

How does the application of low impact out bound locomotor games affect the physical fitness of children with moderate disabilities?

¿Cómo afecta la aplicación de juegos locomotores al aire libre de bajo impacto a la forma física de los niños con discapacidad moderada?

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Abstract. Physical fitness is an important element in the physical and mental development of children, including those with learning disabilities. Children with dementia often face various challenges that may hinder their participation in conventional physical activities. As a result, they are at risk of health problems such as obesity, cardiovascular disorders, and decreased overall quality of life. Therefore, this study aims to provide locomotor movement activities, namely playing outside the classroom or outdoors or outbound to improve the physical fitness of children with intellectual disabilities. This research is experimental research, research design with pretest-posttest control group design experimental research design used to measure the variable effect of outbound low impact locomotor games, namely game activities walking in a 10 m stove, running in a straight line 10 m, jumping times 30 cm, jumping holes 30 cm with light intensity. The population of the study was 42 children with disabilities at SLBN Marsudi Putra I Manding Bantul Yogyakarta, 30 children with moderate disabilities, the sampling technique was purposive sampling. The sample was divided into two groups, namely the control group and the treated group for 2 months per week twice. Initial data processing, the data was processed using descriptive statistics. Furthermore, the normality test was carried out using the Shapiro-Wilk test with a significance level of $\alpha = 0.01$. The homogeneity test used Barlett's test with a significance level of $\alpha = 0.01$. All data were tested using analysis with a significance level of $\alpha = 0.01$. Before conducting the t test, the data was tested using the normality test and homogeneity test first as a prerequisite test.

There is an effect of giving outbound low impact locomotor games on increasing the physical fitness of moderate deaf children assessed from the aspects of running 30 m, moving the ball, shuttle run 10 m, lifting barbells, and lying down. This shows that the data for running 30 m, moving the ball, shuttle run 10 m the experimental group has a faster average time than the control group. While the data on lifting barbells and lying sitting and resting obtained by the experimental group average is higher or the number is more than the control group. This research highlights the importance of integrating fun and inclusive physical activities in fitness programs for children with disabilities. By doing so, they can enjoy better health benefits and improve their overall quality of life.

Keywords: Locomotor Out Bound Games, Physical Fitness, Children with Intellectual Disabilities

Resumen. La forma física es un elemento importante en el desarrollo físico y mental de los niños, incluidos aquellos con problemas de aprendizaje. Los niños con demencia a menudo se enfrentan a diversos retos que pueden dificultar su participación en actividades físicas convencionales. Como resultado, corren el riesgo de sufrir problemas de salud como obesidad, trastornos cardiovasculares y disminución de la calidad de vida en general. Por lo tanto, este estudio tiene como objetivo proporcionar actividades de movimiento locomotor, es decir, jugar fuera del aula o al aire libre para mejorar la forma física de los niños con discapacidad intelectual. Esta investigación es una investigación experimental, diseño de la investigación con pretest-posttest grupo de control de diseño de investigación experimental utilizado para medir el efecto variable de outbound juegos de bajo impacto locomotor, a saber, las actividades de juego caminar en una estufa de 10 m, correr en línea recta 10 m, saltando veces 30 cm, saltando agujeros 30 cm con intensidad de la luz. La población del estudio fue de 42 niños con discapacidad en SLBN Marsudi Putra I Manding Bantul Yogyakarta, 30 niños con discapacidad moderada, la técnica de muestreo fue el muestreo intencional. La muestra se dividió en dos grupos, a saber, el grupo de control y el grupo tratado durante 2 meses por semana dos veces. Procesamiento inicial de los datos, los datos se procesaron mediante estadística descriptiva. Además, se realizó la prueba de normalidad mediante la prueba de Shapiro-Wilk con un nivel de significación de $\alpha = 0,01$. Para la prueba de homogeneidad se utilizó la prueba de Barlett con un nivel de significación de $\alpha = 0,01$. Todos los datos se probaron mediante análisis con un nivel de significación de $\alpha = 0,01$. Antes de realizar la prueba t, los datos se sometieron a la prueba de normalidad y a la prueba de homogeneidad como requisito previo. Existe un efecto de la realización de juegos locomotores de bajo impacto en el aumento de la condición física de los niños sordos moderados evaluados desde los aspectos de correr 30 m, mover la pelota, correr 10 m en lanzadera, levantar pesas y tumbarse. Esto demuestra que los datos para correr 30 m, mover la pelota, correr 10 m en lanzadera el grupo experimental tiene un tiempo medio más rápido que el grupo de control. Mientras que los datos sobre levantar pesas y tumbarse sentado y descansar obtenidos por el grupo experimental la media es superior o el número es mayor que el del grupo de control. Esta investigación pone de relieve la importancia de integrar actividades físicas divertidas e inclusivas en los programas de acondicionamiento físico para niños con discapacidad. De este modo, pueden disfrutar de mayores beneficios para su salud y mejorar su calidad de vida en general.

