



The Effect of Applied Behavior Analysis on the Gross Motor Development of Autistic Children

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Abstract

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BACKGROUND: Autistic children have abilities and characteristics that are different from each other, so different ways of interacting the environment autistic children individuals. The development of autistic children both physically, emotionally, intellectually, and psychosocially has a problem that results in the inhibition of children reaching a level of gross motor development that is appropriate to their age. Stimulation applied behavior analysis (ABA) in children with autism includes gross motor, fine motor, emotional, social, language, informational, and practical supports. An autistic child will feel that he is loved and wanted if more and more people in the family environment love and care for him. Based on this preliminary study, interviewing eight autistic schools in the provinces of DIY and Ponorogo, East Java, to 16 parents who have autistic children, the majority of parents (93%) think that by entering autistic children into a special school (SLB) in accordance with its limitations mean that their efforts can be said to be enough. Not all parents realize that stimulating and accompanying children with special needs can maximize gross motor development.

AIM: This study aims to assess the effect of stimulation ABA on the gross motor development of children with autism.

METHODS: Quasi-experiment "Pre-Post Control Group Design" was used in this study. The first observation is to determine the gross motor development of an autistic child before being given stimulation ABA and the second observation after being given the ABA stimulation. Samples were recruited using a purposive sampling technique with the criteria of parents and autistic children aged 6–12 years in the autistic schools of the provinces of Yogyakarta and Ponorogo, East Java. T-test and Wilcoxon applied in this study with significance level was <0.05. The significance level was set at $p < 0.05$.

RESULTS: Result of data analysis showed in the experiment group before intervention, the category of the gross motor is enough category and after intervention, the category was high. Meanwhile, in the control group, there is no differences category between pre test and post test. there is a difference of the gross motor development of autistic children in intervention group and control group with p value 0.001 and 0.004 respectively.

CONCLUSION: There is an effect of stimulation ABA on the gross motor development of autistic children in autistic schools with p (sig.) <0.05 means that H_a is accepted and H_0 is rejected.

Introduction

Autism is a developmental disorder caused by organic damage to the brain. In general, autism children have difficulty in communicating both verbal and non-verbal, when they want something the way to do is to pull other person's hand to get attention. Children with autistic disorders show a withdrawn attitude where the child unable to maintain communication, talk to himself, sing alone, which can irritate those around him. Autism children have abilities and characteristics that are different from each other, so different ways of interacting with themselves and the environment and making autism children as unique individuals [1].

Until now, no definitive cause of autism can be found, so prevention and treatment methods have not yet been developed. At first, autism was seen as a disorder caused by psychological factors, namely, parenting patterns that are not emotionally warm.

In the early 1970s, research on the characteristics of autism children succeeded in determining the diagnostic criteria which were subsequently used in the Diagnostic and Statistical Manual of Mental Disorder. Autism is defined as developmental with three main characteristics, namely, disruption in social interaction, disruption in communication, and limited interests or ability of imagination [1].

In the United States, currently, there is a comparison gross motor development between normal children with autistic children 150:1, in the UK 100:1, while in Indonesia, there are no data on autistic children because there has never been an official survey. Although different from normal children, children with autism still have basic rights as normal children. Autistic children need to play, learn, and socialize gross motor developmental in the community in their environment [1].

The development of autism children physically, emotionally, intellectually, and psychosocially has problem so that the result of inhibition of children

reaching level of development in accordance with their age. The emergence of various developmental obstacles in children with autism is phenomenon that needs to be addressed further so that sufferers can still live well and optimize the slightest ability possessed. This is important because despite its various limitations, every human being has the same right to grow, develop, be accepted, and carry out certain roles in society [2].

To achieve maximum results, every educational process always requires the cooperation between the school and parents. Education in principle must actually start from home and education will fail without parental participation. One of the main requirements that must be met by parents in seeking good cooperation with the school so that the educational process takes place optimally is to give full attention to the development of the child as a person, and not just attention to what is achieved by children. Similar to the education of children with autism, parents and other family members with educational institutions must be able to work well together [2].

This is consistent with the exposure in various literatures that the effectiveness of various programs for handling and improving the ability of life of children and adolescents who have special needs will greatly depend on the participation and full support of parents, families, and communities. The knowledge and skills acquired, for example, gross motor development by children at school will be more endured and well mastered if parents can also practice it at home and direction from parents. Parents play a role as educators of their children, especially autistic children. The family environment is also said to be the most important environment, because most of the lives of children with autism in the family, so the most widely accepted education for children with autism is in the family.

Parents must understand their nature and role as parents in raising children, equip themselves with knowledge about proper, knowledge about the education that children go through, and knowledge about child development, so it is not wrong in applying a form of educational pattern, especially in the formation of personality children in accordance with the purpose of education that is to educate the nation.

