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MOTOR COORDINATION AND ITS RELATIONSHIP WITH THE ACCURACY OF PERFORMING SELECTED FLOOR GYMNASTICS SKILLS AMONG BEGINNERS

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Abstract
This study aimed to investigate the relationship between motor coordination and selected floor exercise skills in artistic gymnastics, namely the forward roll, handstand, and cartwheel, among fifth-grade pupils during the 2025–2026 academic year. To achieve this aim, the study was conducted on a sample of 20 pupils. The sample was tested for homogeneity in the relevant variables of age, weight, height, and the selected motor skills. The pilot and main experiments were conducted on the playground of Al-Mutanabbi Primary School in the presence of the assisting staff. After the data had been collected, they were organized and tabulated for statistical analysis. The findings revealed positive correlations between motor coordination and the three motor skills examined: the forward roll, handstand, and cartwheel. The researcher therefore concluded that a good level of motor coordination is associated with better skill performance during practical execution.
The researcher proposed several recommendations. Most notably, future studies should examine other cognitive variables and investigate their association with proficient performance. Further research should also address motor coordination in other individual sports, including swimming and individual combat sports.

Introduction

Physical education seeks to achieve cognitive, motor, and affective objectives through a range of teaching methods and strategies. This process requires a competent teacher who understands how to construct and design instructional situations in accordance with learners' needs and characteristics. Teaching also plays a central role within the educational system. Consequently, many modern, innovative, and varied teaching methods have emerged. Teachers at different educational levels have recognized the difficulty of relying on a single method because numerous variables influence learning. These include coordination-related variables, such as motor control and movement regulation, as well as the nature of the instructional situation, the type of activity practiced, the educational stage, available resources, and modern educational technology.

Gymnastics differs from other sports in its physical and cognitive demands. Skill learning requires specialized preparation from a mechanical perspective, together with mental and motor coordination. Gymnastics movements also pass through successive stages of increasing difficulty across the phases of skill acquisition and are classified as closed skills. Accordingly, gymnastics skills require training and highly precise mental preparation (4: 181).

Motor learning is among the most important educational processes and requires sound scientific planning to achieve its objectives and convey information to learners through effective methods. Through observing practical physical education lessons for primary-school pupils in Al-Qadisiyah Governorate, the researcher noted limited attention to learning and practicing certain gymnastics skills. Most learners also experienced difficulty with motor control during performance, while modern scientific methods were seldom used. This situation highlights the need to incorporate selected gymnastics skills into the curriculum in a structured manner that supports the educational process, particularly simple skills such as the forward roll, handstand, and balance exercises. Learning should be organized in accordance with pupils' cognitive capabilities. On this basis, the researcher conducted a descriptive scientific investigation by measuring pupils' motor coordination and examining its relationship with selected fundamental skills in artistic gymnastics. The study is important because physical education teachers continually seek effective instructional methods that promote learning, engagement, and active participation in acquiring fundamental skills across different sports. Hence, the present study examines the relationship between motor coordination and the performance of selected floor gymnastics skills among beginners.

Purpose of the Study

1. To determine the level of motor coordination among the beginner gymnastics participants in the research sample.
2. To assess the accuracy of skill performance in the fundamental skills under investigation: the forward roll, handstand, and cartwheel.
3. To identify the nature of the correlations between motor coordination abilities and the accuracy of technical performance in these skills.

Method and Procedures

The researcher employed a descriptive correlational design because it was the most appropriate approach for describing the phenomenon as it exists and analyzing the statistical relationships among its components without manipulating the variables (5: 115). The research population comprised 73 fifth-grade pupils enrolled at Al-Mutanabbi Primary School in Al-Shamiya District during the 2025–2026 academic year, under the General Directorate of Education in Al-Qadisiyah. According to the school records, the pupils were distributed across three classes. A simple random sample of 20 pupils was selected from the different classes. The sample was then tested for homogeneity in the relevant variables, as presented in Table 1.

Table 1. Description of the Study Sample by Age, Height, and Weight

Variables	Unit of Measurement	Mean	Standard Deviation	Skewness Coefficient
Age	year	11.50	0.46	0.34
Weight	kg	39.32	2.77	0.72
Height	m	1.38	0.32	0.53
Forward roll	score	2.05	0.83	0.67
Handstand	score	1.92	0.47	0.84
Cartwheel	score	1.08	0.82	0.39

Description of the Tests Used in the Study

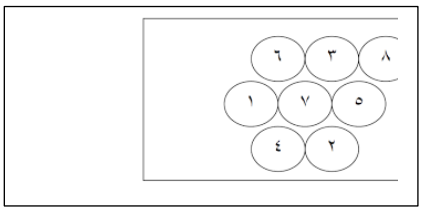
First: Motor Coordination Test (1: 92)

Test name: Jumping within Numbered Circles Test

Purpose of the test: To measure eye–leg coordination.

