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Artikel Asli/*Original Articles*

The Introduction of a Secondary Reinforcer During Therapy Based on the ABA Model for Children with Autisme

(Ganjaran Sekunder kepada Kanak-Kanak yang Mengalami Autismee Semasa Terapi Berlandaskan Model ABA)

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ABSTRACT

Applied Behavior Analysis (ABA) is a technique used to teach children with autisme a variety of skills. In ABA, children with autisme often do not receive reinforcers because they have difficulty performing their targeted behaviors, which consequently leads to challenging behaviors. Objectives of this study are to increase spontaneous request and decrease challenging behavior among children with autisme by introducing a secondary reinforcer during therapy based on ABA model. Secondary reinforcer has lower reinforcing value than the primary reinforcer. When the children tried but were unable to produce their targeted behavior, they were given the secondary reinforcer. The children were divided into two groups, five children in the intervention group and four children in the control group, and they were taught specific target requesting behavior (TRB) to request for a preferred item. Three children in the intervention group recorded an increase in spontaneous request and a reduction in challenging behaviors. Only two children from the control group recorded an increase in spontaneous request and a decrease in challenging behaviors. However, only children from the intervention group were able to maintain their performance during the generalization sessions. The results suggest that children respond differently to specific prompts and interventions. Future studies should focus on how prompts affect children's performance and also on reinforcer selection. Bigger scale studies are still needed to further determine the effectiveness of a secondary reinforcer in assisting the learning of requesting skill and in reducing challenging behaviors among children with autisme during therapy based on ABA model.

Keywords: Requesting; challenging behaviour; reinforce; ABA; autisme

ABSTRAK

Applied Behavior Analysis (ABA) merupakan satu teknik yang digunakan untuk mengajar pelbagai kemahiran kepada kanak-kanak yang mengalami autismee. Semasa ABA, kanak-kanak yang mengalami autisme kerap tidak berjaya menerima ganjaran kerana mereka menghadapi kesukaran untuk menghasilkan respon yang dikehendaki dan ini menyebabkan mereka mempamerkan tingkah laku mencabar. Objektif kajian ini adalah untuk meningkatkan permintaan spontan dan mengurangkan tingkah laku mencabar kanak-kanak yang mengalami autisme dengan melibatkan ganjaran sekunder semasa terapi berlandaskan model ABA. Ganjaran sekunder merupakan ganjaran yang mempunyai nilai ganjaran yang lebih rendah berbanding dengan ganjaran utama. Apabila kanak-kanak cuba tetapi masih tidak berjaya menghasilkan respon yang dikehendaki, mereka diberikan ganjaran sekunder. Kanak-kanak dibahagikan kepada dua kumpulan; lima kanak-kanak dalam kumpulan intervensi dan empat kanak-kanak dalam kumpulan kawalan. Setiap kanak-kanak diajar cara permintaan target (CPT) masing-masing untuk meminta objek kegemaran mereka. Tiga kanak-kanak dalam kumpulan intervensi berjaya mencatatkan peningkatan dalam permintaan spontan dan juga pengurangan dalam tingkah laku mencabar. Hanya dua kanak-kanak dalam kumpulan kawalan berjaya mencatatkan peningkatan dalam permintaan spontan dan pengurangan dalam tingkah laku mencabar. Akan tetapi, hanya kanak-kanak dalam kumpulan intervensi sahaja yang berjaya mengekalkan prestasi mereka di sesi generalisasi. Keputusan kajian ini mencadangkan bahawa setiap kanak-kanak mungkin memberi respon yang berlainan terhadap bantuan dan intervensi yang berlainan. Kajian masa depan perlu memberi perhatian terhadap pemilihan ganjaran dan juga bantuan yang diberikan kepada kanak-kanak. Kajian yang berskala lebih besar masih diperlukan untuk menentukan keberkesanan ganjaran sekunder dalam membantu pembelajaran kemahiran permintaan dan mengurangkan tingkah laku mencabar bagi kanak-kanak yang mengalami autisme semasa terapi berlandaskan model ABA.

Kata Kunci: Permintaan; tingkah laku mencabar; ganjaran; ABA; autisme

INTRODUCTION

Impairments of communication and social interaction are two of the major characteristic of children with autisme (Hill & Frith 2003; Rapin & Dunn 2003; Landa 2007; APA 2013; CDC 2014). Communication deficits in children with autisme include delays in speech, a lack of response towards their name and poor orientation towards voices as well as reduced babbling at a young age as compared to typically developing children (Lordet al. 1996; Tager-Flusberg et al. 2005; Whitehouse & Bishop 2008). Research has also indicated that their low social awareness resulted in their lack of communication initiatives and caused them difficulties in comprehending instructions, thus leading them to give irrelevant replies (Stone & Caro-Martinez 1990; Loveland et al. 1990; Ziatas et al. 2003).

One of the biggest communication deficit experienced by children with autisme are difficulties in requesting. Almost one third (Bryson 1996) or half of children (Baileyet al. 1996; Lord & Paul 1997) with autisme did not manage to learn requesting skills. It has been evident that children with autisme display signs of interest but they rarely initiate or verbally request for their needs (Charmanet et al. 1997; Bondy & Frost 2001; Landa 2007; Tager-Flusberg & Caronna 2007; Bruinsma et al. 2004). Dawson et al. (2000) in a study that followed the development of a child with autisme from birth up to the age of two years found that the child's difficulties in requesting became more obvious at the age of 13 to 15 months. The child did not attempt to request for his favourite toy that was made visible to him by placing it in a see-through plastic jar with a large lid.

The inability to request appropriately often led to frustration in children with autisme which in turn caused them to demonstrate challenging behaviors (Matson et al. 2008; Kozlowski 2010) Some of the challenging behaviors displayed by children with autisme are repetitive behaviors (stereotypy, hand flapping, body rocking, echolalia) and disruptive behaviors (screaming, throwing objects, self injurious behaviors, biting)- (Landa 2007; Tager-Flusberg & Caronna 2007; Dominick et al. 2007). In a study by Chiang (2008), 32 children with autisme were video recorded for two hours a day while they were at school. The children were observed to often display challenging behaviors when they were unable to get what they wanted. According to Hatton et al. (2006), a high frequency of challenging behaviors affects a child's ability to learn new skills and also causes the child to be irresponsive to social opportunities. Bingham et al. (2007) in their study taught three children with learning disabilities whom frequently displayed challenging behaviors to request using Augmentative and Alternative Communication (AAC) strategies. The introduction of AAC provided the children with a means of requesting and this resulted in a decrease in challenging behaviors demonstrated by all three of them. Findings from these and other studies suggested that children with autisme should be taught requesting skill as it will lead to a reduction in frustration and thus reduced challenging behaviors (Carr & Durand 1985; Durand 1999; Machalicek et al. 2007; Tiger, Hanley & Bruzek 2008; Overcash et al. 2010; Ganz et al. 2012).

