

Improving fundamental motor skills in children with intellectual disabilities through adapted sports and games

YUNI ASTUTI¹, BEKIR ERHAN ORHAN², ERIANTI³, DINA AMSARI⁴, DESSI NOVITA SARI⁵
^{1,3,5}Department of Sport Education, Faculty of Sport Science, Universitas Negeri Padang, INDONESIA
²Departement of Sport Management, Faculty of Sport Science, Istanbul Aydin University, TURKIYE
⁴Department of Elementary School Teacher Education, Universitas Negeri Padang, INDONESIA

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Abstract:

Play serves as a medium through which individuals can free themselves from various complex and harmful pressures. Play activities provide a platform where emotions can be alleviated, made accessible, and acquire significance. Recognizing the crucial role of play for mentally disabled children, play activities have evolved into play therapy. In adaptive physical education, it stands out as a suitable activity for individuals with intellectual disabilities. Specifically, for children with mild mental retardation, engaging in traditional sports games is expected to enhance their fundamental locomotor movements. This research aimed to investigate whether traditional sports games contribute to the improvement of basic locomotor movements in children with mild mental retardation by assessing the improvements of these movements among students at Padang 2 State Special School. The research followed a quasi-experimental design with a one-group pretest–post-test structure. The population and sample for this research included all students at Padang 2 State Special School, totaling 12 students. Performance tests, namely walking, running, and jumping, were employed to assess the results of basic locomotor movements. Based on data calculations, the difference between the pretest and post-test results of basic locomotor movements was 5.78. Given that the t-count is greater than the t-table ($5.78 > 1.86$) with a significance of 5% at df 11, H_0 was rejected, and H_a was accepted. Therefore, there is a considerable improvement in learning using traditional games, enhancing the basic locomotor movements of mildly mentally disabled students at Padang 2 State Special School after participating in equipment-moving and traditional games.

Keywords: Traditional Games, Basic Locomotor Movements, Mildly Mental Impaired

Introduction

Education plays a pivotal role in facilitating the progressive development of children across academic, social, and emotional dimensions, empowering them to effectively navigate and thrive in their surrounding environments (Garira, 2020; Maryanti & Nandiyanto, 2021). The constitutional and legal frameworks underscore the fundamental right of every citizen to education. According to the 1945 Constitution, article 31, paragraph 1, the government emphasizes that education is a universal entitlement for all citizens. Similarly, Article 5 of the National Education System Law affirms the equal right of every citizen to access education. It is crucial to acknowledge that this right extends to children with special needs (ABK), whose developmental trajectories may differ from those of their typically developing peers in physical, mental, or social and emotional aspects (de la Herrán Gascón et al., 2022; Mbewe et al., 2021). Aligning with these principles, providing education to children with special needs is essential to fostering an inclusive and equitable educational system, ensuring that every child, regardless of individual differences, can develop optimally and realize their full potential.

Special education (PLB), dedicated to addressing the educational needs of children with various disorders, including those with mental disabilities, is committed to continually enhancing its services (Levent, 2016; Wahsheh, 2019; Yildirim, 2022). Despite the focus on providing specialized support, it is imperative to recognize that mentally disabled children possess the same right to education as their peers. According to the Law of the Republic of Indonesia Number 20 of 2003, chapter IV, article 5, paragraph 2, citizens with physical, emotional, mental, intellectual, and social disabilities are entitled to special education. A mentally disabled child, as defined by Hamadneh & Almogbel (2023) and Sukri & Indartono (2020), is characterized by significantly lower intelligence compared to the average child and encounters challenges in adapting to the surrounding environment. Ensuring equal access to education for mentally disabled children aligns with the principles of inclusivity and upholds their fundamental right to education, as outlined in the legal framework. As efforts persist in refining Special Education services, it is crucial to uphold the principles of equality and inclusivity, fostering an environment where every child, regardless of their abilities, can access and benefit from education.

