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Comparative Analysis on the Impact of Ergogenic Aids and Skill Practice to Athletic Performance Among Paid Athletes in Edo State Sports Commission

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Abstract

In the pursuit of athletic excellence, optimizing performance is a paramount concern for athletes, coaches, and sports organizations. This study compares the impact of skill practice and ergogenic aids on athletic performance among 100 paid athletes in Edo State Sports Commission. Six research questions guided the study, and four hypotheses were tested at 0.05 alpha level. A correlational survey research design was used, with a validated questionnaire (EAASP) having a Cronbach's alpha reliability of 0.70, administered through a combination of online and offline modes to ensure maximum participation and response rate. To select the respondents, stratified random sampling technique was utilized to ensure athletes are selected randomly to reflect the diversity of the entire population. The data collected from the study was analysed using frequencies, percentages, and t-test Analysis of variance while inferential statistics of regression was used to test four hypotheses at 0.05 alpha levels. The findings indicate that skill practice is prioritized over ergogenic aids for achieving long-term athletic success (M = 2.27, SD = 1.00). Athletes also acknowledged general health risks (M = 2.15, SD = 0.97) and concerns about dependence or addiction (M = 2.20, SD = 1.03) associated with ergogenic aid use. The study recommends the need for personalized training strategies and structured education on ergogenic aids to prevent misconceptions and potential health risks by prioritizing skill practice; promoting informed decision-making to optimize performance while minimizing risks.

Keywords: *Ergogenic aids, Skill practice, Athletic performance, Athlete Development, Performance Optimization*

Introduction

The pursuit of athletic excellence has led to the widespread adoption of ergogenic aids among athletes. These aids, ranging from carbohydrate-electrolyte drinks to caffeine and deep ocean minerals, aim to enhance physical performance, improve training adaptations, and facilitate recovery. Research conducted by López-Torres et al; (2023) highlights the efficacy of certain ergogenic aids like caffeine, creatine, and beta-alanine in boosting athletic performance. Caffeine, for instance, has been shown to improve jumping performance, isometric strength, and sprint performance, while beta-alanine enhances aerobic capacity (Murphy, et al; 2022). Understanding the effects of these ergogenic aids is crucial for athletes, coaches, and sports organizations seeking to optimize performance. Athletic performance is influenced by a combination of factors, including physical training, skill practice, and the use of ergogenic aids. Ergogenic aids encompass a broad spectrum of substances and techniques utilized by athletes to boost performance, endurance, and recovery processes. Ergogenic aids can be categorized into Nutritional Ergogenic Aids, Pharmacological Ergogenic Aids, Mechanical Ergogenic Aids, and Psychological Ergogenic Aids. Nutritional Ergogenic Aids according to Maughan & Burke, (2015), are dietary supplements designed

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to provide essential nutrients such as carbohydrates, protein powders, and creatine. Protein is essential for muscle repair, and studies show that protein supplementation can significantly enhance recovery and muscle protein synthesis following exercise (Phillips & Van Loon, 2011). Pharmacological Ergogenic Aids include substances like anabolic steroids, stimulants, and growth hormones, which can lead to significant performance improvements but raise serious ethical and health concerns (Calfee & Fadale, 2006).

Research indicates that carbohydrate loading can significantly enhance endurance by maximizing glycogen stores and creatine supplementation has been demonstrated to improve strength and power output during high-intensity workouts (Kreider et al., 2017). The use of anabolic steroids was however countered by Peterson & Brown, (2018) due to the resultant effect on the physiological and psychological well-being of individuals, including mood alterations and cardiovascular complications. The World Anti-Doping Agency (WADA) actively prohibits these substances to ensure fair competition (WADA, 2015).. Jeukendrup, (2017) opined that nutritional aids enhance the availability of energy substrates, crucial for sustaining high-intensity exercise by improving endurance and maintaining blood glucose levels. In same vein, Phillips & Van Loon, (2011) aver that protein and certain amino acids facilitate muscle repair and growth, leading to enhanced recovery after exercise. Creatine supplementation boosts phosphocreatine stores, facilitating the regeneration of ATP during high-intensity activities. However, the prevalence of some Pharmacological Ergogenic Aids in sports raises concerns about ethics, health risks, and fairness. Specifically, performance-enhancing drugs which poses serious health risks and compromise the integrity of competitive sports, highlighting the need to evaluate their impact on athlete well-being and fair play. Skill practice is a fundamental and sustainable approach to enhancing athletic performance. It is the cornerstone of athletic training, built on the repetitive execution of specific movements designed to enhance proficiency and performance. This process of skill acquisition is well-explained by established learning theories, notably Fitts and Posner's Stages of Learning model (Fitts & Posner, 1967) which explains the process of skill acquisition providing a framework that outlines the cognitive, associative, and autonomous stages athletes go through to master skills. This is about deliberate practice, characterized by focused and structured training, and it is crucial for developing expertise in sports (Ericsson & Smith, 1991).

