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The Effect of Brain Gym Implementation on the Learning Engagement of Children with Intellectual Disabilities at SLB Jati Wiyata Dharma, Tuban Regency

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Abstract

Background: Children with intellectual disabilities experience limitations in intellectual functioning, attention, and memory, which significantly affect their ability to concentrate and comprehend learning materials. **Aim:** to examine the effect of a brain gym intervention—a series of simple movements designed to optimize brain function, enhance oxygenation, and improve concentration—on students' learning compliance. **Methods:** This research employed a quantitative pre-experimental design using a one-group pretest–posttest approach without a control group. The sample consisted of 19 students from SLB Jati Wiyata Dharma Tuban, selected through purposive sampling. Data were collected using a learning compliance questionnaire administered before and after the intervention and subsequently analyzed using the Wilcoxon signed-rank test. **Results:** The results revealed a significance value of 0.0001, indicating that H1 was accepted. These findings demonstrate that brain gym therapy produced a significant change in the learning compliance of children with intellectual disabilities at SLB Jati Wiyata Dharma, Tuban Regency. The results suggest that brain gym is an effective means of fostering a calm and focused learning environment. **Conclusion:** Therefore, schools are recommended to implement brain gym exercises routinely as an innovative instructional method to enhance focus and discipline among students with special needs.

Keywords: Brain Gym, Learning Process Compliance, Children with Intellectual Disabilities

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Introduction

Children with special needs, including those with dementia and visual impairments, require tailored educational approaches due to their unique challenges in cognitive and sensory development. Children with dementia often struggle with focus and learning, necessitating specialized therapies to enhance attention and learning abilities (Sipahelut, 2021). Children with visual impairments, who experience significant visual limitations, face additional educational barriers such as dyscalculia, which affects their ability to understand numbers and perform calculations (Nastiti et al., 2023). The classification of children with special needs encompasses various groups, including those with intellectual disabilities, motor impairments, and emotional disorders, each of which requires specific educational strategies and support systems (Mardiansah et al., 2024; Saswita et al., 2024).

Children with intellectual disabilities have intelligence levels below the average of typically developing children, resulting in limitations in thinking ability, attention, and memory, as well as an inability to think logically (Faisah et al., 2023). In the educational context, children with intellectual disabilities also experience difficulties in receiving and understanding instructional material delivered at school. They tend to prefer instant outcomes without the patience to engage in the learning process and often favor playing alone rather than studying. Nevertheless, with intensive guidance and support, children with intellectual disabilities are able to acquire new knowledge, including concepts that may be engaging and meaningful to them (Sinaga et al., 2023).

Globally, more than 450 million children experience mental disorders or intellectual disabilities (World Health Organization data, 2019). In Indonesia, data from the Disability Information System reported that as of October 2022 there were 212,237 individuals with disabilities, of whom 13,145 were individuals with intellectual disabilities (Ministry of Social Affairs of the Republic of Indonesia, 2022). In East Java Province, 6,360 children with intellectual disabilities were identified (Statistics Indonesia, 2019). Meanwhile, in Tuban Regency, there were 247 children with intellectual disabilities (Statistics Indonesia, 2019). Children with intellectual disabilities exhibit a number of observable characteristics, particularly related to limitations in emotional and intellectual functioning. They experience difficulties in understanding concepts, tend to repeat the same mistakes, and have limited ability to maintain attention during the learning process at school (Dugassa et al., 2025).

From a social perspective, children with intellectual disabilities are often unable to manage, care for, and protect themselves independently, thus requiring supervision and assistance from others. In terms of mental functioning, they generally have difficulty concentrating, possess weak memory capacity, and struggle to generate and develop new ideas. Emotionally, children with intellectual disabilities commonly display emotional instability, are easily disturbed, become angry quickly, and have limited ability to regulate their emotions (Salleh et al., 2018).

Children with intellectual disabilities (ID) face significant challenges across cognitive, emotional, and social domains, necessitating continuous supervision and support. Individuals with ID typically exhibit limitations in intellectual functioning and adaptive behavior, which may hinder their ability to concentrate, retain information, and generate new ideas (Horvat et al., 2019). Emotionally, they often experience instability, rapid onset of anger, and difficulties in emotional regulation, which can further complicate social interactions and daily functioning (Elshani et al., 2020). In addition, deficits in adaptive behaviors, including daily living skills, are common and negatively affect their independence and overall quality of life (Elshani et al., 2020). To address these challenges, early diagnosis, inclusive educational programs, and tailored interventions are essential to enhance social integration and mental well-being (Soares, 2023; Bhatia & Kour, 2024). Such comprehensive support systems play a critical role in fostering personal autonomy and improving life opportunities for children with intellectual disabilities (Soares, 2023).