Palabras clave: Juegos locomotores al aire libre, condición física, niños con discapacidad intelectual

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Introduction

Physical fitness is an important aspect of child development (Suganda et al., 2023; Suratmin et al., 2024). This includes children with disabilities. Physical fitness for children with disabilities is important to improve to maintain physical condition to stay healthy and fit in living daily life (Raharjo et al., 2021). Appropriate physical activity can help improve their physical, mental, and emotional well-being (Wouters et al., 2019, 2020). Play activities as a way to stimulate deaf children to do physical activity, out bound locomotor games are given to moderate deaf children as a way for children to get excited and want to move without coercion (Haris Satria et al., 2020). In addition, a study revealed that interactive games and activities in learning can make the learning process more fun and interesting for children with disabilities (Hasriani et al., 2022). Providing play activities so that children with intellectual disabilities want to move happily without coercion. One method that can be applied to achieve this goal is to use low impact locomotor games in an out bound setting.

Low impact locomotor games include activities such as walking, light jogging, and obstacle course games that are adapted to children's physical abilities. These games are designed to be safe and accessible for all children, including those with disabilities. Out bound settings, or outdoor activities, provide a natural and fun environment, which can increase children's motivation and participation in physical activity (Sanoesi, 2018; Yusroni, 2024). The selection of low impact locomotor outbound games is one important aspect in an effort to achieve the objectives in the study to improve the physical fitness of students with disabilities (Athaya et al., 2023; Bangun et al., 2023; Harianto et al., 2023). The process of providing game activity treatment is tailored to the characteristics of students with disabilities, namely by modifying physical fitness tests that are easy to do and attractive and safe (Addriana et al., 2019).

The impact of low impact locomotor game activities on children willing to do movement activities and the results affect their fitness status there is an increase (McDonough et al., 2020; Pamungkas et al., 2022; Rizqika Rizal et al., 2022). A treatment in the form of physical activity has a positive impact on children's movement activity and physical fitness (Athaya et al., 2023; Samodra et al., 2023; Septianto et al., 2024). Therefore, it is recommended for coaches and sports teachers to provide interesting and easy and safe movement activities for children (Harianto et al., 2023; Mariati et al., 2024). Physical fitness as a measure of the health status of each individual today and in the future (Fonseca del Pozo et al., 2017; Setiawan et al., 2024). Improved physical fitness can be associated with improved mental health of individuals in childhood (Rodriguez-Ayllon et al., 2019). Activities carried out in daily life require a fit

body condition so that it does not easily experience fatigue, which will cause disrupted activities (Åberg et al., 2009). The results of the study prove that the condition of physical fitness affects the academic condition of children when following learning at school (Wittberg et al., 2012). A teacher is expected to know the level of physical fitness of each student while at school in order to provide appropriate physical activity learning to students, and can have an impact on students after being in the community (Hardinata et al., 2024). Lack of physical activity is thought to be a risk factor for various health complaints and perceived stress (Østerås et al., 2017), cardiovascular disease (Apriandi et al., 2023; Vancampfort et al., 2019). Furthermore, an article found that physical fitness, resilience, anxiety, and mental health are significantly correlated (Li et al., 2021).