Ericsson & Charness, (1994) emphasized that in Nigeria, the integration of skill practice with conditioning has been shown to significantly boost athletic performance across various disciplines and research consistently shows that athletes who adopt this intentional training method exhibit more significant skill gains than those engaging in less focused activities. Effective skill practice involves technique refinement, tactical understanding, and physical conditioning. Regular practice fine-tunes movements, improving performance in sports like gymnastics and swimming (Adebayo & Ogunleye, 2022). It also develops tactical understanding, enabling swift decision-making and strategy adaptation in team sports (Wang et al., 2019). Vealey, (2016), emphasized that methods such as visualization, relaxation techniques, and cognitive-behavioral strategies have been shown to enhance athletes' focus and alleviate anxiety, thereby improving performance outcomes with mental conditioning increasingly recognized as a critical aspect of athletic training.

In Nigeria, challenges persist with limited access to quality facilities and resources and this hinders effective practice (Okafor & Okwor, 2020). The quality of coaching and training programs will significantly impacts skill acquisition, with well-structured programs yielding better results (Ogunleye & Bakare, 2020). Athletic performance of paid athletes in Edo State Sports Commission will significantly be enhanced by a combination of tailored strength and endurance training, mental toughness, proper nutrition, and consideration of environmental conditions. Optimizing athletic performance involves periodized training for strength and power, mental resilience strategies for focus, and tailored nutrition for recovery (Jones et al., 2020). Environmental factors like altitude and temperature also play a critical role with high-altitude training potentially increasing aerobic capacity (Smith, 2019). The Edo State Sports Commission can play a pivotal role in promoting athlete development by providing access to quality facilities, resources, and well-structured training programs. Integrating these factors, athletes and coaches can develop comprehensive strategies "ultimately enhancing athletic performance among paid athletes in the state" (Edo State Sports Commission, 2022).

Statement of the Problem

The use of ergogenic aids among paid athletes in Edo State Sports Commission has raised concerns about their safety, ethical implications, and potential impact on athletic performance. Despite the widespread use of ergogenic aids and skill practice among paid athletes in Edo State Sports Commission, there is a lack of scientific evidence on the comparative impact of these two factors on athletic performance. Furthermore, the use of ergogenic aids is often shrouded in controversy, with concerns about their potential negative effects on athletes' health and well-being. The problem is compounded by the fact that many athletes in Edo State Sports Commission lack access to qualified coaches, trainers, and sports scientists who can provide evidence-based guidance on the use of ergogenic aids and skill practice. As a result, many athletes are forced to rely on trial and error, or seek advice from unqualified sources, which can lead to ineffective training practices and increased risk of injury or illness.

Moreover, most studies have focused on the effects of ergogenic aids or skill practice in isolation, without considering the potential interactions between these two factors. And the lack of research on the comparative impact of ergogenic aids and skill practice on athletic performance among paid athletes in Edo State Sports Commission makes it difficult for sports administrators, coaches, and trainers to develop effective training programs that optimize athletic performance while minimizing the risks associated with ergogenic aid use. Therefore, this study investigated the comparative impact of ergogenic aids and skill practice on athletic performance among paid athletes in Edo State Sports Commission, with a view to providing evidence-based recommendations for optimizing athletic performance while minimizing the risks associated with ergogenic aid use.

Purpose of the Study

The study investigated the comparative impact of ergogenic aids and skill practice on athletic performance among paid athletes in Edo State Sports Commission.

Research Questions

1. What is the impact of ergogenic aids on athletic performance among paid athletes in Edo State Sports Commission?

2. What is the impact of skill practice on athletic performance among paid athletes in Edo State Sports Commission?

3. Which ergogenic aids are most commonly used among paid athletes in Edo State Sports Commission, and what are their perceived effects on athletic performance?

