

The Impact of Mini-Games on the Development of Key Physical and Motor Skills in Middle School Students (Ages 12–16).

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Summary

Developing physical and motor capabilities during adolescence is essential for overall cognitive, psychological, and physical growth. Grounded in classical developmental theories (such as those of Rudolf Laban, Plato, and Jean Piaget), physical motor abilities play a foundational role in human performance. This study addresses the documented weakness in physical and motor performance among middle school students aged 12–16. Mini-games—defined as structurally simple, flexible, and engaging physical activities—were selected as an intervention to enhance key motor and physical abilities without requiring complex technique. Methodology: The research utilized an experimental approach with a confronted groups design on a sample of 30 middle school students (aged 12–16) from Ibn Rushd Middle School in Ain al-Bayda. Pre-tests were administered on February 2, 2026, followed by an 8-week intervention comprising 16 instructional units featuring mini-games in their main sections. Post-tests were conducted on April 4, 2026, evaluating explosive power, transitional speed, agility, coordination, and motor precision.

Keywords: Mini-Games; Physical Abilities; Motor Skills; Middle School Education; Neuromuscular Coordination; Physical Education Curricula.

1- Introduction:

Modern science has come to recognize the importance of developing students' physical and motor abilities due to their close relationship with human development. Therefore, this focus requires a comprehensive approach from early childhood through to the highest levels, encompassing all aspects—cognitive, psychological, skill-based, emotional, and physical. Furthermore, the educational ideas and theories put forward by Rudolf Laban, Plato, and Paget serve as the best evidence of the importance of physical and motor abilities, their relationship to human motor performance, and their role in the development of a child's motor, emotional, and cognitive skills.

Physical and sports education is a form of general education that seeks to achieve integrated and balanced growth (socially, mentally, psychologically, and physically) through physical activity using the method of small games, which is one of the methods of motor education. It is used to teach motor activities to children ages six and older; these games are characterized by their ease of performance and are accompanied by joy, fun, and healthy competition among children.

Since childhood is one of the most important stages in a person's life, given its clear impact on their future, it is essential to focus on educational curricula that actively contribute to the child's overall development, particularly through physical activity, which develops physical and motor skills. Consequently, specialists and researchers must focus on children and work to develop educational curricula that help them acquire these skills.

Thus, the significance of this research lies in the use of small games to develop the most important physical and motor skills in children aged 12–16, as these games enable children to perform movements according to their potential and abilities through freedom of movement, thereby excelling in motor performance—which, in turn, contributes to the further development of these skills in the future. Based on the researchers' experience and their review of a number of studies and research papers on the educational process at this stage, it was found that there is a problem related to children's poor performance in physical and motor skills. This prompted the researcher to find a solution to this problem by using simple games to develop children's most important physical and motor skills.

2. Sub-questions:

1. Are there statistically significant differences between the pre-tests and post-tests in the development of key physical abilities among middle school students (ages 12–16)?
2. Are there statistically significant differences between pre- and post-tests in the development of the most important motor abilities among middle school students (ages 12–16)?

3. General Hypothesis:

Small games play an important and positive role in the development of the most important physical and motor abilities among middle school students (ages 12–16).

4- Sub-hypotheses:

1. There are statistically significant differences between the pre- and post-tests in the development of the most important physical abilities among middle school students (ages 12–16).

2. There are statistically significant differences between the pre- and post-tests in the development of the most important motor abilities of middle school students (ages 12–16).

5- Research Objectives:

1- To develop small games to enhance the most important physical and motor abilities of middle school students (ages 12–16).

2. To identify the impact of mini-games on the development of the most important physical and motor abilities of middle school students (ages 12–16).

Theoretical Framework:

1- Small Games:

Small games are one of the methods that can be used to teach motor skills; they are entertaining and beneficial physically, mentally, psychologically, and socially. A father, mother, or teacher can bring the family together around an entertaining and beneficial game that is enjoyed by both adults and children alike. Small games are used to teach motor skills from one year of age and up. (Abdul Hamid Sharaf, 2005, p. 147).

To ensure a child's well-being, it is essential to provide a variety of age-appropriate toys. Play helps children develop various cognitive, logical, and perceptual skills, in addition to providing the joy of movement, freedom, and diverse interactions with other children. Play also strengthens team spirit and instills a sense of belonging, which improves relationships between individuals and strengthens the bonds of friendship. (www.childhood.gov.sa/vb/archive/index).

