Relationship between Attention Concentration and Ability of Endurance and Dynamic Balance among the Female students at (9-12) Age Group

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Abstract

The dynamic balance is a significant skill in all age groups and it is required for regular daily activities, such as walking and running. Therefore, this study aimed at identifying the differences in concentration of attention, aerobic endurance and dynamic balance among female students in age group (9-12) years. As well as the relationship between attention concentration and ability of female students on aerobic endurance and dynamic, balance. To achieve the objectives of the study the researchers used the descriptive approach on a sample consisting of (130) female students within age group (9-12) years in Khawla bint Al Azur school, Amman. For study data, the researchers used the mental abilities test, aerobic endurance test and dynamic balance test. To Processing the study data, the researchers used means, standard deviations, ANOVA, Scheffe and correlation coefficients. The results showed that there were statistically significant differences between the means of the results in the concentration attention ability, aero aerobic endurance and dynamic balance and for the benefit of category (11-12) years. Consequently, there were statistically significant correlation between the level of concentration of attention abilities and the level of the aerobic endurance and the dynamic balance of the students in age group (9-12) years. Therefore, researchers recommend that female students in the age group (9-12) should be encouraged to exercise physically for coordination abilities and physical abilities.

Keywords: Attention Concentration; Aerobic Endurance; Dynamic Balance.

The relationship between mental and motor abilities is an ancient question discussed since the age of Greek philosophers. It seems clear from the judgment that "the health mind is in the healthy body." The seventeenth century scientists also spoke of the unity of mind and body and assumed that the body is in motion where the soul is also. The relationship between mind and movement is not new. Many philosophers, such as (Basedow, 1763-1890;

Vieth, 1763-1836 and Gutsmuths, 1759-1839), emphasized the important role played by both the concept of the body and the concept of feeling or feeling in the recognition of our world, as they also stressed the lack of separation between the body and mind. Holstiege [14], has formulated the concept of intelligent sense of movement and recommended not to separate the terms of cognition and movement, and here we note the strong correlation between the motor and mental development and its positive impact on the linguistic, social, emotional and moral dimension of the child.

Both mental and motor abilities depend mainly on the central nervous system (CNS) function, which is why any defect or deficit in the maturation or function of the central nervous system will affect and adversely affect both mental and motor abilities [15], [23], [1], [11], [19]. Also Bös et al, [4] stated that mobility to be an information system that can be dividing into physical and coordination abilities. Physical abilities included: endurance, strength and speed, while the coordination abilities included the appearances speed: reaction speed, frequency speed of repeated movements, speed of only movements, estimating the situation, balance, kinetic connection, motor rhythm, adapting to different situations, exert effort ability. As for the element of flexibility, it is considering an unknown system, which is not through the energy production systems.

Furthermore Zahran [22] stated that through motor growth, the growth of the large and small muscles of the child increases, also the coordination of the accurate muscles gradually increases with age, and the child's skill gradually increases in handling things, consequently the child has the ability to master motor skills that necessary and special of games and appropriate for his or her age, And at this stage the extent of attention and duration and intensity, and it is desirable if the topics of attention are organized, and the relationship between them is simple, and the ability to focus regularly and grow memory is growing steadily and be remembered by understanding.

The connectivity between mental ability and motor abilities of late childhood (10-12) is of great importance in the activity of sports, and one of the prerequisites for the success of the educational process, considering that any motor performance is associated with mental abilities such as (Intelligence, attention concentration). In order to produce a good reaction and a correct motor response. Several studies have shown a correlative relationship between mental and motor abilities in children [9], [10]. The reason for this relationship is attributing to the physiological and psychological mechanism.

In recent years, development of proprioception and balance in order to improve the quality of life, prevent potential injuries, and to increase performance in physical activities and in various age groups, and the exercises required for this development have been discussing in various studies. It believes that dynamic balance is a significant skill in all age groups and it is required for regular daily activities, such as walking, running, or other physical activities that require control of dynamic movements. In addition, the studies show that the motor health that includes balance and coordination is a component related to physical well-being in childhood and adulthood.

