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The Effect Of Warm-Up On Motor Skill Performance In Volleyball Activity Among Middle School Students

Nassim Benharrat[1], Larbi Djamal Belhadj[2]

[1]University of Algiers 3 (Algeria), Email: benharratnassim@yahoo.com
[2]University of Hassiba-Benbouali de Chlef (Algeria), Email: d.belhadjlarbi@univ-chlef.dz

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Abstract
This study aimed to highlight the relationship between warm-up and motor skill performance in volleyball activity among fourth-year middle school students, by examining the relationship between warm-up (the preparatory stage) and their motor skill performance in volleyball during physical education classes.
The study relied on a sample of 25 male and female students from fourth-year classes at Lunissi Maqrane Middle School in the Bejaia province. We used the experimental approach with a single group, pre- and post-test design, to measure flexibility and agility. We selected the multi-directional running test and the trunk flexion backward test, adapting both to fit the characteristics of the sample. Results showed statistically significant differences between the pre- and post-test averages at a degree of freedom of (3) and a significance level of (0.05), in favor of the post-test. This makes it clear that warm-up contributed to improving students' flexibility and agility.

Keywords: Warm-up, motor skill performance, athletic activity, adolescence

1. Introduction
The teaching process in physical education is complex, and each of its stages has characteristics that set it apart from the others. The preparatory stage of the physical education lesson is one of the most important phases, it completes the learning situations throughout the class, whether the activity is individual or collective. One of the key aspects of the preparatory stage is what is known as warm-up, which gives students dynamism, flexibility, and agility so they can reach higher levels of motor skill performance. The drive to succeed is a cornerstone of a person's individual achievement across different age stages, in relation to both themselves and their environment.

Adolescence, however, remains the sensitive period in which many changes occur and in which the adolescent strives to reach the highest possible level of performance. Warm-up can directly affect motor skill performance, which is one of the most important criteria determining success or failure in the main phase of the lesson, whether the activity is individual or collective. This, in turn, supports the student's academic path.

Given the importance that warm-up holds in shaping student behavior, and given the poor reality of physical education in middle schools, reflected in low output and weak performance levels, since individuals differ in their physical, skill-based, motor, and cognitive capacities, we wanted in this study to highlight the effect of warm-up on motor skill performance among middle school students and their motor skill output during physical education classes. The success of the teaching-learning process depends largely on how effectively and willingly students exert effort and engage with performance.

For this purpose, the researcher posed the following question:
Does warm-up affect the motor skill performance of middle school students?
The primary objective of this study was to uncover the role that warm-up plays in motor skill performance among middle school students, and to explore the differences between athletic activity with warm-up and without it, since there is a relationship of influence between warm-up and motor skill performance.

2. Theoretical background

2.1. Definition of concepts and terms

2.1.1. Warm-up

Warm-up goes by several names, including preparation and heating.
Warm-up (Healing): Defined as preparing the organs and systems of the human body or player so they are ready to engage effectively and efficiently with the demands of training or a match (Hammad, 1987). In the context of sport, it refers to a set of movements performed by the student or player before a training session, before a match, and between halves. It is divided into two types: general and specific.

2.1.2. Motor skill performance

Motor skill performance is a set of individual motor actions, both with and without the ball, whose execution requires physical, cognitive, and psychological capacities that work together to produce the performance in a form appropriate to the game situation. The special capacity of a high-level football player is not tied solely to possessing game skills and performing them according to match demands.
Operational definition: A set of changes that occur in certain student characteristics such as endurance, muscular strength, reaction speed, and agility.

2.1.3. Physical education and sport

Physical education and sport is an educational system with objectives aimed at improving overall human performance through selected physical activities used as an educational medium with important teaching and formative characteristics. Physical education works as a system to acquire and master motor skills, and to maintain physical fitness for better psychological and social health and a more active life, in addition to acquiring knowledge and developing the various dimensions of individual personality. (Al-Khuli, 1996)

2.1.4. Athletic activity

Athletic activity has become a tool and a program that helps the individual grow socially and psychologically, giving them balance between mental and physical well-being, echoing Plato's saying: "A sound mind in a sound body." (Khaldoun, 1987)

2.1.5. Sports activities

Sports activities are among the most important activities aimed at correcting body posture and stimulating biological and physiological functions, strengthening muscles, and developing muscular and motor coordination, which makes the body agile, flexible, and full of energy. Sports activities also affect psychological health. (Yassin, 1998)

2.1.6. Agility (Agility)

Agility has a complex character because of its close connection to all physical qualities on one hand and to the skill dimension of motor performance on the other. It is a concept that expresses the degree to which an individual can perform in a way characterized by coordination and the ability to quickly modify motor performance in a manner suited to the demands of changing situations.

