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Suchishrava Dubey
Phd Scholar, Department of Sports Psychology, Lakshmibai National Institute of Physical Education, Gwalior, Madhya Pradesh, India

Prashant Kumar Choudhary
Ph.D. Scholar Department of Sports Management, Lakshmibai National Institute of Physical Education, Gwalior, Madhya Pradesh, India

Corresponding Author:
Suchishrava Dubey
Phd Scholar, Department of Sports Psychology, Lakshmibai National Institute of Physical Education, Gwalior, Madhya Pradesh, India

Comparative analysis on selected coordinative abilities among female team sports players

Suchishrava Dubey and Prashant Kumar Choudhary

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Abstract
The crux of the study was to compare and analyze the difference between Orientation ability and Differentiation ability between Female Football, Basketball, and Volleyball players. A group of thirty-six (N=36) female subjects aged between 18-24 years, participated, who were the participants of the National level competitions from M.P State. The purposive sampling technique was used to attain the objectives of the study. All subjects, after having been informed objective of the study, gave their consent and volunteered to participate in this study. They were further divided into three groups of 12 each (i.e., N1=12; Volleyball players, N2=12; Basketball players, and N3=12; Handball players). The evaluation of the test results on SPSS 26.0 by the one-way ANOVA and Descriptive statistics were applied to find out the significant difference in Orientation ability and Differentiation ability between female football, Basketball, and volleyball players. To test the hypotheses, the level of significance was set at 0.05. The result revealed a significant difference between Female basketball players in orientation ability and on the other hand a significant difference was found in the differentiation ability of female football players.

Keywords: Differentiation ability, orientation ability, comparative analysis, purposive sampling, national level competition

Introduction
Researchers in domains such as phenomenology, psychology, and cognitive science have been preoccupied with the mystery of body and mind for a very long time. These researchers are now investigating the possibility of Coordinative abilities. The capacity to regularly carry out a series of actions in a manner that is fluid and precise is an example of coordination. It is also necessary to have co-coordinative talents to get the most out of your technical abilities, your tactical skills, and your conditional abilities. In volleyball, the most essential aspects that contribute to the success of a team in contests are the individual members of the team's anthropometric traits, individual technical and tactical abilities, and individual physical performance capacity (Hakkinen, 1993) [7]. Coordination skills are a requirement for generalized psychometric performance, serving both the purpose of movement control and regulation. The athlete's ability to coordinate their movements results in higher quality and more effective performance of a series of motions. (Pramanick P., 2011) [12]. The capacity to coordinate lies at the foundation of one's abilities and is sometimes referred to as the "Spine of Motiveness" (Epuran M., 1996) [21]. Coordination skills are essential for getting the most out of your technical, tactical, and conditional talents (Singh 1991) [19]. It is the coordinative talents that, to a considerable degree, decide the maximum limitations that may be improved upon in terms of athletic performance in several sports, the majority of which are dependent on technical and tactical aspects (Ruhal *et al*., 2010) [13] The degree of a player's coordinative abilities is a significant factor in the motor learning process, as well as the continual improvement and modification of their athletic talents. Players at the amateur level, in particular, are still required to devote the majority of their training time to technical and tactical training, in addition to endurance and strength training; however, players are not encouraged to focus as much on coordinative training (Gstottner *et al*. 2009) [6]. The coordinated mastery of a sport skill that a player has may help him perform more successfully and efficiently. Only via the development of motor skills, as well as consciously decided drives and cognitive processes, can coordinating abilities become successful in motion (Hirtz 1985) [8].