The American Association on Intellectual and Developmental Disabilities (AAIDD) delineates mental disability as a condition where an individual's general intelligence falls below average, coupled with challenges

in social adjustment throughout various developmental phases (Nikitin et al., 2011; Subedi & Shyangwa, 2018; Widiastuti & Winaya, 2019). Among the population of children with special needs, those grappling with mental disabilities are a distinctive group, their condition stemming from imperfect brain development and compromised neurological function. In the intricacies of human physical development, diverse movement abilities emerge, contingent upon an individual's inherent strength and overall body condition. However, the trajectory of physical development for some children with mental disabilities becomes impeded, giving rise to skill-related predicaments. Generally, these children exhibit deficiencies in movement skills, manifesting as compromised motor coordination, an unhealthy physique, a lack of self-awareness regarding their environment, and deficits in both gross motor and fine motor skills (Adanir, S., Gezer Şen, 2021; Katz & Lazcano-Ponce, 2008; Puteh et al., 2023).

The nuanced challenges faced by children with mild mental disabilities require tailored interventions that address both their personal and physical well-being. A crucial aspect of this comprehensive approach involves engaging in targeted exercises to enhance movement skills, such as fundamental locomotor, non-locomotor, and manipulative movements. Recognizing the unique needs of this demographic, interventions must be holistic, promoting improvements not only in physical capabilities but also in the broader context of social and environmental adaptability. By acknowledging the multifaceted nature of mental disabilities and their effects on various aspects of a child's life, we can strive to create comprehensive support systems to empower these individuals to overcome challenges and lead fulfilling lives. Consequently, integrating specialized exercises to refine movement skills is pivotal in fostering the holistic development of children with mild mental disabilities, promoting their overall well-being and societal integration (Orhan et al., 2023).

Mastering basic movements is essential for independence in daily activities. These fundamental movements are a cornerstone that everyone should adeptly navigate, forming the basis for other movement skills (Barnett et al., 2016; Department of Education Western Australia, 2013). Acquiring fundamental movement skills is particularly crucial for enhancing the quality of life for children with mental disabilities (Kaya & Yildiz, 2019; Yildirim, 2022). Various strategies can be employed to bolster physical and motor skills, with games proving to be a particularly effective avenue (Ritonga et al., 2022; Smith et al., 2021; Valianto et al., 2023). Integral to physical education, games serve as dynamic movement activities that considerably contribute to the educational process. Physical education, as a structured approach to learning, employs selected physical activities, games, or sports to achieve educational objectives. In this context, games align with the same tasks and goals as those inherent in the broader field of physical education (Fencl, 2022; Ilhan & Akin, 2022; Kolokoltsev et al., 2023). With their multifaceted benefits, games become a recreational pursuit and a means to fulfill educational goals. By integrating playful elements into physical education, educators leverage the inherent joy and engagement associated with games to impart essential movement skills.

The significance of fundamental movement skills in the holistic development of individuals cannot be overstated. Barnett et al. (2016) and the Department of Education Western Australia (2013) emphasize that these skills underpin a repertoire beyond physical prowess, fostering capabilities essential for an autonomous and active lifestyle. For mentally disabled children, mastering these skills has added importance, as highlighted by Kaya and Yildiz (2019) and Yildirim (2022). The intersection of physical education and games creates a symbiotic relationship, where the playful nature of games becomes a vehicle for achieving educational objectives, as observed by Fencl (2022), Ilhan and Akin (2022), and Kolokoltsev et al. (2023). Thus, integrating games into physical education improves motor skills, contributing to an individual's overall well-being and quality of life and aligning with the broader goals of educational frameworks.

Physical education plays a pivotal role in the holistic educational development of children by enhancing physical, mental, emotional, and social well-being through physical activity (Gorgon et al., 2020; Kovalev et al., 2023; Sawicki, 2023). The comprehensive nature of this educational process becomes particularly crucial when addressing the needs of mentally disabled children, who often exhibit below-average IQs, affecting their motor skills. This insight originates from the researcher's in-depth observations of the Physical Education, Sports, and Health (PJOK) learning process at Negeri 2 Padang. The implementation of the physical education learning process at Padang 2 State Special School requires careful attention to address the specific requirements of mentally disabled students.

