

## EFFECTIVENESS OF PHYSICAL EXERCISES IN ENHANCING OF SUSTAINED ATTENTION OF 9-11-YEAR-OLD CHILDREN WITH MILD INTELLECTUAL DISABILITY

*Hiệu quả của bài tập thể chất với việc nâng cao khả năng chú ý có chủ định của trẻ 9 - 11 tuổi khuyết tật trí tuệ dạng nhẹ*

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### ABSTRACT

This study aimed to examine the impact of our designed physical exercises on enhancing the sustained attention of 9-to-11-year-old children with mild intellectual disability (ID) in Ho Chi Minh City. Findings included significant increases in sustained attention in the experimental group, suggesting that our physical exercises were effective in enhancing children's sustained attention.

**Keyword:** *physical exercise design, sustained attention, intellectual disability*

### TÓM TẮT

Bài báo nghiên cứu về tác động của bài tập thể chất với việc nâng cao khả năng chú ý có chủ định (CYCCĐ). Trong đó, nhóm tác giả tiến hành lựa chọn xây dựng được các bài tập thể chất để nâng cao khả năng chú ý có chủ định của trẻ 9 - 11 tuổi khuyết tật trí tuệ dạng nhẹ ở TPHCM. Kết quả cho thấy trước thực nghiệm, khả năng CYCCĐ của trẻ nhóm thực nghiệm và nhóm đối chứng là ngang bằng nhau xét trên bình diện chung cũng như xét theo từng tiêu chí và từng bài tập. Sau thực nghiệm, kết quả cho thấy những tiến bộ vượt bậc trong khả năng CYCCĐ của những trẻ ở nhóm thực nghiệm so với trước thực nghiệm và so với nhóm đối chứng.

**Từ khóa:** *thiết kế bài tập thể chất, khả năng chú ý, khuyết tật trí tuệ*

### 1. Introduction

Among the children with intellectual disabilities, those categorized as mildly intellectually disabled count for the majority (about 85%). Children with mild mental disabilities can reach the mental age of 7 to 12 years old (IQ from 50-55 to about 70) (Tran Le Thu, 2010). Furthermore, researchers have generally

agreed that children with ID often have difficulty remembering learning materials. Without regular practice, children will forget the knowledge they have learned, which is called slow memorization and quick forgetting in these children (Huynh Thi Thu Hang, 2005).

There have been multiple pieces of evidence that attention of children with ID

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could be improved. For instance, the study by Javan, Framarzi, Abedi, & Nattaj (2014) on a sample of 20 elementary-school children with ID divided the participants into two groups for with rhythmic movements, revealed that rhythmic movements would affect attention problems and its characteristics, as well as their memories. Another study, by Chiviacowsky, Wulf, & Ávila (2013), on 24 children with ID (average age: 12.2 years) examined whether the learning benefits of an external focus of attention were relative to an internal focus. After interventions with different instructions between the two groups (external and internal), the results showed that the external focus group demonstrated more effective learning than the internal focus group.

Due to limitations in their thinking and attention, especially sustained attention, children with ID have difficulty identifying the most basic concepts of things and phenomena that they need to remember, especially in learning (Le Thi Bao Chau, 2008). However, education for attention enhancement for children with ID is currently considered an activity accompanying other educational activities, lacking specific educational methods and programs (Tran Thi Le Thu, 2010)

Therefore, to improve children with ID's ability to pay sustained attention, it is necessary to facilitate positive impacts on them through educational activities. In particular, physical education (PE) can be considered as a method of direct impact that fundamentally changes children's cognitive processes, contributing to the development of thinking and health maintenance, laying a foundation for other

developments, and helping compensate other deficiencies in their life functions.

## **2. Term explanation**

### ***2.1. Children with intellectual disability***

Up to now, children with ID in Vietnam are understood based on the criteria of DSM-IV and AAMR in 1992. These definitions are based on basic criteria, yet have distinctive differences (Tran Thi Le Thu, 2010). Nevertheless, both divide the intellectual disability into 4 levels: Mild ID: IQ from 50 - 55 to approximately 70; Moderate ID: IQ from 35 - 40 to 50 - 55; Severe ID: IQ from 20 - 25 to 35 - 40; Profound ID: IQ below 20-25 (DSM-IV only)

In this study, we used the term from the DSM to conduct our research, including the follow criteria: the basic characteristic of intellectual disability is below average intellectual activity, significant limitation in at least two of the areas of adaptive behaviors (i.e., communication, self-care, home living, social skills, use of community facilities, navigation, health and safety, learning, entertainment, and work), and before-18-of-age appearance of the disability.

