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The Implementation of Modified Brain Gym with Individual Guidance and Social Reinforcement to Reduce Aggression Teenager with Autism in Intervention Program

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Abstract

Aggression are common among individuals with autism due to neurobiological disorder found in them. The aggressive behaviour may cause them to experience a challenging and difficult time in school. The purpose of this study is to reduce the level of aggressive behaviour occurred during the intervention process. This study employs a single subject ABA design to evaluate the baseline, intervention and without intervention phase that were conducted for 2 weeks. Baseline phase (A) involved observation and time recording of aggression for the subjects during MBG exercise that were conducted in group without any intervention taken place. Intervention phase (B) involved individual guidance and social reinforcement for the subject during MBG exercise. During the phase with no intervention, subjects were asked to perform MBG exercise with their peers in group without any individual guidance and social reinforcement from the teachers. Data were collected based on the frequency and duration of aggressive behaviours conducted by the subjects. The findings show that the subjects did not conduct any aggressive behaviour during the phase when no intervention is taken place. It demonstrates that individual guidance and social reinforcement from the teachers were very helpful in boosting students' confidence in acquiring new lessons in school.

Keywords: Individual Guidance, Social Reinforcement, Brain Gym Modification (MBG), Aggression

Introduction

The enforcement of the Education for All Handicapped Children Act in 1975 has undergone several developments and has been changed to the Individual with Disabilities Education Act (IDEA) in 2004 (Duncan & Posny, 2010, p.1). Since then, the access to education in a less restrictive environment was emphasized with the provision of appropriate interventions,

strategies and supports for the special needs children to increase their participation in the general education system. This is also important in providing a secure and acceptable environment for the school community when facing with the risky behaviours that could possibly disrupt the learning process.

In Malaysia, children with autism are a group of students in special education program in mainstream schools who would also study in the regular classes. Due to the neurobiological disorder that they experienced (Jackie & Justin, 2017, p.5; Alana, 2019), they are at high risk of difficult experience in school, being suspended and excluded or partially accepted (New South Wales Parliament, 2012, p.50, Nuske et al., 2018).

A number of studies show a consistent findings of aggression among students with autism. Fitzpatrick et al (2016, p. 1526) described a higher rate of aggressive behaviour among individuals who suffer from autism than the peers with typical development. Farmer et al (2015, p.8) found that the comparison group of students who are not diagnosed with autism were proactive in the conduct of aggressive behaviour as compared to students with autism who were reactive in action.

The study also found that the age factor is not related to the conduct of aggression for students with autism. In a study involving adolescent anxiety and autism aggressive behaviours in mainstream classes, Ambler et al (2015, p.106) proved that the fears and aggression related behaviours and positive social anxiety was found to have a strong relationship with the behaviour of aggression. In addition, this study also proves that there is a strong relationship between reactive anger and aggressive behaviours for teenagers with autism.

Reactive Behaviour and Aggression

To understand how reactive behaviours and aggressiveness among individuals with autisms are conducted, some physiological and neurological function should be studied in advance. Sensory integration is a process that becomes a guidance to the analysis, synthesis and organization of the data received from the body and the environment. Sensory integration plays an important role in the central nervous system, the development of body perception, selection of concurrent stimuli and the ability to act in conveniences with the environment (Fazlioglu & Gunsen, 2011, p.346).

There are three basic senses involved and interconnected in a complex sensory integration: tactile (information received from the skin), vestibular (process information about the movement, gravity and balance are received through the inner ear) and proprioceptive (information about body position received through muscles, joints and ligaments). Sensory stimulation and experience will produce more dendrites and synapses that make connected components of neurons to form the nervous system. The difficulty to process, integrate and respond to sensory stimuli are among the features of autism since it was first identified (Hazen et al., 2014).

Paul (1970) in his Triune Brain Theory states that the human brain is equipped with three layer of brain: the reptilian brain (the deepest layer of the brain structure that is responsible for the behavioural instincts), the limbic system (the second layer of the brain that adds emotion to behavioural instinct) and the left hemisphere and the right hemisphere (the highest mental functions) (Books, 2013, pp. 40-41). The process of brain development occurs consecutively starting with the reptilian brain while in the womb and it grows into the neocortex at the age of five.