Several previous studies have revealed a lot of research related to physical fitness in students, even the latest research has motion games on the physical fitness of children with intellectual disabilities (Kuznetsova et al., 2022), even on the mental health of students with disabilities (Dimiyati et al., 2022). However, research that discusses low impact out bound locomotor games is still rare, especially discussing physical fitness in children with disabilities. Therefore, this study aims to evaluate how the application of low impact out bound locomotor games can affect the physical fitness of children with deafblindness. The main focus was to assess changes in aspects of physical fitness such as cardiovascular endurance, muscle strength, flexibility and body composition. By understanding the effects of this method, it is hoped that more inclusive and effective physical activity programs for children with intellectual disabilities can be developed. This study is expected to make an important contribution to the field of physical education and health, particularly in the development of strategies that support the physical fitness of children with disabilities, so that they can reach their maximum potential in physical development and health.

Materials and Methods

Participants

The population in this study were 42 children with moderate deformities at Marsudi Putra I Manding Bantul Special School, Yogyakarta. Determination of the sample using purposive sampling technique with consideration of several criteria so as to obtain as many as 30 moderate tunagrahita children with IQ between 35-50 as samples in the study. The research subjects amounted to 30 moderate tunagrahita children with IQ between 35-50. Where these moderate tunagrahita children are difficult to receive information that is directed and accompanied by 1 child 1 teacher in participating in activities. The division of groups is

15 children as a control group and 15 children as an experimental group.

Research Design

The method used in this research is experimental, the experimental research design used to measure the influence variable of outbound low impact locomotor game is an experimental design about several components in outbound impact locomotor game activities that affect the physical fitness of moderate deaf children. Game activities are walking on a 10 m mature track, running on a 10 m straight line, 30 cm jump times, 30 cm jump holes with light intensity. Research design with The Randomized Posttest-Only Control Group Design (Fraenkel et al., 2022). The research subjects were given an initial test and given treatment. The number of treatments given to the experimental group was one week twice for 2 months. Giving treatment per week 2 x with

consideration of adjusting the sports lesson schedule and Friday as a hybrid day. The treatment was given for two months or 16 times. Furthermore, a final test was given to see the effect of the treatment. Instruments to collect data in this study using locomotor outbound game tests (30m straight run, 30m straight run, 30cm jump, 30cm hole jump) and modified TKJI physical fitness measurement tests. The research design can be seen in table 1.

Table 1.

The Randomized Posttest-Only Control Group Design

Treatment group	R	X	O
Control group	R	X	O

Source: (Fraenkel et al., 2022)

Procedure

To refine in more detail, some aspects were developed as follows:

Table 2.

Aspects of modified activities in children with moderate disabilities

Modification of Activities	
Customization	The low-impact locomotor games were tailored to the abilities of children with moderate disabilities by adjusting the intensity, duration, and complexity of each activity
Walking on a 10m track	was adapted by allowing more time to complete the course, ensuring children felt comfortable and confident
Running on a 10m straight line	was modified to accommodate varying speeds, allowing each child to run at their own pace
Jumping activities (30cm jumps and hole jumps)	were adjusted by providing visual cues and support if needed, and the height or distance could be reduced based on individual abilities
Progressive Difficulty	The activities were designed to gradually increase in difficulty, ensuring that the children could build their physical fitness without feeling overwhelmed
Ensuring Consistency Across Sessions	
Standardized Protocols	The researchers developed detailed guidelines to ensure that each session was conducted in the same manner
Session Structure	A fixed schedule for warm-up, main activities, and cool-down phases, ensuring each session followed the same flow
Instructor Training	All instructors were trained to deliver the activities consistently, using the same language and encouragement techniques
Monitoring and Feedback	Regular monitoring of sessions by the research team ensured adherence to the protocol, and any deviations were corrected in real-time
Controlling Potential Confounding Variables	
Baseline Fitness Levels	Before the intervention, children underwent a baseline assessment of their physical fitness levels. This information was used to ensure that the experimental and control groups were comparable
Dietary Control	To minimize the influence of diet on physical fitness outcomes, the researchers provided guidelines to parents and caregivers on maintaining consistent dietary patterns throughout the study. Additionally, any significant deviations from these guidelines were recorded and considered during data analysis
Consistency in Daily Activities	Efforts were made to control for daily physical activities outside of the study by recording any additional physical activities the children participated in, ensuring that the effects measured were primarily due to the intervention
Data Collection and Monitoring	
Regular Assessments	Physical fitness tests were administered at regular intervals to monitor progress and adjust the program if necessary
Parental/Caregiver Involvement	Regular communication with parents and caregivers helped ensure that the children's daily routines, including sleep and nutrition, remained consistent