### ***2.2. Sustained attention***

#### ***Attention***

Based on different definitions, we believe that attention is a psychological state in which the subject directs their consciousness to a certain object (or a group of objects) within or without the subject himself, when these objects act as a strong enough stimulus to the subject, and are relatively separate from other objects for better reflection (Miles & Toren, 1994).

#### ***Sustained attention***

Sustained attention is a type of attention with a conscious purpose, with

measures to direct the subject's attention to the object, which requires a certain amount of willpower. It occurs thanks to the subject's conscious effort to best perform a certain activity. Its typical characteristics are purposefulness, organization, and high sustainability (Pham Quang Uan, 2001)

### **2.3. Physical exercises**

Physical exercises are specialized movement activities consciously and intentionally created by humans, consistent with the rules of PE (Dong Van Trieu, 2000), selected to solve the tasks of PE (Thai Duy Tuyen, 1998). Therefore, simply put, physical exercises are basic human movements organized methodically with forms suitable for each subject and physical condition. The most noticeable characteristics physical exercises are repetition of movements, purposefulness, learning requirements to form skills or develop physical qualities (Nguyen Xuan Thuong, 2014).

In conclusion, physical exercises are a range of requirements and tasks related to specialized movement activities created by humans for learning, training, and complying with the rules and the features of PE.

### **3. The role of physical exercises to the intellectual development of children with ID**

The use of appropriate materials for PE to develop the intelligence of children with ID is essentially a direct and visual teaching method that is very necessary and appropriate in the process of educating them. Basic forms of movement such as walking or running will help the process of changing children's functions stay in a more practical way, in accordance with the requirements of maintaining health and

athletic qualities, and perfecting motor skills (Nguyen Toan, 2006). Physical exercises will also help children become more independent, stimulate the brain, improve learning ability, increase cognitive acuity, and develop interactive abilities (Dong Van Trieu, 2000).

As a social construct, a means of serving society, and a basic means of PE, physical exercises impact the mental development of a child based on the rules of PE and intellectual development of the human brain. With that, choosing appropriate physical exercises to develop will be the basis to promote the cognitive development of children with ID (Nguyen Xuan Thuong, 2014).

## **4. Research methods**

### **Experiment**

We conducted an experiment to evaluate the effectiveness of applying the designed physical exercises to improve the ability of sustained attention of participants.

*Procedure:* We used experimental methods of sequential comparison and parallel comparison. The experiment was conducted during PE classes with the help of the teachers on the main participants, which were the children, and the support participants, which included the teachers. Pre-test and post-test measurements were made.

### **Quantitative research**

#### *Survey*

*Purpose:* To survey the status quo of the sustained attention of children from 9 to 11 years old with mild ID, in terms of the focus of attention, the sustainability of attention, the distribution of attention, and the displacement of attention.

#### *Participants:*

We conducted our research on 100

teachers teaching at special education schools. Details were as follows:

- ATC Center: 21 teachers (20.8%); Bình Minh school: 18 teachers (17.8%); Thảo Điền school: 19 teachers (18.8%), Từng bước nhỏ school: 22 teachers (21%), Thiên thần Center: 20 teachers (19.8%) - In terms of manjors, 34 teachers graduated from Special Education (33.7%), 37 from Psychology (36.6%), 23 from Social Work (22.8%); and 6 from Physical Education (59%)

The data showed that the survey could be objective and could supposedly paint an overall picture of the status quo of sustained ability of children with ID in special schools today.

**\*Scoring and interpretation:**

We coded the teachers’ answers into scores: “very low” = 1; “low” = 2; “medium” = 3; “high” = 4; “very high” = 5. Then we calculated for the means.

For likert-scale means, the highest would be 5 and the lowest would be 1. The meanings of the means were as follows: 1 - 1,5: Very low; 1,51 - 2,5: Low; 2,51 - 3,5: Medium; 3,51 - 4,5: High; 4,51 - 5: Very high.