The motor skills exercises are fundamental methods of training for balance and coordination from ten years of age and the importance of balance and coordination-based exercises in this period is emphasize. Balance is indicating as one of the fundamental movement skills for physical developments, their functional participation in activities and to gain motor. Postural control or balance is commonly grouped under two categories as static balance, which is the ability of keeping the body balance in a certain place or location, and dynamic balance, which occurs when the external forces are neutralized by the soft tissues around the muscles and joints [18], [21].

Etnier, et al [10] stated that practice motor activity has a positive effect on the brain. Dynamic aerodynamic activities and motor abilities act to nourish the brain with oxygen through an increase in blood perfusion. (Hippocampus), cortex, cerebellum, and harmonic abilities increase the density of synapses, which increases the capacity and efficiency of long-term memory; Have a positive impact on learning and remembering. In addition, the Dynamic equilibrium is defining as a compatibility capability through the stages of information processing systems that lie in sensory input, sense, response selection, response programming and motor output [20].

This age group is characterizing by wide growth. The body organs are consistent with each other through the slow increase in both length and mass, as well as improvement in strength and arm relative to resistance and arm, as well as morphological and functional maturity in the body. What distinguishes this age group as the best age to acquire and learn motor skills, as well as the main stage that determines the quality of subsequent motor skills. Where the focus is on the exercise aimed at the precise movements acquired for the delivery to the stage of stabilization or mechanism, and is the compatibility of muscle neuron is the cornerstone of high-level mathematical achievement of this age group to learn complex motor skills quickly [16].

Weineck [20] Stated that emphasis should be placed on general aerobic endurance exercises ranging from medium to low-medium, such as walking and running for 6 minutes, avoiding high-intensity anaerobic endurance, as well as developing the strength component for large muscle groups with moderate intensity such as overcoming body resistance or moderate weights, as well as the development of both speed and flexibility as the child ages. Bataineh et al, [3] stated to a positive relationship between the ability on balance motor and concentration, as well as the ability on balance motor and concentration with the achievement of mathematics, and also between the ability of attention concentration and achievement in Arabic language, and the existence of an inverse relationship between the ability to balance motor and the length of foot, in addition to the existence of an inverse correlation between the ability to balance the motor and body mass index (BMI), and indicates a positive effect for both the variable achievement in mathematics and the length of foot on the ability of motor equilibrium.

Buck et al, [5] stated that a positive correlation between the IQ test and aerobic endurance, and that the age, intelligence tests and fitness level all effect on development of mental abilities. Also stated that there is a positive correlation between body mass index (BMI) and aerobic endurance (Pr = 0.42). As well as the superiority in mathematics and reading, are positively correlated with body mass index and endurance.

The technological development, such as computer games and watching TV, in addition to narrow spaces, has reduced the chances of movement of children. Also sitting on the study bench and for long periods without practicing motor activities reduces the importance of sports education as part of general education. The movement does not affect the child's physical development. However, goes beyond that to include his mental, psychological and social development [4]. The movement is a prerequisite for physical, mental, psychological and social development [12].

The discrete point in this research was to diagnosis of female students in (9-12) age group, through identify of differences in concentration of attention, aerobic endurance and dynamic balance. As well as the relationship between attention concentration level and ability of female students (9-12) years on aerobic endurance and dynamic, balance.

Methodology and Procedures

2.1 Study Sample

The descriptive approach was used on a sample of (130) female students within the age group (9-12) years at Khawla Bint Al-Azwar School in Amman in the second semester of the 2022/2023 academic year. Table (1). shows the homogeneity of the study sample.

Table (1). The anthropometric measurements of the study sample (n=130)

Variables	lowest value	highest value	M	SD	Skewness	Kurtosis
Height/ cm	133	165	148	6.80	0.62	0.18
Mass/Kg	38	52	46	7.32	1.08	1.63
BMI/ kg/m²	15.20	27.37	20	2.85	1.26	2.07
Foot length/cm	18	24	22.30	1.45	0.67	1.25
Leg length/cm	75	90	87	3.58	0.44	0.75

Table (1) shows the values of the Skewness coefficient for anthropometric measurements which ranged from (0.44 - 1.26), therefore these values are close to the normal limits of normal distribution, and are usually accepted between (1.96±) according to the Fisher criterion. Therefore, these values are all very close to normal distribution values.