Autism children can be maximized by utilizing the rest of their abilities. Autism children also need to get special treatment by involving parents in accompanying them while at home. Applied behavior analysis (ABA) in children with autism includes providing emotional, social, informational, and practical support and gross motor development for the autism child. An autism child will feel that he is loved and wanted if more and more people in the family environment love and care for him. This ABA is to understand and follow verbal instructions, respond to the words of others, describe an object, imitate the words and movements of others, and teach reading and writing. Stimulation is an important thing that must be done in children with autism, so parents

and families can accompany and stimulate gross motor development of children with autism during the treatment period at home [3].

Based on the results of a preliminary study conducted by the author by interviewing 16 parents with autistic children in 7 autistic schools in Yogyakarta Province, it shows that most parents (93%) think that they have enough effort if they send their autism children to special schools. The rest is the school that is responsible for educating and teaching various life skills to their children. They do not yet understand that the lack of attention and support from parents will make the results of the educational process at school not optimal. Not all ABA realize that having children with special needs in accompanying the gross motor development can maximize the gross motor development.

Based on the description above, it is necessary to conduct research on "The Effect of Applied Behavior Analysis (ABA) on the gross motor development of autistic children."

Methods

This type of research is a quasi-experimental pre-post control group design. The design of this study can be described as follows:

Pre-test	Intervention	Post-test
O ₁	X	O ₂
O ₃	-	O ₄

Information

- O₁: Pre-test gross motor development of autistic children in the experimental
- X: Intervention with applied behavior analysis (ABA)
- O₂: Post-test gross motor development of autistic children in the experiment
- O₃: Pre-test gross motor development of autistic children in the control
- O₄: Post-test gross motor development of autistic children in the control.

The study was conducted in July–September 2019 (duration of intervention for 3 months). Research sites in eight autistic schools, in the province of DIY seven autistic schools (SLB Samara Bunda Autism, Dian Amanah Autism SLB, Fajar Nugraha Autism SLB, Citra Mulia Mandiri Autism SLB, Autism Bina Anggita SLB, Yogyakarta Public Assistance SLB, and Autism Service Center [PLA] in Sentolo), and one in the autism school/children with special needs/ABK Baitul Qur'ani Ponorogo, East Java. The population is 148 parents with autism children of school age (6–12 years old) in seven autistic schools in DIY province (SLB, Samara, Mother of Autism, SLB, Dian Amanah, SLB, Fajar

Nugraha, SLB, Citra Mulia Mandiri, SLB, Autism, Bina Anggita, Yogyakarta Public Assistance SLB, and the Autism Service Center (PLA) in Sentolo) and the Baitul Qur'ani Ponorogo, East Java.

The samples in this study were 92 of parents with autism in schools in DIY Province (SLB Samara, Mother of Autism, SLB Dian Amanah, SLB Fajar Nugraha Autism, SLB Citra Mulia Mandiri, SLB Autism Bina Anggita, SLB Yogyakarta Specialist Country, and Autism Service Center [PLA] in Sentolo) and the Baitul Qur'ani Ponorogo, East Java, school of autism/children with special needs, taken by purposive sampling technique. The first step of the study was to carry out a pre-test assessment of gross motor skills in both intervention and control groups. After a series of interventions were given to the experimental group, a post-test assessment was carried out for both groups. Examination data were analyzed descriptive and analytic with the help of the SPSS™ for Windows version 16.0 program using Wilcoxon test with a significance level of 0.05.

Results

Research location and number of autism children in eight autism schools

From Table 1, it can be seen that in the experimental group, the highest number of autism children from the Autism Service Center (PLA) was 11 children (23.9%) and those with the least SLB Dian Amanah and Baitul Qur'an were 3 children (6.5%).

Table 1: Research location and number of autism children in eight autism schools (n=92)

Research location	Experiment group		Control group	
	Frequency(f)	Percentage	Frequency(f)	Percentage
SLB Fajar Nugraha	4	8.7	4	8.7
SLB Negeri Pembina	6	13.0	6	13.0
SLB Bina Anggita	5	10.9	5	10.9
SLB Citra Mulia Mandiri	10	21.7	10	21.7
Pusat Layanan Autism (PLA)	11	23.9	10	21.7
SLB Samara Bunda	4	8.7	4	8.7
SLB Dian Amanah	3	6.5	4	8.7
SLB Baitul Qur'an	3	6.5	3	6.5
Total	46	100	46	100

Source: Primary data (2019).

Whereas in the control group, the highest number of autism children from Citra Mulia Mandiri SLB and Autism Service Centers (PLA) was 10 children (21.7%) and the lowest was Baitul Qur'an with 3 children (6.5%).

