



RESEARCH ARTICLE

A Comparative Study of Some Coordination Abilities between Males and Females for the Age Group (10-12) Years

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Abstract

Coordination capabilities refer to a set of physical abilities that impact the organization and coordination of movements resulting in consistent performance. They are considered one of the necessary conditions for good performance. Therefore, the objective of the study is to identify the differences in coordination abilities between males and females in the age group of 10- 12 years. A hypothesis is that there are statistically significant differences in certain adaptive skills between males and females aged 10-12 years. The research community consists of primary school students from Mosul 135 male and 135 female students as samples. Tests were administered. T-tests for independent samples were given as numbers and percentages for categorical variables. A p-value of <0.05 was considered significant. The study concludes that the coordination skills of male and female students between the ages of 10 and 12 are equal. Males outperform females in the ability of motor coordination between the arms, eyes, and balls, which may be due to the nature of the test. Throwing a Tennis Ball (25 seconds)($t(270)=10,785$; $p<0.001$), Balance ($t(270)=2.023$; $p<0.044$), Throwing Balling ($t(270) = 3.072$; $p<0.002$), Significant differences were determined for Touch 30 Seconds ($t(270)=3.122$; $p<0.002$), Circuit Accuracy ($t(270) = 6.551$; $p<0.001$). In conclusion; Aging and participating in sports have a good impact on coordinative performance. Athletes with a genetic propensity for a certain sport may develop motor proficiency that is on par with or even surpasses that of older athletes with well-planned training.

Keywords

Coordination Capabilities, Educational Processes, Specialized Performance

INTRODUCTION

Changes in socio-economic life are associated with new challenges that also affect growing children. Decreased motor activity as a result of the global presence of new technologies, urbanization, and social changes, increased schooling activities and others lead to deterioration of physical health, changes in physical development, and condition of the younger generation. Due to the favorable correlation between the development of motor skills and outcomes in terms of health,

fitness, and academic performance, childhood is a crucial time for acquiring and strengthening basic motor skills (Boutios et al., 2021).

Coordination; It is the ability to perform different movements by their purpose and in harmony with each other. In other words, it is a term meaning that the skeletal muscles and the central nervous system work in harmony and interact in a purposeful movement (Aslan et al., 2016). In addition to maturation, ongoing interaction with a stimulating and encouraging social and physical environment is also essential for the development of coordination and motor

Received: 10 August.2023 ; Revised ;13 September 2023 ; Accepted: 06 December 2023; Published: 25 January 2024

How to cite this article: Yassin, S., Al-Dabbagh, A.A.I. and Sulaiman, H.A. (2024). A Comparative Study of Some Coordination Abilities between Males and Females for the Age Group (10-12) Years. *Int J Disabil Sports Health Sci*;7(1):43-50. <https://doi.org/10.33438/ijdsHS.1338500>

skills (Glass et al.2002; Bridge et al., 2007), a harmonious gait, adequate neuromuscular balance, and the ability to learn new abilities (Pons van Dijk, 2013). Studies conducted throughout Europe have revealed a decline in young children's capacity for coordinated movement (Roth et al., 2010). The lack of quality physical activity that kids engage in may be the cause of their poor coordination performance (Barnett et al., 2009).

The data obtained from the literature review on this problem show that there is a delay in the development of the physical abilities of adolescents. Physical capacity and motoric development are directly related to the development of motor coordination (MC). In addition to developing these abilities at primary school age, the "foundations" for gaining knowledge, skills, and habits for coordination exercises are laid (Boeva, 2012; Lyah, 2006). There are five basic motor coordination skills to be learned in physical education classes. Spatial orientation ability, kinesthetic differentiation ability, balance ability, reaction ability; and rhythm ability. Children with better coordination skills are more physically active and less likely to be sedentary than children with worse coordination skills. It is also a fact that activities such as running, tempo, agility, jumping, and balance are necessary to develop children's coordination skills (Tankoucheva, 2019).

