

## ORIGINAL SCIENTIFIC PAPER

# Challenge-based games' impact on manipulative motor skills, direction-following, and body awareness in children with mental disabilities

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## Abstract

Children with mental disorders have a variety of barriers to social behavior and physical function, which causes many disruptions in motor activities. The purpose of the current study is to show how manipulative basic movement, directions, and body awareness in mentally challenged people are affected by the application of development games. Children with mild mental disabilities will receive treatment using the five basic games. The major conclusions of this study point to the effectiveness of the game model developed for strengthening the manipulative fundamental movement abilities, directions, and body awareness of mildly mentally impaired individuals.

**Keywords:** *Manipulative movement, Directions and body awareness, Mental disabled*

## Introduction

Due to their learning challenges, social impairments, and learning limits, children with mental disabilities require learning assistance that are referred to as special needs. To understand the limitations of children who are mentally impaired, it is thought vital to identify their condition (Linden, 2017; Zhang et al., 2020). A teacher must be able to adapt lessons to the needs of a mentally impaired student by being aware of the limitations of the child.

The physical functioning and social behavior of children with mental disorders are frequently hampered, which causes numerous interruptions in motor activities. As a result of central abnormalities connected to mental and intellectual function, the motor center of the brain has been disturbed. (Lai, Ang, Por, & Liew, 2018; Nijhof et al., 2018; Suherman, Dapan, Guntur, & Muktiani, 2019). The development of kinesthetic awareness-related behavioral traits, such as body awareness, spatial awareness, and directional awareness, is required to help mentally impaired children to move more effectively. This may enhance the quality of their physical functions and accelerate their development as well. As a result, physical education classes are

necessary for providing learning services for children who are intellectually challenged.

Children with mental disorders are not exempt from the rules of engaging learning, one of which is playing (Mesa, Le, & Beidel, 2015; Ogden, Carroll, Kit, & Flegal, 2014). Children can develop their bodies, minds, emotions, and social skills through play. Playing allows children to develop physically.

Running, throwing, catching, striking, and jumping are fundamental manipulating movement skills that benefit from, and are influenced by net play (Nacher, Jurdi, Jaen, & Garcia-Sanjuan, 2019; Stylianou, Kloepfel, Kulinna, & Mars, 2016). The occurrence of movements in online games that result in fundamental manipulative movement abilities serves as evidence for this. Additionally, mentally challenged kids can learn directional awareness skills through online games, which will help them stimulate their nerve function and grow normally. Applying fundamental manipulating movement techniques, such as throwing to the right, throwing left, hitting forward, hitting backward, and so on, can also help with direction awareness (Nacher et al., 2019; Yang, Hwang, & Sung, 2020). Children have the ability to respond to direction information by experiencing these motions.

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Children with modest mental disabilities still have very limited basic manipulation skills, and their kinesthetic awareness is still underdeveloped. This is due to the difficulties that mentally retarded children face in developing their physical abilities. As a result, they struggle with their perceptual motor skills, lack of directional awareness and a lack of ability to adapt to game variations that can increase manipulative basic movements. Therefore, the purpose of this study was to examine the extent to which developmental games can affect the ability of mentally disabled children to manipulate their bodies and follow orders.

**Methods**

Additionally, the pretest and posttest outcomes will be compared using the same design as the one-group pretest-posttest design study. Children with mild mental retardation will receive treatment with 5 core games (throw the shuttlecock, shuttlecock soar, the ball entered the ring, basket ball, shoot the ball), which were developed in this study to improve basic manipulative and directional awareness in children with mild mental retardation. These games will be used 4 times during the course of the treatment.

Mild mental retardation is characterized by having an IQ between 50 and 75, experiencing delays in physical development, motor abilities, language, intelligence, and social skills, and having limits in some areas of life, however basic life skills can still be taught. The study was approved by the Universitas PGRI Semarang Ethics Committee.

*Statistical analysis*

Prior to the start of field trials, quantitative data analysis was done on data collected from the observations of physical education teachers for mentally challenged children, adaptive sports experts, and physical education learning experts. The models developed, especially in the field trial stages, both on a small and large scale, were subjected to qualitative data analysis on data from observations of physical education learning experts, mentally impaired sports specialists and/or physical education teachers. In order to compare the pretest and posttest outcomes, a t-test for dependent samples was applied. The significance level was set to  $p < 0.05$ .

**Results**

The outcomes demonstrated the game's efficacy by demonstrating a significant change at  $p < 0.05$ , and the game was therefore deemed successful in enhancing the cognitive abilities of kids with mental disabilities (table 1). Similarly, there are notable differences, therefore the game is thought to be useful for enhancing the affective qualities of kids with mental retardation (table 2).

Children with mental retardation can significantly improve their psychomotor skills by playing the game of throwing right at the target (table 3). According to the results of the t-test in Table 4, the significant value is  $p < 0.05$ , indicating that the game of throwing in the direction is also very beneficial for enhancing the psychomotor features of throwing according to the direction in mentally retarded children.