In general, intellectual disability is classified into three categories: debil (mild intellectual disability), imbecile (moderate intellectual disability), and idiot (severe and profound intellectual disability) (Apriyanto, 2014, cited in Graces et al., 2023). Differences in mental, emotional, and social conditions compared to typically developing children cause children with intellectual disabilities to experience difficulties in focusing and adhering to the learning process at school. Therefore, they require special attention and assistance in order to participate optimally in educational activities.

Several interventions can be implemented for children with intellectual disabilities, particularly to enhance attention and learning compliance at school, one of which is the brain gym method. Brain gym consists of a series of simple movements aimed at integrating the mind and body; in addition to improving blood flow and oxygen delivery to the brain, it stimulates brain activity and optimizes overall brain function (Suratun & Tirtayanti, 2020). Brain gym serves as a form of motor and sensory stimulation that can promote children’ s brain development. It facilitates optimal brain functioning by enhancing oxygenation to the brain, thereby improving memory, concentration, balance, and coordination.

Research conducted by Suratun and Sri Tirtayanti (2020) demonstrated that brain gym interventions were able to improve students’ learning concentration. Similarly, a study by Epa Nurhayati et al. (2020) showed an increase in learning concentration among students with intellectual disabilities following brain gym intervention. Khasanah et al. also reported that brain gym was proven to enhance children’ s learning concentration. With improved concentration, children are expected to better engage in the learning process and achieve improved academic performance. Findings from Heni (2021) indicated that the average increase in students’ concentration levels after brain gym intervention was 7.01, with a standard deviation of 1.291, demonstrating a significant effect of brain gym on learning concentration among fourth-grade students (Heni & Nurlika, 2021). Furthermore, a study conducted by Risma Damayanti et al.

(2024) showed that brain gym performed over a two-week period significantly influenced learning concentration levels among elementary school students.

Methods

The research design employed in this study was a pre-experimental design using a one-group pretest–posttest design without a control group, with a total sample of 19 students. The sampling technique applied was total sampling. Sample selection was conducted through interviews with the principal of SLB Jati Wiyata Dharma Tuban to obtain information regarding the number of children with intellectual disabilities and their functional abilities. Subsequently, the sample size was calculated using the Lemeshow formula. Therefore, all children who met the predetermined inclusion criteria were included as research participants.

The research instruments used in this study consisted of a Brain Gym Standard Operating Procedure (SOP), which aimed to enhance children' s abilities in reading, writing, thinking, and self-awareness, as well as a learning process compliance questionnaire. The questionnaire comprised 15 items measuring aspects of children' s compliance during the learning process, including their ability to understand and follow instructions, listening skills such as repeating the material delivered by the teacher, and comprehension of the learning material. Based on these aspects, each item was scored as compliant, moderately compliant, or non-compliant according to the responses provided by the research subjects.

The questionnaire scale was constructed using a Likert scale with four response options: very good, good, fair, and poor. The scoring system assigned values of 4, 3, 2, and 1, respectively. Respondents were required to mark (✓) the selected response option for each item. Total scores were obtained by summing all responses. Statistical analysis in this study was performed using the Wilcoxon signed-rank test. Data analysis was conducted using SPSS software version 25 for Windows.

Results

Table 1. Frequency Distribution of Respondents Based on Gender, Age, and Classification of Intellectual Disability at SLB Jati Wiyata Dharma Tuban (n=19)

Variable	Frequency (f)	Percentage (%)
Gender		
Male	15	78.95
Female	4	21.05
Age		
8 years	1	6
10 years	2	11
12 years	1	6
13 years	2	11

14 years	6	33
15 years	2	11
17 years	4	22
Classification of Intellectual Disability		
Mild	7	36.8
Moderate	9	47.4
Severe	3	15.8

Based on Table 1, the total number of respondents was 19 students. The majority of respondents were male, totaling 15 students (78.95%), while female respondents accounted for 4 students (21.05%). In terms of age, most respondents were 14 years old, with 6 students (33%), followed by those aged 17 years, totaling 4 students (22%). Other ages ranged from 8 to 15 years with smaller frequencies. Regarding the classification of intellectual disability, most respondents were classified as having moderate intellectual disability, totaling 9 students (47.4%), followed by mild intellectual disability with 7 students (36.8%), and severe intellectual disability with 3 students (15.8%).