The requirement of coordinative abilities varies from sport to sport, and these abilities ensure a higher economy of movement in some sports, while in others they help in a higher frequency of movement with high explosiveness and force application. Coordinative abilities are important in a variety of sports. In sports that require strength, they assist athletes in exerting the most possible effort in the shortest amount of time and at the optimal moment. However, in cases when technique prevails over the competition. These skills contribute to improved learning, as well as stability, variability, and auto-immunization. In addition to enhancing individual performance, the development of coordinative talents in team sports provides the most efficient use of tactical skills amidst constantly shifting circumstances.
(From Lother Kalb's work in 1979) [11]. Handball requires a high degree of muscular coordination and abilities, quick feet, clear eyesight, and a lot of agility, all of which may be developed via playing the sport. The purpose of coordinating abilities is to allow for the production of the overall movement from its component motions in a manner that is constant and coordinated. If we can coordinate these movements, we will be able to achieve the highest level of general motor coordination required for the performance of motor skills. These movements are regarded as general motor and psychological conditions for sporting achievements because they allow an individual to control motor performances in all types of sporting activities. (Ikeda Namiko, 1960) [9]. Basketball is a team sport that is often played between two teams, each of which consists of five players or more. At any one moment, there are a total of five players representing each of the two teams on the basketball floor. The goal of the game is to amass a greater number of points than the other team while simultaneously attempting to shoot a ball through a basketball hoop (also known as a basket) that is elevated 10 feet from the ground. The two sides take turns shooting at different goals. Dribbling, often known as bouncing the ball, is required for a player to be able to move while still in control of the ball. The player receives a variable amount of points depending on the specifics of the situation in which he successfully shoots the ball through the goal that his team has set up. Volleyball is a difficult sport that just requires basic abilities to play. The achievement of excellence in a volleyball game may be attributed to some different reasons. Because of the nature of the movements performed in volleyball, the pattern of play calls for a high-energy body. This is because the pattern of play is highly dependent on the player's agility, explosive power, endurance, and well-coordinated approach in order for the player to display their skills in volleyball to the best of their ability. Players of volleyball need to have strong physical strength, power, and endurance, as well as speed, agility, and flexibility. They also need to have a high degree of leaping ability, a quick response time, and quick movements (She, 1999) [14]. The capacity to differentiate allows a sportsperson to sense micro-differences concerning the temporal, dynamic, and spatial aspects of movement execution. These differences may be concerning an implement or movement, such as serving, movement serving, water sensation, and so on. The athlete is able to discern the position and movement of his own body as well as the position and movement of a moving object (opponent, partner) in relation to space via the use of orientation.

Methodology

Thirty-six (N=36) Female subjects (mean SD: age 20.47 ± 1.628 years, height 1.75 0.08 m, and weight 69.00 2.32 kg) who competed in National Level competitions in Madhya. For the purpose of data collection Non-Probability sampling technique i.e. purposive sampling was employed. After being briefed on the purpose of the research, every participant provided their informed permission and agreed to take part in it. They were separated into three groups of 12, each of which played a different sport (i.e., N1=12 players played Football, N2=12 players played basketball, and N3=12 players played volleyball).

Selection of variables

For the selection of variables Orientation ability and Differentiation ability (coordinative abilities) were taken as (IV) Independent variable and (DV) Dependent variable consisting of the three sports i.e. Football, volleyball, and Basketball has opted for the study. The required information was gathered by subjecting participants to a variety of tests of their coordination abilities, as proposed by Peter Hirtz in 1985 [8].

Criterion measures

Numbered medicine ball test

Ability to discern orientation was determined by taking this exam. On a level surface, five medicine balls, each weighing 3 kilograms, were arranged in a semicircle with a distance of 1.5 meters between them. Behind the medicine balls, metallic plates numbered one through five and measuring 1 square foot each were fastened in place. The sixth ball, which weighed four kilograms, was placed in such a manner that it was three meters apart from each of the numbered balls ranging from one to five. Before beginning the test, the individuals being evaluated were instructed to position themselves such that they were looking away from the sixth ball. The subject responded to the signal by turning and running toward the number called out by the examiner. After touching the medicine ball, the subject ran back to the sixth ball, and the examiner quickly called out another number. The same thing happened when the tester phoned the number a total of three times, and the subject performed appropriately each time. The number of seconds it took to finish the course was recorded, and a score was tallied based on the best of the two attempts that were provided.