2.1.7. Flexibility (Flexibility)

Flexibility is defined as the ease of movement in the joints of the body that allows the player to perform movement through the required range. Flexibility plays an important role as a physical quality in the time of ball play for optimal performance. Without flexibility, a player cannot perform a skill in the correct technical manner.

2.1.8. Adolescence (Adolescent)

Adolescence is a descriptive term for the period of life in which the individual is not yet emotionally mature and their life experience is limited, while they are approaching mental and physical maturity. It is the period between late childhood and the beginning of adulthood. The adolescent is neither a child nor an adult, but falls in a zone of forces, influences, and expectations between the two stages. It extends, in males, from 14 to 20 years and, in females, from 12 to 18 years. (La Rousse Encyclopedia, 2002)

2.2. Previous and related studies

2.2.1. Study by Dr. Mohamed Sayed Abd Al-Rahim Khalil

Title: A training program to develop some coordinative abilities and its effect on compound motor skill performance among youth football players, 2016.

- **Study objective:** Developing coordinative abilities at the youth level in football.
- **Method used:** The researcher used the experimental approach with an experimental design (single experimental group) using the pre- and post-test method.
- **Sample:** The researcher relied on a sample of 22 youth football players at the Assiut Petroleum Refinery Company, selected by purposive sampling.
- **Tools and equipment:** Restameter for measuring height, stopwatch for measuring fixed time, centimeter measuring tape, wooden poles, ground ladder, 20 cm hurdles, plastic hoops, a survey form to identify the most important coordinative abilities.

- Statistical analysis methods used: mean, standard deviation, median, skewness coefficient, percentage of improvement, correlation coefficient, T-test.

2.2.2. Study by Maqqaq Kamal (2012)

- **Study title:** The effect of physical exercises using the repetition training method on motor skill performance among youth football players.
- **Study objective:** Understanding the effect of physical exercises on motor skill performance in young football players.
- **Method used:** Experimental approach.
- **Sample:** Selected by purposive sampling.
- **Study results:** A statistically significant correlation exists between physical exercises and motor skill performance in youth football players.

2.2.3. Study by Abboush Sharif (2014), Fourth study

- **Study title:** The extent of the effect of the pedagogical teaching process on developing motor skill performance in football teams.
- **Study objective:** Understanding the role that the teaching process plays in developing and improving motor skill performance among youth football players.
- **Method used:** Experimental approach.
- **Study results:** The pedagogical teaching process has a positive effect on developing motor skill performance in football teams.

2.2.4. Study by Nurses and Hodgez (1982), Nurses et Hodgez

- **Study title:** The effect of enrollment on academic achievement in the areas of language, social studies, reading, spelling, and arithmetic in the second year of primary school.
- The study found that children who attended kindergarten achieved higher results in the above-mentioned subjects than those who did not.

Commentary on previous and related studies:

All previous studies dealt with motor skill performance and its effects on personal, social, and academic variables, as well as predictive factors of academic achievement and other variables. Those studies helped the researchers determine the general framework of the research, select appropriate measurements and tests, formulate the problem and objectives, define the study methodology, and choose the statistical method appropriate to the nature of the study.

2. Methodology

2.1. Research method

The researcher used the experimental approach, as it suited the hypotheses of the current study. The aim was to uncover warm-up and its effect on motor skill performance during physical education classes among fourth-year middle school students. (Waharon, 2004) notes that descriptive research seeks to describe contemporary or current phenomena and provide data about certain characteristics of reality (Wakharon, 2000). This approach also provides separate data on the phenomenon under study and gives a realistic interpretation of the factors associated with the research topic, helping in predicting the phenomenon in the future. (Ridwan, 2003)

2.2. Study population

The research population should include all categories that fall within the study and cover all members of the original population (Mursi, 1999). Our research population consists of all students at Lunissi Maqrane Middle School, Bejaia province.