When the literature is examined, it is based on many studies with children, and these studies often include studies comparing the physical, physiological, and coordination characteristics of children. In some of the studies, the characteristics of the groups formed without considering the age variable can also be compared, and thus, perhaps, an error is made in the comparison and interpretation of the measurement results because the age difference is not taken into account (Aslan et al., 2016).

Although the issue of coordination abilities has been adequately studied, it is also very important in all countries (Cillik et al., 2018; Timo et al., 2017). Ages between kindergarten and first grade are ideal for the development of coordination abilities. The majority of scholars think that, in contrast to other physical attributes at this age, significant emphasis should be directed to the development of coordination abilities (Issurin and Lyakh, 2017). Thus, there is a conflict between the requirement that young schoolchildren

improve their coordination skills and the capacity of children to achieve the potential of their physical abilities in school physical education classes.

Growth during the Adolescent years may be slower than in other stages of development. During this stage, the physical development of the body has the potential to enhance neuromuscular compatibility. This study intends to investigate if there exist differences in coordination abilities between males and females aged 10-12 years. The researchers hold the belief that differences in both cognitive and physical performance exist (Halpern, 2000). The study of the student's stages of physical, reactive, and mental training is crucial for the development of the community, which is why developed countries create specific programs to teach physical education to students and develop their skills. Effective physical training requires coordination between an individual's neural and motor systems, which can lead to sporting achievements such as improved skills, tactics, and techniques (Starosta, 2006; Khasawneh, 2015).

This study aims to compare the cognitive and physical performance of males and females between the ages of 10 and 12. The aim is to obtain accurate information that can help in the development of school curricula and help students achieve optimal cognitive and physical performance through education and improved coordination skills. Objective evaluation methods to obtain a database for both sexes of students are inadequate. Therefore, it is important to compare the level of compatibility between males and females to identify their strengths and weaknesses in these abilities. This study is one of the limited studies that has dealt with this issue.

MATERIALS AND METHODS

Participants

Since this approach is one of the approaches that investigate the facts and draw the necessary conclusions to solve the problems in a particular society, the descriptive approach was used in the survey style due to the relevance and nature of the research problem. All the students were controlled by the ethics committee and reported under the ethical rules followed. The research population includes primary school students (boys and girls) aged (1080) years (10-12) from the six preparatory schools shown in Table (1). The sample of the

study was randomly selected and reached 270 students from both genders, 135 students in the age group (10-12) and female students in the same age group (135) (Table 1). The exploratory experiment the sample consisted of (30) individuals of both sexes, divided into men and women.

Ministry of Higher education Scientific Research University of Mosul Ethics Committee approved the study protocol (22-8-2023). Informed consent from the parents and assent from the children were obtained before children were

included in the study. The authors took into account the needs and priorities of the groups/individuals in which the study was conducted, in accordance with Articles 19 and 20 of the WMA Declaration of Helsinki, and the situation that the study could not be carried out outside these groups and individuals was taken into account. "In this study, additional precautions were taken by the researcher(s) to protect the volunteers.

Table 1. Shows the research community and its samples for male and female pupils with ages (10-12)

Schools/Primary	Society	Sample	Male			Female		
			Sample	Exploratory	Constancy	Sample	Exploratory	Constancy
1. School (Boys)	210	45	36	4	7			
2. School (Boys)	180	45	35	3	8			
3. School (Boys)	195	45	34	3	5			
1. School (Girls)	180	45				34	5	4
2. School (Girls)	155	45				35	8	3
3. School (Girls)	160	45				36	7	3
Total	1080	270	105	10	20	105	20	10

To obtain the results that serve the research, the researchers used several means of collecting data using a survey of the opinions of experts.

Through the analysis of the opinions of the experts concerning the literature review, the coordination abilities were determined, and their tests and as follows: The test of passing the tennis ball on the wall for 25 seconds to measure the motor coordination between the arms, the eye, and the ball: The tester stands in front of the wall at a distance of approximately (1m), and upon hearing the start signal, the player passes the ball on the wall with one hand continuously until he hears the end signal or stops. The laboratory records the number of times the ball touches the wall for (25 seconds).