2.2 Tools and Tests

The following tools and devices were used: a stopwatch, Digital Glass scale for mass measurement, ribbon for measuring length, registration form, three bars of balance (3 m), 5 cm above ground level and three different symptoms (3, 4.5, 6) cm, Personalization. In order to obtain the study data, were used the following tests:

1- Mental abilities test: The (D2-Konzentration, D2-k) test was used to determine the ability to concentration of attention (Figure 1). First, a brief instruction was distributed to the students, on which were two lines with "p" and "d", which were provided with either one, one or two strokes above and below. The goal was to smash through all the "d's" that had two dashes in total. There were different target objects and 10 different distractors. That means, it played, that is, it did not matter, whether it was below two or above two or one stroke above and one below the "d".

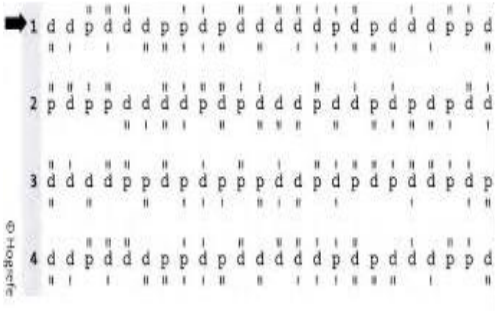

Figure (1). Concentration of Attention Test [8]

2- Aerobic endurance test: Walking and running for 6 minutes (Figure 2). Each (10) students will be tested individually. After giving the starting signal, the testers will run and walk on fatigue at the ends and outside the boundaries of the volleyball court. During the test, the assistants will document each student's number of courses around the field in 6 minutes. The number of courses that the laboratory has performed is recorded within (6) minutes in addition to the distance from the starting point until it is estimate.

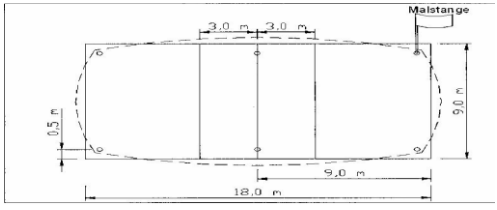

Figure (2). Aerobic Endurance Test

3- Dynamic balance test: three bars of balance (3 m), 5 cm above ground level and three different symptoms (3, 4.5, 6) cm, and square wooden panel (40 cm) height (5 cm) from the ground on the pitch (Figure 3). Where the number of steps taken by the study sample is calculate on the wooden beam until it is lost. So that each student is given two attempts for each wooden beam and the number of points is calculating by the number of steps, not to exceed (8) points for each wooden beam, the highest point the student can get is (48) points (total points) [4].

Figure (3). Dynamic balance test

To verify the reliability coefficient of the study tests, (Test, Re-Test) was used on (30) students. The test was re-applied a week after the first application on the same sample that was excluded from the original sample of the study. Table (2) shows the reliability coefficient of the study tests.

Table (2). The results of the stability coefficient tests (n=30)

Tests	Stability Coefficient
Negative error	*0.83
Positive error	*0.83
The total of the correct characters that are referenced	*0.84
Percent error percentage = total number of errors / correct characters * 100	*0.84
Ability of attention = The total number of correct characters - The total number of characters	*0.82
aerobic endurance and Dynamic balance	*0.81
Dynamic balance	*0.80

*Significant for ($\alpha \leq 0.05$)

Table (2). The reliability coefficient values for the study tests were shown, which ranged between (0.80 - 0.84), all of which are acceptable reliability coefficients and meet the objectives of the study. To process data, arithmetic means, standard deviations, analysis of variance (ANOVA), Scheffe, and correlation coefficients were used.