Characteristics of children and parents in eight autism schools

The characteristics of respondents in Table 2 show that majority of the children were age > 10-12 years old, male gender, in the elementary school class, age of parents were 31-40 years old, the education

Table 2: Characteristics of autism children and parents of autism children in autism schools (n=92)

Characteristics of respondents	Experiment group		Control group	
	Frequency (f)	Percentage	Frequency (f)	Percentage
Age of child (year)				
6-8	11	23.9	14	30.4
>8-10	6	13.0	8	17.4
>10-12	29	63.0	24	52.2
Gender of children				
Man	35	76.1	32	69.6
Woman	11	23.9	14	30.4
Class				
Kindergarten	7	15.2	10	21.7
Primary school	39	84.8	36	78.3
Age of parent (year)				
20-30	5	10.9	1	2.2
31-40	31	67.4	38	82.6
41-50	9	19.6	5	10.9
51-60	1	2.2	2	4.3
Parent education				
Primary school	4	8.7	4	8.7
Junior high	10	21.7	10	21.7
Senior high	24	52.2	21	45.7
Bachelor	8	17.4	9	19.6
Postgraduate	0	0	2	4.3
Parents' job				
Government employees	8	17.4	11	23.9
Private occupations	24	52.3	20	43.5
Housewife	14	30.4	15	32.6

Source: Primary data (2019).

level of parents was senior high school and the work of the parents was private employees.

The gross motor development before and after ABA is given to autism children in the autism school

In Table 3, the gross motor development of children with autism before ABA was given to most categories of only 35 children with autism (76.1%) and after ABA most categories were good for 43 autistic children (93.5%). In the control group, before most were less as many as 30 children with autism (65.2%) and after most less as many as 29 children with autism (63.0%).

Table 3: Gross motor development before and after applied behavior analysis is given to autism children in autism schools

Category of gross motor development	Experiment group		Control group	
	Pre-test	Post-test	Pre-test	Post-test
Good	0 (0)	43 (93.5)	0 (0)	0 (0)
Enough	35 (76.1)	3 (6.5)	16 (34.8)	17 (37.0)
Less	11 (23.9)	0 (0)	30 (65.2)	29 (63.0)
Total	46 (100)	46 (100)	46 (100)	46 (100)

Source: Primary data (2019).

Normality test

The normality test was test using Shapiro-Wilk because n < 50, with p (sig.) > 0.05 means was normal distribution and p (sig.) < 0.05 was not normal distribution.

In Table 4, pre-test experiment with p (sig.) 0.001 < 0.05 and post-test p (sig.) 0.000 < 0.05, not normal distribution so that the parametric test of t-test is used, namely, Wilcoxon. In the control, pre-test with p (sig.) 0.000 < 0.05 had abnormal distribution, post-test with p (sig.) 0.000 < 0.05 had abnormal distribution non-parametric test of t-test which was used Wilcoxon.

Table 4: Test the normality of the experimental pre-and post-test control in children with autism in the autism school

Variable	Group	p	The results
Gross motor development	Pre		
	Experiment	0.002	Abnormal
	Control	0.000	Abnormal
	Post		
	Experiment	0.003	Abnormal
	Control	0.000	Abnormal

Bivariate test

In Table 5, it can be seen that in the experiment pre-post with p (sig.) 0.001 <0.05 then H_a is accepted and H_o is rejected. In the control, pre-post with p (sig.) 0.004 <0.05 then H_a is accepted and H_o is rejected

Table 5: Test results of the differences between pre- and post-test in the experiment and control in autism children in autism school

Variable	Group	p
Gross motor development	Experiment	
	Pre-test	0.001
	Post-test	
	Control	
	Pre-test	0.004
	Post-test	

Discussion

Gross motor development before ABA in autism in autism schools

The gross motor development of autism children in the experimental before ABA was given to most categories of only 35 children with autism (76.1%). In the control group, before most were less as many as 30 children with autism (65.2%). At the time of pre-test, children with autism are difficult in socializing with peers, difficult to interact, and difficult to communicate. Children with autism have a level of intelligence that varies from low to genius. Autistic children who have normal intelligence are generally of low achievement in school. This is caused by the acquisition of information and understanding of language and ability in language development to experience fewer obstacles when compared to other normal children. Autistic children lack understanding verbal information. This makes it difficult for children to accept material that is abstract, so ABA is needed to facilitate understanding of a concept in children with autism so that children will easily communicate with parents and peers [4].

ABA is an activity carried out so that parents direct and assist children in socializing and interacting and communicating with others. According to previous research showed that there is a significance influence on the use of media in learning for children with special needs [1]. ABA can direct and assist children with autism in socializing with peers. In addition, ABA can also improve communication skills so that it helps the

interaction between teachers and students. Students will find learning activities more enjoyable and can understand the material well so as to improve students' gross motoric development. Learning objectives will be achieved with the cooperation between teachers and parental assistance at home so that children are able to stimulate gross motor development [5].