*Procedure:* Our survey questionnaire was designed for teachers, directly working at specialized schools. This questionnaire form was implemented through the following stages:

First stage: Based on the literature review, we designed a questionnaire including open-ended questions about issues related to the status quo of sustained attention, then conducted a trial survey of 80 teachers in specialized schools in Ho Chi Minh City.

Second stage: We developed the official questionnaire.

The questionnaire included 7 questions, divided into the following sections: Section 1: questions to survey the role and the meaning of attention; Section 2: questions to assess the characteristics of attention.

In this stage, we had surveyed 80 teachers and experts in special education schools in HCM City to make a foundation to generate 17 criteria to assess the 4 characteristics of sustained attention in children with mild ID.

The 17 criteria for 4 characteristics of attention are as follows:

Focus	Sustainability	Distribution	Displacement
1. The ability to pay attention to a narrow range	1. The ability to maintain attention from 1 – 3 minutes	1. The ability to pay full attention to multiple objects in an intentional manner at the same time	1. The ability to switch attention from one object to another according to the requirements of the activity and with a clear purpose
2. The ability to pay attention only to one or a few necessary objects	2. The ability to maintain attention from above 3 – 5 minutes	2. The ability to pay attention to two activities at the same time;	2. The ability to pay attention when recess ends and class begins

Focus	Sustainability	Distribution	Displacement
3. The ability to pay attention is not distracted or disturbed by other unrelated stimuli	3. The ability to maintain attention from above 5 – 7 minutes	3. The ability to pay attention to three activities at once	3. The ability to pay attention when switching from fun activities (games) to learning activities
	4. The ability to maintain attention from above 7 – 10 minutes	4. The ability to pay attention to more than three activities at the same time	The ability to pay attention when switching from dynamic activity to static activity
	5. The ability to maintain attention from above 10 minutes		

#### 4.1. Training plan

Duration: Oct, 2020 to Mar, 2021

Number of lessons: 1<sup>st</sup> term: 12 weeks;  
2<sup>nd</sup> term: 12 weeks

Frequency: 1 session per week; 35 minutes per session.

#### 4.2. Procedure

We designed 40 exercises, but had to leave out some due to practicality. We applied specifically designed exercising

plans for each semester. The teachers and the supporters helped us in instructing the exercises to the participants and observing, as well as assessing, their performance.

Our motor skill exercises included running, bouncing, and poses of the fish, the frog, the clamp, the tree, and the board. Our game-based exercises included throwing, rolling, kicking, passing, and catching the ball.

### 5. Results and discussion

#### 5.1. Assessment of impacts of designed physical exercises on the sustained attention of children from 9 to 11 years old with mild ID

##### 5.1.1. The sustainability of attention

**Table 1.** The sustainability of attention before and after the experiment (n = 75)

No.	Criterion	M		T - Test	Sig.
		Pre-test	Post-test		
1	The ability to maintain attention from above 3 – 5 minutes	2.20	2.90	0.001	+
2	The ability to maintain attention from above 5 – 7 minutes	2.10	2.90	0.001	+

No.	Criterion	M		T - Test	Sig.
		Pre-test	Post-test		
3	The ability to maintain attention from above 7 – 10 minutes	2.20	2.90	0.001	+
4	The ability to maintain attention from above 10 minutes	2.20	2.90	0.001	+
<b>Grand mean</b>		2.18	2.90	0.006<0.05	+

The grand means rose from 2.18 (the low rank) to 2.90 (the medium rank), with a gap of 0.72, more than 0.5. And the T-test result was 0.006. This showed to be a statistically significant difference. Therefore, it was evident to state that the sustainability of attention of the students rose significantly after the experiment.

In terms of the criteria, in particular, they all showed positive changes, with statistically significant differences. Each criterion witnessed an increase in its individual mean. Therefore, it is evident that the sustainability of attention of the student witnessed a positive change.