4.. What are the potential risks and side effects associated with the use of ergogenic aids among paid athletes in Edo State Sports Commission?

5. Is there a significant difference in the impact of ergogenic aids and skill practice on athletic performance among paid athletes in Edo State Sports Commission?

6. How do paid athletes in Edo State Sports Commission perceive the importance of skill practice compared to ergogenic aids in enhancing athletic performance?

Hypotheses

1. There is no significant difference in the impact of ergogenic aids on athletic performance among paid athletes in Edo State Sports Commission.

2. There is no significant difference in the impact of skill practice on athletic performance among paid athletes in Edo State Sports Commission.

3. There is no significant difference in the impact of ergogenic aids and skill practice on athletic performance among paid athletes in Edo State Sports Commission.

4. Paid athletes in Edo State Sports Commission perceive no significant difference in the importance of skill practice and ergogenic aids in enhancing athletic performance.

Methodology

This study employed a correlational survey research design to investigate the relationships between ergogenic aids, skill practice, and athletic performance among paid athletes registered with the Edo State Sports Commission. A stratified random sampling technique was implemented to ensure a representative sample, categorizing the population into distinct strata based on specific sports and randomly selecting athletes from each stratum. This approach ensured representation across different sports and performance levels, enhancing the generalizability of the findings. Statistical power analysis determined the optimal sample size, aiming for a minimum of 100 athletes to guarantee adequate statistical power for meaningful comparisons. Data collected from respondents were analyzed using descriptive statistics, including mean and standard deviation to identify trends and patterns, frequencies, and percentages. Inferential statistics, such as correlation analysis and regression, were used to test four hypotheses at 0.05 alpha levels, examining the relationships between ergogenic aids, skill practice, and athletic performance.

A self-developed questionnaire, tagged EAASP, was the primary instrument used in the study. The questionnaire featured a four-point Likert scale with options for Strongly Agree, Agree, Disagree, and Strongly Disagree. It consisted of two sections: Section A, which comprised five items focused on demographic information such as gender, age, educational level, type of sport, and years of participation, and Section B, which included multiple-choice questions aimed at eliciting responses related to ergogenic aids and skill practice. The questionnaire was administered using a combination of online and offline modes. To ensure the reliability of the instrument, a pilot study was conducted using Cronbach's alpha reliability coefficient, which yielded a reliability score of 0.7. The error probability was set at $p = 0.05$ to maintain statistical relevance.

Results

Tables were utilized to illustrate the descriptive analysis, and suitable interpretations were also employed to show and present the inferential analysis as the research's final result. The demographic characteristics of study participants are presented in the Supplementary File (Supplementary Tables S1, S2, S3, S4, S5, S6 and S7).

Analysis of Research Questions

Research Question 1

What is the impact of ergogenic aids on athletic performance among paid athletes in Edo State Sports Commission?

Supplementary Table S8 presents the descriptive statistics for research question 1. The descriptive statistics in Supplementary Table S8 show moderate agreement among athletes regarding the importance of ergogenic aids in their athletic performance. The mean scores range from 2.10 to 2.33, indicating a slightly positive perception. The standard deviations (0.82-0.87) suggest relatively consistent responses.

Table 1: ANOVA results for research question 1

Source of Variation	SS (Sum of Squares)	df (Degrees of Freedom)	MS (Mean Square)	F-value	p-value	Decision
Between groups	3,13	3	1.04	1.07	0.363	Fail to reject Ho
Within groups	307.75	396	0.78	-	-	-
Total	310.88	399	-	-	-	-

From the data in table 1, the results of the ANOVA analysis indicate that there's no statistically significant difference in the responses across the four survey items ($F=1.07$, $p=0.363$, $df=399$). Since the p-value (0.363) is greater than 0.05, we fail to reject the null hypothesis. This means there is no statistically significant difference in responses across the four survey items. In other words, respondents' opinions about ergogenic aids are relatively consistent across the different statements.

Research Question 2

What is the impact of skill practice on athletic performance among paid athletes in Edo State Sports Commission?

Supplementary Table S9 presents the descriptive statistics for research question 2. The descriptive statistics in Supplementary Table S9 indicate that athletes generally perceive skill practice as beneficial, with mean scores ranging from 2.14 to 2.43. The standard deviations (0.85-1.03) suggest moderate variability in responses, indicating some consistency in opinions about the impact of skill practice on technical skills, confidence, and muscle memory.