Table 4. Frequency Distribution of Learning Process Compliance of Children with Intellectual Disabilities Before Brain Gym Therapy at SLB Jati Wiyata Dharma Tuban (n=19)

Level of Compliance	Frequency	Percentage (%)
Compliant	0	0.0
Moderately Compliant	6	31.6
Non-Compliant	13	68.4

Based on Table 2, prior to the administration of brain gym therapy, the majority of children with intellectual disabilities demonstrated non-compliance in the learning process, totaling 13 students (68.4%). A total of 6 students (31.6%) were categorized as moderately compliant, and no students were classified as compliant (0.0%). These findings indicate that the level of learning process compliance before the intervention was generally low.

Table 3. Frequency Distribution of Learning Process Compliance Scores by Classification of Intellectual Disability Before Brain Gym Therapy at SLB Jati Wiyata Dharma Tuban (n=19).

Classification of Intellectual Disability	Frequency	Score Range
Mild	7	20–33
Moderate	9	21–35
Severe	3	21–22

Based on Table 3, prior to the administration of brain gym therapy, most children with intellectual disabilities showed low levels of learning compliance. Students with mild intellectual disability (7 students) obtained scores ranging from 20 to 33, those with moderate intellectual disability (9 students) scored between 21 and 35, and students with severe intellectual disability (3 students) obtained scores ranging from 21 to 22. These results further indicate that learning

process compliance prior to the intervention was relatively low across all classifications.

Table 4. Frequency Distribution of Pre-Intervention Observations of Learning Process Compliance Among Children with Intellectual Disabilities (n=19)

Classification of Intellectual Disability	Compliance with Instructions	Understanding of Material	Paying Attention to Teacher/Researcher
Mild	7	5	6
Moderate	8	3	9
Severe	0	0	2

Based on Table 4, during the pre-intervention phase, compliance with instructions was most frequently observed among children with mild intellectual disability (7 students), followed by those with moderate intellectual disability (8 students), while no children with severe intellectual disability demonstrated compliance with instructions. In the aspect of students' understanding of the material, the highest number was observed among children with mild intellectual disability (5 students), followed by moderate intellectual disability (3 students), with none observed in the severe category. Regarding attention to the teacher/researcher, children with moderate intellectual disability showed the highest frequency (9 students), followed by those with mild intellectual disability (6 students) and severe intellectual disability (2 students). Overall, attention to the teacher/researcher was observed more frequently than compliance with instructions and understanding of learning material prior to the brain gym intervention.

Table 5. Frequency Distribution of Learning Process Compliance of Children with Intellectual Disabilities at SLB Jati Wiyata Dharma Tuban After Brain Gym Therapy (n=19)

Level of Compliance	Frequency	Percentage (%)
Compliant	14	73.7
Moderately Compliant	4	21.0
Non-Compliant	1	5.3

Based on Table 5, after the administration of brain gym therapy, the majority of children with intellectual disabilities were classified as compliant, totaling 14 students (73.7%). A total of 4 students (21.0%) were categorized as moderately compliant, and only 1 student (5.3%) remained in the non-compliant category. These results indicate a notable improvement in learning process compliance following the brain gym intervention.

Table 6. Distribution of Post-Intervention Learning Process Compliance Scores by Classification of Intellectual Disability (n=19)

Classification of Intellectual Disability	Frequency	Score Range
Mild	7	51–58
Moderate	9	42–57
Severe	3	44–50

Based on Table 6, following the brain gym intervention, children with mild intellectual disability consisted of 7 students with compliance scores ranging from 51 to 58. Children with moderate intellectual disability represented the largest group, totaling 9 students, with scores ranging from 42 to 57. Meanwhile, children with severe intellectual disability consisted of 3 students, with compliance scores ranging from 44 to 50. These findings indicate that post-intervention learning compliance was observed across all classifications of intellectual disability, although with varying score ranges.

