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**Original Research Article**

# Relationship between Selected Physical Fitness Variables and Shooting Accuracy among High School Basketball Players in the Cape Coast Metropolis, Ghana

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## Abstract

This research was carried out to examine the relationship between selected physical fitness characteristics and shooting accuracy among high school basketball players in the Cape Coast Metropolis. Preliminary investigation revealed that the shooting accuracy of basketball players in the metropolis was not good compared to the standards set for players of their age category. Forty (40) basketball players comprising twenty (20) male and twenty (20) female, male with a mean age of 17.15, weight of 73.20, height of 1.79, and female also with a mean age of 17.15, a weight of 68.65 and height of 1.64 were randomly sampled and randomly assigned to experimental and control groups, respectively. The experimental group was taken through drills to improve on selected fitness variables while the control group went through a mini-clinic on passing and dribbling. The mini-clinic was used to occupy the control group for the period of training at a different venue as the experimental group went through specific drills intended to improve on selected physical fitness characteristics which were used as the bases for assessing improvement in shooting accuracy. Because the mini-clinic focused on passing and dribbling, it did not have any influence on their shooting hence difference was identified. Physical fitness tests were conducted using standardized tests; agility was tested with the Illinois agility test, balance with the flamingo test, coordination with the alternate hand wall toss test, power (upper body) was tested with the seated medicine ball toss test, power (lower body) with the standing broad jump, reaction time with the ruler test, and speed with the 40m dash. For shooting accuracy, the researchers adapted the tests used by Pojsic, Separovic, and Uzicanin which are static free throw, dynamic free throw, static two points, and dynamic two points. A dependent sample t-test and Pearson's correlation were used for analysis. Overall results showed no statistically significant difference between the experimental and control group for both sexes for the physical fitness and shooting accuracy tests at the pretest but at the posttest, there was a statistically significant difference between the two groups. There was also a strong positive relationship between physical fitness and shooting accuracy among high school basketball players in the Cape Coast metropolis. The problem of shooting accuracy among high school basketball players in Cape Coast metropolis can be improved with a planned programme to improve on their selected game-related physical fitness variables.

**Keywords:** Skill-related fitness, shooting, shooting accuracy, high school basketball players.



## INTRODUCTION

The shooting accuracy of high school basketball players in the Cape Coast metropolis is not good compared to the standards of players of the same age. Preliminary investigations showed that with all the types of shots used to gain points during play, players in the metropolis create lots of shooting opportunities but few ends successfully. And with free throws, players performed very poorly. This affects schools within the metropolis and representative players during competitions, as they are unable to get to the ultimate. A good free throw shooter should be able to shoot over 80% (Kelbick, 2015). With those in high school, they should be able to shoot over 70% to qualify to be placed in the category of good shooters. He further argues that anyone between 15 and 18 years (high school age range in Ghana) who shoots below 70% cannot be classified as a good free throw shooter.

Basketball is among the group of sports that are classified as physically very demanding because it requires that players move frequently, repeating sets of highly intensive actions that include both aerobic and anaerobic energy-driven processes (Narazaki, Berg, & Stergiou, 2008). Basketball players must prepare physically by increasing their agility, power, and other skill-related fitness levels in order to be successful (Apostolidis, Nassis, Bolatoglou, & Geladas, 2004). Movement abilities such as sprints, jumps, and traits of flexibility, as well as good throwing make up the physical variables that are very important in basketball and contribute to overall team performance. According to Chittibabu (2014) and Sinclair, Coetzee, and Schall (2021, successful performance in basketball needs some level of power in the lower body, upper body, sprint speed and an overall kinesthetics that is needed for ball control. Okazaki, Rodacki and Satern, (2015) reported that the main skill that determines successful basketball is shooting accuracy. Shooting accuracy is one of the most important skills for basketball players (Okazaki, Rodacki, & Satern, 2015; Pojskić, Šeparović, Muratović, & Užičanin, 2014). The question of what improves it, particularly among youth basketball players, is worth asking. This research work investigated the difference in selected physical fitness variables and shooting accuracy between the experimental and control group and the relationship between the two variables among high school basketball players in Cape Coast metropolis, Ghana.