2.3. Study sample

The sample is the group of individuals on which the researcher bases their work, drawn from the original population and representing it faithfully (Makki, 1993). To carry out our study, we selected the research sample using random sampling, which is considered the most objective and credible sampling method for achieving the study's objective. The sample included students from the final-year classes of middle school in some schools in Bejaia province, totaling 25 male and female students distributed as follows:

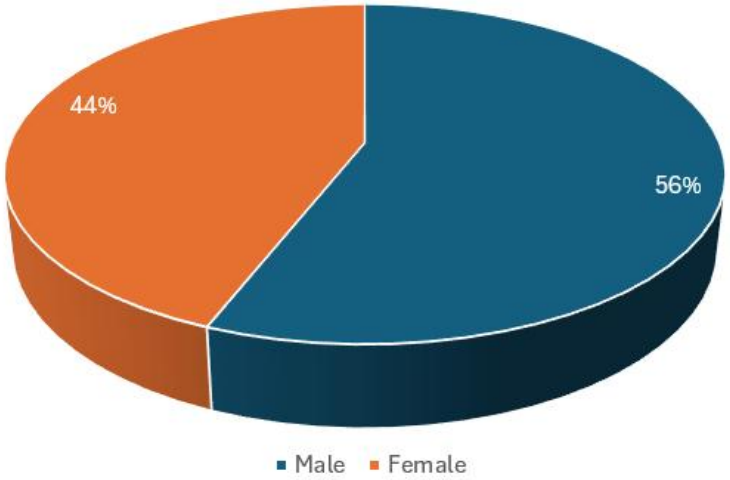
Table 1: Distribution of the research sample

No.	Name	Age	Gender	Academic level
01	Akboush Wiam	15	Female	Fourth year
02	Bara Wissam	16	Female	Fourth year
03	Latrash Anis	16	Male	Fourth year
04	Brarah Kahina	15	Female	Fourth year
05	Brarah Katia	15	Female	Fourth year
06	Taffah Shaimaa	16	Female	Fourth year
07	Hamzi Faysal	16	Male	Fourth year
08	Kharbach Hiziya	15	Female	Fourth year
09	Dghish Hanan	15	Female	Fourth year
10	Rahmuni Islam	15	Male	Fourth year
11	Rzayqi Munir	14	Male	Fourth year
12	Ridwan Yunus	15	Male	Fourth year
13	Tahir Kanza	14	Female	Fourth year
14	Tahir Haytham	16	Male	Fourth year
15	Abdali Ayman	15	Male	Fourth year
16	Abdali Sayf	16	Male	Fourth year
17	Abdali Manal	15	Female	Fourth year
18	Abdali Wiam	14	Female	Fourth year
19	Latrash Hani	15	Male	Fourth year
20	Marrah Badr	14	Male	Fourth year
21	Mansuri Abd Al-Malik	15	Male	Fourth year
22	Kharbach Munir	15	Male	Fourth year
23	Qadri Sayf Al-Din	14	Male	Fourth year
24	Hamzi Omar	16	Male	Fourth year
25	Sabri Rami	14	Male	Fourth year

Table 2: Distribution of sample members by gender

Gender	Frequency	Percentage
Male	14	56%
Female	11	44%
Total	25	100%

Figure 1: Pie chart of research sample members by gender



2.4. Controlling research variables

To obtain reliable results, every researcher must control their study variables and classify them into quantitative or continuous variables (Continuous Variables), where each observation or unit can take any numerical value within a certain range. (Wadi Yassin, Mohamed Al-Takrini, Hassan Mohamed Abd Al-Ubaidi, 2012, p. 09). This was done as follows: the independent variable is the factor the researcher assumes affects the dependent variable, also known as the experimental variable (Zina, 2006). In this study, the independent variable is warm-up, and the dependent variable is motor skill performance.

2.5. Research tools and methods

The researcher used the pre- and post-test, which included the multi-directional running test to measure agility and the trunk flexion backward test from the prone position to measure flexibility.

2.6. Statistical methods used in the study

Given the nature of the study and its variables, the researcher used the arithmetic mean, which is one of the most well-known measures of central tendency, calculated by adding the values of all elements in the group and dividing by the number of elements or individuals. The researcher also used variance and standard deviation, the latter being the most precise, important, and widely used measure of dispersion among statisticians (Batarsa, 2014). The percentage and Pearson correlation coefficient were also used, as was the statistical software system.