Table 8. Frequency Distribution of Post-Intervention Observations of Learning Process Compliance Among Children with Intellectual Disabilities at SLB Jati Wiyata Dharma Tuban (n=19).

Classification of Intellectual Disability	Compliance with Instructions	Understanding of Material	Paying Attention to Teacher/Researcher
Mild	7	6	7
Moderate	9	4	9
Severe	2	0	3

Based on Table 8, in terms of compliance with instructions, most children were classified as having moderate intellectual disability (9 students), followed by mild intellectual disability (7 students), and severe intellectual disability (2 students). In the aspect of students' understanding of the material, the highest frequency was observed among children with mild intellectual disability (6 students), followed by moderate intellectual disability (4 students), while no students with severe intellectual disability demonstrated understanding of the material. Regarding attention to the teacher/researcher, all children with mild and moderate intellectual disabilities showed the highest frequencies (7 and 9 students, respectively), while 3 students with severe intellectual disability demonstrated attention. Overall, attention to the teacher/researcher remained the most frequently observed aspect compared to other indicators.

Table 9. Effect of Brain Gym Therapy on Learning Process Compliance of Children with Intellectual Disabilities at SLB Jati Wiyata Dharma Tuban (n=19)

Brain Gym Therapy	Non-Compliant	Moderately Compliant	Compliant	Total
Pre-test	13 (68.4%)	6 (31.6%)	0 (0.0%)	19 (100.0%)
Post-test	1 (5.3%)	4 (21.0%)	14 (73.7%)	19 (100.0%)

Based on Table 9, during the pre-test phase, the majority of children with intellectual disabilities were classified as non-compliant, totaling 13 students (68.4%), while 6 students (31.6%) were categorized as moderately compliant, and none were classified as compliant. In contrast, during the post-test phase after the brain gym intervention, a significant shift was observed, with most students categorized as compliant (14 students; 73.7%), followed by moderately compliant students (4 students; 21.0%), and only 1 student (5.3%) remaining non-

compliant. The results of the Wilcoxon Signed Ranks Test showed an Asymp. Sig. (2-tailed) value of 0.0001 ($p < 0.05$), indicating a statistically significant effect of brain gym therapy on the learning process compliance of children with intellectual disabilities at SLB Jati Wiyata Dharma, Tuban Regency.

Discussion

The implementation of Brain Gym exercises has been shown to significantly enhance learning process compliance among children with intellectual disabilities, as evidenced by a marked shift from non-compliance to compliance following the intervention. Empirical studies indicate that Brain Gym not only improves cognitive functions such as memory and attention but also positively influences academic performance and motor coordination in children with mild to moderate intellectual disabilities (Tanjung et al., 2024; Adenikheir, 2021; Asolkar, 2025). For instance, one study reported a substantial increase in academic performance scores following the intervention, with mean scores rising from 17.07 to 32.1, underscoring the effectiveness of structured Brain Gym activities (Asolkar, 2025). Furthermore, other studies have demonstrated that after a series of Brain Gym sessions, most children exhibited improvements in cognitive development, reinforcing the notion that these exercises can serve as a valuable tool in educational settings for children with special needs (Siswoariwibowo et al., 2025; Karcı & Sırmen, 2025).

Findings regarding the effectiveness of Brain Gym and similar movement-based interventions in enhancing attention, learning readiness, and engagement among children with special needs remain mixed, reflecting variability based on individual disabilities and the duration of intervention. A qualitative study by Renganath reported that Brain Gym exercises led to improvements in attention, literacy skills, and social interaction among children with diverse developmental challenges, although outcomes varied considerably across participants (Renganath, 2025). Experimental research by Asolkar further supports these findings, demonstrating significant gains in academic performance and cognitive skills, including memory and attention, among children with mild to moderate intellectual disabilities following structured Brain Gym interventions (Asolkar, 2025). In contrast, studies by Watson and Kelso raised concerns regarding the efficacy of Brain Gym, suggesting that it may not consistently enhance academic engagement compared to other forms of physical activity (Watson & Kelso, 2014).

