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ASSOCIATION BETWEEN INVOLVEMENT IN BASKETBALL AND COGNITIVE FUNCTIONING OF ELITE MALE AND FEMALE BASKETBALL LEAGUES PLAYERS IN NIGERIA

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ABSTRACT. Sports are physical activity that consists of rules, competition, challenge, entertainment and uncertainties. Competitive sports could be seen as those sports governed by a set of rules or customs, which serve to ensure fair competition, and allow consistent adjudication of the winner. This study ascertained the association between level of involvement in basketball and cognitive functioning of elite male and female basketball premier league players in Nigeria. Descriptive survey research design was adopted for the study. The population comprised of male and female basketball players in Nigeria. A total of 240 (120 males from the Premier League and 120 females from the Zenith league) basketball players in Nigeria selected using simple random sampling technique. A self-constructed 15 item questionnaire titled Involvement in Competitive Sports and Cognitive Functioning (ICSCF) was used to elicit information on from the level of cognitive functioning of elite basketball players in Nigeria. The results showed that there are two groups of items. The first group is made of 15 items while the second group is made up of 15 items. The mean of first group was 3.1±1 while the mean of group two was 2.1±0.7. df =28 and P-value = -0.20. $P < 0.05$ this indicated that there was a significant association between the level of involvement of respondents in basketball and their level of cognitive functioning. The study concluded that coaches and trainers should combine both the practical and mental mode of trainings when preparing their athletes for competition for optimal performance outcomes.

Keywords: *Elite; Competition; Basketball; Premier Leagues; Cognitive Functioning*

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INTRODUCTION

In Nigeria, the history of basketball dates as far back as the late 1950s when Walid Zabadne served as the first basketball coach to train Nigerians. At the time, Nigeria's only basketball court was situated in the Syrian Club. Walid Zabadne continued teaching young Nigerians to become basketballers. He took them to several basketball competitions across Africa. In view of his role as the pioneer of basketball coach in Nigeria, Walid Zabadne has been deemed "father of Nigerian basketball''. Also worthy of note is that Zabadne was later made the president of the Nigerian Basketball Federation (NBF). Nigeria's national basketball team joined FIBA in 1964. Recently, the team has enjoyed successes, due to an increasing number of talents from Nigeria as well as an orchestrated recruitment of American college and professional players of Nigerian descent. Nigeria is the only African nation to ever qualify for the Summer Olympics through the FIBA World Olympic Qualifying Tournament. This was accomplished at the 2012 Event when Nigeria beat the world elite teams of Lithuania and Greece. In 2015, Nigeria won its first crown as basketball champion of Africa. A team dominated by Nigerian-Americans qualified for the 2006 FIBA World Championship, marking only the second time in the country's history that they qualified to the FIBA World Cup. In March, 2021, the global governing body FIBA ranked Nigeria as Africa's top men's basketball nation. Over the course of the years, the NBBF has produced a significant number of professional basketballers which include: Olumide Oyedeji, Aminu Farouk, Femi Solomon (male category); Rashidat Sodiq, Uju Ugoka, Rosalyn Gold – Onwude (female category). Nigeria features two basketball leagues every year: the Nigerian Premier League Basketball League for the male category and the Zenith Women Basketball League for the women category. The Nigerian Premier League Basketball league, is the preeminent men's professional basketball league in Nigeria. Later it was called Kwese Premier Basketball League for sponsorship reasons after the expiration of the deal with Dstv. Joshua, O. (2017). The league consists of sixteen teams which are categorized into two conferences based on the geographical location. These conferences are Savannah and Atlantic. The league usually spans from March till mid-year. Each team plays a total of 14 games in a regular season after which the top four teams qualify for the Final Eight Playoffs which usually takes place at the National Stadium, Surulere, Lagos. The team at the bottom of the table in each conference is relegated from the league. Towards the end of the year, the Division 1 championship is held to determine who will be promoted to the NPL for the new season (Joshua, 2017). The teams in the NPL for the last competition include Bauchi Nets (Bauchi) Kano Pillars (Kano), Gombe Bulls (Gombe), Plateau Peaks (Jos), Mark Mentors (Abuja), Defenders (Abuja), Niger Plotters (Niger) and Kada Stars

(Kaduna) for the Savannah Conference while for the Atlantic Conference, the teams included Oluwole Warriors (Ibadan), Hoops & Read (Lagos), Royal Hoopers (Rivers), NAF Rockets 4 (Lagos), Delta Force (Asaba), Nigeria Customs (Lagos), Police Baton (Lagos) and Kwara Falcons (Kara) (Premium Times, 2015).

