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PICTURE EXCHANGE COMMUNICATION SYSTEM (PECS): ADVANCEMENT IN THE RESEARCH AND TREATMENT OF AUTISM SPECTRUM DISORDERS

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PICTURE EXCHANGE COMMUNICATION SYSTEM (PECS): ADVANCEMENT IN
THE RESEARCH AND TREATMENT OF AUTISM SPECTRUM DISORDERS

by

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B.S., University of Massachusetts - Amherst, 2010

A Research Paper

Submitted in Partial Fulfillment of the Requirements for the

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TABLE OF CONTENTS

<u>CHAPTER</u>	<u>PAGE</u>
INTRODUCTION.....	1
PICTURE EXCHANGE COMMUNICATION SYSTEM.....	2
PECS TRAINING.....	2
TEACHER VERSUS PARENT IMPLEMENTATION.....	3
EFFECTS OF PECS ON SPEECH DEVELOPMENT.....	6
EFFECTS OF PECS ON FUNCTIONAL COMMUNICATION.....	10
EFFECTS OF PECS ON MALADAPTIVE BEHAVIORS.....	13
RATIONALE ADVANTAGES OF PECS.....	15
EVIDENCE BASED PRACTICE.....	17
CLINICAL IMPLICATIONS.....	17
FUTURE RESEARCH.....	18
CONCLUSION.....	19
REFERENCES	21
APPENDIX	26
VITA	28

Autism is a complex developmental disorder that can be defined at three different interdependent levels: as a neurological disorder, which deals with development of the brain; as a psychological disorder of cognitive, behavioral and emotional development; or as a relationship disorder in which social impairments are present. Since children manifest different combinations of these symptoms depending on their age and ability, autism is also viewed as a spectrum disorder to show this range (Kusch & Petermann, 1995). Due to the significantly different ranges of symptoms presented in individuals with autism spectrum disorders (ASD), it may be challenging for parents and professionals to decide on one of many treatment options that are available.

Advances in the research and treatment of ASD have helped guide parents in deciding on the best treatment plan for their child. Picture Exchange Communication System (PECS), for example, is an extensively researched communication program (Preston & Carter, 2009). The Picture Exchange Communication System (PECS) is a picture-based system developed to help young children with ASD acquire functional communication skills. This program has been influenced by contemporary practices and education treatment approaches, as well as by currently available practices that focus on the core deficits observed in

ASD, which include social communication and emotional regulation.

Picture Exchange Communication System (PECS)

In order to help develop communication skills, various forms of augmentative and alternative communication (AAC) have been developed (Preston & Carter, 2009). PECS, a form of AAC, was developed by Andy Bondy and Lori Frost, and emerged out of many years of research and clinical and educational practice at the Delaware Autistic Program for preschool children with autism, related pervasive developmental disorders, and other communicative disorders (Bondy & Frost, 2001). PECS involves teaching children with autism to exchange a picture or a symbol for a desired object. While PECS aims to teach the child to communicate as opposed to "how to talk" (Liddle, 2001, p. 391), speech production is generally the preferred method of communication (Bondy & Frost, 1994). The overall focus of PECS is on functional communication and the use of PECS can provide an effective method of communication for children with ASD.

PECS Training

PECS training can be broken down into six phases (See Appendix). This procedure is useful in identifying which phase

of the skill the child is struggling with (Yokoyama, Naoi, & Yamamoto, 2006).

Teacher versus Parent Implementation

PECS is designed with the flexibility to be implemented by both teachers and parents of children with ASD. In an attempt to determine which method of implementation is most beneficial, several studies have been conducted.

To explore the effectiveness of teacher implementation of PECS, Charman, T., Gordon, R., Howlin, P., Pasco, G., and Wade, A. (2007) conducted a research study at various schools for children with autism in England. Eighty-four participants consisting of 73 boys and 11 girls were selected from 17 schools for children with autism. In order to be eligible for this study, children had to "(a) have a formal diagnosis of autism, (b) use little or no functional language (i.e., no more than single words), (c) have no sensory impairment, and (d) be aged between 4 and 11 years and not using PECS beyond Phase 1" (Charman et al., 2007, p. 449). The teachers selected to participate at these 17 selected schools had varying amounts of training in PECS with the majority having little or no training at all. Class groups consisting of approximately six children and three teachers were assigned to one of three intervention groups. The three groups were an Immediate Treatment Group, a