Applied Behavior Analysis (ABA) is a technique used widely to help children with autisme acquire many different skills such as requesting, understanding/expressing emotions, object labelling and self help skills (Dillenburger & Keenan 2009; Eikeseth et al. 2002; Grindle & Remington 2002; Leaf et al. 2011). Therapy based on the ABA model has also been reported to be effective in reducing challenging behaviors demonstrated by children (Horner et al. 2002; Sallows & Graupner 2005). Therapy based on the ABA model uses Discrete Trial Training (DTT) where skills taught to a child are broken into smaller steps so that the skills can be more effectively learnt by the child (Smith 2001; Granpeesheh et al. 2009). Children are reinforced when they demonstrate the targeted behavior (Smith 2001; Granpeesheh et al. 2009) and the use of reinforcer has been reported to increase the motivation of children with autisme during therapy based on the ABA model (Koegel et al. 1988; Luman et al. 2005; LeBlanc et al. 2003). In a study by Lovaas (1987), 19 children with autisme aged between 35 to 41 months received intensive therapy based on the ABA model, targeting a range of skills, for two years. At the end of the study, almost half of the children demonstrated positive improvement in their learning abilities and were able to attend school with typically developing children. In another longitudinal study, Leaf et al. (2011) taught five children, four of whom were diagnosed with autisme, facial expressions using therapy based on the ABA model. The study was divided into baseline, intervention and generalization stages, with the generalization stage conducted two months after intervention concluded. At the end of the study, all the participants were able to identify facial expression. In a 12 months study by Itzchak et al. (2008), participants with autisme received 45 hours a week of therapy based on the ABA model, following which they demonstrated a reduction in challenging behaviors and an increment in their IQ and communication skills.

Although therapy based on the ABA model has been shown to have a positive outcome for children with autisme, its effectiveness in reducing challenging behaviors is not convincing (Hanley et al. 2000). In the study by Britton et al. (2002), three individuals with autisme who displayed challenging behaviors were given reinforcers to reduce their challenging behaviors. When the researcher presented the toy to them without playing together with them, they began to demonstrate stereotypy behaviors using the toy (flicking the toy, rotating the toy). When the researcher played with the toy with them, the participant's stereotypy reduced. Therefore, reinforcer on its own, cannot effectively reduce challenging behaviors. A more recent study conducted by Love et al. (2012) found that a combination of reinforcers with response interruption and redirection produced positive results in reducing vocal stereotypy of two children with autisme. Therefore as suggested by Britton et al. (2002) and Love

et al. (2012), reinforcers need to be combined with another object or consequence in order for it to effectively reduce challenging behaviors.

The aim of this study therefore was to provide a secondary reinforcer in therapy based on ABA model in order to increase the learning of requesting skills and reduce challenging behaviors among children with autisme.

METHODS

This was a small group longitudinal study which employed an experimental design. The study was conducted for five months. An experimental design was employed because the researcher wanted in order to: 1) determine the effectiveness of secondary reinforcer, 2) in increasing children's ability to request spontaneously and 3) in decreasing the challenging behavior of children with autisme in the intervention group during therapy based on ABA model as compared to the control group that did not involved secondary reinforce with their children during therapy based on ABA model. Ethics approval was obtained from the Research Ethics Committee of Universiti Kebangsaan Malaysia (Ref. No: UKM 1.5.3.5/224/NN-135-2013).

PARTICIPANTS

Purposive sampling was used to identify the participants of this study. Participants for this study were children who had been diagnosed with autisme. The selection criteria for the children were as follow: 1) diagnosed with autisme by a developmental paediatrician, 2) aged between three to six years old, 3) used minimal speech to communicate (less than five words), 4) unable to request effectively, 5) had been enrolled in therapy based on ABA model for more than five months with little success in learning requesting skills, 6) demonstrated no other health issues based on parental reports, and 7) were not receiving any other communication therapy (e.g. the child was not receiving speech therapy and neither were the parents involved in any parental training programs) other than therapy based on the ABA model during the period of study. Prior to the study, three intervention centres were contacted and they were provided with the selection criteria. Only one intervention centre was interested to participate in this study. The staff short listed 15 children for the study. Of the 15 children, only 10 children met the selection criteria. The first researcher met the parents at the intervention centre and explained the study to the parents and provided them with the information sheet and consent form. All 10 parents agreed to allow their children to participate, and returned the completed consent forms to the first researcher. The 10 children were then randomly divided into intervention and control group. One child from the control group pulled out midway through the study due to health problems.

Table 1 and Table 2 display the demographic information of the children in the intervention group and the control group. In order to obtain more information about the children, they were involved in a structured play before the study. Each structured play session lasted for about 30 minutes. During the structured play, toys (bubbles, puzzles, cars) and food (e.g. honey snacks, chocolate cereal, cakes) were prepared. Each child was presented with two tasks. The first task was toy play. The researcher played with the child using a toy and then paused, waiting for the child to request to continue (when playing with bubbles, researcher blew the bubbles and then paused, expecting the child to request for more it). The second task involved food. The researcher and the child had snack together, the child needed to request for the snack (the researcher put 3 pieces of honey snack in a bowl for the child and after the child finished the snack in his/her bowl, he/she had to request for more from the researcher). Information about their Initial Requesting Behavior (IRB) was obtained through this structured play. Each child's IRB during the structured play was documented in Table 1 and Table 2. Following the structured play, Target Requesting Behavior (TRB) for each child was determined, whereby they were taught more advanced requesting skills compared to what they could already do.

