

# The Effect of Integration Activities for Reduction Repetitive Behaviors in Children with Autism

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## Abstract

This study aims to determine the effectiveness of integrated activities to reduction repetitive behavior in children with autism. The participants were students, age ranged from 4 – 10 years old, who were clinically diagnosed as autism and enrolled at Special Education Center, Loei Province. Research was single subject design with AB design. The participants were selected by purposive sampling. Over the course of 13 weeks of the study, integrated activities were designed for individual program for reduction repetitive behaviors that were negative effect to learning. These behaviors include head butting, hand flapping, finger knocking, finger banding, body shaking and hand gesturing. The behaviors in academic class were video recorded for further analysis where the frequency of the behaviors can be recorded at 1st (A), 5th (B5), 9th (B9), and 13rd (B13) Week. Video recordings were individually replayed by 2 evaluators (inter-observer reliability = 98.3%), the main researcher and research assistant who are teaching special educators and counted number of repetitive behaviors. Data were consensused and analyzed by using descriptive analysis for general information and The Wilcoxon Signed- Rank Test for analysis median difference among number of repetitive behaviors at A1, B5, B9, and B13. The result revealed that integration activities significantly decreased repetitive behaviors for children with autism between the 1st (A) and 13rd (B13) week (Median difference = -32.5, 95% confidence interval = 24.09-38.78).

**Keywords:** Children with Autism, Repetitive Behaviors, Repetitive Behaviors

## Introduction

Autism spectrum disorder (ASD) is a neurodevelopment condition diagnosed on the basis of social and communication impairments plus restricted and repetitive interests and activities. Children with ASD have neurological disorders which result in lack of learning ability, recognition, perception and emotional development,

which can result in many problematic behaviors (Prathanee, 2011) Core features of autism spectrum disorder (ASD) include deficits in social-communication skills and the presence of clinically significant rigid and repetitive behavioral patterns (American Psychiatric Association, 2013). They usually present with rigid and repetitive patterns of behavior and/or interests (RRBIs) (Raulston, Hansen, Machalicek,

McIntyre, & Carnett, 2019) Repetitive behavior is widely known to be one of three core and defining features of autism. Of specific interest here, the repetitive behavior domain involves compulsive behaviors, unusual attachments to objects, rigid adherence to routines or rituals, and repetitive motor mannerisms such as stereotypies and self-stimulatory behaviors (Insel, O'Brien, & Leckman, 1999). Repetitive, apparently purposeless behavior “stereotypy” or “perseveration,” and such behaviors are actually described as symptoms of autism in the DSM-5 (the official diagnostic manual) (Lai, Lombardo, Chakrabarti, & Baron-Cohen, 2013; Mattila et al., 2011). Stereotyped or repetitive motor movements, use of objects, or speech. Hyper-reactivity or hypo reactivity to sensory input or unusual interest in sensory aspects of the environment. Repetitive behaviors in autism can vary radically from person to person. No one really knows what causes perseveration in people with autism, though there are a variety of theories. However, a recent study found that restricted and repetitive behaviors contributing to a diagnosis of ASD at age 2 years are associated with structural properties of callosal and cerebellar white matter pathways measured during infancy and toddlerhood. We further identified that repetitive behaviors and unusual sensory response patterns co-occur and share common brain-behavior relationships. These results were strikingly specific given the absence of association between targeted pathways and social deficits (Wolff et al., 2017)

Lacking of social interaction, language and communication, and learning limitation, especially repetitive behaviors such as rocking, head shaking or banging, flicking, clapping, hand biting, and tiptoeing that are learning obstacles for children and withdraw their attention from the surroundings. It also interrupts them from maintaining interactions with other people, as well as continuing with their daily routines. Moreover, it affects their sensory and learning development. Children who experience these behaviors tend to be underdeveloped in perceptual cognitive abilities, as their physical coordination