Delayed Treatment Group, and a No Treatment Group. "The Immediate Treatment Group received training immediately after the baseline assessment; the Delayed Treatment Group received training nine months later; and the No Treatment Group received no training" (Charman et al., 2007, p. 449). Six teachers and six parents from each group received PECS training at a two-day workshop. One week following PECS training, a PECS specialist went to the Immediate Treatment Group's classroom. Over the span of five months, the PECS specialist monitored the use and effectiveness of teacher implementation of PECS and provided information and strategies to the teachers to further benefit the children with ASD. The Delayed Treatment Group was monitored in the same way as the Immediate Treatment Group by PECS specialists but not as immediately. PECS specialists did not monitor or visit the No Treatment Group of participants. Prior to PECS implementation, 38 children used no words or word approximations, 31 children used single words, and 15 used at least one phrase. At the conclusion of this study, the children in the classroom who received treatment whether immediate or delayed demonstrated both an increase in initiations as well as an overall increase in PECS use.

Parents of children with ASD can also be taught to implement and use PECS as a means of functional communication. According to a study by Chaabane, B., Alber-Morgan, S., & DeBar,

R. (2009), parents of children with ASD may learn how to train their child in the use of PECS. To determine the effectiveness of parent-implemented PECS, improvisation of requesting was explored. Improvisation was defined by Chaabane et al. (2009) as use of a descriptive picture card (i.e., color, shape, or function) to request a desired or preferred item (i.e., foods, drinks, toys) when PECS pictures are not readily available or when a picture of the item is not present. Two children with ASD and their mothers were selected to participate in this study. Prior to this study, Myles had used PECS for one year. Cliff began using PECS four months prior to the start of this study. The participants met the following criteria to be included within in the study: "(a) an individual education plan recommendation for an augmentative or alternative communication system; (b) a prerequisite repertoire of matching colors, shapes, and functions; and (c) parents' regular use of the PECS system with their children" (Chaabane et al., 2009, p. 672). All sessions were conducted in the individual participants' homes and over half of the PECS training sessions were video recorded. During the study, both participants were trained to independently request preferred items using descriptor cards. At time of baseline, Myles did not have any correct improvisation use and Cliff had only used a correct improvisation on one occasion. Following parent implementation, both children

demonstrated gains in the number of correct improvisations when requesting an item of preference or desire (Chaabane et al., 2009).

PECS implementation may be flexible, but it is most beneficial for children with ASD to receive PECS training from a knowledgeable source. A knowledgeable source would be a speech-language pathologist, teacher, or parent.

Effects of PECS on Speech Development

Delay in or lack of development of spoken language is a characteristic associated with the diagnosis of autism. "In fact, almost half of children with autism do not develop speech or develop limited speech and language abilities" (Ganz, J., Earles-Vollrath, T., Heath, A., & Rispoli, M., 2010, p.180).

While the main goal of PECS may not involve the acquisition or expansion of speech, it is an important long-term goal (Bondy & Frost, 2008). During PECS training, once simple sentence structure can be used, several strategies that are aimed at increasing the likelihood of speech development and growth are introduced. These strategies are implemented in an attempt to further strengthen vocalizations (Bondy & Frost, 2008).

Strategies such as delayed prompting appear to be successful as indicated by research showing a marked increase in vocalizations throughout PECS training (Ganz & Simpson, 2004). In addition to

evidence demonstrating the abilities of individuals with ASD to learn to utilize picture-based aided AAC systems, a few studies address the use of such systems to encourage speech development (Mirenda & Erickson, 2000).

Ganz & Simpson (2004) examined the effects of PECS on speech development on three children with ASD and developmental delays who had limited or no speech. Each of the three participants had no prior experience with or exposure to PECS. The participants ranged in ages of three to seven years old. Results indicated that in one participant the overall number of intelligible utterances as well as the presence of non-word vocalizations increased following PECS training. This participant progressed from minimal, inconsistent utterances to utilizing three-word phrases and more desirable speech in the form of requests.

In another study, Ganz and colleagues (2009) investigated the impact of PECS on intelligible words and word approximates. In the study, three male participants, Adrian, Jareck, and Ethan were trained to use PECS as a means of communication. Prior to PECS training and this study, these participants did not use intelligible speech or word approximations for communicative purposes. At the conclusion of this study, two of the three participants increased their use of intelligible words.

