The Effect of Time Out and Differential Reinforcement Procedures on the Reduction of Early Childhood Aggressive Behavior

1*Ni Luh Putri
2Mario Erick Wantah

1 & 2Universitas Negeri Manado, Pendidikan Guru Pendidikan Anak Usia Dini,
Indonesia

Abstract: *The Effect of Time Out and Differential Reinforcement Procedures on the Reduction of Early Childhood Aggressive Behavior. This study aims to reduce aggressive behavior in early childhood using time out procedures and differential reinforcement. This study used a single subject research method with A-B-A-B design. The research subject is a child aged 5 years. Data were collected using interviews, observations, and documents which were finally analyzed descriptively. The results showed that the time out and differential procedures showed positive changes by reducing the frequency of aggressive behavior. The average number of aggressive behavior was 26.5 times (A1), to an average of 11.6 times (B1) after the first intervention was implemented. In condition A2, the means were 5.1 and 4.4 in the intervention condition B2. The results of the graph analysis within conditions show the change in the positive level and the stability of the trend from the variable to being stable. Overlapping data of aggressive behavior reached 100% between conditions (A2-B2). The use of time out and differential procedures has succeeded in suppressing the frequency of aggressive behavior of a child in Kartika XXI-20 Pakowa Kindergarten Early Childhood Education, Manado. After the research is complete, there is maintenance and generalization of behavior. Children no longer showed significant aggressive behavior after graduating in group B with a different class teacher.*
Keywords: time out, differential reinforcement, children's aggressive behavior

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I. Introduction

Early childhood is an individual who is experiencing a rapid process of growth and development. The visual development period occurs when the child is born until the age of two. The critical period for developing the child's ability to control emotions and the habit of reacting to new experiences is acquired also occurs in the first two years of life. In this period the child is at the prime of ability to acquire the skills of the language. Cognitive abilities begin to develop in the second year. But by the age of four, the ability to understand the concept of quantity begins to develop. After that the higher cognitive abilities continued to develop rapidly. When a child is three years old, along with the development of these abilities, the child's ability to socialize with peers also develops. The development of social skills continues until the end of the sixth year (Jalal, 2009).

Along with the development of early childhood abilities, children basically have the nature of imitating what they get and feel and one of the negative interaction patterns that is generally seen when children play together is an aggressive behaviour. Hurlock (2004) states that there are various kinds of behaviour models for children aged 2-6 years or also known as early childhood, such as the existence of social patterns, for example imitating, competition, cooperation, sympathy, empathy, social support, sharing, and familiar behaviour. Meanwhile, those that are not social include negativism, powerful behaviour, self-thinking, and progressiveness. Buss (1961) explains that aggressive behaviour is a behaviour that endangers others. Geen (2001) stated that aggressive behaviour is not only visible behaviour, but there are several elements that underlie visible behaviour, such as the intention to harm, and the motivation of the victim. In line with this, according to Bee & Mitchell (1984) children will be involved in conflict if they are involved in conflicts with their peers. This behaviour appears when hitting, injuring, biting, kicking, pushing, and pinching. Davit Setyawan (2018) states that research conducted by psychologist Albert Bandura regarding exposure to violence in the media with children's aggressive attitudes shows that children learn through the modelling process or imitate the actions of other people, especially adults. Children who watch adult shows are aggressive more likely to be aggressive with other children when they are playing. Several cases of violence against children have recently emerged in the country. The Indonesian Child Protection Commission or KPAI noted that in the last 7 years the number of

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cases of child abuse has reached 26,954 cases. The highest cases were cases of children facing the law both as perpetrators and victims, which reached 9,266 cases. (https://www.kpai.go.id). Aggressive behaviour has a positive relationship with other psychological problems, namely narcissistic personality disorder (Fitriyah & Purwoko, 2018), self-injury (Tang, et al., 2013). Psychological problems are related to aggressive behaviour, which is a sign that aggressive behaviour is a major problems that impact on the human psychological condition.