TABLE 1. Demographic and communication characteristics of the children with autism in the intervention group

Subject	Gender	Age	Initial Requesting Behavior (IRB)	Challenging Behaviors	Target Requesting Behavior (TRB)	Prompts	Reinforcers
A1	Male	3	Single word request by naming the object (e.g. car, ball)	Crying, hitting	Simple phrase (e.g. I want ____)	Verbal cues, written prompts	1st: Truck 2nd: Picture of the truck. 1st: A small bowl of chocolate snack. 2nd: One piece of chocolate snack.
A2	Female	3	Simple gestures	Crying, screaming, scratching	Single word request by naming the object	Verbal cues, written prompts	1st: A small bowl of honey snack 2nd: One piece of honey snack
A3	Female	3	Simple gestures and saying "want" for all preferred objects	Crying, scratching, continuously looking at self in the mirror	Single word request by naming the object	Verbal cues, written prompts	1st: A small pack of biscuit 2nd: One piece of biscuit 1st: One slice of bread 2nd: Quarter of a slice of bread

Continued

TABLE 1. *Continue*

Subject	Gender	Age	Initial Requesting Behavior (IRB)	Challenging Behaviors	Target Requesting Behavior (TRB)	Prompts	Reinforcers
A4	Male	4	Single word request by naming the object and echolalia	Echolalia, crying, playing with fingers.	Simple phrase (e.g. I want ____)	Verbal cues, written prompts	1st: A small bowl of honey snack 2nd: One piece of honey snack 1st: A handful of raisins 2nd: One piece of raisin.
A5	Male	4	Single word request by naming the object	Crying, hitting, stereotypic utterance, continuously looking the light	Simple phrase (e.g. I want ____)	Verbal cues, written prompts	1st: A small bowl of chocolate snack 2nd: One piece of chocolate snack 1st: Puzzle pieces 2nd: Picture of the puzzle

TABLE 2. Demographic and communication characteristics of the children with autism in control group

Subject	Gender	Age	Initial Requesting Behavior (IRB)	Challenging Behaviors	Target Requesting Behavior (TRB)	Prompts	Reinforcers
C1	Male	4	Single word request by naming the object	Crying, hitting.	Simple phrase (e.g. I want ____)	Verbal cues, written prompts	A small bowl of chocolate snack, Toy car
C2	Male	5	Single word request by naming the object	Crying, hitting, continuously looking between the gaps of his fingers.	Simple phrase (e.g. I want ____)	Verbal cues, written prompts	A small bowl of cheese snack, A small bowl of chocolate snack
C3	Female	6	Simple gestures	Crying, laughing for no apparent reason, screaming of random jargon, playing with fingers.	Single word request by naming the object	Verbal cues, written prompts	A small bowl of chocolate snack, A bowl of potato chips
C4	Male	4	Simple gestures	Crying, screaming of random jargon, playing with wheels of a car.	Single word request by naming the object	Verbal cues, written prompts	Toy car

SETTING AND MATERIALS

The study took place in a quiet and unoccupied room in the intervention centre that the children attended. Baseline, intervention and generalization sessions were conducted in that room. The room consisted of two adjoining desks and two chairs. A camera (Canon Powershot A2200) was placed 1.5 metres away from the child. Only the first researcher, who conducted all the sessions and the child were present in the room during each session. The materials used for the sessions were child specific. The toys or food were prepared based on a reinforcer check conducted before the study. Prompt materials were also prepared for the study. Prompt materials included written prompts that were child specific based on their TRB.

PROCEDURE

The study consisted of three stages a) baseline, b) intervention and c) generalization. Each of the three stages employed Discrete Trial Training (DTT). Both children from intervention and control group went through all 3 stages of the study.

BASELINE

Prior to conducting baseline sessions, reinforcer checks were being carried out. During the reinforcer check, the children were presented with five favourite items (toys and/or food) at once based on information obtained from parents and the teacher at the intervention centers that they attended. According to Boyd et al. (2007), the reinforcers were placed on the table, equally spaced in a semi circle in front of the children. The child's favourite item was determined based on the first toy that the child reached for and that was then identified as the primary reinforcer. Secondary reinforcer was determined by the first researcher, based on the primary reinforcer and it had a lesser reinforcing value as compared to the primary reinforcer. For example, A1 chose a truck as the primary reinforcer. Hence his secondary reinforcer was a sticker of a truck. Reinforcer check was done every fortnightly to

avoid the child from getting too bored with the reinforcers. The selected reinforcers were kept away from each child for a week prior to the baseline sessions.

One week after the reinforcers were selected, the baseline session was conducted. Children from both intervention and control group went through the same procedure in baseline session. One baseline session was conducted for each child, and it lasted for about 15 minutes. During the session, the child was given 20 trials to request for his/her preferred item based on the reinforcer check. At the baseline, only the primary reinforcer was presented. Prior to the start of the baseline session, the child was allowed to play or handle the preferred item which served as the primary reinforcer for a short period of time before the item was removed. The child then needed to request for the item using the TRB that was set during the initial structured play. If the child managed to request, the child received the primary reinforcer. If the child was unable to request, no reinforcer was given.

INTERVENTION

Following baseline, each child had to go through 40 sessions of intervention. For every session, each child was given 20 trials to request for their preferred item. Each session was approximately 15 minutes long. The child was expected to request using the TRB set for him/her. To enable the child to use the TRB, prompts were provided. These prompts were in the form of written words and verbal cues. Table 1 and Table 2 listed the prompting strategies used for each child.

For the intervention group, every successful spontaneous or prompted request that the child made, the child would receive the primary reinforcer. However, if the child needed prompts and then tried to request using his/her TRB but did not manage to, the child would also be given the secondary reinforcer. If the child did not show interest to request or did not respond to prompts, no further reinforcer was provided.

For the control group, the child only received the primary reinforcer for every successful spontaneous or prompted request. If the child was prompted but still did not perform the targeted requesting phrase, he/she was not given any reinforcer. If the child did not display any response to request, no reinforcer was given. After 40 sessions of intervention, first researcher met with the parents of each child to talk about their child's progress and taught them the training procedure. Parents were advised to continue practising their child's TRB at home.

GENERALIZATION

The generalization stage was conducted eight weeks after the last intervention session, and it also employed DTT. There were two generalization sessions, each lasting for about 15 minutes, where the child had 20 trials to request. At generalization session, both groups followed the same procedure as their respective intervention session.

CODING

Requesting and challenging behaviors demonstrated by the children were recorded at each of the sessions at baseline, intervention and generalization. All coding was done by the first researcher.

The child's requesting attempts were coded as spontaneous, prompted or non responsive. Spontaneous request was defined as requesting behavior displayed by a child during the absence of verbal cues and modelling (Duffy & Healy 2011). Prompted request was defined as requesting behavior that occurred under the influence of instructions, visual prompts and physical guidance (Duffy & Healy 2011). Non responsiveness was defined as unresponsive to others' conversation initiations and not displaying joint attention (Volkmar et al. 1997).

Each child's challenging behaviors was also coded. Challenging behaviors was defined as inappropriate behaviors of such intensity and frequency that potentially jeopardize the physical safety of oneself or others that may result in the person being rejected or limits its involvement in the society (Emerson 1995).