Physical fitness in general is what enable players to deal with their physical demands of the game and enhances the effective use of technical abilities (Babu & Reddy, 2009). Basketball is very competitive so, it needs high levels of fitness. Some of the main physical qualities are power, agility, endurance, speed, and coordination (Sudha, 2015). Basketball players must possess basic physical fitness components like speed, agility, explosive power, flexibility, and coordination. These qualities help players improve on their performance levels during play. In addition to this, the players' anthropometrics, height, arm length, and leg length are also pivotal in deciding their efficiency during play (Torres-Unda, *et al.,* 2013). Exhibiting good performance in basketball game has also largely depended on variables like speed, strength, agility, flexibility, power, endurance, balance, and coordination (Debnath, 2001). The purpose of this study, therefore, is to find out the difference between selected physical fitness variables and shooting accuracy among the experimental and control groups of high school basketball players in the Cape Coast metropolis before and after intervention and the relationship between the selected physical fitness variables and shooting accuracy.

# METHODS

## Subjects

Forty (40) basketball players, comprising twenty (20) male and twenty (20) female; male with a mean age of 17.15, weight of 73.20, height of 1.79, and female with a mean age of 17.15, weight of 68.65 and height of 1.64 were randomly sampled and assigned by same means to experimental and control groups, respectively. Before commencing the study, the medical records of all the players were taken from the various school infirmaries and scrutinized so each participant was cleared of any medical disorders that might limit full participation in the study. All participants were fully informed, verbally and in writing, about the nature and demands of the study, known health risks, and what they were likely to gain at the end of the study. All participants were informed that they could withdraw from the study at any time. Participants were given written consent forms to sign. Some parents requested the consent forms and they were duly provided. They therefore gave their consent to the voluntary participation of their children in the study. The researchers had the approval of the University of Cape Coast Ethical Review Board to conduct the study after all documents showing how participants will be protected have been perused.

## Design

The study is an experimental research, pretest-posttest control group design. This is an approach to research where one or more variable(s) are controlled to measure their impact on the other variable(s). In this study, selected physical fitness variables were applied to shooting accuracy to measure the effect on the latter. The effect of the independent variables on the dependent variables was observed over time. So, the researchers were able to draw conclusions regarding relationship between these variables (Atinc, Simmering, & Kroll, 2012). Participants of this study belonged to the various basketball teams of the schools located in the metropolis and played regularly for their teams. Their age categories for male are (16yrs, n = 3; 17yrs, n = 12; 18yrs, n = 4; 19yrs, n = 1) and female (15yrs, n = 1; 16yrs, n = 5; 17yrs, n = 7; 18yrs, n = 5; 19yrs, n = 1; 20yrs, n = 1). All the players had completed the annual interschool basketball competition few days before the study so they were in good physical condition and were adequately familiarized with all procedures prior to commencing the study. The experimental group went through training sessions three times a week (2hrs per day); going through activities to improve their selected physical fitness variables while the control group went through a mini-clinic that focused on dribbling and passing.

The physical fitness levels of the players were tested using standardized fitness tests. Agility was measured using the Illinois agility test; balance with the flamingo test; speed with the 40m dash; reaction time with the ruler test; coordination was measured with

alternate hand wall toss; and lastly, lower body power with the standing broad jump and upper body power with the seated medicine ball. For each of these tests, participants were given three trials and the average was used for analysis. These are Eurofit test batteries that have a high-reliability coefficient. The researchers used basketball shooting tests that are more suitable for competitive situations by adapting the tests used by Pojskic *et al.,* (2011) and Uzicanin *et al.,* (2014). These are the Static Free Throw, Dynamic Free Throw, Static Two Points, and Dynamic Two Points.

**Conducting the Tests**

Physical fitness and shooting accuracy tests were conducted for all the participants at the pretest. Before each test, participants went through fifteen minutes of general, specific warm up and stretching exercises and the researchers made sure that a particular test was completed on a particular day for all participants to minimize errors. After the pretest, the control group was taken through a mini-clinic on dribbling and passing, while the experimental group went through drills three times a week (2hrs each day) to improve on selected physical fitness variables. The researchers selected drills that overlap (having the tendency to improve more than one fitness component at a time). Some of the drills are ladder drill, step drill, dot drill, jump rope, box jump, target throwing, ball tossing, wheelbarrow, and medicine ball rotational throws. At the end of the third, sixth, ninth, and twelfth weeks, the control group joined the experimental group for physical fitness and shooting accuracy tests to be conducted.