Based on the researchers' observations and interviews with teachers and parents, there was an aggressive child at the Kartika XXI-20 Pakowa Kindergarten Early Childhood Education School, Manado. The child often pinches and pulls the hair of his friend who is playing and studying. The teacher has made an effort to deal with the aggressive behavior experienced by children. To deal with this aggressive behavior, the teacher uses verbal reprimand, uses punishment where the child is not allowed to sit on a chair near his friends. However, these efforts have not been successful. This aggressive behavior is very detrimental to not only the child himself but also his friends who cannot learn well.

Based on this fact, the researcher conferred with the teacher, principal and parents of the child and there was an agreement to deal with aggressive behavior, especially the behavior of pinching and pulling the hair of friends, by implementing a systematic, continuous and accountable behavior modification procedure. This study concerns the effect of using time-out procedures and differential reinforcement in dealing with aggressive behavior in early childhood. Cooper et al (1987) suggest that time out is the elimination of the possibility of gaining reinforcement or losing access to positive reinforcement for a certain time and has an impact on reducing this behavior in the future. The results of the research by Vika Putri Erianny and Marlina (2016) show that the time-out procedure can reduce the hyperactivity behavior of walking back and forth in children with autism (https: //doi.0rg/10.24036/jupe76850.64). Kadzim (1980) stated that the time out procedure is a procedure that can be implemented in handling class disruptive behavior. The results showed that the type of time out combined with differential reinforcement was successfully used to reduce aggressive behavior in class. One of the behavior modification procedures to reduce deviant behavior is the time out procedure, but using this procedure alone is often less successful, therefore it is recommended to combine it with positive confirmation (Cooper, et al. 1987: 391). One type of positive reinforcement procedure in an effort to reduce deviant behavior is differential reinforcement of incompatible behavior. Differential reinforcement can be used to reduce disruptive class behavior (Cooper, 1987). Differential is a schedule of reinforcement on the target behavior that rarely occurs. For example, a child likes to scold even though his friends don't bother him. A behavioral intervention program with a differential is if cursing does not appear three times in 5 minutes, the child is given confirmation. Furthermore, the confirmation schedule can be enlarged so that children do not depend on confirmation (Tombokan (2013). Positive affirmation is an event that increases the response process to become a target. Positive reinforcement can be given in the form of verbal (praise), concrete material, smiles, or food, but the definition of affirmation must be determined by its effect (Sulzher-azroff, 1992). A behavior does not automatically receive confirmation but must be supported by a stimulus.

In this study, the problem is limited to "the use of time-out procedures and differential reinforcement in handling aggressive behavior in early childhood. While the research problem is about how the effect of time out procedures (temporary allowance) and differential reinforcement in reducing children's aggressive behavior at Kartika XXI-20 Pakowa Kindergarten Early Childhood Education School, Manado. The purpose of this study was to obtain an overview with time-out procedures and differential reinforcement in reducing early childhood aggressive behavior.

II.   Methods

This research uses a single subject research (single subject research) which is an experimental research that focuses on individual scores or performance rather than group performance. This research has been recommended nationally to be used by Kindergarten teachers and special education teachers in conducting research (Juang Sunanto, 2007). This research concerns a single subject research with the A-B-A-B design. The A-B-A-B design is the basis for the withdrawal or reversal design (Tawney and Gast, 1984: 197). Figure 1 is a visualization of the main design procedure.