Sensory integration dysfunction that is experienced by individuals with autism resulted in the inability to respond to the sensory information involved in planning and organizing what needs to be done automatically and appropriately. This situation is likely to cause a state of shock, threatened, frightened or angry that similar to a reptilian brain which generally react in one of the three ways: fight, escape or become stiff. For individuals with autism, the role of the reptilian brain domination is manifested through behavioural outbursts that cause aggression, physically or verbally as an indication that the reptilian brain must be appeased with a sense of security assurance (Ploeger & Galis, 2011).

When the reptilian brain starts to function, the tracks to the highest brain are blocked that cause the inability of the nervous system to complete the signal between each layer. A child who has a good emotions with a perfect development of limbic system will increase self-esteem and motivation to learn.

Therefore, the best way to deal with students with autism is to create an environment that encourages communication to satisfy their curiosity and adaptation to the surroundings towards alleviating fears and embarrassment (Peter, 2013, p. 47).

Treatment and Behavioural Interventions to Control Aggression

Ravet & Williams (2017) have reviewed different objectives for the field of psychiatry and education of children with autism in an article that thoroughly discusses the exploration of study on neuroeducational for children with autism. Clinical psychologists are more interested in looking at the short-term goals of the establishment and evaluation of the treatment for autism symptoms which make categorization of medical model for autism as a 'disorder'. On the other hand, the role of the education sector is to identify the needs and differences through interaction between teachers and students and make adjustments to the learning environment that is known as intervention.

Fitzpatrick et al (2016) have reviewed a number of treatment options for aggressive behaviour among students with autism. Non-pharmacological treatment involves knowledge of behavioural principles and observations in order to identify the purpose of the behaviour is an attempt to improve good behaviours and reduce aggressiveness. Two examples of functional behaviour analysis strategies were discussed: Functional Behaviour Assessment (FBA) and 'Schedules of Reinforcement'. FBA is a procedure that aims to develop interventions for students with emotional and behavioural disorders (Waguespack et al., 2006)

Reinforcement Strategy also involves the provision of reasonable consequences that follow a behaviour to increase the likelihood of good behaviour being repeated. Among other treatment approaches that is reviewed in this article are the pharmacological treatment that involves the consumption of several types of antipsychotic drugs like Risperidone, Aripiprazole and Clozapine to reduce the frequency and intensity of aggressive behaviour for individuals with autism.

A systematic study conducted by Bremer et al (2016) found that the intervention of exercise such as jogging, horse riding, martial arts, swimming, yoga and dance could enhance the positive behaviours, social and emotional well-being, cognitive skills and attention among students with autism. In addition, the physical activity has a positive effect on the self-regulation and motor skills (Sorensen & Zarrett, 2014), the quality of sleep and good morning disposition (Brand et al., 2015), reduce the stimulation of stereotype behaviours (Young & Furgal, 2016) and improve the performance of students with autism in the classroom (Pontifex et al., 2014).

The main purpose of this study is to measure how individual guidance in Modified Brain Gym exercise and social reinforcement could successfully reduce aggressive behaviours among students with autism during teaching and learning activities. This short-term study is an early stage of intervention to reduce the aggressive behaviour of students with autism for a long term target in school.

This study is one of the effort to measure the effectiveness of physical activity to control the aggressive behaviour among students with autism. This effort is crucial in maintaining a secure and effective learning environment for all students including the typical one. Therefore, the research questions that are built for the study is does individual guidance in Modified Brain Gym exercise and social reinforcement could reduce aggression during a group exercise without intervention?