In practical terms, the current approach involved inviting students to participate in walks. However, a significant challenge arose from the lack of teaching staff, especially those with expertise in sports, hindering the optimal execution of Physical Education learning activities. This staffing limitation has consequences for delivering exceptional learning experiences that can effectively stimulate the fundamental movement abilities of mentally disabled children. Basic locomotor skills, such as running, walking, and jumping, essential for overall physical development, still need to be addressed. The impact of these challenges is twofold. First, mentally disabled students at Padang 2 State Special School are not receiving the tailored and comprehensive physical education they require, affecting their overall well-being. Second, the limited availability of sports-specific teaching staff impedes the school's ability to provide a diverse and enriching learning environment. To overcome these challenges, the school must address staffing deficiencies and implement strategies to cater to the unique needs of mentally disabled students. This may involve developing specialized physical education programs, providing additional training for existing staff, and fostering collaborations with external experts in adapted

physical education. By doing this, Padang 2 State Special School can ensure that its students receive the exceptional learning experiences they deserve, promoting both their physical development and mental, emotional, and social growth.

Materials & Methods

Study design

The study involved a quantitative approach with an experimental research design, specifically employing a quasi-experiment due to the researchers' inability to control every student's activities after returning home from school (Gratton & Jones, 2022; Jiménez-Olmedo et al., 2016). The chosen research design is a group pretest–post-test design, with all students at Padang 2 State Special School as both the population and sample. The research instrument used for this study was a performance test, which assesses the physical activity of basic locomotor movements among students with mild mental disabilities. This involves tasks, such as navigating through a rope or obstacle course and jumping a specified distance. We employed a locomotor movement assessment instrument to gather data and conducted the study over four teaching and learning sessions. The research process and treatment delivery involved the following stages: a) providing direction and explanation to the selected class that served as research subjects, b) administering a pretest to the students participating in the study, c) implementing a treatment involving traditional game sports for the research subjects, and d) administering a post-test to evaluate the impact of the traditional game sports treatment on the students involved.

Participants

Data were gathered from a sample comprising 12 students with mild mental disabilities from Padang 2 State Special School. The selection of participants was conducted randomly, considering specific criteria, with a specific focus on male students aged 10 to 12 years.

Procedures

Stage 1 (pretest)

Assessment of the fundamental movement capabilities of students with mild mental disabilities involved various tests, including a 40-m sprint, a farthest throwing assessment, a 15-cm-high jumping test, a long jump without a starting point, and a balance test before the treatment with adapted sports and games. The sample comprised a single experimental group (n = 12).

Stage 2 (treatment)

The experimental group participated in a variety of modified sports and games tailored to enhance the fundamental movement abilities of mentally disabled children. This treatment spanned approximately 2.5 months, with sessions four times a week with an intensity level of 75–85%, repetitions ranging from 4 to 12 times, 1–5 sets, and 30–40 s intervals. The training material encompassed games incorporating elements of throwing and catching, activities involving jumping, games with elements of speed and balance utilizing tools, and games without using tools.

Stage 3 (post-test)

During this stage, post-test data were collected to assess the impacts of modifications to sports and games on the fundamental movement abilities of the students.

Instruments

Table 1. Basic movement abilities

Instruments	Cronbach's Alpha Value	Information
Sprint 40 m	0.9353	Reliable
Throw a handball as far as possible	0.7557	Reliable
Jump from a 15-cm beam	0.9056	Reliable
Long jump without a start	0.7628	Reliable
Stand on one leg for 10 s	0.9448	Reliable

Statistical analysis

Data were analyzed using a paired samples *t*-test to identify differences in primary movement ability following the application of the adapted sports and games treatment.

Results

The data description was intended to assess pretest and post-test muscle hypertrophy data for both the experimental and control groups. Table 3 shows the variations in the average data for each study group, indicating improved muscle hypertrophy for the experimental group compared to the control group.