Results

Table (3). Results of the One-Way ANOVA in the concentration of attention test

Tests	Age group	M	SD	F	Sig
Negative error	9-less than10	24.56	8.30		
	10-less than11	15.97	4.73	58.12	0.00
	11 -12	10.30	5.21		
Positive error	9-less than10	10	7.75		
	10-less than11	13.95	4.77	15.67	0.00
	11 -12	6.11	6.25		
The total of the correct characters that are referenced	9-less than10	95.44	8.30		
	10-less than11	104.03	4.73	58.07	0.00
	11 -12	109.72	5.26		
Percent error percentage = total number of errors / correct characters * 100	9-less than10	37.23	37.23		
	10-less than11	29.03	29.03	48.13	0.00
	11 -12	15.24	15.24		
Ability of attention = The total number of correct characters - The total number of characters	9- less than10	60.89	17.64		
	10- less than11	74.10	10.82	59.45	0.00
	11 -12	93.33	13.10		

*Significant for ($\alpha \leq 0.05$)

Table (3) Shows the differences in the level of concentration of attention test among the students of age group (9-12 years) by using One-Way ANOVA.

Table (4). Results of the Scheffe test in the concentration of attention test.

Age group/ year	M	9-less than10	10-less than11	11 -12
9-less than10	60.89		*-13.21	*-32.44
10-less than11	74.10			-19.23*
11 -12	93.33			

*Significant for ($\alpha \leq 0.05$)

Table (4) shows the results of the Scheffe test for post-comparisons of the study sample in the concentration of attention test.

Table (5). Results of the One-Way ANOVA test in aerobic endurance and dynamic balance test

Tests	Age group	M	SD	F	Sig
aerobic endurance	9-less than10	828.04	195.12		
	10-less than11	865.62	148.56	5.48	0.00
	11 -12	952.93	199.18		
dynamic balance	9-less than10	13.29	9.80		
	10-less than11	14.33	7.99	5.69	0.00
	11 -12	20.39	13.45		

*Significant for ($\alpha \leq 0.05$)

Table (5) shows the differences in the level of the aerobic endurance and dynamic balance test among the students of the age group (9-12 years) by using One-Way ANOVA.

Table (6). Results of the Scheffe test for the study sample in the aerobic endurance test.

Age group/ year	M	9-less than10	10-less than11	11 -12
9-less than10	828.04		*-124.89	*-37.58
10-less than11	865.62			*87.31-
11 -12	952.93			

*Significant for ($\alpha \leq 0.05$)

Table (7). Results of the Scheffe test for the study sample in the dynamic balance test.

Age group/ year	M	9-less than10	10-less than11	11 -12
9-less than10	13.29		*-7.1	*-1.04
10-less than11	14.33			-6.06*
11 -12	20.39			

*Significant for ($\alpha \leq 0.05$)

Tables (6, 7) show the results of the Scheffe test for post-comparisons of the study sample in the aerobic endurance and dynamic balance test.

In order to establish the relationship between concentration of attention and aerobic endurance, dynamic balance among female students in the age group (9-12) years, Pearson's correlation coefficient was used, Table (8) shows that.

Table (8). Pearson correlation coefficient between concentration of attention, aerobic endurance, and dynamic balance (n = 130)

Tests	Age group	R	Sig
aerobic endurance	9-less than10	0.33*	0.04
	10-less than11	0.34*	0.04
	11 -12	0.39*	0.01
dynamic balance	9-less than10	0.52*	0.00
	10-less than11	0.63*	0.00
	11 -12	0.82*	0.00

*Significant for ($\alpha \leq 0.05$)

Discussion

The results of the study show the values of the means and the standard deviations of parts concentration of attention test, notably there were statistically significant differences between the means of the results in relation to the concentration attention ability, and for the benefit of category (11-12) years. This is consistent with previous results reported by Bataineh & Oqili [2], which indicated that there were statistically significant differences in the level of mental abilities and in favor of the older age group. Furthermore, Hollmann & Strüder [13] confirm that synapses increase with age, which increases the ability and efficiency of long-term memory, which positively affects in learning and memory. The researchers attributed this to the development of efficiency and functional capacity of the central nervous system with age.

In addition the results of study also indicated that there were statistically significant differences between the means of the subjects' results in relation to the aerobic endurance test, these differences were between the (9-less than10) age group and each age group (10-less than11and 11-12 years, and for the age group (10-10.9 years) with mean (828.04), while the mean for the age groups (10-less than11, 11-12)years, with (865.62, 952.93), respectively, also the results showed differences between age groups (10-less than11, 11-12)years for the older age group (11-12) years. This is consistent with previous results reported by [5], [2]. The researchers attributed the reason to the increase in the volume of vital capacity and size of the heart with age, and this helps to get a large amount of oxygen during the process of inhalation, as well as increase the size of Stork Volume, which leads to the injection of a large amount of blood containing oxygen and energy for tissue supply, which is positively reflected in aerobic endurance.

