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The Implementation of Picture Exchange Communication System: A Mother's Perspective of a Young Child with Pervasive Developmental Disorder

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ABSTRACT

Picture Exchange Communication System (PECS) is a functional means of communication intervention designed for individuals with a variety of communicative challenges. The purpose of this study was to interview a mother who implemented PECS for her 3;03 year old child with Pervasive Developmental Disorder. The interview aimed to investigate a mother's perception about the efficacy of PECS and issues related to PECS intervention. The results of the interview showed that PECS was effective in enhancing communication skills and reducing problematic behaviours. PECS also had a slight impact on speech production of the child. The issues related to PECS intervention were discussed.

Keywords: Communication, intervention, language disorder, pervasive developmental disorder, Picture Exchange Communication System.

INTRODUCTION

Picture Exchange Communication System (PECS) is an instructional intervention with augmentative communication systems that was founded by Bondy and Frost (1994). PECS is a type of modified applied behavioural analysis programme that is taught using prompting and reinforcement strategies resulting in independent communication. It was designed for early non-verbal symbolic communication intervention for individuals with pervasive developmental disorder (PDD) or autistic spectrum disorder (ASD). It teaches children to spontaneously initiate their wants through an exchange of a picture of the desired items. PECS is not designed to teach oral language, but it has implicitly encouraged oral language use in children via verbal models of language during the picture exchange.

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There are six phases of the PECS protocol. Phase I teaches children to initiate communication by exchanging a single picture for a highly desired item. Phase II teaches children to seek out their pictures and to travel to someone to make a request. Phase III teaches children to discriminate pictures and to choose the picture that represents their desired items. Phase IV teaches children to make a request using the sentence structure "I want ____." Phase V teaches children to respond to the question, "What do you want?" Phase VI teaches children to comment about things in their environment, both spontaneously and in response to questions such as "What do you see?" and "What do you hear?"

PECS is a popular intervention program for children with PDD or ASD. Many studies have reported the overall success of PECS intervention. Currently, there are over 80 PECS-related publications. The first description of PECS was started in 1994 by Bondy and Frost (1994). PECS was originally designed for young children with PDD or ASD, but its use has become much more widespread. It is now used for individuals of any age, with different communication deficits such as PDD or ASD, global developmental delays, cerebral palsy, visual impairment and hearing impairment. In the following session, we look into the efficacy of PECS on children with ASD or PDD by reviewing studies which were conducted over the past 10 years.

Efficacy of PECS in increasing communication

PECS has been widely used in increasing communication skills, namely, requesting skills of children with communication deficits such as PDD or ASD. Majority of the studies investigating the efficacy of PECS have demonstrated positive outcomes. Cannella-Malone, Fant and Tullis (2010) reported that out of two individuals with severe PDD after using PECS, one showed significant improvement in requests and moderate improvement for greeting, while the other showed a moderate improvement in requests. Similarly, Dogoe, Banda and Lock (2010) found that three students with ASD quickly developed the behaviour of requesting independently following the implementation of PECS instruction. Ganz, Sigafoos, Simpson and Cook (2008) found that a 12-year-old boy increased spontaneous communication through the use of PECS and generalised across multiple trainers. Carr and Felce (2007) found that 24 children with ASD showed increased initiation of communication and dyadic communications. In Lerna, Esposito, Russo and Massagli's (2009) study, five children with ASD showed a significant increase in the number of spontaneous requests following PECS intervention. PECS was also proven to be an effective treatment for requesting by Travis and Geiger (2010), who had carried out PECS training on two children with ASD.

Flippin, Reszka and Watson (2010) did a meta-analysis of 11 studies utilizing PECS. They evaluated the effectiveness of PECS on

communication and speech for children with ASD and concluded that PECS had a positive effect on the amount of communication of children with ASD. Likewise, Hart and Banda (2009) conducted a meta-analysis of 13 studies using PECS, and found that PECS resulted in improvements in communicative behaviour in the majority of the participants. Tien (2008) reviewed 13 studies which implemented PECS with participants aged between 1 to 12 years and reported that generally, PECS is an effective evidence-based practice for increasing functional communication for individuals with ASD. Hence, it is not surprising that PECS has yielded positive results in promoting functional communication among ASD children, as reported in previous studies. This is because PECS focuses on a requesting skill, which is a primary skill required in communication. This particular skill is consolidated in PECS by providing concrete reinforcement to the learners (Bondy & Frost, 2001).