2.7. Results obtained across the various tests

Table 3: Pre-test results obtained by the students

Student no.	Multi-directional running test (seconds*)	Trunk flexion backward from prone position (cm*)
01	40	20
02	35	25
03	51	32
04	28	28
05	60	21
06	51	38
07	48	30
08	41	24
09	39	24
10	42	25
11	55	30
12	40	22
13	57	26
14	40	25
15	35	38
16	38	21
17	42	24
18	48	23
19	50	26
20	38	40
21	50	28
22	66	24
23	48	22
24	41	24
25	76	29

2.8. Post-test results obtained by the students

Table 4: Post-test results obtained by the students

Student no.	Multi-directional running test (seconds*)	Trunk flexion backward from prone position (cm*)
01	38	18
02	34	22
03	49	28
04	27	25
05	54	26
06	48	20
07	38	34
08	39	27

09	37	22
10	40	23
11	50	24
12	38	26
13	50	21
14	35	25
15	33	23
16	34	32
17	41	19
18	46	20
19	48	20
20	37	24
21	47	38
22	64	24
23	34	21
24	40	23
25	69	21

3. Results and discussion

Table 5: Pre- and post-test results for flexibility and agility in the experimental group

Flexibility and agility tests	Unit	Pre-test mean	Pre-test SD	Post-test mean	Post-test SD	Difference between tests	Calculated t	Table t	Degrees of freedom
Multi-directional running test	Seconds	46.360	42.000	42.800	40.000	2.900	32.229	3.182	3
Trunk flexion backward from prone position	cm	26.920	25.000	24.240	23.000	1.64191	30.197	3.182	3

The table above shows statistically significant differences between the average scores of the pre- and post-tests at a degree of freedom of (3) and a significance level of (0.05) in:

3.1. The multi-directional running test

For the experimental group, which represents the effect of warm-up: the calculated t-value reached (32.229), greater than the table t-value (3.182). The result was therefore in favor of the post-test, making it clear that warm-up contributed to improving agility among members of the experimental group.

3.2. The trunk flexion backward from the prone position test

For the experimental group, which represents the effect of warm-up: the calculated t-value reached (30.197), greater than the table t-value (3.182). The result was in favor of the post-test, making it clear that warm-up contributed to improving spinal flexibility.

Table 6: Pearson correlation coefficient

Statistical variables	Sample	Calculated t	Significance level
There is an effect of warm-up on motor skill performance	25	0.804	0.01

After statistical processing, the results related to the effect of warm-up on motor skill performance among middle school students revealed a positive correlation between warm-up and the level of motor skill performance in middle school adolescents. The Pearson correlation coefficient (r) reached 0.0, which is statistically significant at significance level $\alpha = 0.01$. We therefore reject the null hypothesis and accept the alternative hypothesis, which indicates a correlational relationship in the study sample between warm-up and motor skill performance. The relationship between both variables, warm-up and motor skill performance level, is a direct, positive correlation, meaning the dependent variable increases as the independent variable increases.

4. General conclusion

From the above, it is clear that warm-up increases the flexibility and agility of middle school students aged [14–16] years. Table 14 shows that the absence of warm-up noticeably affected motor capacities (flexibility and agility), with statistically significant differences in favor of the post-test. Results related to the third hypothesis, through Table 14, were as follows:

Regarding the trunk flexion backward from the prone position test, which represents student flexibility: the flexibility index dropped due to the absence of warm-up between the pre- and post-measurements. The result was in favor of the post-test, shifting from (29 cm) to (21 cm) in the post-measurement. These results agree with studies by Rubley (2001), Al-Mumani (2003), and Khalil (2008), all of which confirmed a decline in this index as a result of stopping training. The researchers attribute the drop in flexibility to some muscles losing their elasticity, which limits spinal movement and lowers its flexibility. This is consistent with Majid (1989) as cited in (Allah, 2014), who noted that the elasticity of muscles acting on any joint determines that joint's range of motion, and when that elasticity is lost, the joint loses its flexibility. The role of warm-up in increasing joint elasticity and muscular flexibility becomes clear here: by raising body temperature and loosening the joints, warm-up allows the muscles to extend to their maximum range.

For the multi-directional running test, which represents student agility in movement: Table 27 shows, through the difference between pre- and post-measurements, that results favored the post-test. For student no. 01, the time dropped from (40) seconds to (38) seconds in the post-measurement. The researchers attribute this drop to a decline in the actual performance indicators due to agility's close relationship with other physical qualities. This aligns with Hassan (1998)

and Saffani and Ahmed (2005), both of whom pointed to a decrease in completion time and an increase in completion time resulting from stopping training. In this study, we concluded that warm-up reduces completion time among middle school students through physical preparation, both general and specific warm-up, since warm-up increases joint extension, supplies the muscles with the necessary oxygen for athletic tasks, and contributes to developing both the respiratory and circulatory systems.
Based on all of the above, the third hypothesis has been confirmed.

5. Conclusion

Warm-up affects performance: the more a student experiences warm-up, the greater their readiness to engage in athletic activities. Put simply, the greater the intensity, variety, and duration of warm-up, the better the level of motor skill performance in athletic activities.

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