# Methodology for developing coordination abilities in 5–6-year-old children with developmental delays through adapted active games

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## Abstract

The article examines methodological approaches to developing the coordination abilities of 5–6-year-old preschool children with developmental delays through adapted active games. Difficulties in motor coordination in such children may manifest as unstable balance, reduced movement accuracy, spatial orientation difficulties, slowed motor reactions, and problems coordinating body parts. Therefore, physical activity in preschool education must match the child's developmental level and provide repeated movement practice in an emotionally supportive format. The proposed methodology combines games aimed at developing dynamic and static balance, spatial orientation, movement accuracy, reaction speed, bilateral coordination, rhythm, and hand-eye coordination. The games are adapted by simplifying instructions, using visual cues, limiting the number of simultaneous tasks, gradually increasing complexity, and providing repetitive practice. A structural framework comprising preparatory, main, and concluding components is proposed for practical application in preschool educational institutions. This methodology can be used by physical education instructors, educators, and specialists in adaptive physical education.

**Keywords:** developmental delay, preschool children, coordination abilities, adapted physical activity, active games, psychomotor development, balance, spatial orientation, motor skills.

## Introduction

The preschool years are characterized by the rapid development of fundamental motor skills, coordination, balance, spatial awareness, and the ability to control body movements. In children with developmental delays, these processes may progress more slowly and unevenly. Difficulties in understanding movement instructions, transitioning from one movement to another, maintaining balance, replicating sequences of movements, and responding to visual or verbal cues limit their participation in regular physical education classes.

Motor difficulties in preschool children are not confined solely to isolated motor qualities. They also affect play activities, peer communication, independence in everyday movements, and participation in educational tasks. Van der Walt, Plastow, and Unger (2020) demonstrated that interventions aimed at developing motor skills in preschool children are typically based on child-centered, play-based approaches and delivered either individually or in group settings. Their review highlighted structured, repetitive practice as an essential component of motor development.

Kirk and Rhodes (2011) reviewed interventions aimed at developing fundamental motor skills in preschool children with developmental delays. The review included 11 studies, 9 of which reported significant improvements in fundamental motor skills. The programs lasted from 8 to 24 weeks, indicating that this category of children requires regular, rather than episodic, practice.

A broader review of motor skill development in children with physical and cognitive impairments found that developmental delay was one of the most frequently studied conditions. At the same time, the evidence regarding motor interventions in preschoolers with movement disorders is mixed: intervention types, participant characteristics, assessment protocols, and methodological quality vary considerably across studies.

Active games are well suited for preschool age because movement tasks are presented to the child in an accessible, understandable format. However, games designed for typically developing children cannot always be transferred to children with developmental delays without modification. An excessive number of rules, rapid switching between tasks, lengthy verbal explanations, and performing multiple actions simultaneously can complicate the activity and hinder improvement in targeted coordination skills. Therefore, adaptations should apply to both the motor content of the game and the instructional approach.

*Research objective:* to develop a methodology for enhancing the coordination abilities of 5–6-year-old children with developmental delays through adapted active games.

Research tasks: to analyze the characteristics of coordination development in preschool children with developmental delays; to select active games aligned with the key components of coordination ability; to determine the sequence and dosage of adapted games; and to develop practical criteria for monitoring children's motor activity.

*Object of the study:* the process of adaptive physical education for 5–6-year-old children with developmental delays.

Subject of the study: the content, organization, and dosage of adapted active games aimed at developing coordination abilities.

## Methods

**Table 1. Structure of an adapted physical activity session for 5–6-year-old children with developmental delays**

| Session Part | Content | Duration | Main Objective |
|---|---|---|---|
| Warm-up / Preparatory Part | Walking along designated lines, light jogging, imitative movements, responding to color cues | 5–7 minutes | Activation, focusing attention, preparing for coordination activities |
| Main Part I | Balance and spatial orientation games | 7–8 minutes | Developing posture control and orientation skills |
| Main Part II | Throwing, catching, target aiming, and bilateral coordination games | 7–8 minutes | Developing eye-motor and limb coordination |
| Main Part III | Reaction, rhythm, and change-of-direction games | 5–7 minutes | Developing motor reaction and movement control |
| Cool-down / Final Part | Slow walking, breathing exercises, simple stretching, and relaxation games | 3–5 minutes | Reducing movement intensity and restoring normal physical state |

The methodology is based on the principle of gradual complication of movements. Initially, the child performs a simple movement in response to a single cue, after which the movement is combined with changes in direction, speed, spatial orientation, object manipulation, or an additional visual cue.

