill competency in secondary school athletes within the Egor Local Government Area of Edo State. The results indicated that plyometric exercises significantly enhance core motor skill variables, including agility, balance, sprinting speed, and leg power. Students who participated more regularly in plyometric exercises exhibited superior performance in shuttle run, Stork Stand balance, 30-meter sprint timings, and vertical jump height, signifying enhanced neuromuscular coordination and explosive capacity.

The research indicated that plyometric activities correlate with improved athletic performance, and consistent engagement fosters higher movement efficiency and physical proficiency in secondary school players. The findings validated the rejection of all five null hypotheses, indicating that the frequency of plyometric exercises significantly forecasts overall motor skill outcomes. These findings corroborate prior study and furnish scientific evidence that plyometrics are exceptionally helpful in cultivating fundamental motor skills in adolescents. The study indicated that plyometric workouts are a vital, effective, and time-efficient approach for enhancing fundamental motor skills in secondary school pupils. Plyometric exercise, when used consistently, supervised appropriately, and intensified progressively, can enhance athletic performance and facilitate long-term physical growth. The research emphasised the necessity for organised plyometric exercises in educational athletic programs.

Recommendations

1. Further research is encouraged to examine the influence of plyometric training over longer durations to determine whether gains in motor skills remain stable or fluctuate with training continuity.

2. Research involving comparisons between guided plyometric training and unsupervised training can help highlight the level of instruction or coach involvement required to achieve consistent performance outcomes.

3. Studies exploring differences across age groups and biological maturity are recommended, as adolescents do not develop physical coordination and strength at the same pace.

4. Another direction involves investigating how plyometric training affects athletes across different sporting events to determine whether certain sports experience greater gains in agility, balance, sprint speed or power.

5. Lastly, examining motivational patterns, training discipline and gender dynamics may provide a more complete understanding of athlete development in school sports.

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