The jump test inside the numbered circles to measure the compatibility between the legs and the eyes: Draw (8) circles on the ground, provided that the diameter of each of them is (60 cm), and the circles are numbered from (1 to 8), where the tester stands inside circle No. (1), and when he hears the start signal, he jumps with both feet together to circle No. (2) and then to (3). Then to

(4) and so on until circle number (8). The tester records the time it takes to travel through the eight circuits.

Throwing two balls with the left and right arms up alternately to measure the kinetic rhythm:

The tester is given two balls and we ask him to throw them up alternately without them falling to the ground (Abu Bshara, 2010) Scoring A point is awarded for each correct exchange of balls.

The front and back touch test for (x) within 30 seconds to measure the dynamic flexibility (flexion, extension, and rotation of the spine) with the eyes and arms alignment: Draw an (x) on two points. 1- On the floor between the feet of the laboratory. 2- On the wall behind the back of the laboratory (in the middle), Upon hearing the start signal, the tester bends the torso in front downward to touch the ground with the tips of the fingers at the (x) mark between the feet, then the tester extends the torso high while turning to the left to touch the (x) mark behind the back with the tips of the fingers, then rotates the torso and bends it down To touch the (x) mark between the feet a second time, then extend the torso while rotating to the right to touch the (x) mark behind the back. This action is repeated as many times as possible in 30 seconds, noting that the mark behind the back should be touched once from the left side and the other from the right side.

The shooting test on the overlapping circles to measure the accuracy of the throw with the eyes and arms compatible): Five tennis balls, a wall in front of which is a flat ground, three overlapping circles are drawn on the wall, the lower border of

the large circle rises from the ground by (24 inches), a line is drawn on the ground at a distance of (3 m) from the wall, where the tester stands behind the line and then corrects the five balls (successively) on the circles, trying to hit the smaller circle. The laboratory has the right to use either or both hands together in aiming.

Where if the ball hit the small circle or on the line specified for it / 3 points. If the ball hits the middle circle or is on the line specified for it / 2 points. If the ball hits the large circle or is on the line specified for it / 1 point. And zero if the ball came outside the three circles (Muhammad Sobhi Hassanein, 1987). In response to the ability of the research sample to implement the specified tests, a pilot experiment was conducted on 21/12/2021, the purpose of which was to identify the safety of the application in terms of performance and the method of registration and to show the possibility of the sample in applying the tests as well as the possibility of the assistant work team.

The test method was applied and re-applied to an exploratory sample of (30) male and female pupils from outside the research sample to identify the reliability of the tests (Başkonuş& Soyer, 2020). The correlation between the scores of the first and second applications was found that the tests had obtained high correlation coefficients that ranged between (0.87 and 0.93). Many scientific references, studies, and research related to measuring coordination abilities were reviewed.

Tests that measure coordination abilities that were characterized by their reliability, and validity were selected (Başkonuş& Soyer, 2020). They were also presented to a group of experienced and specialized and obtained agreement rates between (75-100%) and thus face validity was achieved for these tests.

Statistical analysis

SPSS 25 (Statistical Package for the Social Sciences, version 25) statistical program was used to evaluate the findings obtained in our study. For categorical variables, descriptive statistics were presented as percentages and numbers for numerical variables, including mean, standard deviation, simple correlation coefficient, and T-test for independent samples. A 0.05 p-value was regarded as significant.

RESULTS

Table 2. is examined, age ($t(270) = 1.203; p > 0.230$) and height ($t(270) = 0.54; p > 0.957$) among the female ($n=135$) and male ($n=135$) participants participating in the research no significant difference was found. However, a significant difference was found in favor of the girls in terms of weight ($t(270) = 2,210; p < 0.028$) and BMI ($t(270) = 2,847; p < 0.005$) of the male and female participants participating in the study. The girls had a lower BMI.