is not related to brain function. Repetitive behaviors can be the result of sensory integration or the brain's inability to process or manage sensory stimuli from themselves and the environment (Saenthaweek et al., 2011). There are many interventions for treatment of repetitive behaviors such as sensory integration therapy (SIT), differential reinforcement of incompatible behavior (DRI), differential reinforcement of other or zero rates of behavior (DRO), differential reinforcement of variable behavior (DRV), environmental enrichment, functional communication training (FCT), non-contingent or time based schedules of reinforcement (NCR), overcorrection, physical exercise, response blocking, response cost, response interruption and redirection (RIRD) (Raulston et al., 2019). A survey of behavioral practices revealed that reinforcement-based practices, punishment-based practices, and a group of commonly packaged antecedent and consequence-based package components are the common interventions for decreasing repetitive behaviors in autism (Raulston et al., 2019). Sensory integration therapy (SIT) is a commonly used treatment (Mandell, Novak, & Levy, 2005). For Frequency of treatments, 33% used interventions sometimes (approximately 25–50% of cases) or often (more than approximately 50% of cases). Most of practitioners reported SIT as effective, 62 % (Raulston et al., 2019). Previous studies used duration and frequency of intervention varied from 3 to 90 minutes, 2– 5 sessions a week for 5–12 weeks, depended on designing. For TEACCH (Treatment and Education of Autistic and Related Communication Handicapped Children) in autism, designing integrated activities to increase or decrease the perception of feelings in correspondence with specific problems in each systematic classroom management (Siriratrekha, 2017) by adopting TEACCH principles can be adapted for process of creating a balance in recognition processing, decrease repetitive behaviors, and promote learning (Sudalak, 2012). TEACCH is a method called “Structured Teaching, those strengths

in visual information processing. It provides strategies and tools for teachers to use in the classroom, which help students with ASD to achieve educational and therapeutic goals. This method supports meaningful engagement in activities. It also works to increase students' flexibility, independence, and self-efficacy. TEACCH strategies can be used alongside other approaches and therapies. It also considers the child's interests, making learning functional for them (Mesibov & Shea, 2009). The effectiveness of the TEACCH intervention has been previously synthesized by some studies across different ages and within repetitive behavior, providing positive outcomes and high parental satisfaction (Eikeseth, 2009)

## Objectives

This was to determine the effectiveness of integrated activities for reduction numbers of

repetitive behaviors in children with autism by comparison pre- and post - number of repetitive behaviors after using the integrated activities in classroom.

## Methods

The study was a single subject design, AB Design The proposal had been submitted for review by the committee of research ethics in human research, Center of Ethics in Human Research, Khon Kaen University (HE603022). The participants were six students with autism experiencing repetitive behaviors age ranged from 4 - 10 years old who received education at Special Education Center, Loei Province, semester 2 of the 2018 academic year (January - May) (six months) The purposive sampling was done to recruit participants for the study. Participants' general characteristics, repetitive behaviors and comorbid, medication, and other intervention were shown in Table 1.

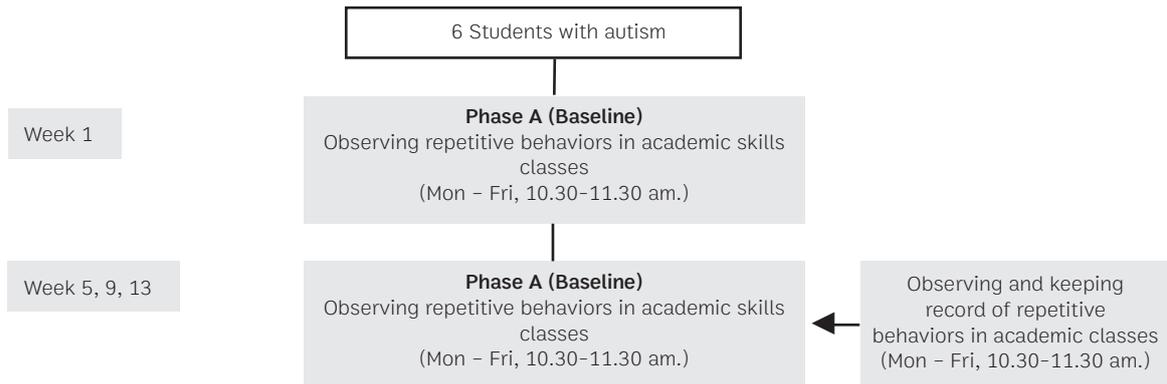
**Table 1:** General characteristics and repetitive behaviors

Student	Gender	Age	Diagnosed age	Repetitive behaviors	Other Comorbidity	Drug Treatment	Intervention
1	Male	8	4	Head butting	Anxiety	None	Using relaxation and calming strategies
2	Male	6	3	Hand flapping	Motor difficulties	None	Toe walking and hypermobility
3	Male	6	3	Finger banding	Motor difficulties	None	Toe walking and hypermobility
4	Male	8	2	Hand butting	Anxiety	1.Risperida 2.Ritalin 3.Clonadine	Using relaxation and calming strategies
5	Male	5	4	Body shaking	Clinical depression	None	Doing hobby and social activities
6	Male	9	3	Hand gesturing	Clinical depression	None	Doing hobby and social activities