The National Women Basketball League, known as Zenith Women Basketball League for sponsorship reasons in the top-level women's basketball club competition in Nigeria. It is the women's version of Nigeria Premier League organized by the Nigeria Basketball Federation (NBBF). The league also determines the Nigerian representatives at FIBA Africa Women's Clubs Champions Cup (Premium Times, 2015). It was founded in 2004 and inaugurated in 2015 (Edward, 2017). The league is composed of 16 teams divided into two groups. The league is played in three phases. The first phase sees one team out from each of the two groups in the league. The first phase runs for about 8 to 9 days. The second phase sees the teams in the two groups reduced to fourteen. Matches continue in the third phase until the two best teams emerge. Teams in the Zenith Women's League include First Bank (Lagos), Dolphins (Lagos), 1st Deepwater (Lagos), Plateau Rocks (Jos), FCT Angels (Abuja), IGP Queens (Lagos), Nigeria Customs (Lagos), GT 2000 (Kaduna), Oluyole Babes (Ibadan), Nasarawa Amazons (Nasarawa), Ekiti Angels (Ekiti), Taraba Hurricanes (Taraba), Delta Force).

Evidently, there may be a relationship between involvement in intense physical activities on a competitive level that may have significant effect on the cognitive functioning of an athlete. Aiguang (2013) posited that competitive sports are physical activity that consists of rules, competition, challenge, entertainment and uncertainties. Competitive sports could be seen as those sports governed by a set of rules or customs, which serve to ensure fair competition, and allow consistent adjudication of the winner. Competitive sports involve not only contests but it also advances as the central tenet that the athlete or team will continually seek progress and advancement to a higher level.

Cognitive functions include: memory, attention, visual-spatial, and executive functions, while complex cognitive processes include: thinking (abstract, cause and effect, creative thinking, and planning) and language functions. The brain is a part of the body that is involved in every activity we do. It is tremendously important to ensure that we are properly exercising the brain in order to enhance our memory, focus and daily role. Without the optimal function of the brain, daily activities can be negatively impaired. This can range anywhere from absentmindedness and inattentiveness to poor decision making. With that being said, improving our cognitive abilities is essential for performing well in tasks such as decision making, motor skills and sports performance.

Cognition is the ability for an individual to understand their surroundings and act appropriately based on the environment.[1] Cognitive abilities are brain-based skills that everyone uses to carry out tasks that are both simple and complex. Specifically, in relation to sports, cognitive skills refer to the ability to identify and acquire environmental information and integrate this with current knowledge. For athletes, this refers to the ability to process live information when playing a sport and then respond to this information quickly.

The seat of cognition functioning in any organism is the brain, with different parts responsible for different aspects (Timmons, Leblanc & Carson, 2012). Participation or execution of a sport is one of the various domains in which physical ability plays a crucial role along with cognitive functioning. Training in competitive sports is a blend of physical and cognitive training. Processes of attention and concentration are even more important for competitive contact team sports like basketball where the objects of attention are constantly moving and mental strategies need to be revised according to new incoming information. In the world of competitive sports, cognitive functioning is a major component.

It was hypothesized by Hillman, Erickson & Kramer (2018) that involvement in competitive (intense) sports has positive effect on cognitive functions, which is partly due to the physiological changes in the body. It is also suggested that an athlete's motor skills may influence cognitive development given that motor and cognitive skills have several common underlying processes, including sequencing, monitoring and planning (Roebers & Kauer, 2016).

In a study that Chang et al., (2012) did on 36 healthy adults in college to determine if there were is a relationship between acute exercise and cognition. The participants had to finish a 49 Physical activity Readiness Questionnaire (PARQ) and a Health Screening Questionnaire (HSQ) a maximal exercise test to determine in which fitness group the fitted. The participants were categorized in low, medium and high cardiovascular fitness. The group described as having poor, good and super fitness for men and poor, excellent and superior for women according to American College of Sports Medicine guidelines. The results showed that all the participants were better at the cognitive test after the exercise in all fitness levels. A similar study was conducted by Garry (2015) to assess the level of training and cognitive functioning of 746 of college basketballers. The study reported that a high number of the respondents practiced free throws daily, majority practiced chest-pass daily, majority engaged in suicide runs and all of the respondents practiced run up exercises on a monthly basis.

