SKILL-RELATED FITNESS LEVEL AND BASKETBALL SHOOTING ACCURACY OF MALE VARSITY IN SOUTHERN PHILIPPINES: BASIS FOR TRAINING PROGRAM DEVELOPMENT

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ABSTRACT

This study investigated how skill-related fitness components affect basketball varsity players' stationary and dynamic shooting accuracy. Twelve male basketball players underwent six standardized fitness tests, which were divided by component: The Illinois Agility Test measures agility, the Sprint Test measures speed, the Stork Stand Test measures balance, the Alternate Hand-Wall-Toss measures coordination, the Vertical Jump Test measures power, and the Reaction Time Ruler Test measures reaction time. The responders' shot accuracy was also tested. This test was categorized: (2) Stationary Shooting (a): stationary free throw, (b): stationary 2-point, and (c): stationary three-point shooting tests. Static shooting performance was significant for balance (-702), coordination (.273), reaction time (-755), and power (-612). Speed and agility were non-significant with -.558 and -.569 means, respectively. In dynamic shooting, all criteria were significant except coordination, which had a mean of .258 and was not significant. These characteristics were speed (-.761), agility (.004), balance (.576), response time (.720), and power (.770). A model for assessing CFCST youth basketball players' physical performance has been developed. This model can also be used for selection and to evaluate training regimens over short, medium, and long periods.
Keywords: Fitness level, basketball shooting accuracy, dynamic shooting, stationary shooting, skill-related fitness components.

1. INTRODUCTION

Basketball has been one of the most studied team sports worldwide. Subsequently, this game demands the use of range of skills, such as dominating athletic physique, muscular power, speed, and strength, all of which are clearly vital components of the varsity's profile. Furthermore, Kawamori and Haff (2004) underlined that strength and power constitute essential aspects of overall athletic performance and serve as the foundation for athlete growth.

In addition, teaching and acquiring skills and tactics in basketball is crucial, and executing them in competition can be troubling, as was observed among the varsity players of CFCST. Thus, mastering them can be a career-long quest (Wissel, 2012). According to Erčulj and Supej (2006), shooting accuracy is a fundamental skill that plays an important role in successful basketball plays (Mohammad, & Tareq, 2016; Hussain et al., 2011). Additionally, it was noted that speed and agility are among the least often examined abilities in basketball players according to the literature. As a result, the deficiency of design and implementation of specialized assessments to evaluate the physical fitness level of young

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basketball athletes, particularly the significance of skill-related fitness elements in shooting, is uncovered.

In addition, it was found that there are more studies on assessing physical fitness in basketball players, such as aerobic and anaerobic capacity or jump performance, However, only a limited number of studies have examined particular assessments of shooting accuracy. Consequently, talent identification, selection, and evaluation of training processes are critical components of a basketball team's methodical approach to sustaining competitive success (Ivanović, et. al, 2022)

While existing literature has investigated the impact of general fitness on overall athletic performance, there is a scarcity of research that specifically examines the role of skill-related fitness components in shaping the shooting accuracy of varsity basketball players (Pojskić et. al., 2014), particularly at the Cotabato Foundation College of Science and Technology. Understanding how these specific fitness components contribute to shooting proficiency is critical for coaches, trainers, and sports coordinators who seek to design training programs to improve overall game performance and prepare athletes for competitions. Addressing this gap will provide a better conceptual understanding of the complex interaction between skill-related fitness components and shooting accuracy and will contribute to enhancing training regimens customized to the specific demands of basketball.

The conduct of this study aimed to investigate the significant relationship between the skill-related fitness component and the shooting accuracy of the basketball varsity in CFCST. Furthermore, aiming accuracy in basketball is the independent variable, whereas fitness level in skill-related components is the dependent variable. The collected information was analyzed with the use of mathematical techniques, such as statistics.