Table 2. Descriptive statistics

Group	n	Data	Min	Max	Mean	Std. dev	Average difference	
							Pretest-post-test	Post-test
Experiment	12	Pretest	6	11	9.42	1.57	9.42	12.34
		Posttest	8	18	12.34	2.15		

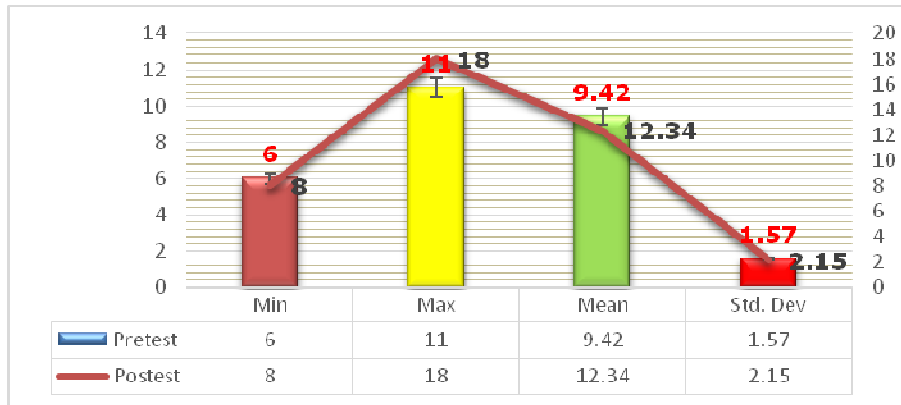


Figure 1. The average difference between pretest and post-test basic motor skills

Figure 1 shows a notable difference in the average basic movement abilities of mentally disabled children between the pretest and post-test in the experimental group subjected to adapted sports and games. Following the treatment, the experimental group exhibited significant improvements in basic movement abilities, with pretest and post-test averages of 9.42 and 12.34, respectively. To assess the normal distributions of the pretest and post-test data from both groups, we conducted a Shapiro–Wilk normality test, as shown in Table 4. The obtained normality values for both data sets ($P > 0.05$) indicate a normal distribution, a pattern also evident in Figure 2, where the data aligns or approximates the diagonal line. The homogeneity test was performed using the Levene test to determine whether the data for the two groups were homogeneous, and the results are shown in Table 3.

Table 3. Normality test

Group	N	Data	P^*
Experiment	13	Pretest	0.451
		Post-test	0.754

*Note - Data are normally distributed ($P > 0.05$).

Table 4. Homogeneity test

Group	Data	P^*
Experiment	Pretest-posttest	0.347
		0.653

*Note - Data are homogeneous ($P > 0.05$).

Hypothesis testing involved both paired and independent sample t -tests. The paired sample t -test was applied to assess the difference between the pretest and the post-test data within the two groups. Simultaneously, the independent sample t -test was employed to compare the post-test data between the two groups.

Table 5. Paired sample t -test

Pretest-post-test	Paired differences			t	df	P^*
	Mean	elementar y school	SEM			
Experiment	9.42	1.57	0.82	2.87	11	0.000
	12.34	2.15	1.43	1.86	11	0.000

*Note - The difference is significant ($P < 0.05$).

Table 6 shows notable differences between the pretest and post-test data for the experimental group. Students with mental disabilities in the experimental group exhibited enhanced basic movement abilities after undergoing adapted exercise and game treatments, with the pretest at 9.42 and post-test at 12.34, indicating a difference of 2.92. With a calculated t -count of 2.87, surpassing the critical t -table value of 1.86, it can be concluded that there was a significant improvement in the basic movement abilities of mentally disabled students at Padang 2 State Special School upon using adapted sports and games.

Discussion

Physical education teachers in specific school settings, particularly at the elementary level, are consistently tasked with delivering instructional content that is simple and easily comprehensible, especially for students with intellectual disabilities (Yildirim, 2022, 2022). Hence, there is a critical need to develop adapted sports and games focused on basic movements, allowing mildly mentally disabled students to build proficiency in uncomplicated movements before progressing to more intricate levels of learning. Notably, movement activities (sports) pose a challenge for students in special schools, particularly for students with intellectual disabilities, as their intellectual capacities are below average. Consequently, mentally disabled students may encounter difficulties in adapting to novel experiences (Kardaş & Sadık, 2018; Wahsheh, 2019). Addressing this

challenge requires dedicated and sincere efforts to ensure that students with mental disabilities can access various forms and types of movement experiences, starting from basic movements and gradually progressing to movements that are more complex. This approach for mentally disabled students significantly differs from that for typical students without disabilities. This necessitates heightened patience, considering the slower stage of understanding, and employs a personality (inclusion) approach (Sandford et al., 2022; Zengin, 2019). In the personality approach, teachers are mandated to tailor their teaching methods by closely observing the diverse characteristics of each student. This individualized attention facilitates the translation of every instruction given by the Physical Education teacher, ultimately making the learning process more accessible for mentally disabled students.