INTER-RATER RELIABILITY

The first researcher coded all the video recordings. A trained ABA therapist was selected as the second observer for the study. Both the first researcher and the second observer watched three video recordings together and each took a set of data. Both sets of data were then compared to ensure the consistency. After that, the second observer watched 25% of the videos recordings separately and agreement between raters were determined by calculating the Kappa coefficient. Kappa value for requesting was 0.7218 and the Kappa value for challenging behaviors was 0.7428. According to Landis and Koch (1977), value ranging from 0.61 to 0.80 was considered to have a substantial strength of agreement. For this study, both Kappa value for requesting and challenging behaviors also fell under the substantial range.

RESULTS

The requesting and challenging behaviors of children from the intervention and control groups are displayed in Figure 1 to Figure 8. The data recorded from the sessions included spontaneous request, prompted request, non responsiveness and challenging behaviors.

REQUESTING

Figure 1 to Figure 6 displayed the requesting behaviors of the participants. The requesting behaviors of the participants were presented as spontaneous, prompted and non responsive. The spontaneous and prompted requests of participants from the intervention group are depicted in Figure 1 and Figure 2 respectively, while the

spontaneous and prompted requests of the participants from the control group are displayed in Figure 3 and Figure 4. The participants' non responsive behaviors are displayed in Figure 5 and Figure 6.

SPONTANEOUS AND PROMPTED REQUESTS

The spontaneous requests of participants in the intervention group during the three stages of the study are displayed in Figure 1 while their prompted requests are depicted in Figure 2. For A1, at baseline, he needed prompts at the start of the study as he was still using his IRB which was single word requesting to request for his primary reinforcer, e.g., he would say "car" when he wanted to play with the car. After six sessions of prompting during the intervention stage, he managed to request using his TRB without any prompts. After 15 intervention sessions, he managed to master his TRB. At the generalization stage, prompts were not needed. A1 was able to use his TRB and requested spontaneously for his primary reinforcer.

A2's IRB was simple gestures. She was not responding well to prompts during the first session of intervention

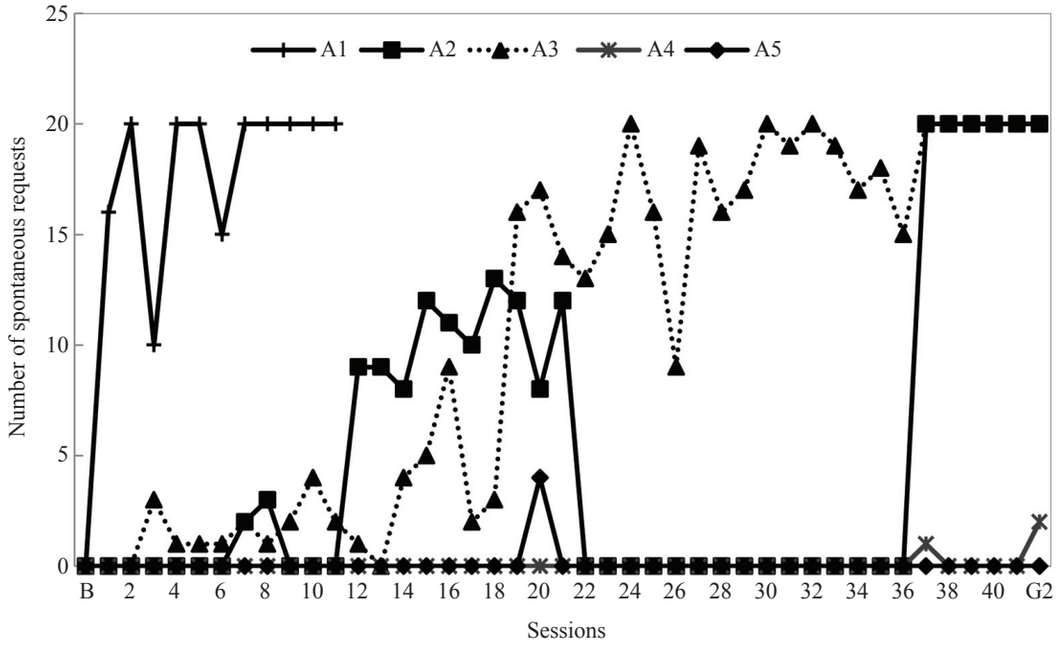

FIGURE 1. Spontaneous requests for intervention group

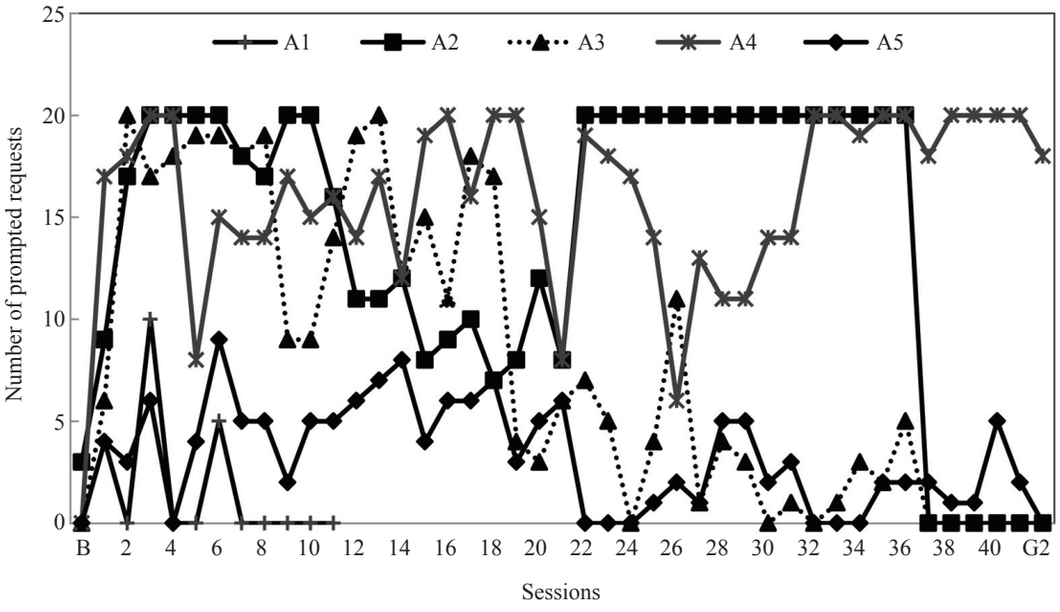

FIGURE 2. Prompted requests for intervention group

but began to respond better during the second session. Following that, the prompts were slowly faded as she started to display her TRB starting from the 8th session of intervention and there was a constant increase until the 22nd session. As evident from Figure 2, there was an increase in prompts from the 22nd to 36th session due to her inappropriate way of requesting. From the 37th session onwards, prompts were no longer required as she was able to request using her TRB appropriately and she was also able to maintain her newly acquired skill at generalization stage.