2. METHODS AND MATERIALS

2.1 Research Design

This study utilized a quantitative research design, more specifically a descriptive research method that incorporated correlational techniques. Furthermore, researchers employ correlational techniques to ascertain the degree of association between two or more variables, while refraining from modifying, supplementing, or manipulating the available data.
In this regard, the causal correlation technique was employed in this study to examine the relationship between two variables; specifically, the relationship between skill-related components and shooting accuracy in basketball was investigated.

2.2 Research Setting

This research was conducted in Region XII, North Cotabato, Southern Philippines, particularly at the BHFMP Gymnasium, Cotabato Foundation College of Science and Technology situated in Barangay Doroluman, Municipality of Arakan.

2.3 Respondents

Male basketball varsity players of Cotabato Foundation College of Science and Technology (CFCST) were the respondents of the study. The selected respondents were the bonafide students of the College. There were twelve (12) basketball varsity players from 1st year up to 4th year aging 18-25 years old, enrolled in the first semester of the academic year 2023-2024. To verify the respondents' validity, the researcher requested a master list of the official basketball varsity players from the Office of Sports, Physical Education and Recreation

(SPEAR), and checked the student IDs and/or CRA (Certificate of Registration) for verification.

2.4 Research Tool/Instruments

This study utilized two set of research instrument i.e. Skill-related Fitness Component Tests; and Basketball Skills Tests in Shooting. The Skill-related Fitness Component Tests comprises six (6) Standard Fitness Test Procedure for each component: (a) Illinois Agility Test for Agility; (b) ¾ Court Sprint Test for Speed; (c) Stork Stand Test for Balance; (d) Alternate Hand-Wall-Toss Test for Coordination; (e) Vertical Jump Test (Sargent Jump, Vertical Leap) for Power; and (f) Reaction Time Ruler Test for Reaction Time. (Wood, 2010).

The second part of the instrument was the Basketball Shooting Accuracy Testing: (1) Dynamic Shooting: (a) The dynamic 60-second free throw shooting test; (b) The dynamic two-point 60-second shooting test; (c) The dynamic 60-second three-point shooting test; and (2) Stationary Shooting (a) The stationary free throw shooting test; (b) Stationary 2-point shooting test; and (c) Stationary three-point shooting test of (Pojskić, et. al., (2014).

2.5 Data Collection Procedure

The data were gathered using the standardized testing procedure and scoresheet/rubrics for each fitness and skills tests. The researcher sought approval and acquired permit to conduct the research from the College of Education Dean and the SPEAR Director through a communication letter. Upon the approval of the request, an orientation to the respondents was made. Additionally, a letter of consent was presented prior to administration of the tests.

2.6 Data Analysis

After the data was gathered, it was tabulated and analyzed with the use of the mean to determine the level of skill-related fitness component and the basketball skill performance of the respondents. Moreover, a Pearson-r correlation was used to determine the relationship between the level skill-related fitness component and the basketball skill performance of the respondents.

3. RESULTS AND DISCUSSION

The results and findings of the research obtained through data collection and statistical analysis are detailed in this part.

Table 1: Level of skill-related fitness component of the basketball players in terms of speed, agility balance, coordination and power

	Skills	Mean	Descriptive Equivalent
1.	Speed	4.49	Excellent
2.	Agility	14.93	Excellent
3.	Balance	49.08	Good
4.	Coordination	40.83	Excellent
5.	Power	67. 17	Very Good
6.	Reaction Time	0.047	Excellent

The respondents' skill-related fitness component level was presented in Table 1. It was revealed in the data that the basketball player attained the mean of 4.49, in speed, 14.93 in agility and 0.047 in reaction time, with the descriptive equivalent of "Excellent".

This implies that in terms of speed, the basketball varsity players possess immense velocity, and that they are capable of sprinting in a forward-directed path within the shortest period of time inside the court during training and in actual games.