Initially, motor learning not only enhances the proficiency of motor skills but also subtly influences an individual's attitudes and behavior. The scope of movement learning is closely related to enhancing movement skills, transforming someone from a novice to a proficient mover, with the reacquisition of movement skills that may have become challenging or impossible due to factors such as injury or illness. Tailoring movement learning for children with special needs is imperative, as it directly affects the anticipated outcomes of the learning process. The learning process considerably shapes both new and previously acquired movement skills, with the potential for positive or negative effects. Hence, the learning process must be customized to align with the characteristics of students with intellectual disabilities. The play approach for mentally disabled students involves play therapy through adapted sports and games to improve basic non-locomotor, locomotor, and manipulator movement skills in mentally disabled students (Jubhari et al., 2022; Kesumawati & Damanik, 2019). Adapted games and sports encompass various simple activities (movement) presented in a game format to provide movement therapy for students with mild mental disabilities. The primary objective is to bolster the movement abilities (performance) of students with mental disabilities, specifically to support their engagement in daily activities (Ratnakumar, 2020).

Thus, play is advantageous for enhancing movement skills (psychomotor), and it improves a person's knowledge (cognitive) as well as attitudes and behavior (affective) (Dalbesar & Yaşar, 2021; Gul et al., 2023). However, it is essential to recognize that each individual's movement skills, influenced by genetics and the environment, vary. This holds for children with special needs (Tangrahita), particularly mentally disabled students at the elementary school level, who require enjoyable and engaging learning experiences due to their emotionally unstable characteristics, leading to notable fluctuations in attitudes and behavior. Consequently, with the guidance of teachers, mentally disabled students at the elementary school level can still actively participate in physical education learning activities. The design of physical education learning in special schools must be tailored to the characteristics of mentally disabled children to enhance enjoyment and excitement to ultimately improve their basic movement and intellectual abilities (Koslouski et al., 2023; Yildirim, 2022)

Teachers need to be vigilant regarding rapid changes in behavior that can disrupt the comfort of other students. Therefore, activities suitable for mentally disabled students are play-based, fostering fun and excitement. This study introduces a game model derived from adapted sports to cultivate the basic movements of students in special elementary schools, particularly those with mental disabilities. This game model is applicable for implementation by teachers in physical education learning for mentally disabled elementary school students in special schools. The objectives encompassed in this game model are to enhance movement skills, such as walking, running, jumping, throwing, catching, and juggling.

Conclusions

This study focused on adapting sports and games for mentally disabled students at Special School Number 2 Padang, resulting in a robust and credible model. The developed model underwent thorough examination and validation, confirming its validity and reliability. This significant achievement lays the groundwork for integrating adapted sports and games into the physical education curriculum for special elementary schools, offering a promising avenue for play therapy among students with intellectual disabilities. This comprehensive investigation emphasizes the critical importance of tailoring physical activities to meet the unique needs and abilities of mentally disabled students. The validation process included rigorous testing and analysis, affirming the effectiveness and dependability of the adapted sports and games model in addressing the diverse requirements of students with intellectual disabilities. The determined validity and reliability can instill confidence in educators when implementing such programs within the specialized context of special elementary schools. Teachers in physical education now possess a valuable tool with the validated model developed in this study. The adaptability of sports and games ensures that educators can create an inclusive and therapeutic environment for students with intellectual disabilities, making play therapy a practical approach to enhance the overall well-being and development of these students.

The significance of this research transcends Special School Number 2 Padang, providing a blueprint for other educational institutions educating students with intellectual disabilities. Recognizing the validity and reliability of the adapted sports and games model, educators can confidently incorporate these activities into their teaching methodologies, contributing to the holistic development of students with special needs. Thus, this research can catalyze positive change in physical education for intellectually disabled students, underscoring the transformative potential of adapted sports and games as a therapeutic and inclusive educational tool.

Conflicts of interest - The authors declare no potential conflicts of interest.

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