A3's IRB was almost similar to A2. She was using simple gestures and said "want" to request for her needs. Initially, A3 required a high number of prompts but A3's ability to request using her TRB consistently increased; hence prompts on her weregradually reduced. From the 37th session onwards, she was able to request using her TRB consistently and 8 weeks later during the generalization session, she managed to request using her TRB without any prompts.

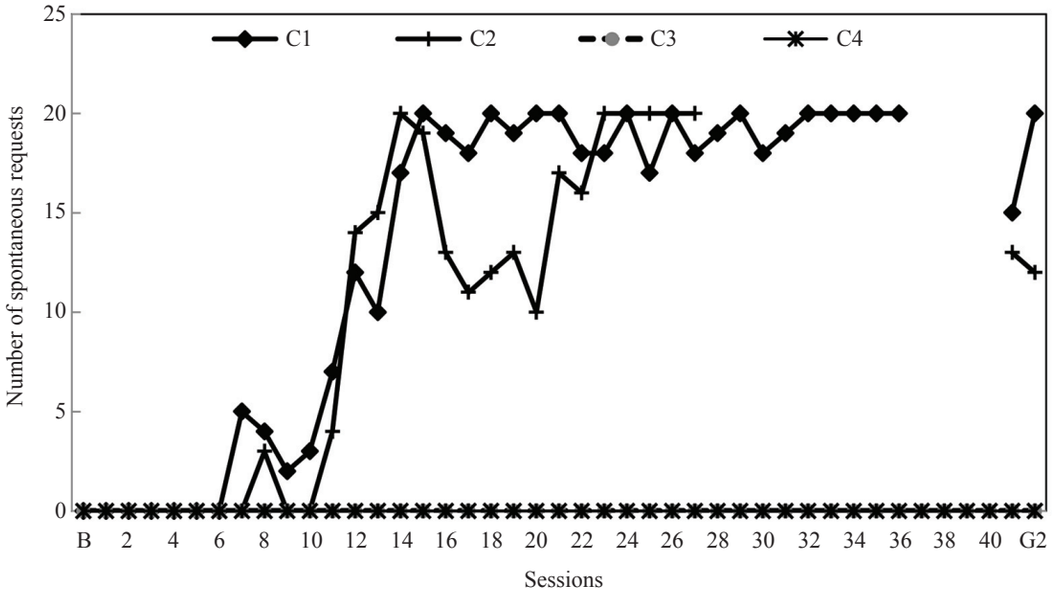

FIGURE 3. Spontaneous requests for control group

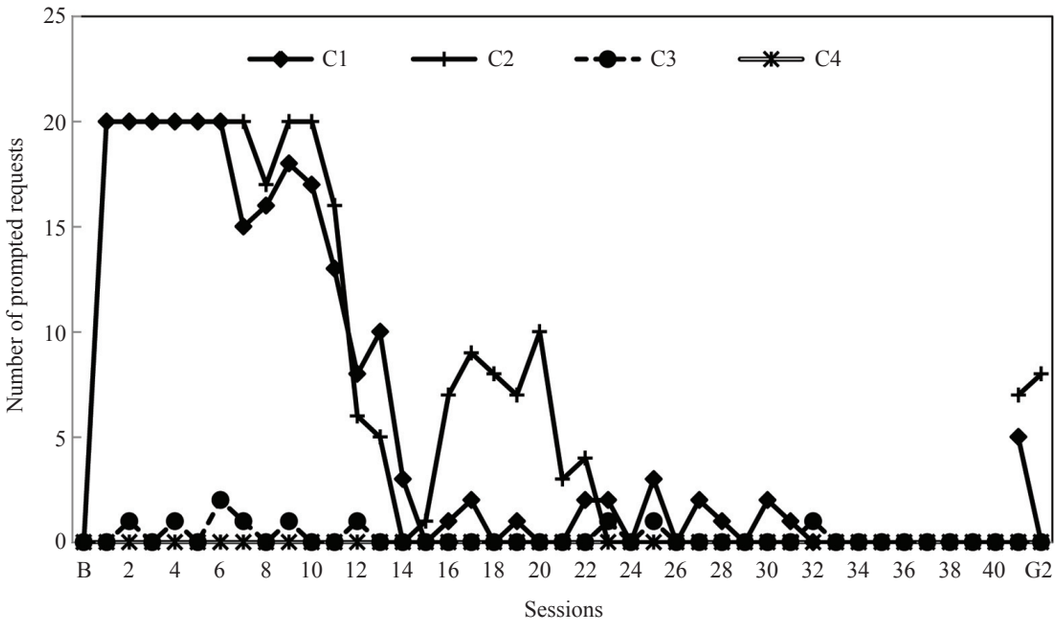

FIGURE 4. Prompted requests for control group

For A4, his IRB was single word requesting but due to his echolalia characteristics, he was able to imitate adults and made full sentences request. For this study, his TRB was to spontaneously request in full sentences. A4 responded well to verbal prompts. Throughout the study, as observed in Figure 2, he was not able to request using his TRB spontaneously and was solely relying on prompts. At generalization session, he was not able to use his TRB spontaneously and prompts were still employed.

A5 did not respond to the prompts throughout the study. He also did not demonstrate any intention to request using his TRB. Figure 2 depicted that A5 needed prompts throughout the study but the amount of prompts he responded to was insignificant. Towards the second half of the intervention sessions, his responsiveness towards prompts reduced to almost 0. Even during the generalization session, he did not respond to prompts.

The spontaneous requests of children from the control group are displayed in Figure 3 while their prompted requests are depicted in Figure 4. C1 and C2 shared the same IRB and TRB. For C1, he was receptive to the prompts given to him and his ability to request using his TRB increased throughout the study. After the 31st session, he no longer required prompts and at the 36th session, he managed to master his TRB. However, at the first generalization session, he still needed prompts to request. He only managed to use his TRB spontaneously during the second generalization session.

C2 was also very receptive to the prompts. His prompted requests reduced as his ability to request using his TRB increased drastically at the 14th session. His ability to request using his TRB remained inconsistent until the 22nd session. Eventually, after 27 sessions of intervention sessions, he managed to master his TRB. However, C2 could not maintain his spontaneous TRB and he needed prompts during both the generalization sessions.