Efficacy of PECS in increasing speech

The effectiveness of PECS in enhancing speech production of the children is questionable. There are mixed findings in this regard. Koita and Sonoyama (2004) found that a non-verbal child with ASD developed some speech after PECS intervention but its frequency was low. Ganz, Simpson and Corbin-Newsome (2008) found that participants receiving PECS training did not demonstrate increased use of spoken words. Park (2009) reported that out of three young children with ASD enrolled in the PECS training, one showed an increase in word vocalisation, but the other two showed limited improvement. Flippin *et al*. (2010) and Hart and Banda (2009), who did a meta-analysis, respectively reported inconsistent or insignificant impact on the amount of speech of children who had received PECS training and PECS only occasionally led to increased speech. Preston and Carter (2009) who reviewed the efficacy of the PECS intervention concluded that its effect on speech development was unclear.

On the other hand, some research studies showed that PECS had substantial influence on the speech development of children receiving the training. Among other, Ganz, Parker and Benson (2009) reported that two out of three young boys with ASD developed intelligible speech after receiving PECS training. Similarly, Charlop-Christy, Carpenter, LeBlanc and Kelley (2002) found that three children with ASD showed concomitant increases in speech production after following PECS intervention. Ganz and Simpson (2004) reported that three young ASD children's word utterances and complexity of grammar increased after receiving PECS training. Jurgens, Anderson and Moore (2009) found that a 3 year-old boy with ASD increased in his oral vocabulary following PECS instruction. Meanwhile, Lerna *et al*. (2009) revealed five children with ASD showed a significant increase in vocalizing and verbalizing on imitation undergoing a PECS intervention. Yokoyama, Naoi and Yamamoto (2006), who studied three elementary-school-aged children, reported

that they showed emergence of intelligible vocalisation after PECS training. Carr and Felce (2007) showed that five out of 24 children who had received the PECS training showed concomitant increases in verbal production, and none of the children showed a decrease in spoken words following PECS instruction.

According to Overcash, Horton and Bondy (2010), verbal language is typically developed in Phase IV of PECS, when the constant time delay strategy used augments the use of verbal language along with PECS. Constant time delay refers to a fixed amount of time is consistently used between the trainer and the prompt. In PECS intervention, there is a 3-5 second delay added before the communication partner provides the prompt. The gap creates an opportunity for the children to attempt to talk in conjunction with the picture exchange. In addition to this, PECS provides the individual an opportunity to attempt speech in a meaningful context and differential reinforcement is used for any spontaneous attempt to verbalise in conjunction with exchanging.

Efficacy of PECS in Reducing Problematic Behaviours

PECS intervention was reported to have some impact on undesirable or contextually inappropriate behaviours in children. Through PECS intervention, some decreases in problematic behaviours were noticed for three children with ASD (Charlop-Christy *et al*., 2002). Frea, Arnold and Vittimberga (2001) conducted a study to examine the effects of PECS on a student's aggressive behaviour and reported that his aggressive behaviour was reduced in a brief amount of time when picture exchanges were available. The increased use of PECS had resulted in an increase of collateral behavioural changes and decrease of inappropriate behaviour such as grabbing, reaching and crying (Yokoyama *et al*., 2006). Contextually inappropriate behaviour in children could be partly due to their inability to communicate functionally. By providing the children functional ways of communication through PECS, a number of contextually inappropriate behaviours are ameliorated (Overcash *et al.*, 2010).