Methodology

Research Design

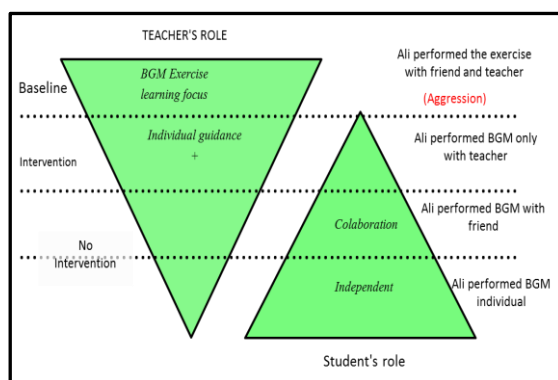
This study employed a single subject ABA design to measure the effectiveness of individual guidance in Modified Brain Gym (MBG) exercise and social reinforcement approach in order to reduce the level of aggressive behaviour happened among students with autism during physical activity in group.

The ABA single subject design started with the baseline phase (A) followed by the intervention of individual guidance in MBG exercise and social reinforcement approach (B). During the second phase (A) of the study, the subject, Ali exertion performed the MBG exercise in group without any implementation of intervention (Byiers et al., 2012).

In this study, individual guidance and social reinforcement intervention are inclined to the concept of the Zone of Proximal Development (ZPD) in Lev Vygotsky Cognitive Theory (1978). In this theory, Vygotsky (1978, p. 86) states that children have a limit within their ZPD development when working alone by themselves but they could achieve a higher limit with guidance and assistance.

The implementation of individual guidance and social reinforcement is illustrated in the conceptual framework shown in Figure 1 which is adapted from the Model for Success for All Students by (Fisher and Frey, 2008, p. 4).

Figure 1: The Conceptual Framework of Ali's Individual Guidance and Social Reinforcement Intervention



Ali's Individual Guidance and Social Reinforcement Model in MBG Exercise

The above diagram is a guided model of ZPD (intervention) in which a meaningful teaching and learning occurs in the triangle which represents the number of lessons that are effectively

perceived and accepted by the students. For Ali, a meaningful learning does not occur in the baseline phase as Ali has conducted aggression upon immediate feedback as he was unable to do the exercise without guidance from the teacher.

Participant

The participant of this study is a 13-year old child with autism who is having difficulty in speaking and always tend to behave aggression. Aggressive behaviour of Ali (not his real name) would constantly cause disruption and interruption during the learning activities in the classroom as the other students will not be able to focus on the learning activities. Teachers also will have to deal with a difficult situation caused by the behaviour. Therefore, intervention from the teachers is needed to reduce, prevent and eliminate aggressive behaviour during lessons in the classroom.

During the observation, the teacher found that the students will conduct aggression when they were not able to perform the assigned tasks with 70% frequency and also due to the environmental factors such as noise, social relationships experiences and communications with 30% frequency.

Teachers conducted MBG physical exercise for Ali and other students during Manipulative Skills classes that were scheduled 2 times a week, on Tuesdays and Thursdays. When Ali was not able to do something or having a slow moving pace during the activity, he would start screaming, biting the four fingers of the right hand and he will also hit his head firmly.

Therefore, in this study the researcher conducted a one-to-one MBG exercise with Ali. When the approach of social reinforcement is implemented, Ali tend to always try to do the right movements during the exercise. The social reinforce that were used are praise (while performing movements) and hand gestures 'High Five' (movement slap palms) upon completion of activities.

Procedure

Baseline

During the baseline phase, Ali and 7 other students were guided by the teacher to perform MBG exercise. The duration of Ali's aggression (when he is not able to do any step in MBG exercise until he was expelled from the group) will be recorded by the observer. Baseline phase were continued for two weeks (two times a week and three minutes for each session). The frequency of aggressive behaviours were recorded.

Intervention

The intervention involves a one-to-one guidance from the teacher to Ali to conduct each movement of the MBG exercise correctly. Social reinforcement and support were given when Ali was able to do any movement in a correct way. Observers were always ready to record the duration of behaviour in the event of aggression. When the exercise is completed, the teacher will give "High Five" and praise Ali for the accomplishment of the exercise. The intervention phase will last for two weeks, two times a week, and six minutes for each session (time is reduced when Ali is able to follow the movement performed by the teachers). The duration of aggression were recorded.