Both C3 and C4 were not able to request spontaneously using their respective TRB. C3 was not very responsive to the prompts. She only managed to request with prompts 10 times throughout the study. C4 was not receptive to the prompts. He was not able to achieve any prompted requests.

NON RESPONSIVENESS

The non responsiveness of the children in the intervention group is displayed in Figure 5. A1 was very engaging during all three stages of the study. There were no data of his unresponsiveness in Figure 5. A2 was only non responsive at the start of the study. After the 2nd intervention session, she was responsive to prompts. Even at the Generalization sessions, she did not show any non responsiveness. A3's non responsiveness fluctuated during the first half of the study. She only settled down and began to engage completely after the 16th session. Due to his challenging behaviors, A4 demonstrated non responsiveness throughout the study. It was only towards the end of intervention session that he appeared more responsive to prompts. From Figure 5, it is also evident that A5 was highly non responsive at baseline, intervention and also generalization sessions. His challenging behaviors made it difficult for him to engage in requesting with his TRB.

The non responsiveness of the children in control group is displayed in Figure 6. C1 and C2 were very responsive throughout the study. No data was recorded for their non responsiveness during all three stages of the study. C3 recorded very high levels of non responsiveness throughout the study. C4's non responsiveness fluctuated throughout the study. There were sessions where he was fully engaged and there were also sessions where he was not interested in requesting for his primary reinforcer.

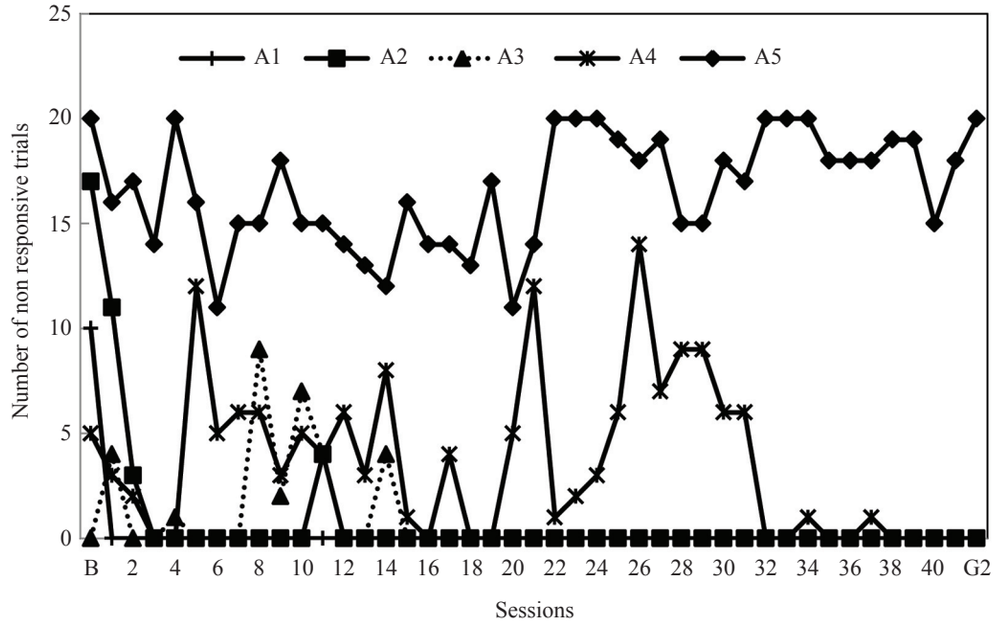

FIGURE 5. Non responsive for intervention group

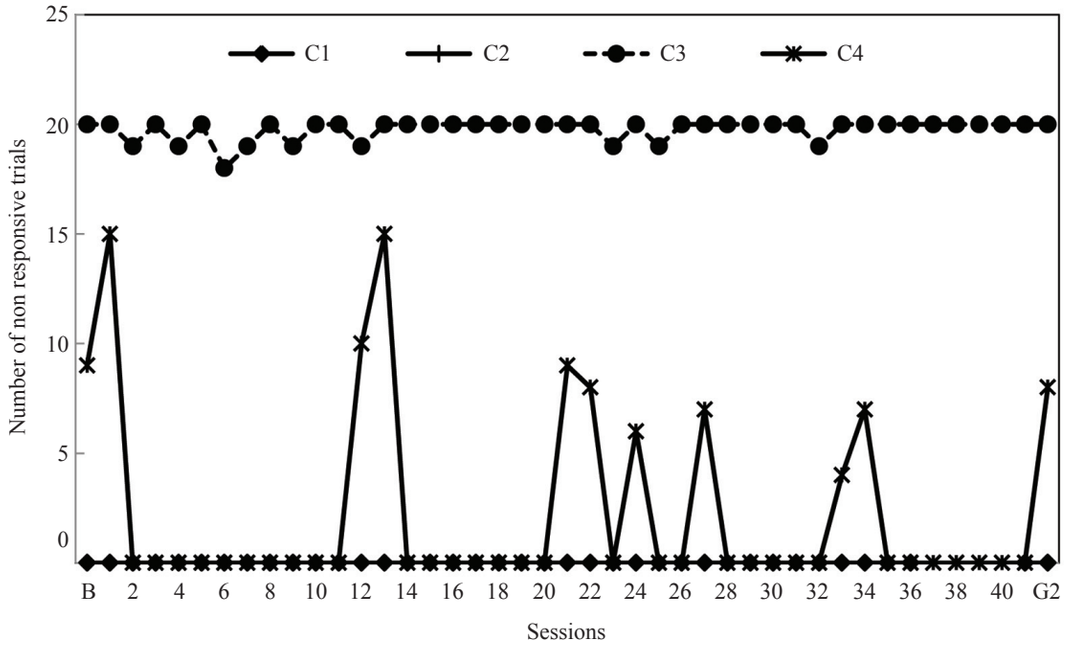

FIGURE 6. Non responsive for control group

CHALLENGING BEHAVIOR

The challenging behaviors of children in intervention group are displayed in Figure 7. All the children's challenging behaviors that were observed at the start of the study are listed in Table 1. From Figure 7, it is evident that A1 only displayed his challenging behaviors at the start of the study. He demonstrated challenging behaviors at baseline session and during the 1st intervention session. A2 did not demonstrate much challenging behaviors after the 7th session because she picked up her prompts and TRB. She only began to demonstrate challenging behaviors from the 22nd session onwards. She was shouting her TRB to request for her reinforcers. The shouting was considered as an inappropriate way to request, and hence it was recorded as a challenging behavior. Her shouting reduced at the 37th session, after which no challenging behaviors were recorded.