Gross motor development after ABA in autism children in the autism school

The majority of autism children (43, 93%) in the experiment have good gross motor development after the implementation of ABA. The control group, as many as 29 children (63.0%) were categorized to have less gross development score. At the time of the post-test, autism children still have difficulty in interacting and communicating with peers and other people. This is due to many factors that affect autistic children in the gross motor development of autistic children's [5]. Interventions for children with autism in children/infantile autism in the form of stimulations so that children show a response in this case ABA assistance are parenting. Actually, before children are included in the therapy program that is being followed, parents should accompany children with autism at home without stopping so that children do not drown in their own world. Do not leave the child alone and with rigid interests and activities, for example, turning on and turning on lights, being amazed at watching the fan spinning and other insignificant activities. Always try to have someone accompany your child while not sleeping. Invite children to communicate both ways both verbal and non-verbal. Do not let the child be preoccupied with television or other games that are unidirectional and damage eye contact. At the beginning, do not expect your child to respond to the communication invitation given to him. Most of the responses of indifferent children, do not understand that communication is addressed to him or even if conscious they may respond negatively like crying out loud because they feel disturbed so that children can socialize and interact and communicate with peers and other people [6].

Children who are in a relationship interacting with their families in a healthy manner (attentive and affectionate with their parents) can facilitate children's gross motor development. Conversely, if the relationship between children and parents is not healthy, the language development is also not good. The neighborhood also influences the development of children's gross motor, where the village environment with close family conditions and socialization with the environment is still good, so the contact of children with children the same age is still intensive enough so that children can play with peers using toys to improve gross motor development. This contact with children of the same age encourages children's gross motor development [7].

Family socioeconomic status of several studies stated that children from poor families will experience gross motor development delays compared to children

from families whose economic level is better. This condition is caused due to lack of learning opportunities in children from poor families [8]. Adequate family income will support the growth and gross motor development of children, because parents can provide all the needs of children both primary and secondary, for example, providing games to improve gross motor development [7].

Poverty is associated with damage to nerve structure and function, including smaller white and cortical gray matter and the hippocampus, amygdala related to cognitive abilities [1]. Families with low socioeconomic status have a tendency to limited knowledge, time, and low quality in accompanying and accompanying children to play and communication activities to provide stimulation of play to improve gross motor development that should be needed by a child in growth and gross motor development [1].

Wong stated that to increase gross motor development in children, it can be done by: 1) offering exclusive breastfeeding; 2) adequate nutrition; 3) Provide food with patience and compassion; 4) Inviting children to do activities outside the home; and 5) Teach children something as simple as prayer training [8].

The influence of ABA on the gross motor development of autism children in autism schools

In Table 5, the experiment pre- and post-test with p (sig.) $0.001 < 0.05$ then H_a is accepted and H_o is rejected, meaning that there is a difference between pre- and post-test in the experiment. In the control group showed that there is also differences between pretest and post test with p value is 0.004.

ABA in accompanying children can train to communicate, interact, and socialize with children with autism so that it can influence gross motor development [1]. The benefit of ABA is also can improve the practice of social skills so children can interact with others [5]. Thus, it can be said that ABA given to children with autism who have language development disorders can have an effect on increasing gross motor development in autism children. This is due to the frequent accompaniment of children so that children will be able to adjust interaction and socialization with peers and others and make it easier to develop gross motor. Increased child gross motor development before and after due to ABA with the assistance provided regularly will be received by the five senses and will then be conveyed to the brain [5]. The development of the child's brain and sensory develops very rapidly, which will improve the brain's ability to learn, analyze, understand and respond appropriately to stimuli. Previous research has suggested that stimulus should be provided when the parent or caregiver is reliable with the child. The more frequent and regular stimuli was received, the relationship in the brain cells will be stronger [8].

Conclusion

Gross motor development in the experiment before ABA in autism children in the autism school is categories as sufficient and the control group category is lacking. Gross motor development in the experiment after ABA in children with autism in the autistic school category is good and the control category is lacking.

There is an effect of Applied Behavior Analysis on the gross motor development of autistic children with p value was 0.001.

Suggestion

For pediatric nursing, ABA can be used as a model to stimulate the gross motor development of autistic children in autistic schools and can be included in the curriculum in autistic schools and included in child nursing courses.

For families and parents of autism children in autism school, ABA is a guide for families with autism children in assistance to improve gross motor development while at home and in the midst of the family.

For teachers in autistic schools, ABA is very good for improving the gross motor development of autism children, so it is expected that ABA is included in the curriculum and applied in teaching and learning in the classroom.

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