From the data in table 2, the results of the ANOVA analysis indicate that there's no statistically significant difference in the responses across the four survey items ($F=1.64$,, $p=0.179$, $df=399$). Since the p-value (0.179) is greater than 0.05, we fail to reject the null hypothesis. This means that skill practice is generally perceived similarly across different aspects of athletic performance, with no strong statistical variation among the responses.

Table 2: ANOVA results for research question 2

Source of Variation	SS (Sum of Squares)	df (Degrees of Freedom)	MS (Mean Square)	F-value	p-value	Decision
Between groups	4.55	3	1.52	1.64	0.179	Fail to reject Ho
Within groups	365.65	396	0.92	-	-	-
Total	370.20	399	-	-	-	-

Research Question 3

Which ergogenic aids are most commonly used among paid athletes in Edo State Sports Commission, and what are their perceived effects on athletic performance?

Supplementary Table S10 presents the descriptive statistics for research question 3. The descriptive statistics in Supplementary Table S10 show varying levels of agreement among athletes regarding the use and effectiveness of different ergogenic aids. The mean scores range from 1.83 to 2.53, indicating differing perceptions. Notably, creatine is perceived as effective (mean=1.83), while opinions on safety and effectiveness of ergogenic aids are more divided (mean=2.53).

Table 3: ANOVA results for research question 3

Source of Variation	SS (Sum of Squares)	df (Degrees of Freedom)	MS (Mean Square)	F-value	p-value	Decision
Between groups	33.93	3	11.31	11.24	433×10^{-7}	Reject Ho
Within groups	398.57	396	1.01	-	-	-
Total	432.50	399	-	-	-	-

From the data in table 3, the results of the ANOVA analysis indicate that there's a highly statistically significant difference in how athletes perceive and use different ergogenic aids. The responses across the four survey items (F=11.24,, p= 4.33×10^{-7}, df=399). Since the p-value (4.33×10^{-7}) is lesser than 0.05, we reject the null hypothesis. This means that athletes perceive and use different ergogenic aids in significantly different ways.

Research Question 4

What are the potential risks and side effects associated with the use of ergogenic aids among paid athletes in Edo State Sports Commission?

Supplementary Table S11 presents the descriptive statistics for research question 4. The descriptive statistics in Supplementary Table S11 show that respondents generally agree that ergogenic aids are associated with potential health risks and side effects. Mean scores range from 2.15 to 2.39, indicating varying levels of concern. Respondents are particularly concerned about health risks (mean=2.15), while cardiovascular problems received the highest mean score (2.39), suggesting relatively lower concern level compared to other items.

Table 4: ANOVA results for research question 4

Source of Variation	SS (Sum of Squares)	df (Degrees of Freedom)	MS (Mean Square)	F-value	p-value	Decision
Between groups	3.25	3	1.08	1.08	0.36	Fail to reject Ho
Within groups	398.25	396	1.01	-	-	-
Total	401.50	399	-	-	-	-

From the data in table 4, the results of the ANOVA analysis indicate that there's no statistically significant difference in the perceived risks and side effects of ergogenic aids among athletes (F=1.08, p= 0.36, df=399). Since the p-value (0.36) is greater than 0.05, we fail to reject the null hypothesis.

Research Question 5

Is there a significant difference in the impact of ergogenic aids and skill practice on athletic performance among paid athletes in Edo State Sports Commission?

Supplementary Table S12 presents the descriptive statistics for research question 5. The descriptive statistics in Supplementary Table S12 show varying opinions on the importance of ergogenic aids versus skill practice. Respondents tend to agree that skill practice is important (mean=2.10), while opinions on the comparative impact of ergogenic aids and skill practice are more neutral (means range from 2.20 to 2.38). There's also moderate agreement that the impact of ergogenic aids depends on individual needs (mean=2.20).

Table 5: ANOVA results for research question 5

Source of Variation	SS (Sum of Squares)	df (Degrees of Freedom)	MS (Mean Square)	F-value	p-value	Decision
Between groups	4.05	3	1.35	1.39	0.25	Fail to reject Ho
Within groups	385.15	396	0.97	-	-	-
Total	389.20	399	-	-	-	-

From the data in table 5, the results of the ANOVA analysis indicate that there's no statistically significant difference in the perceived impact of ergogenic aids and skill practice on athletic performance (F=1.39, p= 0.25, df=399). Since the p-value (0.25) is greater than 0.05, we fail to reject the null hypothesis. There is no strong consensus that one factor (ergogenic aids or skill practice) is significantly more impactful than the other.