By elaborating on these aspects, your manuscript will provide a more comprehensive understanding of how the intervention was tailored, ensuring the results are robust and replicable.

Data Analysis

Initial data processing, the data will be processed using Descriptive statistics. Furthermore, the normality test will be carried out using the Shapiro-Wilk test with a significance level of $\alpha = 0.01$. Homogeneity test using Barlett's test with

a significance level of $\alpha = 0.01$. All data were tested using analysis with a significance level of $\alpha = 0.01$. Before conducting the t test, the data was tested using the normality test and homogeneity test first as a prerequisite test.

Research Results

The results of the frequency distribution of locomotor outbound games shown in table 3 and histogram figure 1 below show that: First, walking on 10 m bundles, most children have successfully walked on 10 m bundles as many as 21 children

(70%) and the remaining 9 children (30%). Second, running 10 m straight, most children have succeeded in running 10 m straight as many as 23 children (76.7%) and the remaining 7 children (23.3%). Third, jumping 30 cm, most children have successfully jumped 30 cm as many as 23 children (76.7%) and the remaining 7 children (23.3%). Fourth, jumping over a 30 cm hole, most children have successfully jumped over a 30 cm hole as many as 21 children (70%) and the remaining 9 children (30%).

Table 3.
Statistical Results of Low Impact Outbound Locomotor Game Description

Road				
	Frequency	Percent	Valid Percent	Cumulative Percent
Unsuccessful	9	30.0	30.0	30.0
Valid Successful	21	70.0	70.0	100.0
Total	30	100.0	100.0	
Run				
	Frequency	Percent	Valid Percent	Cumulative Percent
Unsuccessful	7	23.3	23.3	23.3
Valid Successful	23	76.7	76.7	100.0
Total	30	100.0	100.0	
Jump				
	Frequency	Percent	Valid Percent	Cumulative Percent
Unsuccessful	7	23.3	23.3	23.3
Valid Successful	23	76.7	76.7	100.0
Total	30	100.0	100.0	
Jump				
	Frequency	Percent	Valid Percent	Cumulative Percent
Unsuccessful	9	30.0	30.0	30.0
Valid Successful	21	70.0	70.0	100.0
Total	30	100.0	100.0	

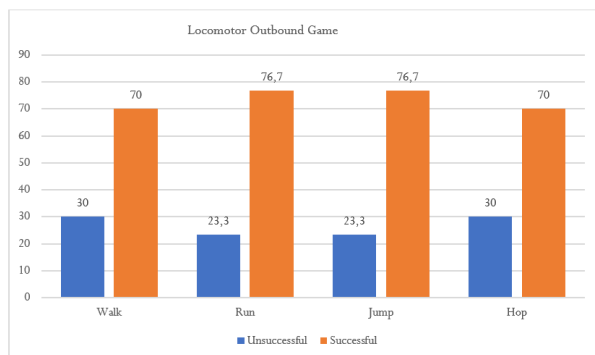


Figure 1. Histogram of low-impact outbound locomotor games

Research on the effect of providing locomotor outbound games on increasing the physical fitness of moderate deaf children. In this study, descriptive statistical testing was carried out on 30 m running data, moving the ball, 10 m shuttle run, lifting barbells, and lying down. The results of descriptive statistics will be presented in Table 3. Based on Table 4 and Figure Histogram 2 can be explained that the provision of locomotor outbound games to improve the

physical fitness of moderate deaf children is better than the group without the provision of games.