However, a number of studies reported inconsistent or insignificant impact of PECS in reducing problem behaviour. Some inconsistent findings were reported in Ganz *et al*. (2009) when the impact of PECS on maladaptive behaviour was investigated. They found that maladaptive behaviour varied throughout baseline and intervention sessions. From the results of Harta and Banda's (2009) meta-analysis, PECS only occasionally led to reduction in problematic behaviour. Preston and Carter, when reviewing the efficacy of PECS, concluded that there were very limited data that could adequately show that PECS training was effective in reducing challenging behaviours.

OBJECTIVES OF THE STUDY

From the literature review, it is evident that most of the studies have shown that PECS is effective in enhancing communication skills of individuals with communication deficits.

Inconsistent findings were reported for its effectiveness in speech production and in reducing challenging behaviours. However, thus far, none of the studies considered the perspective of parents who implemented PECS to their children with PDD or ASD. It is not known if parents were satisfied with the outcomes of PECS; whether they were comfortable with the way PECS was administered; whether parents encountered any challenges when administering PECS to their children; and whether PECS was an ideal intervention programme that they would recommend to other parents with a child possessing a similar problem.

Therefore, the main purpose of the present study was to interview a mother who implemented PECS for her child with PDD. The aim of the interview was to gather information about the mother's perception of (a) the child's improvement in communication, speech and behaviour following the implementation of PECS, (b) the strength of PECS, (c) the challenges encountered when implementing PECS, and (d) recommending PECS to parents who have children with PDD or ASD. In order to bridge the gap between the interview of this mother and the PECS training undergone by her child, a brief report on the participant's background (setting where PECS was implemented, materials used in the training, PECS training sessions and interview session) is presented in the following section. Subsequently, a summary of the interview is discussed in the section on results.

METHOD

Participant, Setting and Materials

Alex was a 3;03 year-old boy with a diagnosis of mild pervasive developmental disorder. He had not received any formal speech and language assessments and interventions prior to PECS training. He had relatively poor eye contact and a short attention span. He had some intact contextual understandings such as "putting clothes in the laundry basket" and "throwing the diaper into the dustbin". According to Alex's mother, Alex had his first few words at 3 years old, which comprised words such as "three", "eight" and "ten". This was because she did a lot of counting with him. Nonetheless, Alex did not seem to understand the concept of numbers and these words disappeared in his speech repertoire after a month. At the time of the intervention, he had less than ten expressive vocabularies, which included "baby", "two", "scissors", "pear" and "car". His frequency of initiating speech was very low. He occasionally verbalised these words when prompted. Most of the time, he remained non-verbal and used gestures to communicate by holding the hand of communicative partners and leading them to wherever he wanted them to go, and putting their hands on whatever item that he wanted.

The setting for the training of PECS was in Alex's home. The sessions were usually held in the morning when he was more alert. Materials consisted of toys or games (e.g., car and slide, ball, blocks, stacking rings, stickers, puzzles, toy fruits, drawing set, train, toy phone, iPad, fishing game) and

food (e.g., yoghurt drink, water, banana, pear and grapes). A three-ring notebook with Velcro strip and colourful graphic symbols of items were used in the PECS training.

The PECS Training Sessions

The PECS training was implemented following the procedures described in the manual (Frost & Bondy, 2002). Phases I to V, as described in the training protocol, were administered in this study. The PECS training was conducted over 5 sessions, which lasted for an average of an hour each across a 3-week period. The sessions were conducted by Alex's mother who acted as the facilitator, and a speech-language therapist who served as the trainer. After the sessions, Alex's mother practised PECS with Alex everyday for half an hour.

Phase I. Physically-assisted Exchange

In the first training session, Alex was taught to initiate communication by exchanging a single picture for a highly desired item. He was shown a preferred item (e.g. car) by the speech-language therapist (trainer), and when he reached for the desired item, his mother (facilitator) physically assisted him to pick up a picture of the desired item and gave the picture to the trainer who was sitting near him. Open-hand cue was used by the trainer. The trainer who received the picture did not say anything until the picture was offered. At that juncture, the trainer said, "Oh, you want a car" and gave the item to Alex. The physically-assisted exchange went on for 40 times before Alex could spontaneously initiate the exchange. The exchange without assistance went on for 55 times with five different items. Alex achieved 100% accuracy of exchanging the pictures independently without the facilitator's assistance and without the open hand cue from the trainer.