Figure 1

Design Graphics A-B-A-B
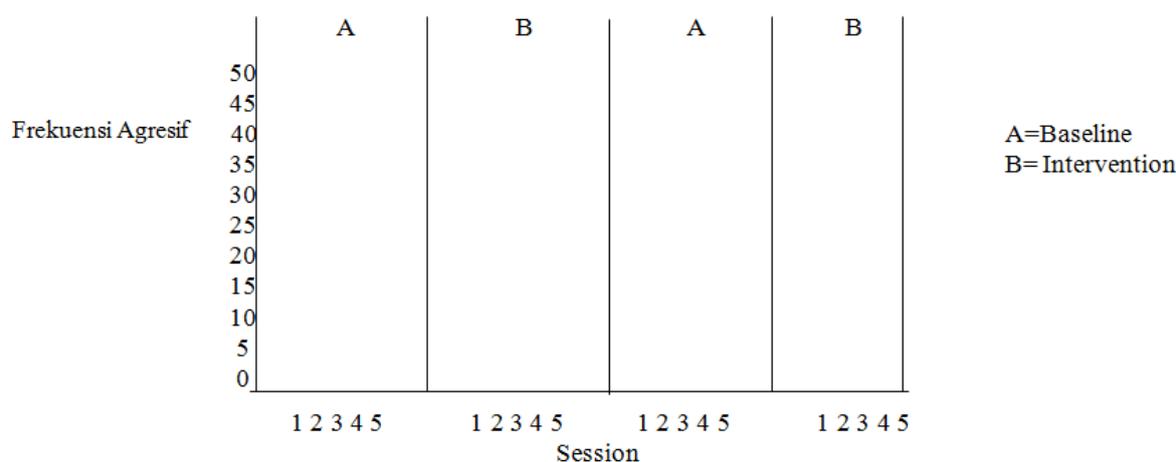
This A-B-A-B design is an "equivalent time sampling" (Campbell, J. & Campbell, 1982). The steps for implementing the ABAB design (Tawney and Gast, 1984) are: (1) collecting data on target behavior at baseline conditions (A1) where the intervention has not been applied, (2) after the data is stable at baseline conditions, implementing intervention (B1) and collect data on the conditions of this intervention until the data reaches a clear level and level of conditions, (3) return to baseline conditions (A2), (4) reintroduce the intervention (B2)

III. Research Procedure

After there is an agreement with the principal, teacher, and parents of the child to plan behavioral interventions, it is determined that the independent variable is the time out procedure and the dependent variable or target behavior is aggressive behavior. The research procedure is: (1) Conduct baseline data collection (condition A1) or a condition where the intervention has not been carried out until the behavior target data is stable in six consecutive sessions. After the data is stable, an intervention will be applied. Observations were made during one class hour. The target is aggressive behavior, such as pinching and pulling on a friend's hair. (2) Carry out interventions. The time out procedure was carried out by the researcher. The research setting was a first-class room with an observational type of time-out space. The child is placed in the time-out room if in 10 consecutive times he shows pinching and pulling on his friend's hair, messing up the class. If the child is against the researcher, ask him well and lead him to the time out room. The length of time out is increased if the child is screaming or being aggressive. As long the child was in time out, there was no comment about what he was doing. Cooper (1987) suggested that the time out ranges from 5-10 minutes. Behavioral data were recorded in 5-minute intervals for 1 session/hour of lessons. If the child shows aggressive behavior, the child is placed in a time-out space for the initial time of 5 minutes and is reduced if the target behavior appears and increases if the behavior decreases. If for 5 minutes the child shows good behavior, then the child allowed to sit back in his chair and study with his friends. If during the next 5 minutes he does not show any target behavior (not pinching, pulling the hair of the theme), then he will get verbal reinforcement by saying "good", ("great, you didn't pinch"). In addition to verbal reinforcement, children are given tokens in the form of small robots (application of differential reinforcement procedures). Robot was chosen as additional confirmation. At the beginning of the intervention, verbal reinforcement was carried out for each differential reinforcement intervention (5 minutes), then reduced as the behavioral target was reduced, a small robot was given first after the child did not pay attention to the behavior target for 15 minutes then gradually increased to half hour and finally given to end of session (3) After the data shows a stable level and trend in the intervention condition (B1), back to the baseline stage (A2) (4) Back to the intervention stage with time out procedures and Differential reinforcement (5) Aggressive behavior data is plotted on a graph ABAB's study design and change in target behavior were analyzed in both conditions by comparing baseline conditions with intervention conditions.