The training was conducted three times a week on Tuesdays, Thursdays, and Fridays. The period for training was two hours each day, and it followed the following routine:

| | |
|---|---|
| Warm-up and stretching | 20mins |
| Drills on related activity for the day | 20mins |
| Workout | 35mins |
| Water breaks | 5mins |
| Workout continues | 30mins |
| Cool down | 10mins |

Physical fitness tests were conducted using standardized tests; agility was tested with the Illinois agility test, balance with the flamingo test and coordination with the alternate hand wall toss test. Power (upper body) with the seated medicine ball toss test, power (lower body) with the standing broad jump, reaction time with the ruler test, and speed with the 40m dash. For each of the tests, participants were given three trials and the average was used for analysis. With shooting accuracy, the researchers adapted the tests used by Uzicanin *et al.,* (2014) which are static free throw, dynamic free throw, static two points, and dynamic two points. Players were given the opportunity to shoot ten times for each of the four, and the number of successful shots was recorded and used for analysis.

**Statistical Analysis**

Data is expressed as mean and SD to compare the differences between the experimental and control groups. A dependent sample t-test was used to analyze the difference in the selected physical fitness and shooting accuracy levels between the experimental and control groups of high school basketball players in the Cape Coast metropolis before and after the intervention, while Pearson's correlation was used to analyze the relationship between the selected physical fitness variables and shooting accuracy.

## RESULTS

Table 1 presents the results of the male; for agility, the experimental group had a pretest mean (M) = 19.04, while the control group had a pretest mean (M) = 19.02 and posttest, the experimental group had a mean (M) = 17.17, while the control group had a mean (M) = 19.06. For balance, at pretest, the experimental (M) = 3.52, while the control mean (M) = 3.49, experimental group mean (M) = 3.66, while the control group mean (M) = 3.52 at posttest. Coordination, pretest mean for the experimental group (M) = 20.12, and the control group (M) = 20.17 however, at posttest the experimental group mean (M) = 25.11, while the control group (M) = 20.21 for posttest. Power (Lower body) pretest mean for experimental group (M) = 3.16 and control group mean (M) = 3.19, and posttest, experimental group mean (M) = 4.93 and control group mean (M) = 3.21. Power (Upper body) pretest mean for the experimental group (M) = 2.58 and the control group mean (M) = 2.53 and for posttest experimental group mean (M) = 3.96 with a control group mean (M) = 2.55. Reaction time pretest experimental mean (M) = 10.28, and control group mean (M) = 10.20, meanwhile posttest means for experimental and control groups are (M) = 7.47 and (M) = 10.30, respectively. Finally, for speed the experimental group mean for pretest (M) = 7.51, while the control group mean (M) = 7.41 and, at posttest, the mean for the experimental group was (M) = 6.01, while the control group mean (M) = 7.47.

**Table 1: Paired Sample Statistics for Selected Physical Fitness Tests for Male**

| Physical Fitness Variables | Experimental Group | | Control Group | |
|---|---|---|---|---|
| | Mean Pretest | Mean Posttest | Mean Pretest | Mean Posttest |
| Agility | 19.04 | 17.17 | 19.02 | 19.06 |
| Balance | 3.52 | 3.66 | 3.49 | 3.52 |
| Coordination | 20.12 | 25.11 | 20.17 | 21.21 |
| Power (Lower Body) | 3.16 | 4.93 | 3.19 | 3.21 |
| Power (Upper Body) | 2.58 | 3.96 | 2.53 | 2.55 |
| Reaction time | 10.28 | 7.47 | 10.20 | 10.30 |
| Speed | 7.51 | 6.01 | 7.41 | 7.47 |

**Source:** Filed survey

Results in Table 2 presents an outlook for the female; agility, the experimental group had a pretest mean (M) = 21.77, while the control group had a pre-test mean (M) = 21.81. At posttest, the experimental group had a mean (M) = 18.51, while the control group had a mean (M) = 21.79. For balance, the experimental group (M) = 4.79, while the control group (M) = 4.66 at post-test, experimental group (M) = 4.70, control group (M) = 4.57. Coordination, pretest mean for the experimental group (M) = 18.30, while the control group mean (M) = 18.41. However, the experimental group mean (M) = 21.27 and the control group mean (M) = 18.51 for posttest. Power (Lower body) pretest, experimental group mean (M) = 3.23 and control group mean (M) = 3.21, and posttest, experimental group mean (M) = 4.99 and control group mean (M) = 3.19. Power (Upper body) pretest mean for the experimental group (M) = 2.12 and the control group mean (M) = 2.10; posttest experimental group mean (M) = 3.57 with a control group mean (M) = 2.13. Reaction time pretest experimental mean (M) = 7.88 and control group mean (M) = 7.89. However, posttest mean for experimental is (M) = 5.05 and control group mean (M) = 7.90. Finally with speed, the experimental group mean (M) = 8.80, while the control group mean (M) = 8.84, but at posttest, the mean for the experimental group mean was (M) = 6.77, while the control group mean (M) = 8.82.