Research Question 6

How do paid athletes in Edo State Sports Commission perceive the importance of skill practice compared to ergogenic aids in enhancing athletic performance?

Supplementary Table S13 presents the descriptive statistics for research question 6. The descriptive statistics in Supplementary Table S13 show that respondents prioritize skill practice over ergogenic aids (mean=2.27 and 2.16), indicating a stronger emphasis on skill development. Opinions are more neutral regarding the equal importance of both (mean=2.45). Respondents tend to disagree that ergogenic aids are a shortcut to success (mean=2.67), suggesting a preference for skill practice over shortcuts.

Table 6: ANOVA results for research question 6

Source of Variation	SS (Sum of Squares)	df (Degrees of Freedom)	MS (Mean Square)	F-value	p-value	Decision
Between groups	14.93	3	4.98	4.88	0.0024	Reject Ho
Within groups	404.01	396	1.02	-	-	-
Total	418.94	399	-		-	-

From the data in table 6, the results of the ANOVA analysis indicate that there is a statistically significant difference in how athletes perceive skill practice versus ergogenic aids in enhancing performance (F=4.88, p= 0.0024, df=399). Since the p-value (0.0024) is lesser than 0.05, we reject the null hypothesis. Athletes do not have a uniform perception, some place more emphasis on skill practice, while others may prioritize ergogenic aids differently.

Discussion

The Impact of Ergogenic Aids on Athletic Performance

The findings of this study suggested that paid athletes in Edo State Sports Commission have relatively consistent perceptions regarding the impact of ergogenic aids on athletic performance. Most respondents agreed that ergogenic aids play a role in their athletic preparation and performance, with mean scores ranging from 2.10 to 2.33 and standard deviations between 0.82 and 0.87 (Supplementary Table S8 presents the descriptive statistics for research question 1). This suggests a moderate level of agreement among respondents regarding the role of ergogenic aids in enhancing athletic performance. This finding aligns with previous research by Petróczi & Naughton, (2008) that athletes generally perceive ergogenic aids as beneficial for performance enhancement. However, the ANOVA test results (F = 1.07, p = 0.363) indicate no statistically significant difference in responses across the four survey items (Table 1), suggesting that athletes' perceptions of ergogenic aids are consistent across different aspects of performance. These findings align with previous research, which suggests that ergogenic aids are widely used among athletes to enhance performance, yet perceptions of their effectiveness vary based on personal experience, sport type, and individual physiological responses (Maughan, Burke, & Dvorak, 2018). While some athletes believe that ergogenic aids are essential for achieving peak performance, others may see them as supplementary rather than fundamental to success (Peeling et al., 2019). The lack of significant variation in responses could be attributed to a generally shared understanding of ergogenic aids among paid athletes, possibly influenced by standardized training regimens and knowledge disseminated by sports commissions and coaching staff. Research by Kreider et al. (2017) highlights that education on sports nutrition and supplementation significantly influences athletes' perceptions and usage of ergogenic aids. The relatively low standard deviation in the responses suggests that most athletes hold similar beliefs regarding the importance of these aids. Despite the perceived benefits of ergogenic aids, some literature raises concerns about their long-term effects and ethical considerations in competitive sports (Bahrke & Yesalis, 2019). While this study did not find significant differences in athletes' perceptions, future research could explore variations in perception based on sport type, level of experience, and individual performance outcomes.

The Impact of Skill Practice in Enhancing Athletic Performance

The findings from this study also indicated that paid athletes in Edo State Sports Commission generally perceive skill practice as an important factor in enhancing their athletic performance. The descriptive analysis reveals that respondents largely agreed with statements regarding the impact of skill practice on technical skills, confidence, muscle memory, and reaction time, with mean scores ranging from 2.14 to 2.43 and standard deviations between 0.85 and 1.03 (Supplementary Table S9 presents the descriptive statistics for research question 2). This suggests that skill practice is widely recognized as a key component of athletic development, though individual variations in perception exist. This finding supports the notion that deliberate practice is essential for skill acquisition and performance improvement (Baker & Young, 2014). Similarly, studies by Côté et al. (2012) highlight that athletes who engage in frequent, high-quality practice sessions demonstrate superior technical skills and decision-making abilities compared to those who rely more on talent alone. The ANOVA test results (F = 1.64, p = 0.179) however indicate that there is no statistically significant difference in responses across the four survey items (Table 2). The fact that respondents generally agreed on the importance of skill practice in these areas supports the idea that repetitive training helps refine motor patterns and enhance automaticity in movement execution (Davids, Button, & Bennett, 2008). This reinforces the idea that skill practice serves as a fundamental component in optimizing performance across different sports disciplines. Despite the strong agreement among respondents, the lack of significant differences in responses may be due to standardized training programs within the Edo State Sports Commission. Research by Baker & Young (2014) suggests that access to structured training programs significantly influences an athlete's perception of skill practice, as they are exposed to consistent coaching philosophies and methodologies.