Small games are defined as “games that are simple in structure, easy to play, and accompanied by joy and pleasure, while also involving fair competition; at the same time, they do not require complex motor skills, and the rules governing them are flexible and simple.” (Abdul Hamid Sharaf, 2005, p. 147).

2- Types of Mini-Games:

There are various perspectives that attempt to categorize “mini-games” into homogeneous groups, despite their wide variety of types and fields, which cannot be fully enumerated or defined. In general, we do not currently have an ideal classification for the various types of mini-games, but we favor the perspective of (Dibler), head of the Department of Games at the (Leipzig) Institute in East Germany, who divides small games into several homogeneous groups that differ from one another in terms of their educational impact and the nature of their activities, as follows: (www.diwami.alazraq.com)

1- Singing Games: These include role-playing games and dance games accompanied by singing.

2- Running Games: These include races and relay races, as well as tag, touch, and chase games, and hide-and-seek.

3- Ball Games: These include various ball games designed to teach throwing, catching, and accuracy, or to avoid and evade being hit, as well as games involving scoring a goal or getting the ball to a specific mark.

4- Strength and Agility Games: These include wrestling, tug-of-war, pushing, pulling, dodging, and balance games.

5. Sensory Training Games: These consist of games designed to develop observational skills, reaction time, attention, and so on.

6. Small Water Games: These are games played in the water, as well as small games involving boats and swimming aids.

7. Winter sports: These are sports played on ice or involving sliding.

8. Outdoor games: These include tracking games, treasure hunts, and games involving attack, defense, and ambush.

3- Motor and Physical Abilities:

Motor and physical abilities are important topics in the field of sports; they have been, and continue to be, the focus of discussion and debate regarding the identification of their components and how to distinguish between them. If we examine motor and physical abilities more closely, we find that some are closely linked to physiological and physical condition, while others rely on the central and peripheral nervous systems to control movement.

On this basis, scientists have classified physical abilities based on physiological capacity, which include (strength, speed, endurance, and flexibility). As for abilities that are not subject to changes in physiological state but rather depend on the ability to control movement—an ability that relies on the use of proprioception and the central and peripheral nervous systems to control motor skills—these include (balance, coordination, motor precision, agility, and motor flexibility). (Ya'rub Khayoun, 2002, p. 21).

Motor skills are defined as “the abilities that a person acquires from the environment or possesses naturally, such as flexibility, agility, and balance; they are based on training and practice and develop according to the individual’s physical, sensory, and cognitive abilities.” (Wajih Mahjoub et al., 2000, p. 57).

Physical abilities, on the other hand, are defined as “abilities primarily related to physiological condition; thus, we find that speed is related to the type of muscle fibers, endurance is related to the cardiorespiratory system, while strength is related to the number of motor units activated and the cross-sectional area of the muscle, and finally, flexibility is related to the elasticity of the tissues surrounding the joint, which determines the joint’s range of motion.” (Ahmed Bastoisi, 1999, p. 450)

4- Components of Physical Ability:

- Explosive Strength:

This is “the highest dynamic force that a muscle or muscle group can produce in a single contraction.” (Mohammed Hassan Alawi and Mohammed Nasr al-Din Radwan, 1994, p. 232)

- Transitional speed:

This refers to “the ability to move from one place to another in the shortest possible time and is divided into two types: short-distance running and maximum running speed.” (Muhannad Hussein and Ahmad Ibrahim, 2005, p. 340)

-Components of Motor Skills:

- Agility:

This refers to “the ability to quickly change the direction of the body or certain parts of it.” Agility holds a special place among many physical attributes, as it is linked to all motor skills; it is, therefore, a complex ability. (Mufti Ibrahim Hammad, 2001, p. 199).

- Coordination:

Motor coordination is defined as “the ability to integrate different types of movements into a single, fluid, harmonious, and well-executed sequence.” (Al-Yin and Wadi Faraj, 2002, p. 256) Types of coordination include limb coordination and whole-body coordination.

- Motor Accuracy:

Larson and Yokum define accuracy as “an individual’s ability to control their voluntary movements toward a specific goal,” while others define it as “control over motor performance directed toward a specific goal.” (Ali Jawad Saloum al-Hakim, 2004, p. 152).

From the above, it is clear that accuracy refers to the ability to hit a specific target.

5- Characteristics of the adolescent stage (ages 12–16):

These include the following points: (Abdul Hamid Sharaf, 2005, pp. 93–95).