**Table 2: Paired Sample Statistics for Selected Physical Fitness Tests for Female**

| Physical Fitness Variables | Experimental Group | | Control Group | |
|---|---|---|---|---|
| | Mean Pretest | Mean Posttest | Mean Pretest | Mean Posttest |
| Agility | 21.77 | 18.51 | 21.81 | 21.79 |
| Balance | 4.79 | 4.70 | 4.66 | 4.57 |
| Coordination | 18.30 | 21.27 | 18.41 | 18.51 |
| Power (Lower Body) | 3.23 | 4.99 | 3.21 | 3.19 |
| Power (Upper Body) | 2.12 | 3.57 | 2.10 | 2.13 |
| Reaction time | 7.88 | 5.05 | 7.89 | 7.92 |
| Speed | 8.80 | 6.77 | 8.84 | 8.82 |

**Source:** Filed survey

**Table 3: Paired Sample Test for Selected Physical Fitness Tests for Male**

| | | Pretest | | | | Posttest | | |
|---|---|---|---|---|---|---|---|---|
| **Test Variables** | ***Mean*** | ***+/- Score*** | ***t*** | ***Sig.*** | ***Mean*** | ***+/_ Score*** | ***t*** | ***Sig*** |
| Agility | -.078 | 2.62 | -.089 | .931 | -1.34 | 1.06 | -3.98 | .003 |
| Balance | 1.33 | 3.80 | 1.05 | .323 | -.340 | 2.94 | -.364 | .724 |
| Coordination | -1.27 | 2.65 | -1.44 | .189 | 3.60 | 2.84 | 4.01 | .003 |
| Power (Lower Body) | -.376 | .359 | -3.14 | .014 | .763 | .576 | 4.19 | .002 |
| Power (Upper Body) | .069 | .301 | .687 | .511 | .616 | .245 | 7.96 | <.001 |
| Reaction time | -.622 | 4.12 | -.453 | .662 | -3.34 | 2.86 | -3.69 | .005 |
| Speed | .701 | .928 | 2.27 | .053 | -.657 | .559 | -3.72 | .005 |

**Source:** Filed survey

Table 3 shows the paired sample t-test results of skill-related fitness tests for the experimental and control group of males. For all the selected physical fitness tests, there was a statistically significant difference between the experimental and control group at posttest with the exception of balance. The following are details of the paired sample tests, agility t(19) = -3.98, *P* = .003, (M) = -1.34, SD = 1.06. Coordination, t(19) = 4.01, *P* = .003, (M) = 3.60, SD = 2.84. Power (Lower Body), t(19) = 4.17, *P* = .002, (M) = .763, SD = .576. Power (Upper Body) t(19) = 7.96, *P* = <.001, (M) = .616, SD = .245. Reaction time, t(19) = -3.69, *P* = .005, (M) = -3.34, SD = 2.86. Speed, t(19) = -3.72, *P* = .005, (M) = - 6.57, SD = .559. There was no statistically significant difference was found between the experimental and control group for all the variables at

pretest and for balance at posttest as well. The results are, agility t(19) = -.089, *P* = .931, (M) = - .078, SD = 2.62. Balance pretest, t(19) = 1.05, *P* = .323, (M) = 1.33, SD = 3.80 and posttest, t(9) = -.364, *P* = .724, (M) = -.340, SD = 2.94. Coordination, t(19) = -1.44, *P* = .189, (M) = -1.27, SD = 2.65. Power (Lower Body), t(19) = -3.14, *P* = .014, (M) = .376, SD = .359. Power (Upper Body) t(19) = .687, *P* = .511, (M) = .069, SD = .301. Reaction time, t(19) = - .453, *P* = .662, (M) = -.622, SD = 4.12. Speed, t(19) = 2.27, *P* = .053, (M) = .701, SD = .928.