Equipment: A stopwatch and eight adjacent circles drawn on the ground. Each circle has a diameter of 60 cm and is numbered from 1 to 8.

Performance procedure: The pupil stands inside circle 1. Upon hearing the start signal, the pupil jumps with both feet together into circle 2, then circle 3, circle 4, and so on until reaching circle 8. Scoring: The shortest time taken by the pupil to move through all eight circles is recorded.



Second: Artistic Gymnastics Skill Tests (3: 123). Performance accuracy was assessed using a technical performance rubric for the three skills: the forward roll, handstand, and cartwheel. The rubric was developed in accordance with the judging criteria presented in Appendix 2. Three fundamental skills were selected for the present study, as shown in Table 2.

Table 2. Selected Skills and Their Assessment Methods

Skills	Assessment Method	Assessment Score
Forward roll	Video-recorded performance	0–10
Handstand	Video-recorded performance	0–10
Cartwheel	Video-recorded performance	0–10

Field Procedures

Main Experiment

The main experiment was conducted on Monday, 6 April 2026, on the playground of Al-Mutanabbi Primary School in the presence of the assisting staff. Each skill was recorded using a Sony video camera. All participants first performed the handstand, followed by the forward roll and then the cartwheel. After the assessment forms and video recordings for each participant and skill had been completed, the recorded videos were presented to a panel of gymnastics experts. The experts evaluated each participant's movement while performing every skill separately. The forms were then collected, classified, and entered for statistical analysis.

Results

Table 4. Pearson Correlation Coefficients among the Study Variables

Artistic Gymnastics Floor Exercise Skills	Unit of Measurement	Mean	Motor Coordination		R Value		Significance Level*	Statistical Significance
			Standard Deviation	Mean	Standard Deviation	R Value		
Forward roll	score	2.05	0.69	8.3 s	0.82	0.49	0.031	Significant
Handstand	score	1.92	0.54	6.9 s	0.50	0.81	0.000	Significant
Cartwheel	score	1.08	0.62	8.8 s	0.48	0.47	0.041	Significant

* Statistically significant at $\alpha \leq 0.05$; critical R = 0.44; degrees of freedom = 18.

Table 4 shows that the correlation coefficient between motor coordination and the forward roll was 0.49, compared with 0.81 for the handstand and 0.47 for the cartwheel. These results confirm statistically significant relationships at $\alpha \leq 0.05$ between the mean motor coordination measurements and the performance of selected floor exercise skills in artistic gymnastics among the study participants.

Discussion

The researcher attributes these findings to the fact that accurate performance of gymnastics skills depends substantially on an individual's ability to control different body segments and respond rapidly. Previous studies have indicated that motor learning tasks requiring coordination demand a level of bodily control that enables the performer to respond to external stimuli more effectively than individuals with low motor coordination. A high level of coordination also gives the pupil a sense of confidence while performing artistic gymnastics movements and skills. Such coordination among individual body segments is clearly reflected in the execution of the complete gymnastics movement sequence.

Accordingly, when pupils with a high level of coordination among different body segments are placed in instructional situations requiring acrobatic movements, as in gymnastics, they can execute the skill immediately and accurately along its required movement pathway.

The researcher considers the positive relationships between motor coordination and certain skills to be attributable to the nature of the skills themselves. Skills that rely on repeated practice, immediate error correction, and support from the teacher may show greater

improvement than skills that require substantial assistance and involve a high risk of falling (2: 112).

Conclusions

In light of the study objectives, findings, and discussion, the researcher concludes the following:

1. Motor coordination had a positive and statistically significant relationship with the performance of selected floor exercise skills in gymnastics: the forward roll, handstand, and cartwheel.
2. The relationship between the handstand and motor coordination was stronger than the corresponding relationships for the other motor skills.

Recommendations

Based on the study findings, the researcher recommends the following:

1- Motor control should be developed alongside the learning of technical skills.
2- Similar studies should examine other motor variables and compare their relationships across different sports.
3- Assisted teaching methods should be used when teaching gymnastics skills that require support and involve a high risk of falling.

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Appendix 1. Performance Assessment Form

Player No.	Skill	Assessment Level										Final Score
		1	2	3	4	5	6	7	8	9	10	
1												
2												
3												
4												
5												