Perceptions and Usage Patterns of Different Ergogenic Aids

Furthermore, the study explored the perceptions of paid athletes regarding different types of ergogenic aids. The descriptive analysis reveals that creatine was perceived as the most effective aid for enhancing muscular strength and endurance, with a mean score of 1.83 (SD = 0.75), indicating a strong level of agreement among respondents (Supplementary Table S10 presents the descriptive statistics for research question 3). This finding is consistent with previous research that creatine supplementation is effective for improving athletic performance (Cronin, 2020). On the other hand, protein powder (M = 2.51, SD = 0.98) and energy drinks (M = 2.12, SD = 1.09) were also commonly used but with more varied opinions on their effectiveness. Additionally, the belief in the safety and efficacy of ergogenic aids showed a wide range of responses (M = 2.53, SD = 1.15), suggesting some level of skepticism or concern among athletes. The ANOVA test results (F = 11.24, p = 4.33×10^{-7}) indicate a highly statistically significant difference in how athletes perceive and use different ergogenic aids (Table 3), suggesting that athletes differentiate between various types of ergogenic aids.

This implies that athletes have distinct preferences and attitudes toward different ergogenic aids, likely based on their perceived effectiveness, availability, and potential risks. These findings align with previous research on ergogenic aid consumption among athletes. Studies have shown that creatine supplementation is widely regarded as one of the most effective and research-backed performance enhancers, particularly for strength

and power-based sports (Branch, 2003; Kreider et al., 2017). The high agreement on creatine's effectiveness in this study supports existing evidence that it enhances muscle strength, endurance, and recovery (Cooper et al., 2012). In contrast, protein powders, while commonly used for muscle repair and growth, tend to be viewed as a supplementary rather than a performance-enhancing aid (Phillips & Van Loon, 2011). The mean score of 2.51 suggests that while some athletes find protein powders beneficial, others may prioritize whole-food protein sources or see limited direct performance benefits. Energy drinks, which had a mean score of 2.12, have been frequently debated in sports science. While some studies suggest that caffeine and sugar in energy drinks can improve alertness and short-term performance, others warn of potential negative effects such as dehydration, increased heart rate, and energy crashes (Higgins, Tuttle, & Higgins, 2010). The mixed responses in this study reflect the ongoing debate on their effectiveness and safety for athletic performance. The perception of ergogenic aids as safe and effective showed the highest variability (M = 2.53, SD = 1.15), indicating differences in individual trust and knowledge regarding these substances. This variation may stem from concerns over side effects, long-term health risks, or regulatory issues, which have been discussed in previous research (Maughan, 2013).

Overall, the findings suggest that while ergogenic aids are widely used among athletes, their perceived effectiveness and safety vary significantly depending on the specific substance. Future research could explore sport-specific trends in ergogenic aid usage, as some aids (e.g., creatine) may be more beneficial for strength-based sports, while others (e.g., caffeine) may be more useful for endurance or skill-based sports. Additionally, educational interventions on the safe and effective use of ergogenic aids could help athletes make more informed choices about supplementation.