Ersoy, et. al. (2020) states that one of the competencies considered in sports, particularly ball games, is speed, which refers to the ability of the player to execute a swift transition using either an extremity or themselves. Speed in sports is a complex movement that requires quick awareness, decision making, and reaction to unexpected circumstances. Moreover, it is associated with the execution and development of other essential sports skills, such as powerful changes in direction and defensive and offensive plays. On the other hand, the acquired level of the respondents in agility implies that the basketball varsity displayed an exceptional ability to control their bodies' orientation quickly and change directions with proper posture, which evidently demonstrated in the gameplay that the players exhibit in court during actual games. In the study of Peña et al. (2018), basketball players had greater agility in comparison to athletes of different sports. Basketball involves vigorous physical exertion, rapid offensive maneuvers, and high jumps, all of which are essential for achieving a successful play. To win over their opponents, basketball players must possess exceptional agility and jumping abilities

The fourth data on skill-related fitness component level presents the coordination of the respondents. It was shown that the basketball players demonstrate excellent hand-and-eye coordination, evident in the acquired total mean of 40.83. Coordination plays a crucial role in fulfilling the fundamentals of the game, including passing, shooting, and dribbling. With the result garnered, it can be implied that the respondents display admirable skills in keeping track and focus on the movement of ball while receiving a pass from the teammates, and for them to anticipate and coordinate their movement with the direction of the play inside the court.

In support of the evidence, Park & Jeong (2023) state that in order to obtain a greater understanding of one's playing ability, it is crucial to observe the dynamic changes in synchronized movements that comprise the coordination required for dribbling. Possessing this knowledge can potentially facilitate the development of efficacious training methodologies and the prevention of injuries among athletes. In addition, Armando & Rahman (2020) explained that eye-foot movements and Coordination greatly contributes on dribbling ability. Moreover, adequate hand-eye coordination is essential for passing and active dribbling, as skilled shooters consistently position their arms and hands and concentrates on maintaining this motion until the ball makes contact with the ring (Sawiya, 2022). Mastering fundamental shooting methods requires a high level of synchronization across different body parts, particularly the eye-hand coordination.

The respondents' level of skill-related fitness component in terms of reaction time is also presented in Table 1. The result means that the respondents are exceptionally quick to response in any sort of stimulus, movement or situation that occurs in front of them, with the acquired mean of 0.047 sec. This implies that during the game, excellent reaction time allows players to anticipate other players' motion, make split-second decisions, maintain court awareness, respond swiftly to game situations, and can prevent injury, making it a crucial attribute for success on the basketball court.

In reference to Mankowska et al. (2015), competitive sports require athletes to exhibit an excellent level of response time to stimuli in both the central and peripheral fields of vision (left and right). This is because the athlete can only efficiently discern crucial information regarding the opponent's movements by observing the opponent's entire body and its surroundings. Accordingly, athletes significantly outperform non-athletes in terms of visual acuity, coordination, and motor abilities.

In Column 5 the respondents' skill-related fitness component in terms of power was presented. It can be seen that the basketball players display a large amount of leg power,

garnering a total mean of 67.17 which can be verbally described as "very good". This means that most of the respondents have the ability to perform high vertical jumps, which is a vital skill to outplay opponents and execute flawless rebounds, jump shots and dunks. According to a study by Ferioli et al. (2018), levels of competitive play can be characterized by strength and power in addition to the capacity to maintain high-intensity intermittent efforts.