The aggressive behavior instrument consisted of pinching a friend and pulling on a friend's hair. In accordance with the DRI (differential reinforcement) schedule for recording the frequency of target behavior at baseline conditions and intervention conditions. This instrument was compiled by the researcher. Before the instrument was used, it was tested on a child who was carried out at the Kindergarten School of Pembina Manado and analyzed with item analysis. Instrument testing shows that the aggressive behavior instrument is

consistent. Thus, all 2 items can be used on the subject, so they do not need to be revised.

Data collection techniques were carried out by interview, observation, and document analysis. This method is used to analyze aggressive behavior data that has been collected at baseline and intervention conditions. Data analysis technique. The data that has been collected is plotted on the A-B-A-B research graph which was carried out in two ways, they are adjusted to baseline conditions and intervention (A1 and B1) and adjusted to baseline conditions and second interventions (A1 and B2) Tawney and Gast (1984); Richard, et al (1999). In graphic analysis, level changes, trend stability and overlapping data are interpreted so that the effect of successful application of time out and DRI (differential reinforcement) procedures with interval schedules in dealing with aggressive behavior in early childhood can be determined.

The research subject is a child aged 5 years. This research was conducted at Kartika XXI-20 Pakowa Kindergarten Early Childhood Education School, Manado, starting from January 11 to April 17, 2022.

IV.   Research Result

1.   Results of First Baseline Conditions (A1)

The average of class disruptive behavior during baseline conditions was 26 times. In the baseline conditions intervention has not been implemented. If the child keeps pinching and pulling the hair of his friend, the teacher moves the child to another seat without comment. When the child comes back pinching, pulling the hair of another friend, it will be put into the time out room (3-5) minutes. If in the time out room the child shows good behavior (does not call friends, makes a fuss), then he is asked to sit back down with a warning. In baseline conditions, 5-minute intervals are set in one lesson hour or one session. The effects of aggressive behavior at the first baseline condition (A1) are reported in Table 1 below.

Table 1
Aggressive Frequency during Baseline Conditions (A

Session	Pinch	Pulling hair	Total
1	12	20	32
2	8	12	20
3	13	17	30
4	10	16	26
5	9	16	25
6	10	16	26
Total	62	97	159
Average (mean level)	10,3	16,3	26,5

As shown in Table 1, the children's aggressive behavior showed sharp fluctuations in the first session (32, 20, 30 times), but was stable in the last 3 sessions (26, 25, 26 times). Data stability is at least 3 times (Tawnwy & Gast, m1984). To convince researchers that the data does not fluctuate so that research activities can be continued in the intervention condition (B1).

2.   First Intervention Conditions (B1)

In this intervention condition, the independent variable is implemented. The time out procedure will be implemented. The intervention procedure is as follows: In the timeout space, a 3 to 5 minute period is applied. During the rung time out, the child shows the target behavior that will be reduced, so the child allowed to sit back. Then DRI (differential reinforcement) is applied if the child does not show aggressive behavior for 5 minutes (does not pinch and pulls friends' hair) then he will receive verbal reinforcement and material reinforcement. If the child shows good behavior, he will receive confirmation and a robot, and the time for giving inauguration is gradually reduced by increasing the time interval for confirmation to 10-15 minutes so that the child does not depend on the confirmation.

DRI (differential reinforcement combined with time out) has an effect on aggressive behavior. In the seventh session the number of frequencies decreased. Details are in table 2 from the seventh session to the last session. Pinching and pulling a friend's hair decreased to only about 4 times in one session. , but in the last session the average pinching behavior of friends was no longer. The frequency of aggressive behavior decreased by 10%. Because aggressive behavior decreased to 90% (while the hypothesis was set at least 80%), this research activity was continued at the second baseline condition (A2 Table 2 details the change in target behavior under the conditions of the first intervention.