**Procedure**

The procedure is divided in two phases; phase A, and B, respectively. For phase A, before the study 1<sup>st</sup> week (baseline), repetitive behaviors of students in academic classes without integrated activity arrangement were video recorded. Later on, phase B (intervention) was conducted by implementing integrated activities

while video was recorded in 5<sup>th</sup>, 9<sup>th</sup>, and 13<sup>rd</sup> weeks as shown in Figure 1. The researcher and research assistant independently kept track of the frequency of the repetitive behaviors shown in the video (inter-observer reliability = 98.3%). The two sets of data were comparatively analyzed and discrepancy of the data was discussed to achieve the consensus.



**Figure 1:** Study design

Designing integrated activities for optimal effectiveness in reducing repetitive behaviors of each student required corporation between parents, special education teachers, students’ teachers, and occupational therapists. Afterwards, the designed activities were submitted for reviewing from two occupational therapists, and a special education educator, followed by amendments (index of item objective congruence = 0.80) before implanting them for students in classroom. Accordingly, students were informed of the order of the activities for the implementation



**Figure 2:** Structure pictures for inspection process

of integrated activities, and what to expect to happen during classes. These activities were illustrated in pictures for each student and followed the TEACCH principles which used structure pictures (Figure 2) to guide the visual inspection process of each activity of sensory integration (Table 2).

**Table 2:** Integrated activities for the focused group of students with autism

Repetitive behaviors	Activities	Duration (minutes)
Head butting (Student 1)	Ball on head: The student cradled a ball on the head with two hands and pick up each of ten clothespins from one side to another.	10
	Barrel roll: Push a 90 cm barrel with the head back and forth to collect each of the ten multi-colored pyramid block pieces.	10
	Ball balancing: Balance a 75 cm ball on the head to collect each of the ten multi-colored pyramid block pieces.	10
Hand flapping (Student 2)	Collecting objects: Place half of the body on a chair with face down, and push on the floor with both hands while placing twelve multi-colored pyramid blocks on the pole.	10
	Slime twisting and pulling: Pull and split slime with fingers and then squeeze it into pieces with fingers.	10
	Finger paint: Dip both hands in a color plate and stamp each hand on the paper.	10
Finger knocking (Student 3)	Unbinding beads and pressing beads: Unbind twenty beads from modeling clay and put them in a box and press them on another modeling clay.	10
	Pressing modeling clay on a chair: Mold modeling clay into small round balls and press each one of the ball onto animal paper-cut charts with each finger on both hands.	10
	Slime twisting and pulling: Pull and split slime with fingers and then squeeze it into pieces with fingers.	10
Finger banding (Student 4)	Unbinding beads and pressing beads: Unbind twenty beads from modeling clay and put them in a box and press them on another modeling clay.	10
	Slime twisting and pulling: Pull and split slime with fingers and then squeeze it into pieces with fingers.	10
	Finger paint: Dip both hands in a color plate and stamp each hand on the paper.	10
Body shaking (Student 5)	Balance board: Carry each of the fifteen balls from one side and walk on a balance board to put the balls in the basket at the other end of the walk.	10
	Rocking horse: While sitting on a rocking horse, pick up each of the thirty balls from one side and place it in the basket on another.	10

The frequency of repetitive behaviors of students with autism in both before (A), and after using of integrated activities (B5, B9, B13) were rated frequency by 2 special educators, principle researcher and research assistant (inter - observer reliability = 98.3%, then consensused and analyzed by using the Wilcoxon Signed Rank Test.

### Results

The results revealed integrated activities reduced repetitive behaviors among 6 students with autism as shown in Table 3.

**Table 3:** Median and mean frequency of repetitive behaviors

Student	A	B5	B9	B13	Score Difference (A-B13)
1	48	34	20	22	26
2	92	77	57	51	41
3	36	23	19	16	20
4	52	42	27	20	32
5	60	52	37	29	31
6	63	42	33	25	38
<b>Mean</b>	<b>58.5</b>	<b>45</b>	<b>32.2</b>	<b>27.2</b>	<b>31.3</b>
<b>Median</b>	<b>56</b>	<b>42</b>	<b>30</b>	<b>23.5</b>	<b>32.5</b>

Table 3 displayed median and mean frequency of repetitive behaviors and it clearly appeared that the occurrence of the behaviors was less frequent after implementation of integrated activities. appeared that the occurrence of the behaviors was less frequent after implementation of integrated activities.