**Table 4: Paired Sample Test for Selected Physical Fitness Tests for Female**

| | | Pretest | | | Posttest | | | |
|---|---|---|---|---|---|---|---|---|
| **Test Variables** | ***Mean*** | ***+/- Score*** | ***t*** | ***Sig.*** | ***Mean*** | ***+/_ Score*** | ***t*** | ***Sig*** |
| Agility | -2.22 | 3.21 | -2.182 | .057 | -4.05 | 2.96 | -4.33 | .002 |
| Balance | -1.68 | 3.28 | -1.62 | .141 | -2.33 | 4.29 | -1.72 | .120 |
| Coordination | 3.53 | 5.35 | 2.09 | .068 | 6.60 | 2.95 | 7.08 | <.001 |
| Power (Lower Body) | -.154 | .565 | -.863 | .411 | 1.03 | .662 | 4.92 | .001 |
| Power (Upper Body) | .200 | .092 | 2.18 | .058 | .714 | .314 | 7.20 | <.001 |
| Reaction time | -.200 | 2.84 | -.233 | .829 | -3.64 | 2.34 | -4.91 | .001 |
| Speed | -.340 | 1.02 | -1.05 | .320 | -1.45 | .928 | -4.94 | .001 |

**Source:** Filed survey

Table 4 shows the paired sample t-test results of skill-related fitness tests for the experimental and control group of females. With the female also, all the selected physical fitness tests showed a statistically significant difference between the experimental and control group at posttest with the exception of balance. The following are details, agility t(19) = -4.33 , *P* = .002, (M) = -4.05, SD = 2.96. Coordination, t(19) = 7.08, *P* = <.001, (M) = 6.60, SD = 2.95. Power (Lower Body), t(19) = 4.92, *P* = .001, (M) = 1.03, SD = .662. Power (Upper Body) t(19) = 7.20, *P* = <.001, (M) = .714, SD = .314. Reaction time, t(19) = -4.91, *P* = .001, (M) = -3.64 , SD = 2.34. Speed, t(19) = -4.94, *P* = .001, (M) = -1.45, SD = .928. There was no statistically significant difference between the experimental and control group for all the variables at pretest and for balance at posttest. The results are, agility t(19) = -2.18, *P* = .057, (M) = -2.22, SD = 3.21. Balance pretest, t(19) = -1.62, *P* = .141, (M) = -1.68, SD = 3.28 and posttest, t(19) = -1.72, *P* = .120, (M) = -2.33, SD = 4.29. Coordination, t(19) = 2.09, *P* = .068, (M) = 3.53, SD = 5.35. Power (Lower Body), t(19) = -.863, *P* = .411, (M) = - .154, SD = .565. Power (Upper Body) t(19) = 2.18, *P* = .058, (M) = .200, SD = .092. Reaction time, t(19) = -.233, *P* = .829, (M) = -.200, SD = 2.84. Speed, t(19) = -1.05, *P* = .320, (M) = .340, SD = 1.02.

The findings indicate a statistically significant difference for all the selected physical fitness test variables, with the exception of balance where the results showed no statistically significant difference at both pretest and posttest. This implies that there was a significant difference between the selected physical fitness variables and shooting accuracy among the experimental and control groups. The overall finding shows that there was no statistically significant difference between the selected physical fitness variables and shooting accuracy among the experimental and control group of high school basketball players in the Cape Coast metropolis, Ghana before the intervention, but after the intervention, there is a statistically significant difference between the two groups.

Table 5 contains the paired sample statistics for shooting accuracy for males. For static free throw, results at pretest for the experimental group mean (M) = 4.20; and for the control group mean (M) = 4.30 and at the posttest, the experimental group mean (M) = 6.90, while the control group mean (M) = 4.26. For dynamic free throw, the experimental group mean at pretest, (M) = 3.50, and the control group mean (M) = 3.46, but at the posttest the experimental group mean (M) = 7.10, while the control group mean (M) = 3.48. For static two points, the experimental group mean (M) = 2.70, and the control group mean (M) = 2.70 at the pretest but posttest results showed experimental group mean (M) = 6.50, and the control group mean (M) = 3.80. Lastly, for dynamic two points, at pretest, the experimental group mean (M) = 5.70, and the control group mean (M) = 5.66 while at posttest, the experimental group mean (M) = 8.90, and the control group mean (M) = 5.76.

**Table 5: Paired Sample Statistics for Shooting Accuracy Tests for Males**

| **Shooting Accuracy Test Variable** | **Experimental Group** | | **Control Group** | |
|---|---|---|---|---|
| | **Mean Pretest** | **Mean Posttest** | **Mean Pretest** | **Mean Posttest** |
| Static Free Throw | 4.20 | 6.90 | 4.30 | 4.30 |
| Dynamic Free Throw | 3.50 | 7.10 | 3.46 | 3.48 |
| Static Two Points | 2.70 | 6.50 | 2.70 | 2.00 |
| Dynamic Two Points | 5.70 | 8.80 | 5.66 | 5.76 |