Without Intervention

During the third phase, Ali and other eight students performed MBG exercise in a circle with the guidance of teachers. During this phase, all students performed the MBG exercises with teachers' guidance without the intervention of any social reinforcement to Ali. The duration of Ali's aggression were recorded by the observer. This phase lasted for two weeks, two times a week and three minutes for each session. The frequency of aggression occurred during the session were recorded.

Brain Gym Modification

The Brain Gym Modification involves a series of Brain Gym movements known as PACE (Koester, 2013) including cardiovascular movements such as spot running and jumping. This three-minute exercise is intended to prepare the students for the learning process as well as to provide composure to the nervous system and awareness of the surroundings.

Data Collection Strategy

This study collected two types of significant data: the frequencies of aggression; and total duration of aggression per week.

The frequency and duration of aggression occurred have been recorded in the study as the beginning and ending time of the behaviour can be observed clearly. In addition, the consistency of the daily observation period increased the reliability of the two types of data collected. The combination of the two types of data collected provide better picture of Ali's aggression. (www.sped.sbcs.k12.in.us 2016).

Data Analysis

Duration Record

The duration of aggression during MBG exercise is recorded for each session. The average duration that were recorded for each week is illustrated in a line graph that displays the information on duration of aggression during the baseline phase, intervention and without intervention.

Frequency Record

The frequency of aggression occurred during MBG exercise were recorded. The average frequency of observations for each phase of the current baseline, intervention and without intervention were taken. Data for each phase is reviewed and compared in a line graph.

Result and Discussion

The descriptive data shows the duration of aggression in percentage for each manipulative skills learning session that were taken 2 times a week for the period of 6 weeks. The duration of Ali's aggressive behaviours in percentage was obtained by dividing the conduct of aggression during MBG exercise (in seconds) with the total duration of MBG exercise (180 seconds) per session.

Duration of Behaviour
Calculation formula: ----- x 100
Duration of MBG

For example, Ali has been aggressive for 87 seconds during the first session of MBG. Therefore, the percentage of behaviour duration is as follows:

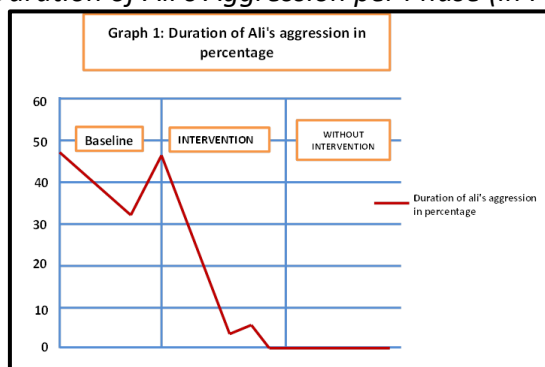
$$\text{Behaviour \% Per Session} = \frac{87}{100} \times 100$$

The duration of Ali’s aggression (in percentage) during each session of MBG The duration of Ali’s aggression (in percentage) during each session of MBG exercise were recorded and illustrated in a table and a line graph as below:

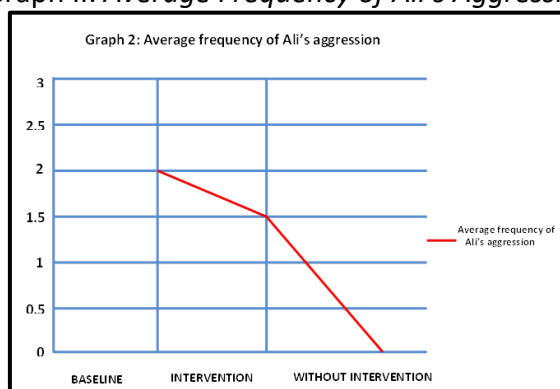
Phase	Duration (second)	Duration Percentage Per Session	Frequency Per Week	Average frequency of each phase
Baseline	87	48	2	2
	75	42		
	59	33		
	80	44		
Intervention	10	5	2	1.5
	11	6		
	2	1		
	0	0		
No Intervention	0	0	0	0
	0	0		
	0	0		
	0	0		

Table I Duration and Frequency of Ali’s Aggression

Graph I: Duration of Ali’s Aggression per Phase (in Percentage)



Graph II: Average Frequency of Ali's Aggression



During baseline phase, the duration of aggression had decreased from 48% to 33% on the third session of manipulative skills teaching during the second week. It increased to 44% at the end of the intervention that shows Ali had feeling pressured for not being able to do MBG exercise well like the rest of his classmates.