Backward throw test

This test was carried out in order to evaluate one's capacity for differentiation. A gymnastic mat was placed at a distance of two meters from the beginning line. In the middle of the mat, a circle with a radius of 40 centimeters was drawn, and a medicine ball weighing 2 kilograms was placed at the center of the circle. The participant(s) were instructed to stand behind the starting line with their backs in the opposite direction and to throw five medicine balls of one kilogram each over their heads while aiming for a two-kilogram ball that was placed on the mat. They were to do this in succession while using both hands. The score was determined by tallying up all of the points that were
earned across all five throws (having the medicine ball touch the mat earned one point, having it touch the circle line earned two points, having it land inside the circle earned three points, and having it touch the 2-kilogram medicine ball earned four points).

Analysis of the data

For the analysis of data descriptive statistics were applied

which were mean, and standard deviation. Furthermore, One Analysis of Variance was used to obtain the mean difference along with the post hoc test HSD turkey was applied. For this study, the level of significance was set at α 0.05 for the statistical findings of the data (SPSS) version, 26.0 Statistical packages for social sciences were employed.

Results

Finding about the descriptive Statistics of the players from selected groups on the selected coordinative abilities has been presented on basis of their mean age and standard deviation in Table 1. The values of mean, standard deviation, and standard error of the mean for Football, Basketball, and volleyball were shown in Table 2.

Table 1: Descriptive statistics of age

Descriptive					
		N	Mean	Std. Deviation	Std. Error
Differentiation Ability (In Points)	Football	12	9.5000	1.08711	.31382
	Volleyball	12	10.9167	1.44338	.41667
	Basketball	12	13.0000	2.13201	.61546
	Total	36	11.1389	2.14013	.35669
Orientation ability (In sec)	Football	12	7.4317	.25337	.07314
	Volleyball	12	7.7867	.13627	.03934
	Basketball	12	7.8250	.15187	.04384
	Total	36	.25596	.25596	.04266

Above given table 2 shows the descriptive statistics of the three team sports.

Table 2: Test of homogeneity of variance

Coordinative Abilities	Levene Statistics	Df1	Df2	Sig.
Differentiation Ability	2.742	2	33	0.79
Orientation Ability	10.330	2	33	.000

For the Homoscedasticity of variance, Levene Statistic was used shown in table 2 below and found to be significant at 0.79 and.000 for differentiation ability and Orientation Ability

Table 3: Anova

Coordinative Abilities	Groups	Sum of Squares	df	Mean Square	F	Sig.
Differentiation Ability	Between Groups	74.389	2	37.194	14.286	.000
	Within Groups	85.917	33	2.604		
	Total	160.306	35			
Orientation Ability	Between Groups	1.129	2	.564	16.000	.000
	Within Groups	1.1607	33	0.35		
	Total	2.239	35			

From the above-given table of (ANOVA) Analysis of variance for differentiation ability between and within three groups i.e. Football, Basketball, and Volleyball a significant difference was found. Likewise in the case of Orientation ability in between and within groups of three groups i.e. Football, Basketball, and Volleyball a significant difference was found.

Table 4: Multiple Comparisons Differentiation Ability

Dependent Variable: Sports Tukey HSD						
(I) Players	(J) Players	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Football	Volleyball	-1.41667	.65873	.095	-3.0330	.1997
	Basketball	-3.50000*	.65873	.000	-5.1164	-1.8836
Volleyball	Football	1.41667	.65873	.095	-.1997	3.0330
	Basketball	-2.08333*	.65873	.009	-3.6997	-.4670
Basketball	Football	3.50000*	.65873	.000	1.8836	5.1164
	Volleyball	2.08333*	.65873	.009	.4670	3.6997

*. The mean difference is significant at the 0.05 level.