Potential Risk and Side Effects of Ergogenic Aids

The findings from this study suggested that paid athletes in Edo State Sports Commission generally acknowledge the potential risks and side effects associated with the use of ergogenic aids, but their perceptions do not significantly differ across specific concerns but their perceptions do not significantly differ across specific concerns. The descriptive analysis reveals that most respondents recognize health risks related to ergogenic aids, with mean scores ranging from 2.15 to 2.39 across the four survey items (Supplementary Table S11 presents the descriptive statistics for research question 4). However, the ANOVA results (F = 1.08, p = 0.36) indicate that there is no statistically significant difference in the perception of different risks (Table 4). The high level of agreement regarding general health risks (M = 2.15, SD = 0.97) aligns with previous studies that highlight concerns about both the short-term and long-term effects of performance-enhancing substances (Maughan, 2013). Similarly, the perception that ergogenic aids can lead to serious side effects such as stomach issues, headaches, or dizziness (M = 2.27, SD = 1.01) is consistent with research showing that substances like creatine, stimulants, and protein supplements can cause gastrointestinal discomfort, dehydration, or other adverse reactions (Cooper et al., 2012; Higgins, Tuttle, and Higgins, 2010). The perception that ergogenic aids increase the risk of cardiovascular problems (M = 2.39, SD = 0.99) is also in line with concerns raised in sports science literature. Stimulant-based supplements, such as caffeine, ephedrine, and anabolic steroids, have been linked to increased heart rate, high blood pressure, and even the risk of heart attacks and strokes (Moran et al., 2018). The slightly higher mean score for this item compared to other risks suggests that some athletes may be more aware of cardiovascular dangers than other side effects.

Additionally, the concern that ergogenic aids can lead to dependence or addiction (M = 2.20, SD = 1.03) reflects the ongoing debate in sports science regarding psychological and physiological dependence on supplements and performance enhancers. Studies have found that some athletes develop reliance on stimulants, painkillers, or anabolic steroids to maintain performance levels, leading to withdrawal symptoms or long-term health complications (Backhouse et al., 2007). The relatively high standard deviation (1.03) for this item suggests that opinions on addiction risks may be more divided than concerns over immediate physical side effects. Despite the high level of agreement on potential risks, the ANOVA results suggest no significant variation in how athletes perceive these risks across different types of side effects. This could indicate that athletes view ergogenic aids as a general health concern rather than distinguishing between specific risks. This uniformity may stem from a lack of detailed knowledge about the specific dangers of different ergogenic aids or from general caution based on publicized cases of doping and supplement misuse. These findings support previous research emphasizing the importance of education and regulation in ergogenic aid use (Maughan, 2013). To ensure athlete safety, sports commissions and regulatory bodies should provide evidence-based guidelines on supplement use, potential risks, and safe alternatives. Given the widespread concern over health risks, targeted awareness campaigns on specific dangers such as cardiovascular risks and dependence could help athletes make more informed decisions.

Differences in the perceptions of skill practice versus ergogenic aids

The findings from this study suggested that paid athletes in Edo State Sports Commission hold statistically significant differences in their perceptions of skill practice versus ergogenic aids in enhancing athletic performance. The descriptive statistics reveal that the statement "I prioritize skill practice over using ergogenic aids to improve my athletic performance" (M = 2.27, SD = 1.00) and "Skill practice is more important than using ergogenic aids for achieving success in my sport" (M = 2.16, SD = 0.97) received relatively high agreement (Supplementary Table S12 presents the descriptive statistics for research question 6). The ANOVA results (F = 4.88, p = 0.0024) indicate that athletes do not have a uniform stance on whether skill practice or ergogenic aids contribute more to performance improvement (Table 6), which highlights the complexity of factors influencing athletic performance. This suggests that some athletes may prioritize consistent training and skill refinement, while others see supplementation as a viable performance enhancer. The descriptive statistics reveal that the statement "I prioritize skill practice over using ergogenic aids to improve my athletic performance" (M = 2.27, SD = 1.00) and "Skill practice is more important than using ergogenic aids for achieving success in my sport" (M = 2.16, SD = 0.97) received relatively high agreement. These findings align with Ericsson et al.'s (1993) theory of deliberate practice, which emphasizes that long-term skill acquisition and training adaptations are the most critical factors in expert performance. Many studies support the notion that consistent, high-quality practice enhances technical skills, motor learning, and competitive success in athletes (Williams and Ford, 2008). On the other hand, some athletes acknowledged the combined importance of both factors, as reflected in the statement "I believe that skill practice and ergogenic aids are equally important for improving athletic performance" (M = 2.45, SD = 1.03). This perspective aligns with research suggesting that ergogenic aids, when used appropriately, can complement training by improving endurance, recovery, and muscle function (Peeling et al., 2018). Legal supplements such as protein powders, creatine, and caffeine have been shown to enhance training outcomes when paired with structured skill practice (Maughan, 2013).