During intervention phase, Ali's aggression are reduced for 5 and 6 seconds when individual guidance and positive social reinforcement were provided to him during the exercise. Ali has only shown a very minimal symptom of aggression like finger biting and screaming when his teacher was trying to correct his body position. During the final intervention phase, Ali did not show any sign of aggression and he was able to work the MBG exercise out with the teacher confidently and easily.

On the other hand, during the phase without intervention, Ali managed to perform the MBG exercise confidently without any early symptoms of aggression. It shows that Ali has started to master the movements and positions of MBG exercise without the negative feelings like low self-esteem, shame and anger which can trigger physical and verbal hostilities.

The result of this study displays that there is a significant relationship between academic learning and social-emotional abilities among students with autism. This relationship could reinforced the notion that socio-emotional plays an important role in learning, especially for students with autism in terms of behaviour, academic engagement and attendance to school (Russo-Ponsaran et al., 2015).

In the Triune Brain Theory, socio-emotional is associated with the development of limbic system that allows information and new experiences to be learned effectively through higher mental function in the neocortex. Learning environment that does not support good emotion and threatening will encourage reactive responses and aggressive behaviour among individuals with autism. This is due to the dominant role played by the reptilian brain that caused a blockage on the route to brain function (Books, 2013, pp.41-43). In addition, the imperfect sensory integration of students with autism had caused difficulties in adapting themselves to new learning and socializing experiences. The difficulties lead to behavioural problem and struggle to make academic gains (Lee, 2013, pp.6-9; Chiang et al., 2019). Throughout the baseline phase, the researcher found that Ali started to become aggressive when he felt angry as he was not able to perform the MBG exercise movement as good as how the other students could perform.

Ali screams and hurts himself to interact and communicate as he is not able to speak. Limited understanding of the meaning and function behind the symbolic language caused such condition of communication dysfunction. The frustration for not being able to communicate with others can lead to behavioral outbursts in some children (De Giacomo et al., 2016, p.2; Brown et al., 2019).

During the early stage intervention towards Ali, individual guidance from the teacher acts as a model in providing encouragement and guidance for Ali when he is having difficulty to perform any movement correctly. With this kind of approach, Ali can have more focus on the guidance given to him within a flexible time frame without any element of competing and force from other students. On top of that, individual counselling is also in line with Zone of Proximal Development (ZPD) in Lev Vygotsky Cognitive Theory, which make a closer space between personal problem solving and problem solving with teacher's guidance. Based on this concept, individual guidance from the teacher in MBG exercise will be helpful for Ali to perform the activity on his own in the future (Veresov, 2004).

The positive reinforcement provided for Ali during MBG exercise is also one the factor that help this intervention to gain success despite of the individual guidance. In this study, praise and 'High Five' signal are extrinsic factors that have significant positive relationship with Ali's motivation to complete the MBG exercise. A stable and comfortable emotion are intrinsic factors that stimulate the integration of limbic system and the highest brain function for a more effective learning (Catani et al., 2013). The findings are consistent with the previous studies that prove the implementation of social reinforcement strategy in individual basis is an effective method for students with autism in completing the tasks assigned by the teacher (Joe, 2013; Vernon et al., 2019).

The teacher will continuously conduct the MBG exercise in the classroom as Ali has able to perform the activity individually and in group to ensure that Ali's aggression is reduced for a long term basis.

Conclusion

The factors that triggered the behavioural problems were identified and defined in advance prior to the interventions that were conducted to address, reduce and eliminate aggression among students with autism. Therefore, the teacher could plan the suitable method for the interventions in meeting the needs of autism students' sense of security and motivation when the cause of an aggressive behaviour is successfully identified. An effective learning is difficult to be achieved and will only lead to aggression that disrupt the learning when students' instinctive needs are not fulfilled.

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