## Results and discussion

The methodology encompasses static and dynamic balance, spatial orientation, motor precision, hand-eye coordination, bilateral coordination, motor response, rhythm reproduction, and the differentiation of direction and amplitude. Exercises should be organized into short segments, as prolonged repetition of the same task can diminish children's attention and motor precision. Verbal instructions are kept brief and are reinforced with demonstrations, colored markers, flashcards, hand gestures, or floor markings.

The difficulty of each game should be adapted individually. In the "Walk along the path" game, children can initially walk along a wide, straight path. Once the task is mastered, the path is narrowed and curved sections are introduced. In the next stage, carrying a light object while walking can be added.

In the “Follow the color” game, initially one visual cue corresponds to one movement. For example, green means walking forward, and red means stopping. A third cue is introduced only after the child consistently follows these cues. This reduces the simultaneous cognitive and motor load and helps determine whether an error was caused by motor difficulty or the complexity of the instruction.

Weekly schedule of adapted active games. A systematic program is more effective than isolated sessions. Reviews on motor development in preschool children indicate that repetitive programs lasting several weeks can improve motor skills, although their duration and frequency vary.

Three sessions per week can serve as a practical organizational model, but the exact frequency should be adapted to the preschool curriculum and the children's load tolerance. Complexity should be increased by only one parameter at a time. If the direction, speed,

**Table 2.** Set of adapted active games

| N | Game | Core coordination component | Execution |
|---|---|---|---|
| 1 | Follow the color | Movement reaction, spatial orientation | Moving toward the colored marker indicated by the teacher |
| 2 | Walk along the path | Dynamic balance | Walking along straight, curved, and zig-zag lines |
| 3 | Freeze on the island | Static balance | Stopping in the designated circle after a signal |
| 4 | Catch and return | Hand-eye coordination | Catching and returning a soft ball from a close distance |
| 5 | Right–left steps | Bilateral coordination | Stepping onto visual markers on the right and left |
| 6 | Find your spot | Spatial orientation | Moving to the designated colored zone upon a signal |
| 7 | Repeat my movement | Movement imitation and motor memory | Repeating one or two demonstrated movements |
| 8 | Rhythmic steps | Rhythm and temporal coordination | Walking, clapping, or stepping to a simple rhythm |
| 9 | Hit the target | Movement accuracy | Throwing a soft ball at a large target |
| 10 | Obstacle course | Complex coordination | Moving over, around, and between low obstacles |

number of rules, target size, and sequence of movements are changed simultaneously, it becomes difficult to determine which factor caused an error.

Methodological stages. Stage 1. Adaptation and familiarization. Children become familiar with the educator's cues, the movement area, equipment, and basic rules. Exercises are performed individually or in small groups. Key objectives: maintaining a stable body posture, following a single visual cue, moving in a designated direction, stopping on command, and replicating a demonstrated movement. The rules of the game should be clear in advance, and the sequence of actions should be short.

Stage 2. Developing individual components of coordination. The program focuses on balance, reaction time, spatial orientation, movement precision, bilateral coordination, and hand-eye coordination. Children perform tasks such as changing direction, navigating low obstacles, throwing and catching a ball, stepping on visual markers, and maintaining balance after moving. The educator increases the difficulty only after the previous progression is consistently mastered.

Stage 3. Integrating coordination abilities. Several previously mastered movement components are combined into a single activity. For example, a child walks along a line, stops at a colored marker, picks up a ball, and throws it at a target. The goal is not to achieve maximum speed; the child must maintain movement accuracy while switching between tasks.