- 1- The physical activity provided to the child should be of a non-violent nature so that the child is not exposed to serious consequences that could affect his or her vital systems.
- 2- At this stage, neuromuscular coordination begins to improve, so there is no reason not to have the child perform certain movements that require coordination between nerves and muscles.
- 3- This stage is similar to the previous one (preschool), as physical growth remains relatively slow.
- 4- Children at this stage really enjoy participating in the same sports activities as adults, so it is possible for a father to engage in some activities with his son—provided they are appropriate for the child’s level of maturity.
- 5- Children at this stage tend to be competitive, so we recommend that the sports activities our children engage in take the form of competitions, tag, or wrestling; small-group games are preferable to structured physical education classes.
- 6- The world of imagination that the child creates for himself—which began in the previous stage—continues to expand.
- 7- The child remains curious and prefers to be introduced to new sports activities, seeking to learn more about them.
- 8- The child’s higher cognitive abilities—such as attention, perception, and concentration—remain relatively underdeveloped.
- 9- The child shows a tendency toward reading and acquiring knowledge.
- 10- At this age, he shows a tendency to respect adults.
- 11- He tends to cooperate with his peers and enjoys teamwork.
- 12- He enjoys belonging to groups and organizations.

6- Research Methodology and Field Procedures:

6-1 Research Methodology:

The researchers employed an experimental approach, utilizing a “confronted groups design”—a method for testing or comparing two or more groups—due to its suitability for the nature of the research problem to be addressed. (Wajih Mahjoub, 2002, p. 315)

6-2 Research Population and Sample:

The research population was defined as 30 middle school students aged 12–16 at Ibn Rushd Middle School in Ain al-Bayda.

7- Main Research Procedures

7-1 Pre-tests:

The researcher conducted pre-tests for the most important physical and motor abilities on Monday, February 2, 2026, at 9:00 a.m., for both the control and experimental groups.

The tests included the following:

- 1- Hand-held shooting test on overlapping rectangles.
- 2- 20-meter standing start run.
- 3- Circle run.
- 4- Standing broad jump.
- 5- Figure-8 run.

7-2 The Mini-Games Curriculum:

Implementation of the curriculum began on February 3, 2026, and continued for 8 weeks, comprising 16 instructional units—at a rate of one session per week. Mini-games were incorporated only into the main section of each instructional unit. Each instructional unit lasted (45) minutes, while the main section alone lasted (35) minutes.

7-3 Post-Tests:

The researcher administered the post-tests after the curriculum was completed on Monday, (04/04/2026), at exactly (9) a.m.

8. Statistical Methods: (Mohammed Jassim Al-Yasiri and Marwan Abdulmajeed, 2001)

- 1- Percentage.
- 2- Pearson's correlation coefficient.
- 3- Arithmetic mean.
- 4- Standard deviation.
- 6- t-test for two related, equally distributed samples.

9. Presentation, Analysis, and Discussion of Results:

4.1 Presentation and analysis of the results showing the differences between the pre- and post-tests for the most important physical and motor abilities:

T	Tests	Unit of Measurement	Pré-test		Posttest		Calculate d t-value	Statistical Significance
			X	±S	X	±S		
1	Explosive Power	Cm	54.01	0.771	92.43	5.27	13.48	Significant
2	Transition al Speed	S	11.415	0.487	6.30	1.485	11.36	Significant
3	Agility	S	9.269	1.007	5.54	0.956	5.78	Significant
4	Coordinati on	S	16.8	1.316	9.53	0.955	8.82	Significant
5	Motor Precision	Degree	10.9	0.650	16.53	3.95	10.76	Significant
and the tabulated t-value (2.04) at 29 degrees of freedom and a significance level of 0.05								

The table shows the arithmetic means, standard deviations, and calculated and tabulated t-values for the pre- and post-tests for both the experimental and control groups, each consisting of 30 students. In the explosive power test, the calculated t-value was (13.38), which is greater

than the critical value of (2.04), indicating that the results are statistically significant and in favor of the posttest.

As for the test of transition speed between the pre-test and post-test, the calculated t-value was 11.36, which is greater than the critical value of 2.04, indicating that the differences are statistically significant and in favor of the post-test. In the agility test, statistically significant differences were found between the pre-test and post-test, with a calculated t-value of 5.78, which is greater than the critical value of 2.04. As for the harmony test, the results between the pre-test and post-test were statistically significant, with a calculated t-value of 8.82, which is greater than the critical value of 2.04. This indicates the presence of statistically significant differences in favor of the post-test.