Basketball players make between forty and fifty leaps throughout the course of a game (Wen et al. 2018), which emphasizes the significance of an athlete's jumping ability in basketball. As stated by Aksovi et al. (2020), the most skilled team members tend to leap higher than the rest. This is further supported by our research, which revealed that players positioned forward obtained the most favorable results in jumps and other tests (Ahsan, & Mohammad, 2018). Meanwhile, the level of balance skills of the respondents is verbally described as "Good". Garnering the mean of 49.08, it can be seen that the players display good command in balance. This implies that the basketball varsity players have the ability to perform outstanding plays and respectable kinaesthetic during game while remaining upright and steady, without losing their footing. As detailed by Lin (2023), the greater the capacity for gait adjustment during the sporting process, the more advantageous it is for basketball players to adapt their movements inside the court. By incorporating series of relevant training, deficiencies in this aspect (balance) can be remedied, thereby facilitating the overall development of basketball players' capabilities. Additionally, Vidhi (2021) claims that successfully execute a pass after an attack or block and land back on the floor; one must maintain a stable equilibrium. Balance is considered a crucial element in the performance of athletes across different sports, and it is attained through an intricate process that combines the functioning of the musculoskeletal and neurological systems.

Table 2: Stationary shooting accuracy of basketball varsity

Static Shooting	Mean (%)
Free Throw	77.50
2 Point Shot	81.67
3 Point Shot	68.33
Weighted Mean	**75.83**

Table 2 presents the accuracy level of stationary shooting skills of the respondents. Utilizing the *Basketball Shooting Accuracy Test* by Pojskić et.al. (2014), the respondents obtained a grand mean of 75.83% out of 100% accuracy for shooting straight point in a designated area, without moving in places. Garnering the highest mean of 81.67%, it is inferred that the respondents possess highest skills in terms of executing 2-point shots. Meanwhile, with the lowest mean of 68.33%, it is shown that they have slightly noticeable weakness in terms of 3-point shots. The result implies that during training and actual game, particularly in acquiring free throws, the basketball players have ability to consistently make shots from a stationary position. Players can reliably contribute to their team's scoring output, whether through mid-range jumpers, three-pointers, or free throws. Moreover, their consistent static shooting accuracy instills confidence in both the shooter and their teammates, fostering a positive team dynamic and contributing to overall team success.

Table 3: Dynamic shooting accuracy of basketball varsity players

Dynamic Shooting	Mean (%)
60-sec Free Throw Shot	75.83
60-sec 2-point Shot	77.38
60-sec 3-point Shot	66.67
Weighted Mean	**73.29**

In terms of dynamic shooting accuracy, data collected were presented in Table 3. As shown, the respondents display a weighted mean equal to 73.29%. This means that the basketball players have great locomotive shooting skills, which is majorly applied during competitive games where the shooters will move place-to-place, maintaining equilibrium, and attempts to secure a point by shooting the ball while being guarded by one or more opponent. As for the 2-point shot accuracy, the respondents gained the highest mean of 77.38% which implies that they have the highest shooting precision while moving around the 2-point area of the court. Conversely, lowest mean was evident in the 3-point shot which suggests that the players still need to develop their shooting beyond the 3-point area, to secure more points for the team.

Table 4: Relationship between skill-related fitness component and shooting accuracy of basketball varsity

Skill-related Fitness Component		Stationary Shooting	Significance Level	Dynamic Shooting	Significance Level
Speed	Pearson Correlation	-.558	Not significant	-.761**	Significant
	Sig. (2-tailed)	.059		.004	
	N	12		12	
Agility	Pearson Correlation	-.569	Not significant	-.725**	Significant
	Sig. (2-tailed)	.054		.008	
	N	12		12	
Balance	Pearson Correlation	.702*	Significant	.576*	Significant
	Sig. (2-tailed)	.011		.050	
	N	12		12	
Coordination	Pearson Correlation	.273	Not significant	.258	Not significant
	Sig. (2-tailed)	.390		.418	
	N	12		12	
Power	Pearson Correlation	.612*	Significant	.770**	Significant
	Sig. (2-tailed)	.034		.003	
	N	12		12	
Reaction Time	Pearson Correlation	-.755**	Significant	-.720**	Significant
	Sig. (2-tailed)	.005		.008	
	N	12		12	

*. Correlation is significant at the 0.05 level (2-tailed).

Table 3 shows the significant relationship between the skill-related fitness components in terms of speed, agility, balance, coordination, reaction time, and power, and the accuracy of basketball shooting skills specifically stationary and dynamic shooting among the respondents.