Table 2
Frequency of Aggressive Behavior During First Intervention Conditions (B1)

Session	Pinching Friends	Pulling Friends' Hair	Total
7	10	14	24
8	8	13	21
9	8	12	20
10	7	11	18
11	6	9	15
12	6	10	16
13	5	9	14
14	4	8	12
15	5	7	12
16	2	8	10
17	1	9	10
18	2	6	8
19	1	5	6
20	2	4	6
21	1	4	5
22	0	4	4
23	0	4	4
24	0	4	4
Total	68	141	209
Average (mean level)	68/18=3,8	141/18=7,6	209/18=116

3. Second Baseline Conditions (A2)

The second baseline condition is the same as the first baseline where no intervention was applied. This is done to determine whether the impact of time out intervention with DRI (differential reinforcement) applies again or not. Because even though there was a decrease, the number of aggressive behaviors began to increase in the last 4 sessions as seen in table 3. In other words, a second intervention is needed (B2).

Table 3.
Aggressive Frequency During Second Baseline Conditions (A2)

Session	Pinching Friends	Pulling Friends' Hair	Total
25	1	3	4
26	1	3	4
27	1	3	4
28	0	4	4
29	1	4	5
30	1	4	5
31	1	5	6
32	1	6	7
33	1	5	6
34	1	5	6
Total	9	42	51
Average (mean level)	9/10=0,9	42/10=4,2	51/10=5.1

4. Second Intervention Conditions (B2)

In the second intervention condition, DRI (differential reinforcement) and time-out procedures are repeated. As in Table 4, the aggressive behavior decreased and stabilized up to 2 times during approximately 6 consecutive sessions at the second baseline condition. In other words, the second intervention re-treatment has shown the effect of using time out and DRI (differential reinforcement) procedures in reducing aggressive behavior.

Table 4
Frequency of Aggressive Behavior during Second Intervention Conditions (B2)

Session	Pinching Friends	Pulling Friends' Hair	Total
35	1	5	6
36	1	4	5
37	1	3	4
38	1	4	5
39	0	5	5
40	0	4	4
41	0	4	4

42	0	4	4
43	0	4	4
Total	4	37	41
Average (mean level)	4/9=0,4	37/9=4,1	4,4

5. Visual Analysis

The data in table 5 is a summary of the data on baseline conditions A1, intervention conditions B1, baseline conditions A2 and conditions for intervention B2 can be seen as follows:

Table 5
Frequency of Aggressive Behavior in Conditions A-B-A-B

Session/Day	A1	Session/Day	B1	Session/Day	A2	Session/Day	B2
1	32	7	24	25	4	35	6
2	20	8	21	26	4	36	5
3	30	9	20	27	4	37	4
4	26	10	18	28	4	38	5
5	25	11	15	29	5	39	5
6	26	12	16	30	5	40	4
		13	14	31	6	41	4
		14	12	32	7	42	4
		15	12	33	6	43	4
		16	10	34	6		
		17	10				
		18	8				
		19	6				
		20	6				
		21	5				
		22	4				
		23	4				
		24	4				
6 session	159	18 session	2009	10 session	51	9 session	41

Data on baseline conditions and intervention conditions are plotted on the A-B-A-B graph. Visual graph analysis includes changes in levels (level and trend stability).