In addition study results indicate there were statistically significant differences between the means of rustle for sample study in relation to dynamic balance, these differences were between the (9-less than10) age group and each age group (10-less than11) and (11-12) years, and for the age group (10-10.9 years) with mean (13.29), while the mean for the age groups (10-less than11, 11-12) years, with (20.39, 14.33), respectively, also the results showed differences between age groups (10-less than11, 11-12) years for the older age group (11-12) years. This is consistent with previous results reported by Meinel & Schnabel [16] which indicated that the rapid development of coordination abilities at this age group to the rapid development of the cerebral cortex responsible for the functions of higher mental processes such as learning and memory as well as the cerebellum responsible for the compatibility of muscular nervous system, also consistent with previous results reported by Bataineh & Oqili; Bataineh et al, [2], [3].

The researchers attributed the cause of the increase in balance with age to the obvious improvement in the development of the central nervous system, which increases the ability to process analysis and treatment and absorption of

motor skills, especially the clear development in the growth of the cerebellum associated with the overall growth of the body in addition to motor behavior in females for this age group Which depends mostly on the physical abilities that do not depend on energy production systems such as strength, speed and endurance, but on the capabilities that depend on the coordination abilities such as the wheel and the balance. Based on the physical variables and specifically the length of the lower limb, it is clear that the body is more stable and balanced when the base balance is more width and whenever the center of gravity near the base balance. According to the results of the study sample in anthropometric measurements the length of the lower limbs of the age group (11-12) year is similar to The length of the lower limbs of the age group (10-less than 11) years, although the difference in lengths of the body and this indicates that the balance is more stable in the older age group according to the law of mechanical stability = tan angle, where tan = gravity line / Edge falling.

To investigate the relationship of attention concentration to the ability of female students in the age group (9-12) in aerobic endurance and dynamic balance, the results of the study were shown There was a statistically significant correlation between the level of concentration of attention abilities and the level of the aerobic endurance and the dynamic balance of the students in age group (9-12 years), according to the age group variable, where correlation coefficients were statistically significant. The researchers attributed the cause of a statistically significant correlation between the concentration of attention that are processed through specific areas of the cerebral cortex and the adaptive abilities dynamic balance and the aerobic endurance that is controlled and processed by the central nervous system and certain fields in the cerebral cortex as well, so that they are common to motor and mental coordination abilities.

Etnier et al, [9] stated that the exercise of motor activities have a positive effect on the brain, aerobic dynamic activities and motor abilities act to nourish the brain with oxygen through an increase in blood perfusion, as well as increase the production of nutrition for neurons, especially in the Hippocampus((Hippocampus), (Cortex), Cerebellum, Leading to an increase in the density of synapses, which increases the capacity and efficiency of long-term memory (Long Term Memory), which affect positively on both learning and memory. Weineck [20] stated that the aerobic endurance of the antenna in general is that the individual is psychological and physical ability to resist fatigue, where it cannot run for a long distance without psychological and mental ability of that duty. Consequently, the researchers attributed the reason for the availability of psychological and mental ability to run long distance. This is consistent with previous results reported by Memmert & Weiackgenannt; Chomitz et al [17], [6] which stated that a statistically significant correlation between concentration attention and physical activities.

Conclusions

Physical activities are one of the key factors in physical and mental development of children Physical activity capacity can also be define as physical fitness or motor fitness. Motor fitness, which is also call motor skills, also is known as the individual's performance skills, which are influenced by factors, such as speed, agility, balance, coordination, and strength. There are only a few studies in literature that focus on development of static and dynamic balances of children, and the effects of different sports activities on postural control.

Recommendations

Future studies must focus exercise programs for improving balance performances of children are required. Therefore, researchers recommend that female students in the 9-12 age group should be encouraged to exercise physically for coordination abilities and physical abilities

because they have a clear impact on concentration of attention, and conduct similar studies and research by using tests that measure mental abilities and motor abilities in the same age group and other age groups, as well as more variables such as gender (males, females).

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