In the motor accuracy test, the results were statistically significant, as the calculated t-value (10.76) was greater than the critical value (2.04), indicating the presence of statistically significant differences in favor of the post-test.

10- Discussion of Hypotheses in Light of the Results:

In the explosive power test, the researcher attributes this development to the fact that children at this stage tend to engage in physical activities that satisfy their motivations and desires and that enhance their sense of self; thus, we find that one of the most important conditions for motor learning is the presence of motivation to learn.

There is a state of tension resulting from basic needs that drives an individual or a child to practice and learn a particular skill. (Najah Mahdi Shalash and Mazen Abdulhadi, 2006, p. 911), As for the experimental group, the researchers attribute this development to small games because of their effective role in developing explosive power; the exercises they involve—such as running, jumping, and leaping—and their guided use all contributed to the development of this ability.

As for the transitional speed test, an improvement was observed. The researcher attributes this improvement in the experimental group to the fact that transitional speed is an activity characterized by movement and competition, as it satisfies children's needs by fulfilling their desires while also fostering fair competition among them, The researchers were able to utilize this through small games that inherently involve fair competition, This leads to motor development, as Mazen Abdulhadi emphasized: "A child's motor development comes from providing the child with sufficient motor opportunities as well as freedom of movement, while creating an environment that aligns with the child's desires and beliefs; in doing so, we have facilitated the child's natural development." (Mazen Abdulhadi Ahmed, 1996, pp. 15–16).

As for the agility test, statistically significant differences were observed, showing an improvement in agility in favor of the post-test, as shown in the table. The researchers attribute this improvement to the use of mini-games, as the researcher relied on games that included exercises such as (running, jumping, rolling, and running with changes in direction), based on the principle of excitement and stimulation. This prevented the students from feeling bored and contributed to increasing their motivation and desire to perform and develop this skill," , "A good physical education and sports curriculum includes a broad framework that provides nearly all students with the opportunity to learn and participate in various sports, whether individual or team sports of their choice." (Abbas Ahmad Saleh, 2000, p. 191).

As for the coordination test, statistically significant differences emerged in the development of coordination, favoring the post-test, as shown in the table. The researchers attribute this development to the fact that children at this stage prefer complex motor skills such as (running and jumping, walking and alternating hopping) All of these require a certain degree of coordination, as confirmed by Abdul Hamid Sharaf, who states, “At this stage, neuromuscular coordination begins to improve, so there is no reason not to give the child some challenging movements that require coordination between the nerves and muscles, which helps further improve neuromuscular coordination.” (Abdul Hamid Sharaf, 2005, p. 93).

This is what the researchers confirmed by using mini-games that helped enhance the development of coordination.

As for the motor accuracy test, there were significant differences in the development of motor accuracy in favor of the post-test, as shown in the table. The researchers attribute this development to children’s rapid motor learning ability as a result of maturation and the nature of growth, (Shafiq Falah Hassan, 1989, p. 185). The researcher also attributes this development to the effectiveness of the instructional units, as well as to the impact of small games on the development of motor precision.

When we discussed the results presented and analyzed in the table for the follow-up tests of physical and motor abilities, statistically significant differences emerged, which means that the use of mini-games has led to significant improvement, and that the reason for this improvement is the effectiveness of the mini-games included in the instructional units, as they contributed to the development of these abilities by incorporating purposeful exercises that satisfied the students’ desire for movement and activity through proper motor activity, which led to motor development.

By presenting, analyzing, and discussing the research findings, the study achieved its objective and confirmed the hypotheses formulated by the researchers, demonstrating that the mini-games were effective in developing children’s most important physical and motor skills.

11. Conclusions and Recommendations:

11.1 Conclusions:

In light of the test results, their analysis, and discussion, the researchers reached the following conclusions:

1. The use of small games characterized by fun and enjoyment had a significant positive impact on students’ performance, which led to the development of the physical and motor skills that were the subject of this study.
- 2- The test results demonstrated the validity of the instructional units prepared by the researchers, as evidenced by the clear improvement in key physical and motor abilities.
- 3- Motor skills (agility, coordination, and motor precision) do not receive sufficient attention in physical education and sports classes in schools.

11-2 Recommendations:

In light of the findings presented above, the researchers recommend the following:

- 1- Adopting small games in schools due to their positive impact on the development of children’s most important physical and motor skills.

2- It is necessary to revise school curricula so that they contribute significantly to the development of children's physical and motor abilities.

3- Focus on training in agility, coordination, and motor precision, as these abilities are essential and important for building the foundation of any athletic performance.

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