**Table 4:** Comparison frequency of repetitive behaviors during phase A and B

Phase	Median	Max	Min	Median difference			**95% CI
				B5 (max-min)	B9 (max-min)	B13 (max-min)	
A	56	92	36	-14*(95-22)	-26*(95-16)	-32.5*(95-15)	A1-B5 (9.26-18.21) A1-B9 (20.34-32.19) A1-B13 (24.09-38.78)
B5	42	77	23		-12*(78-16)	-18.5*(78-15)	B5-B13 (10.43-25.00)
B9	30	57	19			-6.5*(95-15)	B9-B13 (1.30-9.04)
B13	23.5	51	16				B5-B9 (7.05-18.01)

A: week 1, B5: week 5, B9: week 9, and B13: week 13, \*p<0.05, \*\*95% CI = 95% confidence interval

The Wilcoxon Signed Rank Test revealed that repetitive behaviors among students with autism had reduced after the arrangement of integrated activities, at the statistically significant level  $p < 0.05$ .

## Discussion

The results of this study supported the results of this study supported on the previous study by Sorntamart (2015) on utilization of cyclic model movement activities based on the sensory integration theory to reduce repetitive behaviors in a child with autism were implemented to reduce stereotyped behaviors of one autistic pre-schooler at age 3. The student was observed while doing cyclic model physical activities on multiple sensory carpet floors, on a balancing board, with a big ball and on a trampoline, three times a week, and lasted 60 minutes per session. After 8 weeks of the study, the results showed that cyclic model physical activities based on sensory integrations theory could reduce repetitive behaviors in pre-schoolers with autism. Additionally, consistently employing integrated activities in academic classes at certain periods with specific patterns can reduce problematic stereotyped behaviors, particularly those considered obstacles in classroom management. More importantly, it can promote students' interaction in learning activities and improve learning and development. Systematic review presented sensory integration therapy be limited to experimental contexts in single case design studies (Leong, Carter, & Stephenson, 2015) however, the current finding supported most previous studies including meta-analysis study and that found the positive effects for on psychoeducational and motor categories (Vargas & Camilli, 1999) sensory processing, concentration, motor control, bilateral coordination, and reflex integration (Kim, Bo, & Yoo, 2012), as well as gross and fine motor skills. (Abdel Karim & Mohammed, 2015). These indicated that integrated activities could directly reduce repetitive behaviors among students with autism. It also agreed with Juanongwaeng, (2012) for using sensory motor activities to reduce fingers flicking in a child with

autism. This study aimed to investigate the effect of using activity sets to stimulate the sensory system and movement through sensory stimulating activities of the muscles, tendons, and joints such as hand walking, a game in which students have to connect parts of body and move coordinately and moving through obstacles. Moreover, sensory stimulating activities such as playing with dough, throwing a ball in the basket; as well as sensory stimulating activities of balance and movement such as stair climbing, rolling and picking up a ball, and back riding were also included for 30 minutes a day, with an average of 10 minutes per game. These activities were arranged in order to decrease hand playing in students with autism aged of 4 over the course of 9 weeks. Likely, finding of a previous study (Daly, Rioux, Schaffner, Hudson, Lander, 2001) that explored the effects of a weighted vest on attention to task and self-stimulatory behaviors in preschoolers with pervasive developmental disorders with ABA single-subject design and found that a weighted vest resulted in an increase in attention to task and decrease in self-stimulatory behaviors. The most consistent improvement observed was the decreased number of distractions. Additional research is necessary to build consensus about the effectiveness of wearing a weighted vest to increase attention to task and decrease self-stimulatory behaviors for children with PDD.

For summary, it is important that activity leaders such as teachers or occupational therapists select suitable tools and equipment for each activity and respond to the developmental issues and learning difficulties among students with repetitive behaviors. In doing so, students' repetitive behaviors will be decreased and had abilities to learn should be promoted. Limitation of this study was duration of observation was 13 weeks,

it suggested that with AB design which might not cover effect of integrated activities in withdrawn period. Therefore, with ABA Design would be suggested for further research.

## Conclusion

Individual design of integrated activities significantly reduce repetitive behaviors in 6 students with autism over the course of 13 weeks.

## Recommendation

Integration activities are the benefit interventions for reduction repetitive behaviors because they balance abnormal sensory integration and result in good attention and cooperation in academic class. Recommendation for maintain reduction of repetitive behaviors should extend duration of study to observe the long term effect of integration activities or using ABA Design in the further researches.

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