Graph 1. FREQUENCY OF AGGRESSIVE BEHAVIOR IN CONDITIONSA-B-A-B
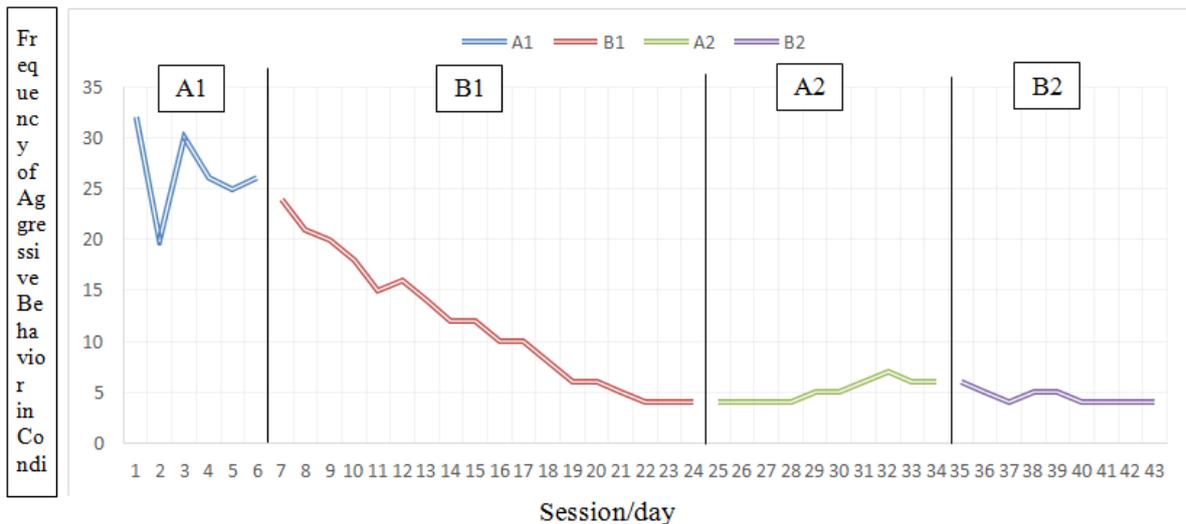
Visual graph analysis includes level changes and trend stability, can be seen in table 6 below.

Table 6
The calculation of the trend stability of aggressive behavior from the A-B-A-B chart using the split middle method

Steps	A1	B1	A2	B2
Define the boundary of the trend line	32x0,15=4,8	24x0,15=3,6	7x0,15=1,05	5x0,15=0,75
Average level	159:6=26,5	209:18=11,1	51:10=5,1	41:9=4,5
The upper limit of the trend line	26,5+4,8=31,3	11,1+3,6=14,7	5,1+1,05=6,15	4,5+0,75=5,25
Lower limit of trend line	26,5-4,8=21,7	11,1-3,6=6,5	5,1-1,05=4,05	4,5-0,75=3,85
Trend stability	4:6=66,6% (Variabel)	8:18=44,4% (Variabel)	3:10=30% (variabel)	9/9x100=100% (Stabil)

Note: -Trendline boundary-highest value x criterion = 32 x 0.15 = 15
- Average (mean level) = the number of frequencies in one condition: the number of sessions in that condition; - upper limit = mean level + trend line boundary; - Lower limit = the mean level-boundary trend line; - Trend stability = the number of data points within the boundaries of the trend line (Sunanto and Nakata, 2005). The criterion for stability = less than 80% is variable. Equal or more than 80% is stable (constant) (Tawney & Gast, 1984: Richard, et al. 1999).

The results of the analysis in each condition (within conditions) can be seen in table 7 which is a summary of the results of the analysis in each condition (within conditions). This data is taken from table 6, it can be seen below.

Table 7
Results of Analysis within Conditions

Condition	A1	B1	A2	B2
Condition Width	6	18	10	9
Estimated trend direction	Up (-)	Down (+)	Up (-)	Down (+)
Trend stability	Variable	Variable	Variable	Stable
Data paths within trend	(-) (=)	(+) (=)	(=) (-)	(=)
Level and range stability	Variable 26-32	Variable (4-24)	Variable (4-6)	Stable (4-5)
Level change	(32-26) (+6)	(24-4) (20)	(4-6) (-2)	(5-4) (+1)

The results of the analysis between adjacent conditions can be seen in table 8 which is a summary of the results of the comparative analysis of conditions (between adjacent conditions), can be seen below.