Phase II. Expanding Spontaneity

In the second session, Alex first learned to remove the pictures from a display notebook for the exchange. Then, he was required to exchange the pictures with the trainer from a distance. In this phase, Alex was taught to be persistent and an independent communicator who could actively seek out his picture and travel to the trainer to make a request. After being assisted for 15 times, Alex consistently picked up a picture from the notebook and travelled to exchange pictures with the trainer. The exchange without assistance went on for 56 times with six different items. Alex achieved 100% accuracy of travelling to exchange the pictures independently without the facilitator's assistance.

Phase III. Discrimination of Pictures

During the third session, Alex was required to discriminate and select the picture that represented the item he wanted. He seemed to have intact discrimination skills as he could immediately discriminate most of the pictures and handed it to the trainer. However, when he responded incorrectly, error correction strategies were used (Frost & Bondy, 2002). Ten items were exchanged in this phase. Based on 44 spontaneous

requests, Alex achieved 85% accuracy in discriminating and exchanging the pictures independently without the facilitator's assistance.

Phase IV. Sentence Structure (using "I want")

In the fourth session, Alex was taught to combine the object picture with the carrier phrase "I want" on a sentence strip and hand it over to the trainer. Alex placed both cards on the strip after being conditioned 22 times. Based on 62 spontaneous requests, Alex achieved 90% accuracy of placing "I want" picture and object picture and exchanging the pictures independently without the facilitator's assistance.

Phase V. Responding to "What do you want?"

In the fifth session, Alex was required to respond to the question "What do you want?" by exchanging the sentence strip. He responded spontaneously to highly desired items such as car, pear, and iPad. However, most of the time, he still needed prompts from both his mother and the trainer for other items. More practice was needed to consolidate his ability to respond to "What do you want?" Out of 48 requests, Alex achieved 50% accuracy of responding to "What do you want?" by exchanging the sentence strip.

Interview Session

The interview session, which lasted for half an hour, was held in Alex's home. The interview session with Alex's mother was audio-recorded. The interview clip was then transcribed and analysed.

RESULTS

The results were based on the interview with Alex's mother.

Improvement in communication

Alex's mother reported that Alex's communication skills, especially the ability to make requests, improved tremendously after using the PECS. Alex could now tell her what he wanted through the pictures. For instance, if he wanted a pear, he would place the picture "I want" and the picture of "pear" on the Velcro strip and hand it over to his mother, and point at the pictures. Alex's mother also claimed that he was happier as he could tell her what he wanted a bit more. Overall, Alex's mother was very happy with the outcomes of the PECS intervention.

Improvement in speech

According to Alex's mother, Alex showed increased speech after utilising PECS. Alex was found to utter some words spontaneously when he did the exchange. For instance, he occasionally said "car", "pear" and "iPad". However, his utterances were limited to a few words, as aforementioned and the initiation of speech was inconsistent. Alex's mother expected to see more progress in Alex's speech with PECS.

Improvement in behaviours

After using PECS, Alex's mother reported that Alex not only showed improvement in his communication skills, but also demonstrated improvement in his behaviour. Alex's concentration and patience improved, and his impulsiveness reduced. He paid more attention to what he was doing and was less inclined to rush. He tended to perform the tasks given to him correctly when his attention was better. In addition to this, his temper-tantrums had reduced as he could communicate more effectively using the PECS. Alex's ability to remain seated also increased.

The strength of the PECS intervention

Alex's mother felt that PECS was suitable for young children like Alex, as it was like a game for Alex as well as for herself. According to her, when Alex completed the exchange successfully, he was very proud of himself. This programme made the child acquire a sense of satisfaction as he could tell his mother what he wanted, and his mother could understand him.

The challenges in implementing PECS

There were two major challenges that Alex's mother encountered when implementing PECS. First, Alex sometimes did not pay attention to the pictures and simply picked any one to exchange with her. Second, Alex was occasionally so obsessed with a particular toy that he did not want to move on to another toy. This had stopped him from trying out other things.