**Source:** Filed survey

Table 6 contains the paired sample statistics for shooting accuracy, females. Static free throw results at pretest for the experimental group mean (M) = 3.00; and for the control group mean (M) = 3.10, but at the posttest, the experimental group mean (M) = 6.80 while the control mean (M) = 3.12. Dynamic free throw experimental mean (M) = 3.20 and control group mean (M) = 3.10 at pretest but at posttest, the experimental group mean (M) = 6.20 and the control group mean (M) = 3.30. For static two points, the experimental group mean (M) = 2.20 and the control group mean (M) = 2.10 at the pretest and for posttest, the experimental group had a mean (M) = 6.30 and the control group mean (M) = 2.20. Dynamic two points, at the pretest the experimental group mean (M) = 3.50 and the control group mean (M) = 3.46 but at posttest, the experimental group mean (M) = 7.00, and the control group mean (M) = 3.40.

**Table 6: Paired Sample Statistics for Shooting Accuracy Tests for Females**

| Shooting Accuracy Test Variable | Experimental Group | | Control Group | |
|---|---|---|---|---|
| | Mean Pretest | Mean Posttest | Mean Pretest | Mean Posttest |
| Static Free Throw | 3.00 | 6.80 | 3.10 | 3.11 |
| Dynamic Free Throw | 3.20 | 6.20 | 3.10 | 3.30 |
| Static Two Points | 2.20 | 6.30 | 2.10 | 2.20 |
| Dynamic Two Points | 3.50 | 7.00 | 3.46 | 3.40 |

**Source:** Filed survey

**Table: 7 Paired Samples Test for Shooting Accuracy for Male**

| | | Pretest | | | | Posttest | | |
|---|---|---|---|---|---|---|---|---|
| Test Variables | Mean | +/- Score | t | Sig. | Mean | +/_ Score | t | Sig |
| Static Free Throw | .700 | 1.77 | 1.25 | .242 | 2.30 | .675 | 10.78 | <.001 |
| Dynamic Free Throw | .100 | 2.13 | .148 | .885 | 2.60 | .516 | 15.92 | <.001 |
| Static Two Points | .200 | 1.81 | .349 | .735 | 2.90 | 1.10 | 8.33 | <.001 |
| Dynamic Two Points | -1.70 | 2.83 | -1.90 | .090 | 2.30 | 1.57 | 4.64 | .001 |

**Source:** Filed survey

Further analyses were performed to investigate whether there was any statistically significant difference between the two groups for males and the results are presented in Table 7. For the shooting accuracy tests, results showed that there was a statistically significant difference between the experimental and control groups in all the four kinds of shooting accuracy tests used at post-test but no statistically significant difference at pre-test. Posttest results are, static free throw t(19) =10.78, $P < 0.001$, M = 2.30; SD = .675, dynamic free throw t(19) = 15.92, $P < .001$, M = 2.60; SD = .516. For static two points t(19) = 8.33, $P < .001$, M = 2.90; SD 1.10, and dynamic two t(19) = 4.64, $P$ .001, M = 2.30; SD = 1.57 and pretest results are, static free throw t(19) = 1.25, $P = .242$, M = .700; SD = 1.77, dynamic free throw t(19) = .148, $P = .885$, M = .100; SD = 2.13. For static two points t(19) = .349, $P = .735$., M = .200, SD = 1.81, and dynamic two t(19) = -1.90, $P = .090$, M = -1.70; SD = 2.83.

Analysis was also performed to investigate whether there were any statistically significant differences between the two groups for females also and the results confirmed what was evident with the male counterpart.

The results for females are shown in Table 8. For the shooting accuracy tests, results showed that there was a statistically significant difference between the experimental and control groups in all the four kinds of shooting accuracy tests used at posttest but pre-test results showed no statistically significant difference between the two groups. Posttest results are, static free throw t(19) =13.52, $P < 0.001$, M = 3.50, SD = . 850. Dynamic free throw t(19) = 12.43, $P < .001$, M = 2.90; SD = .738. For static two points, t(19) = 11.64, $P < .001$, M = 3.80, SD 1.08, and dynamic two t(19) = 5.78, $P < .001$, M = 3.20, SD = 1.75 and pretest results also showed that for static free throw t(19) = 2.25, $P = .051$, M = 1.20; SD = 1.69. Dynamic free throw t(19) = 1.59, $P = .146$, M = 1.10; SD = 2.18. For static two points t(19) = 1.31, $P = .233$, M = .400; SD .966, and dynamic two t(19) = .287, $P = .780$, M = .200; SD = 2.20. In effect, there was no statistically significant difference between the experimental and control groups for shooting accuracy before intervention, but after intervention, there was a statistically significant difference between the two groups.