Table 8.
Results of the analysis between adjacent conditions

Ratio	B1/A1 (2-1)		B2/A2 (4-3)	
Number of variables that change	1		1	
Changes in trend stability and effects	Flat (=)	Down (+)	Up (-)	Flat (=)
		Positive		Positive
Trend stability changes	Variable to Variable		Variable to Stable	
Level change	(26-24) (+2)		(6-5) (+1)	
The percentages of overlap	1/18= 5,5%		9/9=100%	

Note: Overlapping data = the number of the same data points in A1 and B1 divided by the class length in condition B multiplied by 100%. The trend stability criterion used is 15% and the percentage of overlap is greater than or equal to 80% = stable and less than 80% = variable (Tawnwy & Gast, 1984: Ricard, et al, 1999).

Data in each condition (within conditions) analyzed were the estimation of trend direction and level stability. Meanwhile, data between adjacent conditions includes changes and stability of trends as well as overlapping presentations. From these two analyzes, it can be determined the success of using DRI (differential reinforcement) and time-out in reducing aggressive behavior. The results of graphical analysis are shown in tables 6, 7 and 8.

V. Discussion

The discussion includes 3 (three) things, they are: (1) interpretation of the results of the A-B-A-B graph analysis, (2) decreasing punishment or time out, and (3) decreasing aggressive behavior

1. Interpretation of the results of the A-B-A-B chart analysis

The implementation of DRI intervention (differential reinforcement) and time out produced a positive effect on the frequency process of aggressive behavior after the variables at condition A1 became stable in the last 4 sessions in condition B1 (A1-B1). This positive effect occurs because (1) the change in level between conditions (+6), the data overlap between conditions of 5.5% decreases to 0% in the last 4 sessions (B1), and (3) the direction of the trend changes immediately in the reversal condition. (B1) and has stabilized in the last 3 sessions

In conditions A2-B2, there is a delay in effect after the second intervention is implemented. During the first 4 sessions, the frequency of aggressive behavior parallels condition B1. However, after no intervention (A2) was applied in the last 3 sessions and then it became stable in B2 condition. The time out and DRI (differential reinforcement) procedure succeeded in reducing the frequency of aggressive behavior with a level (+2) to an average of 4 times in condition B2. Overlapping data of 100% aggressive behavior between conditions as a result of the low frequency of behavior in the first 4 sessions in condition B2

The result is a decrease in the frequency of using time out and (2) the frequency of aggressive behavior pinching friends and pulling friends' hair. The explanation is as follows:

2. Decreased time out frequency

The following table shows the frequency of use of the time out. This data shows a decrease in the use of time outs as a form of punishment. Thus the punishment given to children decreases, but the inauguration is still enforced but decreases. The number of inaugurations was reduced because the time interval received reinforcement in the form of praise and robots, increased from 5 minutes to 10-15 minutes and lastly only at the end of the session, can be seen in table 9 below:

Table 9. Time out Usage Frequency

Intervention conditions	The frequency of use time out
B1	24 (18 session)
B2	4 (9 session)

3. Decreased frequency of aggressive behavior

The average of aggressive behavior was 26.5 times (A1) at the first baseline condition, to a mean of 11.6 (B1) after the introduction of the first intervention. In the second baseline condition, the means were 5.1 (A2) and 4.4 (B2). Figure 2 is a graph of the frequency of aggressive behavior which can be seen below