Brain Gym is theorized to improve learning compliance by facilitating hemispheric brain integration, enhancing cerebral blood flow, and optimizing motor coordination, all of which collectively support attentional functioning and behavioral regulation. The exercises incorporated in Brain Gym are designed to stimulate brain integration, thereby improving communication skills and emotional regulation, which are essential for effective learning environments (Dennison, 1992). Research has shown that such activities promote

neuroplasticity and enhance cognitive functions such as memory, attention, and logical reasoning, particularly among adolescents who benefit substantially from these practices during critical developmental periods (Canchigña et al., 2025). Moreover, structured neuro-motor exercises have been demonstrated to strengthen cognitive skills in younger children, emphasizing the importance of incorporating these methods into educational settings to create adaptive learning environments that accommodate diverse cognitive needs. Overall, Brain Gym serves as a valuable pedagogical tool that not only enhances cognitive abilities but also contributes to emotional well-being and learner motivation (Canchigña et al., 2025).

Research further suggests that Brain Gym exercises may be more effective in enhancing learning readiness than in directly improving academic comprehension. For example, one study found a significant increase in concentration among students who practiced Brain Gym prior to lessons, indicating that these exercises prepare students for learning by improving focus and engagement (Prodyanatasari & Prodyanatasari, 2025). Additionally, other studies have highlighted that Brain Gym positively influences students' behavior and attitudes, leading to improved attention and enjoyment of learning, although academic performance outcomes remain variable (Herbawi, 2018). Literature reviews also indicate that while Brain Games may excel in enhancing specific cognitive skills, Brain Gym is particularly effective in improving attention and motor coordination, both of which are critical components of learning readiness (Roosyanti et al., 2024). Collectively, these findings support the view that Brain Gym may be more beneficial in preparing students for learning rather than directly enhancing their mastery of academic content (Hyatt, 2007; Cappuccio & Compagno, 2021).

Evidence also indicates that children with mild intellectual disabilities demonstrate greater responsiveness to Brain Gym stimulation compared to those with more severe impairments. For instance, a study focusing on children with mild intellectual disabilities reported significant improvements in visual perception following Brain Gym exercises, reflecting enhanced cognitive engagement and motor control capabilities (Karcı & Sırmen, 2025). Additionally, children with mild intellectual disabilities have shown improved reaction times and strength stability across various training contexts, suggesting a greater capacity to adapt to and benefit from structured physical activities. Conversely, children with severe intellectual disabilities often experience more profound challenges in motor control and cognitive processing, which may limit their responsiveness to similar interventions (Memisevic & Djordjevic, 2018). Consequently, variations in compliance and the effectiveness of Brain Gym exercises are closely associated with the severity of intellectual disability, with milder cases exhibiting more pronounced benefits.

The limited improvement in learning material comprehension among children with severe intellectual disabilities indicates that while Brain Gym is beneficial for enhancing certain cognitive and social skills, it may not be sufficient as a standalone intervention. Research emphasizes that multisensory approaches, incorporating visual, auditory, kinesthetic, and

tactile stimuli, are essential for optimizing cognitive learning outcomes in this population. Tailored interventions, including individualized education plans and specialized instructional strategies, are crucial for addressing the diverse needs of these children (Dwivedi & Gautam, 2024). Although Brain Gym exercises demonstrate positive trends in attention and engagement, their effectiveness is constrained without integration into comprehensive, individualized support systems that address the unique challenges faced by children with intellectual disabilities (Renganath, 2025). Therefore, combining Brain Gym with multisensory and individualized learning approaches is necessary to effectively enhance cognitive outcomes (Hyatt, 2007).

Conclusion

This study demonstrates that the implementation of Brain Gym exercises has a significant positive effect on learning process compliance and learning readiness among children with intellectual disabilities. The intervention effectively improved students' attention, adherence to learning instructions, and overall engagement during the learning process, particularly among those with mild to moderate levels of intellectual disability. Although Brain Gym alone may not be sufficient to substantially enhance academic comprehension in children with severe intellectual disabilities, it serves as a valuable supportive intervention that fosters a more focused, calm, and conducive learning environment. Therefore, integrating Brain Gym into daily educational or therapeutic activities in special education settings is recommended as a practical, low-cost, and non-pharmacological strategy to support the learning needs of children with intellectual disabilities, while further research with larger samples and controlled designs is warranted to strengthen the evidence base.

Conflicts of Interest

The author declares no conflict of interest related to this work.

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