Table 4.
Descriptive Statistical Results of Children's Physical Fitness

Variables	Experiment				Control			
	Min	Max	Mean	SD	Min	Max	Mean	SD
Lares 30 m	3.35	17.00	6.46	3.57	3.50	17.08	6.56	3.57
The ball moves	1.00	14.41	3.75	3.47	1.02	14.45	3.83	3.46
10m sprint	18.39	42.24	24.04	5.09	18.41	42.24	24.18	5.09
Lift the barbell	6.00	31.00	18.20	5.19	6.00	29.00	15.53	4.29
Sit and rest	7.00	39.00	22.47	8.89	4.00	40.00	21.87	9.24

N=30. Source: Data processed with SPSS version 26

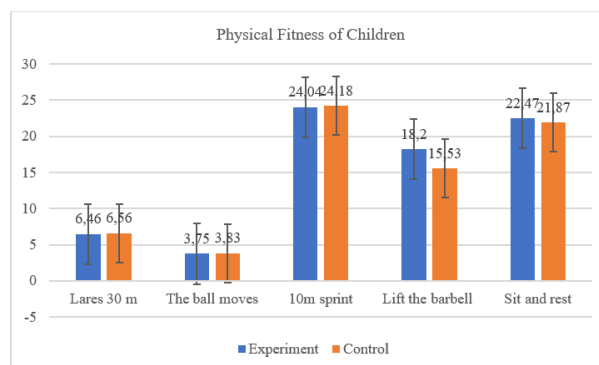


Figure 2. Histogram of Children's Physical Fitness

Hypothesis Test Results

Based on the results of the normality test in table 5, the significance value ($p > 0.05$) shows that the data is normally distributed and can be continued with a different test. The results of the homogeneity test calculation in table 6 obtained the p sig value between the experimental and control groups is greater than 0.05, so the relationship between the data variables of 30 m run, ball move, 10 m shuttle run, barbell lift, and sit and rest based on the experimental and control groups. is homogeneous.

Furthermore, the Independent t-test analysis aims to significantly differentiate the data from the 30 m run, ball movement, 10 m sprint, barbell lifting, and sitting and resting based on the experimental group and control group. The results of the Independent t Test can be seen in table 7.

Table 7 shows that there are differences in the average data of 30 m run, ball move, 10 m shuttle run, barbell lift, and sit and rest based on the experimental group and control group. The average value of the experimental group is faster than the average value of the control group in the 30 m run, ball move, 10 m shuttle run variables. This means that there is a difference in average data based on 30 m run, ball move, 10 m shuttle run. This shows that the experimental group has a faster average time than the control group. While the data seen from the barbell lift, and lying sitting obtained the average experimental group is higher or the number is more than the control group.

Statistical results show the results of the independent t test statistical test conducted to determine the average difference in data running 30 m, moving the ball, shuttle run 10 m, lifting barbells, and sit and rest. The results showed that based on the experimental group and control group, the p-value was smaller than 0.05 (5% significance level), meaning that there were significant differences in data based on 30 m running, moving the ball, 10 m shuttle run, barbell lifting, and sit and rest.