**Table 8: Paired Samples Test for Shooting Accuracy for Female**

| | | Pretest | | | | Posttest | | |
|---|---|---|---|---|---|---|---|---|
| **Test Variables** | **Mean** | **+/- Score** | **t** | **Sig.** | **Mean** | **+/_ Score** | **t** | **Sig** |
| Static Free Throw | 1.20 | 1.69 | 2.25 | .051 | 3.50 | .850 | 13.02 | <.001 |
| Dynamic Free Throw | 1.10 | 2.18 | 1.59 | .146 | 2.90 | .738 | 12.43 | <.001 |
| Static Two Points | .400 | .966 | 1.31 | .233 | 3.80 | 1.03 | 11.64 | <.001 |
| Dynamic Two Points | .200 | 2.20 | .287 | .780 | 3.20 | 1.75 | 5.78 | <.001 |

**Source:** Filed survey

In conclusion, there was no statistically significant difference between the experimental and control group for shooting accuracy with both males and females before intervention, but after intervention, there was a statistically significant difference between the two groups.

The results in testing the relationship between skill-related fitness and shooting accuracy among high school basketball players in the Cape Coast metropolis are displayed in Table 9.

**Table 9: Pearson's correlation test**

| | | Agility | Balance | Coordination | Power (Upper Body) | Power (Lower Body) | Reaction Time | Speed |
|---|---|---|---|---|---|---|---|---|
| **Static Free Throw** | R | - .092 | .177 | .365 | .414 | .502 | -.045 | .325 |
| | Sig. | .701 | .456 | .891 | .544 | .829 | .849 | .892 |
| **Dynamic Free Throw** | R | .630 | .201 | .979 | .782 | .771 | .647 | .793 |
| | Sig. | .583 | .396 | .156 | .229 | .455 | .137 | .310 |
| **Static Two Points** | R | -.196 | .620 | .825 | .840 | .852 | .213 | -.225 |
| | Sig. | .409 | .913 | .113 | .141 | .121 | .386 | .340 |
| **Dynamic Two Points** | R | .843 | .784 | .758 | .752 | .874 | .790 | .759 |
| | Sig. | .054 | .510 | .196 | .127 | .104 | .376 | .017 |

From Table 9, overall results showed a strong positive relationship between skill-related fitness and shooting accuracy. There were strong positive relationships between agility and dynamic two points r(38) =.843, *P* =.054, balance and dynamic two points r(38) =.784, *P* =.510, coordination and dynamic free throw r(38) =.979, *P* =.156, static two points r(38) =.825, *P* =.113, and dynamic two points r(38) =.758, *P* =.510. Power (upper body) and dynamic free throw r(38) = .782, *P* = .229, static two points r(38) = .840, *P* = .14, and dynamic two points r(38) = .752 Dynamic free throw r(38) =.771, *P* =.455, static two point r(38) =.852, *P* =.121, and dynamic two point r(38) =.874, *P* =.104. Finally, the speed dynamic free throw r (38) =.793, *P* =.310, and dynamic two points r (38) =.759, *P* =.017. The correlation results also showed a moderate positive relationship between agility and dynamic free throw r(38) =.630, *P* =.583. Balance and static two points r(38) =.620, *P* =.913, lower body power and static free throw r(38) =.502, *P* =.829. r(38) = 647, *P* =.137 for reaction time and dynamic free throw. Speed and dynamic free throw r(38) = .539, *P* = .310. Balance and static free throw r(38) =.177, *P* =.456 and dynamic free throw r(38) =.201, *P* =.396, coordination and static free throw r(38) =.365, *P* =.891, and static two points r(38) =.213, *P* =.386, speed and static free throw r(38) =.325, *P* =.892. Lastly, we observed a weak negative relationship between agility and static free throw r(38) =-.092, *P* =.701, static two points r(38) =-.196, *P* =.409, reaction time and static free throw r(38) =-.045, *P* =.849, and between speed and static two points r(38) =-.225, P =.340.

## DISCUSSION

Basketball has five playing positions, and in all these positions, players' shooting accuracy is a major factor for successful game. Consequently, players have to be physically fit and have a well-balanced physique. Findings from the present study indicate a positive relationship between physical fitness variables and basketball shooting accuracy. These findings concur with Naicker, (2014) who asserted that components of skill-related fitness are necessary for playing basketball. The result also agrees with the findings of Fort Vanmeerhaeghe, Romero-Rodriguez, Lloyd, Kushner and Myer (2016) who maintained that speed, agility, endurance, and coordination are essential for skillful performance. There are many instances where speed becomes essential in the game of basketball. Fast breaks are the ways in which most points are scored in the game of basketball, and for that to be very successful, speed is a very important factor. When a player is defended against, he/she needs a high level of agility and coordination to dribble and continue with his/her ball possession to be able to advance.