Figure 2
Graph of the Frequency of Aggressive Behavior in Conditions A-B-A-B
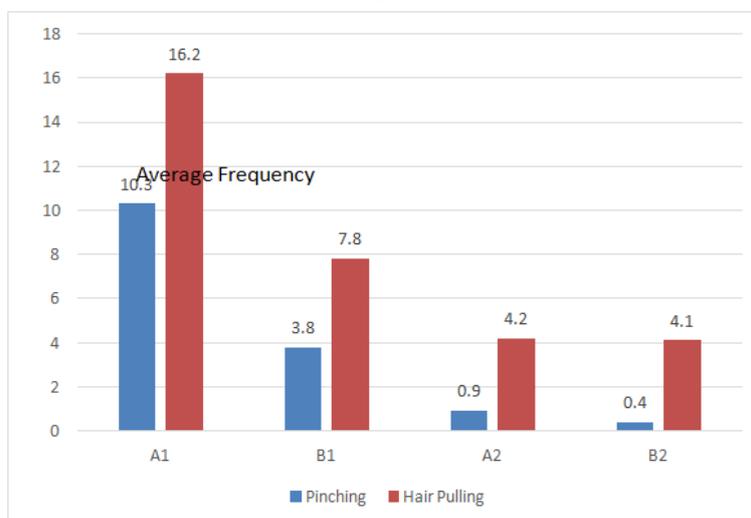
The graph of aggressive behavior has been divided according to (1) pinching behavior by friends, and (2) hair-pulling behavior of friends who are studying at baseline and intervention conditions. In the last 4

sessions, B2 condition, the frequency of pinching friends reached zero. However, the frequency of pulling friends' hair was still 4 times.

The number of sessions in condition B1 is 18 and B2 is 9, or there is no immediate decline in behavior. However, the downward trend in aggressive behavior starts from an average of 26.5 times in the initial condition to only 4 times in the final condition. Although there is a decrease in the frequency of behavior, this behavior does not completely disappear until 100%. About 10% or 4 times aggressive behavior is still seen in condition B2. It is possible that this happens because of other factors that were not studied so that the child's behavior does not completely disappear. For example, environmental factors at home or use of other types of affirmation were not studied. Children still like to pinch friends who are studying or playing by picking up toys or taking stationery, even though the frequency has decreased compared to before the intervention was implemented. However, the effectiveness against aggressive behavior was felt after the study was completed. The teacher feels happy even with changes in the classroom, where teaching and learning activities go as expected without any significant behavioral disturbances shown by one of the aggressive children.

Furthermore, according to the reports of parents, the state of children's behavior at home is better than before the study. After the children sat in group B, in the first month the last information was obtained from the teacher who taught in group B, that there was no significant aggressive behavior. This indicates the significant effect of using DRI (differential reinforcement) and time-out due to the maintenance and generalization of non-aggressive behavior. Maintenance of behavior, i.e., there is no meaningful aggressive behavior even though the intervention has been completed and the generalization of the behavior applies in other classes and other teachers (group B) and at home.

HYPOTHESIS TEST
DRI (differential reinforcement) and time-out procedures succeeded in suppressing aggressive behavior from an average of about 26 times in the initial condition to 4 times in the final condition or a decrease of 84% (22/16 x 100%). Thus the research hypothesis can be accepted because the minimal hypothesis decrease in class aggressive behavior is around 80%.

VI.   Conclusion
Based on the results and research discussion described above, the conclusions are as follows:
1.   Time out and DRI (differential reinforcement) procedures demonstrate a decrease in aggressive behavior as indicated by a positive trend change and a change in trend stability from variable to stable.
2.   The cooperation of the principal, class teachers, partner teachers, parents and other children in an effort to reduce the disruptive behavior of an aggressive child's class.
3.   There is maintenance and generalization of non-aggressive behavior even though the research has been completed and the children continue to group B with different learning places and teachers.

VII.   Suggestion
Based on the research conclusions, the suggestions are follows:
1.   For Kindergarten: This study shows that early childhood aggressive behavior can be handled with the cooperation of parents, teachers, partner teachers, and school principals.
2.   Kindergarten teachers should be able to use a behavior modification approach, especially inauguration procedures and time-outs in handling aggressive children.
3.   For other researchers to be able to conduct research on other aggressive children attending Kindergarten

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