Table 2. Differences between demographic variables-independent groups T-Test

Değişken	Gender	N	X	SD	t	p
Age (years)	Male	135	11,14	0,78	1,203	0,230
	Female	135	11,02	0,73		
Height (cm)	Male	135	137,24	8,99	0,54	0,957
	Female	135	137,18	8,96		
Body Weight (kg)	Male	135	38,08	8,02	2,210	0,028*
	Female	135	35,84	8,65		
BMI (kg/m2)	Male	135	20,07	2,81	2,847	0,005*
	Female	135	18,93	3,72		

n= number of participants, x= mean, SD= standard deviation, T= T score, VKİ= Body Mass Index , p>0,05

The mean and standard deviations of male participants participating in the study were respectively; Throwing a Tennis Ball (25 seconds ($t(135) 15.01 \pm 3.54$), Jump for the Circle ($t(135) 7.14 \pm 2.06$), Balance

($t(135) 25.46 \pm 16.90$), Throwing Balling ($t(135) 2.82 \pm 1.14$), Touch 30 Seconds ($t(135) 16.22 \pm 3.26$), Circuit Accuracy ($t(135) 8.72 \pm 2,38$) was determined (Table 3).

Table 3. Mean and standard deviation values of male participants' coordination skills

Değişken	N	X	SD
Throwing a Tennis Ball (25 seconds)	135	15,01	3,54
Jump for the Circle	135	7,14	2,06
Balance	135	25,46	16,90
Throwing Balling	135	2,82	1,14
Touch 30 Seconds	135	16,22	3,26
Circuit Accuracy	135	8,72	2,38

The mean and standard deviations of the female participants participating in the research, respectively; Throwing a Tennis Ball (25 seconds (t(135) 9.77±4.38), Jump for the Circle (t(135) 7.25±2.09), Balance (t(135) 21.22±17.54), Throwing Balling (t(135) 2.42±0.98), Touch 30 Seconds (t(135) 15.02±3.04), Circuit Accuracy (t(135) 6.67±2.74) was determined as (Table 4).

Table 4. Mean and standard deviation values of female participants' coordination skills

Değişken	N	X	SD
Throwing a Tennis Ball (25 seconds)	135	9,77	4,38
Jump for the Circle	135	7,25	2,09
Balance	135	21,22	17,54
Throwing Balling	135	2,42	0,98
Touch 30 Seconds	135	15,02	3,04
Circuit Accuracy	135	6,67	2,74

Differences between the coordination skills of male and female participants-independent groups According to T-Test results; Jump for the Circle (t(270) = -0.438; p>0.662), no significant difference was detected. In other parameters, Throwing a Tennis Ball (25 seconds) (t(270) =10,785 ; p<0.001), Balance (t(270) = 2.023 ; p<0.044), Throwing Balling (t(270) = 3.072 ; p<0.002), Significant differences were determined for Touch 30 Seconds (t(270) = 3.122 ; p<0.002), Circuit Accuracy (t(270) = 6.551 ; p<0.001) (Table 5).

Table 5. Differences between the coordination skill tests of the participants by gender-independent groups T-Test result

Ability Tests	Gender	N	X	SD	t	p
Throwing a Tennis Ball (25 seconds)	Male	135	15,01	3,54	10,785	0,001*
	Female	135	9,77	4,38		
Jump for the Circle	Male	135	7,14	2,06	-0,438	0,662
	Female	135	7,25	2,09		
Balance	Male	135	25,46	16,90	2,023	0,044*
	Female	135	21,22	17,54		
Throwing Balling	Male	135	2,82	1,14	3,072	0,002*
	Female	135	2,42	0,98		
Touch 30 Seconds	Male	135	16,22	3,26	3,122	0,002*
	Female	135	15,02	3,04		
Circuit Accuracy	Male	135	8,72	2,38	6,551	0,001*
	Female	135	6,67	2,74		

DISCUSSION

Children's abilities must be developed from birth. Most significantly, this happens in school physical education lessons. It is also well recognized that exercise has advantages for the growth of mental and cognitive functions. The

problem is still relevant today even though there has been enough research on the development of coordination skills. The importance of coordination skills, particularly for young athletes, is well understood, however, it should be highlighted that the majority of the strategies the authors describe are alternatives to extra or core

programs. In our study, the differences between the coordination skills of male and female participants in independent groups According to the T-Test results; No significant difference was detected in the Jump to the Circle skill. Significant differences were determined in other parameters.