**Table 3.** Sample weekly schedule

| Day | Main focus | Games | Intensity |
|---|---|---|---|
| Monday | Balance and spatial orientation | Walk the line; Freeze on the island; Find your spot | Low–moderate |
| Wednesday | Visuomotor and bilateral coordination | Catch and return; Hit the target; Right–left steps | Moderate |
| Friday | Reaction, rhythm, and integrated coordination | Follow the color; Rhythmic steps; Copy my moves; Obstacle course | Moderate |

**Table 3. Recommended indicators for assessing coordination abilities**

| Indicator | Test task | Recorded result |
|---|---|---|
| Dynamic balance | Walking along a marked line | Errors / execution time |
| Static balance | Standing on one leg | Seconds |
| Hand-eye coordination | Catching a soft ball | Successful catches out of 10 attempts |
| Movement accuracy | Throwing a ball at a target | Hits out of 10 attempts |
| Motor reaction | Response to a visual cue | Time or correct responses |
| Spatial orientation | Moving to the correctly designated area | Correct choices / errors |
| Bilateral coordination | Alternating right and left steps | Correct cycles |
| Motor memory | Repeating a short sequence of movements | Correctly repeated movements |

**Adaptation principles.** Visual support. Whenever possible, movements are demonstrated before verbal explanations are given. Colored cones, lines, footprints, cards, hoops, and gestures can be used.

**Brief instructions.** A single instruction should generally include only one or two actions. Long verbal sequences are broken down into separate steps.

Predictable game structure. From the outset, the child must know where to start, where to move, and where to finish.

Individualized difficulty. Distance, target size, lane width, ball size, and the number of movement elements can be adjusted without altering the core content of the game.

Repetition with variation. Repetition is necessary to learn a movement, but minor variations in direction, equipment, or visual cues prevent mechanical performance.

Positive feedback. Praise and feedback should focus on specific actions rather than general impressions. For example: “You stopped inside the circle” or “Both of your feet stayed on the line.”

Assessing coordination abilities. To experimentally evaluate the methodology, identical tests must be administered before and after the intervention. During the initial and final assessments, the instructions, equipment dimensions, distance, number of attempts, and testing conditions remain constant.

In an empirical article, results may be expressed using the arithmetic mean ($\bar{X}$), standard deviation ($\sigma$), coefficient of variation (V%), and, where the research design permits, Student's t-test and the corresponding p-value. These indicators are calculated exclusively from actual empirical data collected during the study.

The proposed methodology interprets coordination not as a single general ability, but as a combination of several motor control components. This approach is well suited for children with developmental delays, as performance in balance, eye-hand (visual-motor) coordination, spatial orientation, and reaction tasks can vary significantly.

Evidence from intervention studies supports systematic movement practice in preschool children with developmental delays. *Kirk and Rhodes (2011)* noted that most programs included in the review improved fundamental motor skills, although program duration and instructional design varied. Van der Walt, Plastow, and Unger (2020) also identified child-centered and play-based activities as common elements of motor interventions in preschool settings.

The proposed methodology cannot be considered effective for all children without experimental verification. Research on preschool children with motor impairments varies considerably, and differences in sample sizes, intervention designs, and assessment procedures limit direct comparisons.

Therefore, the experiment should clearly document participant composition, developmental characteristics, duration, attendance, baseline comparability of groups, game dosage/norms, and test reliability.

## Conclusion

Coordination development in 5- to 6-year-old children with developmental delays can be

fostered through a system of adapted active games focused on balance, spatial orientation, reaction time, bilateral coordination, movement precision, rhythm, and hand-eye/eye-motor coordination. The methodology is based on a gradual progression from simple, single-movement tasks to complex, combined activities.

Visual cues, concise instructions, repeated demonstrations, modifications of equipment and distance, and individual adjustment of task difficulty make the games more accessible to children whose cognitive and motor development deviates from typical age norms.

The proposed session consists of preparatory, main, and cool-down parts, with complexity being increased based on the child's actual motor performance rather than age alone.

Further experimental research is required to quantify changes in specific coordination metrics and to compare this methodology with traditional preschool physical education.

Such research should employ standardized pre- and post-tests, as well as provide both descriptive and inferential statistical data for the experimental and control groups.

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