There is a direct effect on balance, reaction and power on stationary shooting. Based on the results, the Pearson-r value of balance obtained 0.701, reaction time -0.755, and power with 0.612. This is in line with the theory that the aforementioned factors are very influential to achieve maximum jump results. Varsity's who have adequate balance, reaction time and power allow students to have the opportunity to reach adequate distances and focused on the game very well. In support, it was observed that when balance training was implemented during competitive season, the occurrence of injury rate was reduced by 38 % (Seya et al. 2009). As mentioned in sports, reaction time considered as one of critical factors of perceptual abilities (Cengage, 2022). In basketball, power is essential for players to perform various skills such as shooting, jumping, and running (Duda, 2019). Thus, these results indicate the analysis that factors mentioned is needed to improve the players shooting skills.

Based on the results, the basketball players' speed, agility, balance, reaction time and power exhibits significant relationship with the accuracy in terms of dynamic shooting, with acquired Pearson-r value of -.761, -.725, .576, -.720, .770, respectively. In the study of Walton (2003) he states that Leg power and speed are inseparable and need each other in a series of shoot movements. This means when players successfully demonstrated these two factors there is a high tendency to accurately aced a score. This is the anchored on the framework of Montagu (2003) where he initiates that agility performance comprises two components such as; preplanned and nonplanned. As for varsity's game, Preplanned direction change can be described by foresight regarding the impending change in direction, whereas unplanned direction change is prompted by an unexpected visual or auditory stimulus. These two qualities comprise a fundamental aspect of basketball (Sattler, 2007). Furthermore, coaches find balance training to be an intriguing and contentious training method due to its cross-disciplinary impact on athletic performance across multiple sports and age groups (Bocolloni, 2013).

This implies that attainment of such skills is effective in variety of sports and could be helpful for both players and coaches. Meanwhile this framework is also syncing on Saud (2017) definition of reaction time as the ability to respond instantly to a stimulus and an interval of time between presentation of stimulus and appearance of appropriate voluntary response in a subject. The findings of the research study indicate that the level of fitness in skill-related components (speed, agility, balance, reaction coordination, and power) is an independent variable that influences the dependent variable (accuracy of shooting skills in basketball). A positive correlation has been observed between speed and the shooting accuracy, agility and shooting accuracy, and balance and shooting accuracy among varsity students enrolled at Cotabato Foundation College of Science and Technology. Conversely, excellence in coordination has a significantly greater impact on the ability to dribble the ball than on the ability to aim (Armando & Rahman, 2000).

In addition, it is essential for basketball players to possess certain abilities, including but not limited to shooting proficiency, ball control, and coordination (Poulsen & Ziviani, 2004; Nimphius et al., 2010; Ali, 2011; Ambegaonkar et al., 2013; Burhaein et al., 2020). In support of the findings, Zhang et al. (2019) noted that the physical capacities of basketball players have a substantial impact on their performance. According to studies examining the significance of strength in basketball, excellent lower extremity strength is also positively correlated with motor control and coordination of the lower limb joints, which impacts the players' ability to accelerate, change direction, and soar. Furthermore, Gaetano et al. (2016) concurred that the most crucial skill in basketball is the ability to aim. The document delineates the fundamental qualities that define an accomplished shooter, which comprise body equilibrium in both static and dynamic environments, meticulousness, synchronization, sensitivity, and precise implementation of a parabolic trajectory.

4. CONCLUSION

From the synthesis of all the procedures, statistical treatment, analysis and interpretation of the study, the following conclusions were drawn:

- Based on the collected data, it has been concluded that the basketball varsity players of CFCST possess excellent fitness level.
- It can be concluded that the respondent has high shooting accuracy in both training and actual game.
- Finally, based on the data collected it is therefore concluded that there is a significant relationship between the basketball players' skill-related fitness level and their shooting accuracy.

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