The challenging behaviors of children in the control group are displayed in Figure 8. All the challenging behaviors that were observed at the start of the study are listed in Table 2. C1 only demonstrated challenging behaviors at the start of the study and showed reduction in challenging behaviors after he learned his TRB. Although he did not demonstrate any challenging behaviors after the 28th intervention session, at the 1st generalization session, he demonstrated challenging behaviors again.

Similarly, C2 also only displayed challenging behaviors at the beginning of the intervention sessions. After he learned his TRB, his challenging behaviors reduced but continued to fluctuate until the end of his intervention sessions. However, he did not display any challenging behaviors at the generalization session. C3 displayed high levels of challenging behaviors throughout all three stages of the study while C4 demonstrated fluctuating challenging behaviors.

A3's challenging behaviors were only significant at the beginning of the study. After her 2nd intervention session, her challenging behaviors reduced, but it continued to fluctuate throughout the study. At the later stage of the intervention, her challenging behaviors were no longer significant and during the generalization sessions, she did not display any challenging behaviors.

From Figure 7, it is evident that A4 displayed challenging behaviors throughout the study. Even at generalization, he was still displaying his challenging behaviors. A5 demonstrated high levels of challenging behaviors throughout all three stages of the study. Although he demonstrated a reduction in challenging behaviors at the end of the study, this reduction was not significant.

DISCUSSION

The results of this study suggests that the combination of primary reinforcer and secondary reinforcer during therapy based on the ABA model yielded better results as compared to the common practice of having a single reinforcer during therapy based on the ABA model. As mentioned earlier, the main difference between the intervention and control group was the provision of reinforcers. The results of this study further highlighted the importance of reinforcers in increasing the motivation of children with autisme to learn requesting skills and in handling their challenging behaviors.

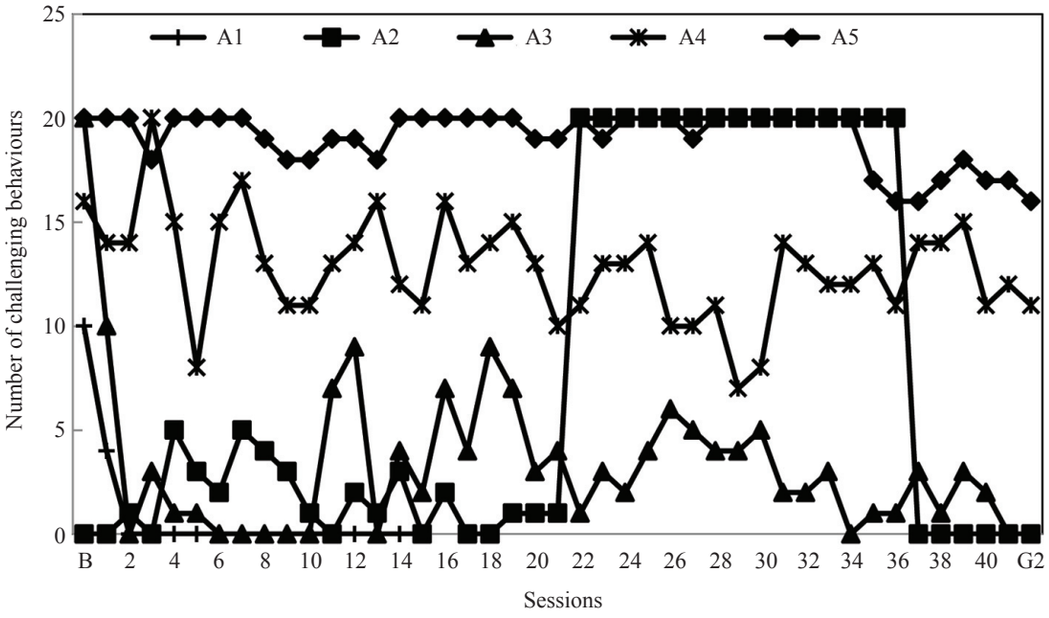

FIGURE 7. Challenging behaviors for intervention group

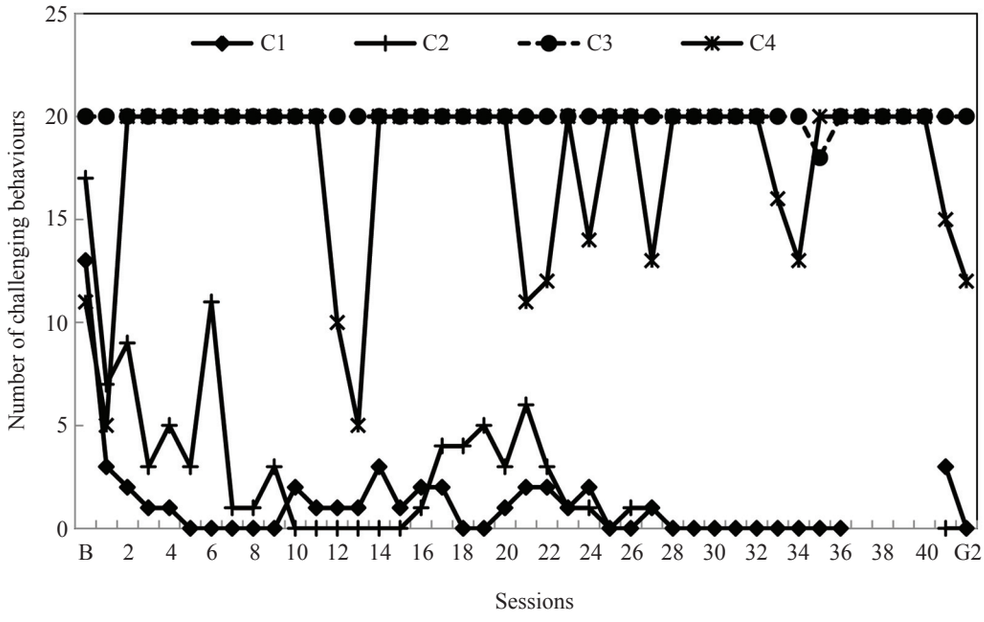

FIGURE 8. Challenging behaviors for control group

According to the data obtained from both intervention and control group, children that were successful in learning their respective TRB, recorded reductions in challenging behaviors as well. This outcome on how the ability to request for needs leads to reduction in challenging behaviors among children with autisme is similar to that reported in previous studies (Carr & Durand 1985; Durand 1999; Machalicek et al. 2007; Tiger et al. 2008; Overcash et al. 2010; Ganz et al. 2012).