The findings of the study also revealed that there was a high level of cognitive functioning regarding the difficulty they have in acquiring new skills, understanding explanations and instructions and throwing and catching the

ball. The level of cognitive functioning was moderate on the difficulty they face in perceiving what other people say, comprehending orientation and spatial direction and judging distance or size; the level of cognitive functioning of respondents was however low on their ability to move fast and with energy, ability to pay close attention to details or make careless mistakes; sustaining attention in tasks or sport activities; organizing tasks and activities and maintaining attention despite extraneous stimuli.

A study conducted by Lubans et al. (2016) examined the relationship between physical activity and cognition. The participants were recruited as part of a bigger study on adult brain function and genetics of cognition where 626 adult twins and their non-twin siblings were asked to do a protocol of cognitive function testing. To narrow it down and avoid correlating results from family resemblance, only one participant from each family was chosen. In total 47 the study had 241 individuals between the ages of 15-71 participated in tasks requiring executive function such as Eriksen flanker task, intelligence testing such as Wechsler Adult Intelligence Scale (WAIS) and a physical activity assessment that was measured in sweat index ranging from 1-4 that indicated how many times a week they were doing a physical activity: Once a week (code 1), twice a week (code 2), three times a week (code 3) and four times a week or more often (code 4). The participants had to report their physical activity by rating 1- 4. The participants were asked to do a 4,5 hours of cognitive functions tests for 2 hours where they alternated with the WAIS test and Eriksen flanker task, then the participants did a 2, 5 hours of EEG testing that was conducted by trained assistants. In the analyzed data they controlled for age, sex and IQ. After controlling for confounding variables, the scientists found that age was associated with a general decrease of reaction time speed over conditions of the Eriksen flanker task. They also found that physical activity had a significant correlation with improvements in reaction time speed over conditions of the Eriksen flanker task. This research suggests that physical exercise can be beneficial for cognitive functions during early, middle and later part of a human's lifespan and may protect from age-related loss of cognitive function during older adulthood. Scharfen & Memmert (2019) investigated the relationship between cognitive functions and soccer-specific motor skills in soccer players ranging from 11 to 13 years of age. The attention window was positively correlated with dribbling skills, and working memory was positively associated with dribbling, ball control, and ball juggling skills. Interestingly, the cumulated score of the cognitive tests was positively related to the cumulated score of the motor tests. This finding supports the close interplay of motor and cognitive skills, suggesting a connection between physical and cognitive domains in youth athletic development.

According to Policastro, Accardo, Marcovich, Pelamatti & Zola (2018) in their study of the correlations between motor and cognitive skills in young basketball players. The study identified the cognitive functions of the player in attentions shift, inhibition, planning, working memory and emotional regulation. Generally, the responses of respondents were high for each of the cognitive functions. The findings of the study further revealed that there is a significant relationship between the level of involvement of respondents in basketball and their cognitive functioning. A similar study conducted by Diamond & Ling (2016) on intentions, programs and approaches for improving cognitive functions recommended physical activity like basketball for improving cognitive functions. Preparation of athletes for competitive activities is a combination of both physical and mental processes. Peak performance is not limited to the preparation of the motor senses, it also encompasses the training of "the seat of control" for effective functioning. Cognitive function is an important determinant of the performance outcome in sports especially competitive sport. However, many coaches believe in the physical preparation of the athletes at the expense of mental preparation. There tends to be a paucity of research on the influence of involvement in intense physical activity (like playing basketball at a very competitive level) on cognitive functioning among male and female league basketball players in Nigeria.

OBJECTIVES OF THE STUDY

The objective of the study is to ascertain the association between involvement in competitive basketball and the cognitive functioning of the Amateur basketball players in South Western part of Nigeria.

HYPOTHESIS

There will be no significant difference in the level of cognitive functioning of male and female Southwestern elite male and female basketball league players.

METHODS

A descriptive survey research design was adopted for this study. The population comprised of male and female basketball players in Nigeria. A total of 240 (120 males from the Premier League and 120 females from the Zenith league) basketball players in Nigeria selected using simple random sampling

technique. A self-constructed 15 item questionnaire titled Involvement in Competitive Sports and Cognitive Functioning (ICSCF) was used to elicit information on from the level of cognitive functioning of elite basketball players in Nigeria. Using a four Likert scale a test-retest pilot study with a two-week interval was carried out using basketball players in the Nigeria Division one League. Using the Pearson Moment Correlation coefficient to analysed data collected a 0.78 co-efficient alpha was returned. Data obtained was analyzed using means score and standard deviation to test the hypothesis. Oral consent was obtained from each respondent before administering the instrument for assessment in conformity with the declaration of Helsinki.