The recommendation of PECS

Alex's mother would highly recommend PECS to parents who have a child with PDD, as PECS worked out very well with Alex, and the PECS looked like a fun game to him. Most importantly, he enjoyed communicating using the PECS. Alex's mother felt that PECS is a programme which is inexpensive, low-cost, useful, yet easy to administer.

DISCUSSION

The interview showed that Alex's mother was very satisfied with the progress shown by Alex, mainly in his communication, after the implementation of PECS. Alex's mother's perception was congruent with many research studies that proved that PECS was effective in increasing communication in children with PDD or ASD (Cannella-Malone *et al*., 2010; Dogoe *et al*., 2010; Ganz *et al*., 2008; Carr & Felce, 2007; Lerna *et al*., 2009; Travis & Geiger, 2010; Flippin *et al*., 2010; Hart & Banda, 2009; Tien, 2008).

Alex's mother reported that Alex had developed some spontaneous speech resulting from the implementation of PECS. However, the speech production was limited and inconsistent. This was probably because PECS was not used long enough to record significant progress in his speech production, as Alex was introduced to PECS for just five sessions over a three-week period. Verbal language generally begins approximately after one year of PECS intervention among young children (Bondy, Hoffman & Glassberg,

1999). The other possible reason was that PECS might not be effective in enhancing the development of speech. A number of studies have demonstrated that PECS did not yield positive effects on speech production. These studies included those by Koita and Sonoyama (2004), Ganz *et al*. (2008), Park (2009), Flippin *et al*. (2010), Hart and Banda (2009) and Preston and Carter (2009). Nonetheless, the effectiveness of PECS in enhancing speech needs to be further validated.

Alex's mother observed some changes in Alex's behaviour after the implementation of PECS. Alex's behavioural changes included improved attention span, less out-of-seat behaviour, as well as less temper-tantrums. PECS was reported to help in reducing problematic behaviours. This is because inability to communicate will result in contextually inappropriate behaviours. When a child is provided a functional way of communication, contextually inappropriate behaviours are greatly eliminated. For instance, reduced aggressive behaviours, as reported in Frea *et al*. (2001), decreased undesirable behaviours such as grabbing, reaching and crying as described by Yokoyama *et al*. (2006), and reduction of disruptive behaviours, tantrums, grabbing, out-of-seat behaviours as reported by Charlop-Christy *et al*. (2002).

According to Alex's mother, PECS was suitable for children as young as 3 years old. PECS has been implemented on a wide range of individuals with different ages, ranging from young children to adults. PECS that was implemented for young children yielded positive outcomes. For instance, Carr and Felce (2007) implemented PECS for children aged 3 to 7 years with ASD; Schreibman (2008) introduced PECS to very young children with a mean age of 2.5 years, and Jurgens *et al*. (2009) carried out PECS on a 3 year-old child with ASD.

Alex's mother highlighted two major challenges encountered when practising PECS with Alex. She claimed that Alex sometimes did not discriminate the pictures correctly due to his lack of attention. Frost and Bondy (2002) had come out with a number of error correction strategies which Alex's mother could adopt. For instance, begin by offering Alex a choice between something highly preferred and something either relatively neutral or even negatively valued. Alex will learn the consequences through this strategy and will tend to discriminate pictures more correctly. The other challenge that was reported by Alex's mother was object obsession. Alex's mother probably could distract Alex by offering him a similar highly preferred item.

Alex's mother would highly recommend the use of PECS to any parent with a child with PDD or ASD. It is not surprising as PECS has gained worldwide popularity in over 60 countries. PECS is clearly an effective functional communication system for individuals with communicative difficulties.

CONCLUSION

From the interview, it can be concluded that PECS appeared to be effectively enhancing communication skills of a young child with

PDD. PECS also resulted in decreased challenging behaviours. Slight improvement in speech production was noted. It is hoped that the findings of the current research will provide useful insights and data that can help professionals and parents dealing with PDD children as to the possible impact of PECS on PDD children.

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