As for those children who did not manage to learn their TRB, the main cause was their excessive display of challenging behaviors. The extensive amount of challenging behaviors by children with autisme will significantly affect their abilities to learn new skills (Horner et al. 2002; Matson et al. 2008). Furthermore, as suggested by Hatton et al. (2006) high frequency of challenging behaviors causes children to be irresponsive to communication. For the children in this study, the high frequency of challenging behavior caused them to be unable to acquire their respective TRB.

Among the children in the intervention group, A1 was the first to learn his TRB. Prior to his participation of this study, he was involved in therapy based on the ABA model for 6 months where only one primary reinforcer

was used (Smith 2001; Granpeesheh et al. 2009). During the six months, he was taught many different skills which included requesting skill. However, his requesting skill was inconsistent and most of the time, he would still use single word request. In this study, after he was introduced to the secondary reinforcer, he managed to learn his TRB.

A2 was slow in picking up her TRB but eventually, with the involvement of secondary reinforcer, she started using her TRB. However, at the 22 session, she started to scream to request for her needs. As suggested by Balan and Manjula (2009), children often communicate using the mode of communication that is most convenient for them and also most likely to gain the attention of adults, and for A2, it was screaming. Verbal prompts were given to her to teach her to request appropriately and from session 37th onwards, she stopped screaming and started to request appropriately.

A3, A4 and A5 from intervention group were constantly displaying their challenging behaviors throughout the study. However, A3 started to use her TRB at the later stage of her intervention session. This could be due to the continuous provision of secondary reinforcer during the intervention sessions that managed to maintain A3's motivation to keep trying and eventually, she learned to request using her TRB. Koegel et al. (1988), Luman et al. (2005) and LeBlanc et al. (2003) stressed on the importance of motivation when it comes to the learning of a new skill.

Besides continuous reinforcements, her family's involvement also made a positive impact on her progress. After 40 sessions of intervention sessions with the first researcher, her family continued to practise her TRB with her using the same DTT routine as the first researcher. During generalization session, she was able to use her TRB consistently to request for her primary reinforcer. This finding is consistent with the review by Diggle, McConachie and Randle (2005) which stated that parents' involvement in intervention for children with autisme will bring forth positive result.

A4 was not successful in acquiring his TRB because he displayed echolalia throughout the study. According to Mohanaprakash (2015), a child with echolalia might say a lengthy complicated sentence without understanding it. In this study, A4's TRB was "I want cookie." Throughout the study, he was observed to imitate the verbal prompts given by the researcher to get the reinforcers without learning the meaning of his TRB. He did not learn the meaning of the sentence, in that it was a request; instead, he treated it as a task to repeat the sentence said by the adult in order to get his preferred item. It could have been that the usage of verbal prompts was not suitable for him. It is common for children with autisme to repeat the exact same phrase said by the researcher during training (Valentino et al. 2012).

A5 did not show any improvement in his requesting skill and there were no significant reduction in their challenging behaviors as well. Prior to his participation in this study, A5 was enrolled in therapy based on the ABA model for six months, with minimal improvement. It could be that therapy based on the ABA model is not suitable for him, and other intervention approaches need to be explored. This outcome is consistent with the findings by Kamio et al. (2015) which stated that because of individual variation, there were a huge range of results and the improvement of the children were not significantly linked to therapy based on the ABA model.

C1 and C2 in the control group managed to learn their respective TRB and demonstrated a reduction in challenging behaviors. However, both were unable to maintain their TRB at generalization session and C1 also displayed challenging behaviors at generalization sessions. C3 and C4 did not show any improvement in their requesting skill and there were no significant reduction in their challenging behaviors as well. C3 and C4 were constantly displaying their challenging behaviors throughout the study.

Comparing the results between A1, A2 and A3 to C1 and C2, A1, A2 and A3 were successful at maintaining the ability to use their TRB at generalization session. This was the advantage observed in pairing up secondary reinforcer to primary reinforcer during therapy based on the ABA model. This finding was also parallel with the studies by Britton et al. (2002) and Love et al. (2012) which stated that the pairing of reinforcers with another object or consequences will bring positive result when teaching children with autisme.

LIMITATIONS AND SUGGESTIONS

There were several limitations to this study. One of them was the small number of participants. Given the small number of participants, the results of this study need to be interpreted with caution. As this study is only limited to intervention centres in Klang Valley, Malaysia, the results produce cannot be generalize and represent the children with autisme. Besides that, this research was conducted within five months. Due to individual variation, some of the participants might need a longer period of learning before they could master their TRB. During reinforcer checks, only one trial was conducted. Hence, the first reinforcer reached out by the child might not be his most preferred reinforcer.

In the future, it is suggested that a larger scaled study be conducted where more participants and more intervention centres are involved. The reinforcers used in this study were mainly food. The participants might respond differently if toys were also involved. Besides that, more than one trial of reinforcer checks should be conducted and the position of the reinforcers should be changed during each reinforcer checks trials to ensure that the reinforcer that the child reaches out for is really his/her most preferred reinforcer. Prompts given to each child should also be child specific. For example, an echolalia child should be given more visual prompts rather than verbal prompts to avoid the child from being too prompt dependent.

CLINICAL IMPLICATIONS

This study suggested a few clinical implications. First, each child with autisme might produce different response to different intervention. Therefore, if traditional ABA does not benefit a child, a secondary reinforcer can be introduced to the child. If the child continues to not show improvement, there is a need to explore other intervention techniques because it could be that therapy based on the ABA model is not be suitable for the child.

Second, prompts provided to each child needs to be specific and depending on the characteristic of the child. For example, if the child has echolalia, verbal prompts might not be suitable for the child. It might caused the child to be too prompt dependent.

Third is regarding the reinforcer selection for each child. Reinforcer checks should be carried out more often to ensure that the child's preference did not change. If the child was given the same reinforce over a period of time, the child might be bored and not interested to request for it anymore. This will affect the child's learning progress.

CONCLUSION

Challenging behaviors and deficit in requesting have always been key issues when it comes to providing intervention to children with autisme. A variety of therapies and techniques have been crafted to handle these two primary concerns but these are still major challenges to overcome. In this study, the introduction of secondary reinforcer did increase the learning of requesting skill among some children and reduce their challenging behaviors as well. However, the results were not significant. Further research on a bigger scale is needed to determine the effectiveness of a secondary reinforcer in motivating children with autisme to learn better and to reduce their challenging behaviors.

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