RESULTS

Table 1a. Mean Scores Statistics for Respondents' Involvement in Basketball

ITEM	VO = 4	O= 3	R = 2	N= 1	Scores
How often do you train in a day?	201	39	0	0	3.8
How often do you train in a week?	220	20	0	0	3.9
How often do you participate in state competitions?	25	23	0	192	1.5
How often do you participate in National Competition?	05	10	03	222	1.2
How often do you engage in high intensity basketball training?	119	73	32	16	3.4
How often do you play in Nigerian Amateur Basketball League?	240	0	0	0	4
How often do you practice skills in passing?	201	36	03	0	3.8
How often do you practice free throws?	191	38	11	0	3.8
How often do you practice in international competitions	0	5	0	235	1.0
How often do you engage in suicide exercises?	191	35	14	0	3.7
How often do you engage in run up exercises?	205	20	15	0	3.8
How often do you visit the gym?	102	100	25	13	3.2
How often do you play full time during competitions?	143	82	6	7	3.6
How often do you participate in other basketball leagues	45	50	72	73	2.3
How often do you train in a month?	221	18	0	0	3.8
MEAN SCORE					**3.1±1**

VO = Very often, O = Often, R = Rarely, N = Not at all

Table 1b. Mean Scores Statistics for Respondent's Level of Cognitive Functioning

ITEM	VO = 4	O= 3	R = 2	N= 1	Scores
I have difficulty acquiring new skills	4	3	70	163	1.4
I have difficulty understanding explanations and instructions	0	4	37	199	1.2
I have difficulty perceiving what other people say	31	23	82	104	1.9
I have difficulty comprehending orientation and spat direction	31	23	82	104	1.9
I have difficulty judging distance or size	14	74	31	121	1.9
I seem slow, inert or lacking energy	56	62	112	10	2.6
I often fail to pay close attention to details	32	45	152	11	2.4
I have difficulty sustaining attention in tasks	41	55	109	35	2.4
I have difficulty organizing tasks and activities	91	82	63	4	3.1
I am distracted by extraneous stimuli	109	98	26	7	3.3
I have difficulty throwing and catching ball	0	0	9	231	1.0
I am forgetful in daily activities	24	15	106	95	1.9
I have difficulty completing sequential tasks	22	27	115	76	2.0
I am over sensitive to touch	17	19	123	81	1.9
I have difficulty remembering what skill was taught recently	24	22	99	95	1.9
MEAN SCORE					**2.1±0.6**

VO = Very often, O = Often, R = Rarely, N = Not at all

Table 1c. Standard Deviation Measure of the Association Between Levels of Involvement and Cognitive Functioning of Elite Basketball Players

Item	N	Mean	S.D	df	P value
Involvement in Basketball	15	3.1	1	28	0.20
Cognitive Functioning	15	2.1	0.6		

Table 1a and 1b shows the scores for the respondent's level of involvement in basketball and the respondent's level of cognitive functioning respectively based on the four-point Likert Scale. Table 1c shows the relationship between the level of involvement of the respondents in basketball and their level of cognitive functioning. Table 1c showed that there are two groups of items. The first group is made of 15 items while the second group is made up of 15 items. The mean of first group was 3.1±1 while the mean of group two was 2.1±0.7. df =28 and P-value = -0.20. $P < 0.05$ then, there is a significant association between the level of involvement of respondents in basketball and their level of cognitive functioning.

DISCUSSION OF FINDINGS

The finding of this current study revealed that there was a significant association between involvement in basketball and the cognitive functioning of elite basketball players in the Nigeria Basketball League. This finding is consistent with the findings of Policastro et al. (2019) in their study on the correlations between motor and cognitive skills in young basketball players and identified the cognitive functions of the player in attentions shift, inhibition, planning, working memory and emotional regulation. The study reported that the responses were high for each of the cognitive functions and that there is a significant relationship between the level of involvement of respondents in basketball and their cognitive functioning. A similar study conducted by Diamond & Ling (2016) also recommended that intentions, programs and approaches for improving cognitive functions should include physical activity especially basketball. Formenti, Trecroci, Duca, Vanoni, Ciovati, Rossi & Alberti (2020) in their study posited that a combination of both physical and motor performance with basic cognitive functions should be considered to depict a complete portrait of athletes' abilities. (Trecroci, Duca, Cavaggioni, Rossi, Scurati, Longo, Merati, Alberti, & Formenti, 2021) maintained that athletes with superior basic cognitive functions present better sport-specific physical performance.

CONCLUSION

Based on the findings of the study it was concluded that there was a significant association between involvement in basketball and cognitive functioning of elite male and female basketball players in the professional basketball leagues in Nigeria. The following recommendations were also inferred:

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