**Table 1.** Cognitive aspects' in pretest and posttests.

No	Games	Pre-test	Post-test	Sig
1	Send the shuttlecock flying	6.78±0.28	8.56±0.67	0.001
2	Jumping Shuttlecock	5.66±0.33	7.68±0.65	0.003
3	The ball rolled into the ring.	5.78±0.35	8.76±0.14	0.001
4	Basket Ball	5.78±0.35	7.78±0.22	0.001
5	Strike the Ball	6.48±0.25	8.76±0.13	0.033

**Table 2.** Affective aspects in pretest and posttest.

No	Games	Pre-test	Post-test	Sig
1	Send the shuttlecock flying	6.13±0.51	8.21±0.12	0.001
2	Jumping Shuttlecock	5.25±0.48	8.21±0.71	0.001
3	The ball rolled into the ring.	4.78±0.67	7.22±0.13	0.001
4	Basket Ball	5.68±0.37	8.32±0.22	0.001
5	Strike the Ball	6.20±0.38	7.32±0.13	0.001

**Table 3.** Psychomotor aspects (throwing on target) in pretest and posttest

No	Games	Pre-test	Post-test	Sig
1	Send the shuttlecock flying	12.76±0.21	16.75±0.23	0.001
2	Jumping Shuttlecock	13.50±0.22	15.72±0.22	0.001
3	The ball rolled into the ring.	16.57±0.32	21.68±0.72	0.001
4	Basket Ball	17.21±0.33	21.79±0.48	0.001
5	Strike the Ball	16.62±0.34	23.48±0.48	0.001

**Table 4.** Psychomotor aspects (throwing according to direction) in pretest and posttest

No	Games	Pre-test	Post-test	Sig
1	Send the shuttlecock flying	12.21±0.18	14.71±0.25	0.001
2	Jumping Shuttlecock	13.68±0.10	15.24±0.11	0.002
3	The ball rolled into the ring.	12.42±0.21	15.25±0.76	0.001
4	Basket Ball	13.31±0.19	15.74±0.25	0.001

## Discussion

Children with mental retardation can benefit from playing net games like “throw the shuttlecock,” “throw the shuttlecock soar,” “the ball entered the ring,” “basket ball,” and “shot the ball” over the course of four meetings. After receiving the game, youngsters with mental retardation showed complete completion of their abilities in all areas.

This is supported by pertinent research by Kennedy-Behr et al (2013) which demonstrates the creation of a game model that is highly structured, efficient, and enjoyable. This is further supported by Frantz et al (2011), who found that the integrated physical activity game for kindergarten students contains seven models, each of which is a good and useful tool for transferring the objectives of the cognitive, affective, perceptual-motor, and psychomotor domains to be accomplished with each game.

The improvement in skills is the result of the child associating knowledge from the previous meeting with new knowledge, and the association gets stronger with each repetition. This is based on the law of practice learning theory proposed by Griffiths et al (2010), which claims that repetition is the key to learning and that the more times a subject is practiced, the more proficient a student will become. Research by Hands & Martin (2003), which discovered that physical activity learning programs (basic movements) combined with learning in schools can considerably improve cognitive, psychomotor, and emotional capacities, lends credence to the findings of this study.

Furthermore, Hardy et al (2010) contend that given the advantages it confers on physical, social, and psychological health, physical activity is crucial for all kids. Children’s health—physical, social, and emotional—benefits greatly from physical activity. This demonstrates how engaging in physical activity helps children develop socially, psychomotorily, and intellectually, as well as how it improves their physical health.

The findings of a study by Fedewa (2011), which revealed that physical activity has a significantly good impact on children’s cognitive outcomes and academic achievement, support the claim that physical activity influences cognitive development. Children’s academic progress and increased cognitive capacities are both benefits of physical activity. In addition, physical activity helps enhance kids’ social skills. According to Liu et al (2010), physical education can have a positive psychological impact through fostering children’s ability to respond appropriately in social and personal contexts as well as helping them develop their psychomotor abilities. According to the study’s findings, playing large-scale ball games with children repeatedly will create permanent brain connections that will enhance children’s ability to recognize letters, concepts, and number symbols (cognitive abilities), fundamental motor skills, and the development of active and happy (affective) lifestyles.

## Conclusion

The goal of strengthening manipulative basic movement skills, following directions, and body awareness in mildly mentally disabled children who wish to be achieved in every game is effectively transferred by the game model that has been developed. The output of this development only takes the form of a net game model that helps kids with minor mental retardation learn their basic manipulating movement abilities and body and directional awareness. For additional research, it can create different game-like tasks or continuing creating game models while trying to improve other skills.

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## Conflict of Interest

The authors declare that there are no conflicts of interest.

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