Table 5.
Normality Test Results

Variables	Experiment	Control	Description
30m run	0.122	0.120	Normal
Ball move	0.101	0.101	Normal
Shuttle run 10 m	0.142	0.151	Normal
Lift the barbell	0.703	0.154	Normal
Sit and rest	0.536	0.887	Normal

Table 6.
Homogeneity Test Results

Variables	Experiment	Control	Description
30m run	0.989	0.980	Homogeneous
Ball move	0.982	0.764	Homogeneous
Shuttle run 10 m	0.996	0.766	Homogeneous
Lift the barbell	0.234	0.164	Homogeneous
Sit and rest	0.914	0.882	Homogeneous

Table 7.
Independent t-test results of physical fitness of moderately disabled children

Data Variables	Experimental group Mean \pm (SD)	Control group Mean \pm (SD)	p-value	Information
Lares 30 m	6.46 \pm (3.57)	6.56 \pm (3.57)	0.011	Very different
The ball moves	3.75 \pm (3.47)	3.83 \pm (3.46)	0.026	Very different
10m sprint	24.04 \pm (5.09)	24.18 \pm (5.09)	0.013	Very different
Lift the barbell	18.20 \pm (5.19)	15.53 \pm (4.29)	0.034	Very different
Sit and rest	22.47 \pm (8.89)	21.87 \pm (9.24)	0.008	Very different

Discussion

This study examines the effect of locomotor outbound games on improving the physical fitness of children with moderate disabilities. A relevant study said that using interactive games and activities in learning can make the learning process more fun and interesting for children with disabilities (Sari et al., 2020). The process of providing game-based learning media in it so that it can make mentally retarded students more active in the learning process, and can attract student interest (Dimiyati et al., 2022).

Low impact outbound locomotor games are physical activities designed to involve basic body movements, such as walking, running, jumping and crawling at low intensity, combined with fun and challenging outbound elements. These activities are designed to be safe and appropriate for the physical abilities of children with moderate disabilities, avoiding the risk of injury while still providing fitness benefits (Irawan, Sutaryono, & Widya Permana, 2021; Irawan, Sutaryono, Permana, et al., 2021). After receiving treatment with free outdoor locomotor movement play activities

(experimental group) for 2 weeks or 16 times, the physical fitness of children with disabilities has increased significantly compared to children with disabilities who do not receive free outdoor locomotor activity game treatment (control group). This shows that movement activities that are playing outdoors have a good impact on increasing the physical fitness of children with disabilities.

Moderately impaired children often have limitations in motor, cognitive, and social skills that affect their quality of life and physical development (Özkan & Kale, 2023). Therefore, a special approach in learning and physical training through outbound low impact locomotor games is needed to improve their physical fitness. Interesting, easy and safe games make it easy for students with disabilities to perform.

The impact of low impact locomotor game activities on children willing to do movement activities and the results affect their fitness status there is an increase (Khairuddin et al., 2023). Without giving unfavorable treatment to children's physical fitness movement activities, it is advisable for coaches and children's sports teachers to provide movement activities that are interesting and easy and safe for children (Athaya et al., 2023).

Although the benefits of play were mentioned, the study did not thoroughly explain how the findings could be applied in an educational setting or what challenges might arise in implementing the program in a different context, so this could also be one of the limitations of the study. Furthermore, such as the small sample size and specific characteristics of the participants, future research is expected to provide a broader presentation of both the sample and the concept of programs for children with disabilities.

Conclusion

Outbound low impact locomotor games are an effective method to improve the physical fitness of children with moderate disabilities. Through this approach, children can experience improvements in muscle strength, balance, coordination, cardiorespiratory capacity, as well as cognitive and emotional development. With proper supervision and a customized program, these games can be a valuable tool in helping moderately retarded children achieve their optimal physical fitness potential. Based on the results of the research and discussion in this study, there is an effect of the provision of locomotor outbound games on improving the physical fitness of children with moderate deafness assessed from the aspects of running 30 m, moving the ball, shuttle run 10 m, lifting barbells, and lying sitting. This shows that the experimental group has an average of more than the control group. Research limitations based on the direct experience of researchers in the research process, there are limitations that respondents are only students with intellectual disabilities without looking at other characteristics. Future researchers

can use respondents of children with special needs who have other disabilities, and the research population is more expanded.

Conflict of interest

The authors have received no support from any organization for the submitted work. The authors have no relevant financial or non-financial interests to disclose.

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