From the post hoc comparison by Tukey HSD Test, it was found that the mean which differed among all the three-sport when compared for differentiation ability was Basketball. The P-value for basketball sport was less than 0.05 but in the case of football and volleyball, it was found that p- the value was greater than 0.05.

Table 5: Multiple Comparisons of Orientation Ability

Dependent Variable: GAME Tukey HSD						
(I) Players	(J) players	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Football	Volleyball	-.35500*	.07668	.000	-.5432	-.1668
	Basketball	-.39333*	.07668	.000	-.5815	-.2052
Volleyball	Football	.35500*	.07668	.000	.1668	.5432
	Basketball	-.03833	.07668	.872	-.2265	.1498
Basketball	Football	.39333*	.07668	.000	.2052	.5815

	Volleyball	.03833	.07668	.872	-.1498	.2265

*. The mean difference is significant at the 0.05 level.

From the post hoc comparison by Tukey HSD Test, it was found that the mean which differed among all the three-sport when compared for Orientation ability was Football. The P-value for football sport was less than 0.05. But in the case of Basketball and volleyball, it was found that the p-value was greater than 0.05.

Conclusion

Out of two variables of selected Coordinative ability one variable has shown a significant difference i.e., Orientation ability in the Sport of Football. And for the case of Differentiation ability of selected Coordinative ability has shown an insignificant difference in female Basketball teams out of volleyball and football team. From the above results, we could infer that the case in the Differentiation ability of three games i.e., Football, Basketball, and volleyball is different. And so, the in case of Orientation ability in Basketball, Football, and volleyball teams players Female Basketball was found better than the other two sports teams. Hence the results produced by the researchers show that the ability of female football team players in comparison to that of Basketball and Volleyball team sports players was better and furthermore their ability to determine the position of the body and its parts in time & space concerning gravity was also at par with that of other two teams. In addition to the result incurred by the study is also now clear in terms of orientation ability that female basketball players have the upper hand among the other two sports and have better rhythmic capacity/ability which enables them to grasp and motorically express rhythm which is extremely determined or contained in the motor activity itself.

Discussion of the findings

Comparing the levels of Orientation and Differentiation ability among female athletes competing in team sports (football, basketball, and volleyball) was the goal of the current research. In both the instance of Differentiation ability and Orientation ability, a significant difference was found between the two groups. When it came to their Orientation ability, the female players on basketball, volleyball, and football teams had significantly different results, the most notable of which was shown in the female basketball squad. Differentiation ability has a direct influence on how well a player performs, which is why researchers found a significant gender gap in female football team players when comparing volleyball, basketball, and football as team sports. This was because differentiation ability has a direct bearing on how well a player performs. Differentiation ability enables the sportsperson to perceive micro differentiation regarding the temporal, dynamic, and spatial aspects of movement execution (Shondell Donald Stuart, 1972) [15]. Differentiation can be concerning an implement or movement such as serve, movement serve, water feeling, etc. (Shondell Donald Stuart, 1972) [15], and in these three sports, differentiation ability is more or less different because, in the case of football, players have to pass the ball to the other wing or side of the field. In tennis, players have to because players in basketball, football, and volleyball all have to aim towards the target to score a basket or goal in their respective games, this type of play necessitates a high level of precision and control on the part of the players. As a result, researchers may or may not get significant results when comparing the differentiation ability and orientation ability of athletes participating in these three sports. In terms of Orientation ability, it was discovered that football players, basketball players, and volleyball players all had significantly different means. Additionally, it was shown that female basketball players had a higher Orientation ability than female volleyball and football players. This was a gender-based comparison. It is because of the rules of the game, such as in basketball, where players have to score and then come back for defense. Orientation ability allows a sportsman to determine the position and movement of his own body and/or of a moving object (an opponent or a partner) concerning space. This is necessary because of the nature of the game. (Shondell Donald Stuart, 1972) [15]. On the other hand, players in volleyball don't move nearly as much as they do in Basketball and Football, which is why researchers got these findings on orientation ability.

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