The findings showed that agility negatively related to static free throw, static two points, and

dynamic two points but positively related to dynamic free throw. This implies that a player within the metropolis who has a high level of agility will have better shooting accuracy as far as dynamic free throws are concerned but may have challenges with static free throws, static two points, and dynamic two point shots. Also, since there was a positive relationship between balance and static free throw, dynamic free throw and static two points, it can be said that a player who has good balance will do better in the aforementioned shots (static free throw, dynamic free throw and static two points) but not necessarily with dynamic two points. Therefore, as players increase their ability to keep good posture during basketball games especially when shooting, their shooting accuracy with regards to static free throw, dynamic free throw, and static two points increases.

Moreover, because coordination is positively related to all four shooting accuracy variables, it can be argued that a player's ability to put his body parts in tune will make him/her a better shooter. The findings also showed that power was positively related to all the four shooting tests, implying that a high level of power will improve the shooting accuracy as asserted by Boone and Bourgois (2013) that coordination, lower and upper body power is indispensable aspects of a player's fitness in the game of basketball. Reaction time had a positive relationship with dynamic free throw, static two points, and dynamic two points, and so, it can also be stated that for high school basketball players within the Cape Coast metropolis, reaction time will also improve their shooting in dynamic free throw, static two points, and dynamic two points if they are taken through drills to enhance their reaction time. Therefore, as players develop the proper ability to react or respond quickly to what they hear, see, or feel during play, their shooting accuracy increases, especially for dynamic free throws, static two-point shots, and dynamic two-point shots. Finally, speed had a positive relationship with static free throw but was inversely related to dynamic free throw, static two points, and dynamic two points.

From the findings, it can be asserted that there was a strong positive relationship between skill-related fitness and shooting accuracy of high school basketball players in the Cape Coast metropolis. A study by Lehnert, Hůlka, Malý, Fohler and Zahálka (2013) found a positive relationship between basketball shooting test and competitive shooting accuracy, which is similar to the findings of the current study. Players regularly perform blocking, shooting, and bouncing back maneuvers, vertical bounces, and sprint work-outs which are the fundamental motor components of basketball (Abdelkrim, Fazaa, & Ati, 2006). Manzi, D'Ottavio, Impellizzeri, Chaouachi, Chamari and Castagna (2010) and Manchado, Tortosa, Vila, Ferragut and Platern (2010) posited that strength is an essential aspect of physical conditioning and it is a requirement for all sports performance. The result, however, contradicts the findings of Hum-Kinet (2012), Pojskic, Sisic, Separovic and Sekulic (2018) and Manchado, *et al.,* (2013) who all found no relationship between any measure of strength, single sprint performance, and shooting accuracy in basketball.

## CONCLUSIONS

The researchers can conclude that the selected physical fitness variables have a positive relationship on shooting accuracy of players in the Cape Coast Metropolis. Based on the findings, the poor shooting accuracy of basketball players in the metropolis can be attributed to the lack of attention to fitness preparations in addition to technical and tactical training when preparing basketball player for competitions. Coaches are therefore admonished that during conditioning and team preparation periods, selected activities should include those that improve players' fitness especially the skill related ones which are also known as game related. From the results, there was no statistically significant difference between the experimental and control group for balance at pre-test and post-test. This, the researchers can attribute to the fact that there were no specific drills for the experimental group during the intervention to develop that aspect of their physical fitness. As the researchers have stated, selection of the drills centered largely on those that can develop more than one fitness aspect at a time, we can therefore speculate that hopscotch which was used with the intention of developing both power of the lower body and balance as well as wheelbarrow also intended for power of the upper body and balance had an effect more on power. The researchers postulate that electing overlap activities to develop physical fitness, there should be specific drills for all aspects that need to be developed as step-ups and push-ups were used as well during the intervention to develop the power of the lower and upper body respectively.

Coaches who want to improve their players' shooting accuracy must plan and consciously include training interventions that improve their players' fitness especially skill related fitness (also known as game related fitness). It can be concluded from this study that fitness is one of the key factors which affects the shooting accuracy of basketball players within the Cape Coast metropolis.

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