However, a notable divergence in perception is evident in the statement "The use of ergogenic aids is a shortcut to achieving success in my sport, rather than relying on skill practice" (M = 2.67, SD = 1.04). This suggests that some athletes may view ergogenic aids as an alternative to intensive training, possibly due to marketing influence or misconceptions about their effectiveness. Research has shown that athletes sometimes overestimate the benefits of supplements while underestimating the necessity of consistent training (Burke, 2017). This could indicate a need for better education on the limitations and ethical concerns of ergogenic aid use in sports performance.

Comparing the Impact of Ergogenic Aids and Skill Practice

The findings from this study indicated that paid athletes in Edo State Sports Commission do not perceive a significant difference in the impact of ergogenic aids and skill practice on athletic performance. The descriptive statistics reveal a relatively balanced perception, with mean scores ranging from 2.10 to 2.38 across the four survey items (Supplementary Table S13 presents the descriptive statistics for research question 5). The ANOVA results ($F = 1.39$, $p = 0.25$) suggest that there is no statistically significant difference in how athletes rate the importance of ergogenic aids versus skill practice (Table 5), meaning both factors are considered important, but not overwhelmingly superior to one another. The relatively low mean score for the statement that "ergogenic aids have a greater impact than skill practice" (M = 2.38, SD = 0.94) suggests that many athletes do not believe performance-enhancing substances alone can replace skill development. This aligns with previous research emphasizing that skill acquisition, technical training, and practice consistency are key determinants of long-term athletic success (Ericsson, Krampe, & Tesch-Römer, 1993). While ergogenic aids can enhance physiological capacity, they cannot substitute for the neuromuscular adaptations that come from deliberate practice (Baker & Young, 2014). The highest level of agreement in the descriptive results was for the statement "skill practice is more important than using ergogenic aids for achieving success in my sport" (M = 2.10, SD = 0.97). This suggests that athletes generally prioritize training and skill refinement over supplementation. Studies in sports psychology support this perspective, showing that technical mastery, tactical awareness, and psychological resilience developed through practice are more reliable predictors of success than ergogenic aids (Williams & Ford, 2008). Interestingly, the mean score for the statement "both ergogenic aids and skill practice are equally important" (M = 2.21, SD = 1.00) suggests a balanced view among some athletes, recognizing that supplementation may complement training rather than replace it. Some studies have shown that ergogenic aids, when used appropriately, can enhance the benefits of training by improving recovery, increasing endurance, and reducing fatigue (Maughan, 2013).

This supports the idea that a combined approach—proper training supplemented with legal and safe ergogenic aids—may provide the best performance outcomes. The final statement, "the impact of ergogenic aids on athletic performance is dependent on the individual athlete's needs and goals" (M = 2.20, SD = 1.03), highlights the context-dependent nature of supplement use. Some athletes may benefit more from nutritional supplements, creatine, or caffeine, while others may see minimal performance improvements (Peeling et al., 2018). This variability may explain why there was no significant difference in the overall ANOVA results, as different athletes may have unique training needs, physiological responses, and perspectives on ergogenic aids versus skill practice. The lack of statistical significance in the ANOVA results suggests that there is no dominant factor—skill practice and ergogenic aids are perceived as complementary rather than mutually exclusive. This supports previous findings that training adaptations are the primary drivers of performance, but legal supplements may provide additional benefits when used correctly (Burke, 2017).

Conclusion

The study concludes that paid athletes in the Edo State Sports Commission generally recognize the role of both ergogenic aids and skill practice in athletic performance. However, their perceptions remain largely uniform, with no significant differences across various aspects of training and competition. While athletes acknowledge the benefits of ergogenic aids, their views on specific substances vary, with creatine being the most favored and protein powders and energy drinks receiving mixed opinions. Additionally, concerns over health risks exist, but athletes do not significantly differentiate between specific risks such as cardiovascular issues, dependence, or side effects. The findings suggest that while skill practice remains the primary factor in achieving long-term athletic success, some athletes view supplementation as a valuable support tool. However, the statistically significant difference in direct comparisons between skill practice and ergogenic aids indicates that opinions on the best approach to performance enhancement are divided. This highlights the need for personalized training strategies that consider individual athlete preferences, sport-specific demands, and scientific evidence on supplementation efficacy. The study also underscores the importance of structured education on ergogenic aids to prevent misconceptions, over reliance, and potential health risks associated with their misuse.

Supplementary File

The Supplementary File for this article can be found online

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