It's likely that carefully thought out, long-term coordinated educational activities can increase children's activity levels, enhance the motor abilities of 9–10-year-olds, and advance their psychomotor development levels. Given the increasing complexity of movement during growth, developing coordination at young school age is crucial. The psycho-physical qualities of each age range should be considered in the education program for effective children to concentrate on and maximize their unique age-related motor learning skills (Ricotti, 2011).

A study submitted by Ahmed (2016) involved two groups of 10-year-old adolescent rhythmic gymnasts, a total of 20 participants. The experimental group (n=10) underwent an eight-week training program to improve their coordination skills. The traditional program was followed by the control group (n=10). The results of the study show that the experimental group scored higher than the control group in terms of coordination skills and performance levels. The results are evidence of effective training in coordination skills. Furthermore, it is expected that better performance requires better coordination skills. The researcher also used the Drer and Dale-Koch test battery to measure motor skills. The results of the study showed that there were statistically significant differences in all the motor tests for the (9) year old male category, while there were statistically significant differences in all the motor tests for the (9) year old female category, except for the one-legged standing test in favor of the 9-year-old (Ahmed, 2016)

The year 2019 conducted a study to determine the level of physical fitness of Chennai district Kabaddi and Kho-Kho players. 50 subjects from the YMCA College of Physical Education District Chennai were chosen at random to participate in the current study. Of these, 25 were participants in the Kho-Kho sport and 25 were Kabaddi players. Players of Kabaddi and Kho-Kho were evaluated on their level of physical fitness using the AAHPER youth fitness exam. For this study, 50 participants from the YMCA College of

Physical Education District in Chennai were randomly chosen, of which 25 were kabaddi players and 25 were kho-kho players. A straightforward 't-test' was used to statistically assess the data. The threshold for significance was set at 0.05.

Further analysis revealed no appreciable differences between Kabaddi and Kho-Kho players in terms of attributes like power, coordination, and strength. According to the study's findings, there are no appreciable differences between Kabaddi players and Kho-Kho players in terms of traits like strength, coordination, and power (Jesuudoss, 2019)

Through previous studies, we can say that what distinguished this study is its connection to the process of sports training in terms of accurate digital data that it will provide, which the sports teacher or coach can stand on the level of these abilities through, an attempt by researchers to determine the level of coordination abilities between males and females. For the age group (10-12) years.

Conclusions

This is all equal for the research sample of male and female pupils, especially when schools ignore the physical education lesson, which contains plans, exercises, and games through which the physical education teacher can stand on the level of both physical and motor abilities and work on their development and improvement, as the physical education lesson is the only thing to develop these capabilities. From the results of the study and its objectives, the following can be concluded: Within the limits set by the research, male and female pupils aged 10-12 are equal in coordinating. The reason for this may be due to the nature of the test, but males outperform females in the ability of motor coordination between the arms, the eyes, and the ball. The study recommends that coordinative skills should be developed through the development of programs and plans for these age groups and that attention should be paid to physical education in schools for both genders, especially for girls. The best way for this age group is to focus on games that are compatible with their abilities.

ACKNOWLEDGMENT

The authors would thank the University of Mosul for all supporting their study.

Conflict of interest

The authors declare no conflict of interest. No financial support was received.

Ethics Statement

Ministry of Higher education Scientific Research University of Mosul Ethics Committee approved the study protocol (22-8-2023). Informed consent from the parents and assent from the children were obtained before children were included in the study.

Author Contributions

Study Design, HAS and SY; Data Collection, HAS and AAAID; Statistical Analysis, HAS, AAAID; Data Interpretation, HAS and AAAID; Manuscript Preparation, HAS, SY and AAAID; Literature Search, AAAID, HAS and SY. All authors have read and agreed to the published version of the manuscript.

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