### 5.1.2. The distribution of attention

**Table 2.** The distribution of attention before and after the experiment (n = 75)

No.	Criterion	M		T - Test	Sig.
		Pre-test	Post-test		
1	The ability to pay full attention to multiple objects in an intentional manner at the same time	2.20	2.70	0.02	+
2	The ability to pay full attention to multiple activities in a deliberate manner at the same time	2.90	3.00	0.03	+
3	The ability to pay attention to two activities at the same time	2.50	3.10	0.03	+
4	The ability to pay attention to three activities at once	2.50	3.10	0.002	+
5	The ability to pay attention to four activities at once	2.20	3.00	0.003	+
6	The ability to pay attention to more than four activities at once	2.50	3.00	0.003	+
<b>Grand mean</b>		<b>2.46</b>	<b>2.98</b>	0.03	+

The grand mean rose from 2.46 (low) to 2.98 (medium) with a T-test result of  $0.03 < 0.05$ . Similarly, all criteria witnessed acceptable significant increases.

Therefore, in brief, after the experiment, the physical exercises made a significant impact on the children's attention distribution.

### 5.1.3. The focus of attention

**Table 3.** The focus of attention before and after the experiment (n = 75)

No.	Criterion	M		T- Test	Sig.
		Pre-test	Post-test		
1	The ability to pay attention to a narrow range	2.30	2.48	0.01	
2	The ability to pay attention only to one or a few necessary objects	2.12	2.28	0.01	
3	The ability to pay attention is not distracted or disturbed by other unrelated stimuli	1.41	1.67	0.01	
<b>Grand mean</b>		1.94	2.15	0.06 >0.05	+

The grand mean of the focus of attention rose from 1.94 to 2.15, both of which belonged to the low rank. With the

T-test results being acceptable, it is safe to say that our designed physical exercises were effective.

### 5.1.4. The displacement of attention

**Table 4.** The displacement of attention before and after the experiment (n = 75)

No.	Criterion	M		T- Test	Sig.
		Pre-test	Post-test		
1	The ability to switch attention from one object to another according to the requirements of the activity and with a clear purpose	1.32	1.58	0.01	
2	The ability to pay attention when recess ends and class begins	1.94	2.57	0.01	
3	The ability to pay attention when switching from fun activities (games) to learning activities	2.41	2.70	0.01	
4	The ability to pay attention when switching from dynamic activity to static activity	2.18	2.35		
<b>Grand mean</b>		<b>1.96</b>	<b>2.30</b>	0.06 >0.05	+

The displacement of attention rose from 1.96 to 2.30, both of which belonged to the low rank. But with the T-test results being acceptable, it is safe to state that our physical exercises helped the participants displace their attention better.

**5.2. Assessment of impacts of designed physical exercises on the sustained attention of children from 9 to 11 years old with mild ID after the experiment**

The comparison for means of the sustained attention of the participants is illustrated in the below tables.

**Table 5.** The grand means of the sustained ability of the two groups before and after the experiment

Time	Group	N	M	Std. Deviation	ĐTN	ĐCN	Sig. ( $\alpha = 0,05$ )
Pre-test	Control (n=72)	72	<b>1.744</b>	0.427	0.767	2.233	0.845
	Experimental (n=75)	75	<b>1.778</b>	0.264	1.300	2.167	
	<b>Total</b>	147	<b>1.874</b>	0.345	0.767	2.233	
Post-test	Control (n=72)	35	<b>1.985</b>	0.570	1.133	2.700	0.001
	Experimental (n=75)	39	<b>2.778</b>	0.235	2.300	3.000	
	<b>Total</b>	74	<b>2.381</b>	0.587	1.133	3.000	

It is obvious that in the before the experiment, both groups scored a low rank on their sustained attention, the control group had 1.744, the experimental group scored 1.778. T-test results showed no significant differences ( $\text{sig}=0.845 > 0.05$ ). Therefore, it was evident that both group had similar levels of sustained attention.

After experiment, the means of the sustained attention of the experimental group rose considerably from 1.778 to 2.778, with the T-test result being 0.001. Therefore, it is evident that our designed physical exercises made an effective, positive impact on the children.

**6. Conclusion**

Before intervention, the sustained

attention of both groups were roughly levelled in terms of the overall definition as well as each criterion. After 6 months of intervention, there were many positive changes in the experimental group. This showed that the participants' overall sustained attention and each of its characteristics (focus, sustainability, distribution, and displacement) rose statistically significantly, meaning our designed physical exercises were effective.

Therefore, we concluded that our designed physical exercises were effective and could be implemented widely at schools. We recommend utilizing our physical exercises based on practicality of each class, each school, and for each group of students.

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