In a study conducted by Yoder and Stone (2006), 36 children with ASD were recruited to participate. Of the 36 participants, 19 of the children were required to attend a university-based clinic for three 20-min PECS training sessions per week for a duration of 6 months. "The implementation plan was to use the clinic room as the "lead environment" and to teach the parent to support PECS use in the home, community, and school" (Yoder & Stone, 2006, pg. 429). An aspect of this study was parent training which consisted of direct training, discussion of PECS, and ways to incorporate PECS into multiple environments and with various communication partners. The children with ASD who received PECS training in this study increased the frequency and amount of non-imitative verbal communication.

Carr and Felce (2007) investigated the use of spoken words by two groups of children with ASD. This study aimed to identify if PECS training had an effect on frequency of verbal communication in children with ASD. This study consisted of one group of 17 children with ASD who did not receive treatment and one group of 24 children with ASD who were trained to use PECS in a classroom environment. The children included in this study ranged in ages from three to seven years old. This study was carried out in a classroom environment with a researcher, teacher, and trained teachers' aide. Children who were not in the control group received 15 hours of PECS training with

researchers in a school environment. Once a participant advanced to the third phase of PECS, it was incorporated into the child's classroom with teachers and teachers' aides acting as communication partners. The results of this study indicated an increase in total word production of children who received PECS training. Three children with prior speech production increased their total word production following PECS training, and two of the participants in this study who had not previously used speech to communicate increased their word productions prior to PECS training as well. The control group of children who did not receive PECS training did not demonstrate an increase in word productions. In fact, four of the 17 children in the control group experienced a decrease in their overall word production.

The previously mentioned studies show that there may be a connection between PECS use and speech development. PECS implementation may increase the amount of spontaneous speech as well as mean length of utterance in children with ASD. Studies have reported that just as in typically developing children, an increase in vocalizations, utterances, as well as increased word length in children with ASD may be predictors of growth in speech development.

Effects of PECS on Functional Communication

PECS has increased functional communication for many children with ASD. PECS offers individuals with limited speech abilities a method of functional communication (Preston & Carter, 2009). Functional communication is considered to be an effective method of communication which occurs in a natural environment with a set of natural communication partners (Ganz et al., 2009).

In an attempt to support the claim that PECS offers individuals with ASD a method of functional communication, studies have been conducted. In a study conducted by Ganz and colleagues (2009), participants were recruited from a private school for children with ASD. In this study, three male children were examined to determine the effects of PECS on functional communication. The participants ranged in age from three years to eight years of age. The three participants were taught the first phase of PECS, which involves teaching the child a physical behavior which will be considered communicative. The results of this study indicated that these three male children were able to successfully present a picture to a communication partner to request a desired item during the study. Eleven weeks after the study, the three participants were still effectively using the PECS as a means of functional communication.

Functional communication not only provides children with ASD a means of communication, but it also allows them a potential opportunity to generalize their communication to various environments and communication partners.

Schwartz and Garfinkle (1998) studied the effectiveness of PECS as a means to increase the functional communication on children with ASD. Two females with communication delays were selected for participation in this study. Both participants had previously been trained to use PECS, but neither used PECS as their primary mode of communication. In addition to the two female participants, two other children were selected for this study. One male and one female were selected to interact as peers with the two female participants. A preference assessment as well as an initial baseline data collection was completed prior to PECS training. Participants of this research study were trained in the first three phases of PECS. Following the PECS training, at least three baseline sessions were conducted to determine the implications of PECS on social communication. The two peers selected as communication partners for invention purposes were taught how to respond to the two participants (i.e. take the PECS icon and give the requested item to the participants) (Schwartz & Garfinkle, 1998). Small group activities were used throughout this study to incorporate high preference items. These activities included activities such as

coloring, puzzles, and art projects. Throughout this portion of the study, "the participants were prompted to interact with their peers in these situations where the peer had access to the participant's preferred items. The participant was given 15 seconds to respond to the peer, and then the participants were physically prompted to respond using PECS" (Schwartz & Garfinkle, 1998, pg. 154). To teach the concept of social greetings, the participants were prompted to exchange greetings using PECS with their peers. The participants were initially brought in and out of the room several times throughout the 15 minute session to allow for recurrent practice of greetings and other functional communication. The participants were removed from the room every 5 to 7 minutes to practice the physical act of walking in and out of the room and greeting their peer communication partner. To teach the concept of requesting, the participants were taught to ask their peers for something they needed or wanted. Both participants increased their overall functional communication with gains in social interactions using PECS with their peers and also demonstrated a general preference for verbal communication. Social validity questionnaires indicated that teachers and parents found the social communication skills to be important and that this PECS intervention was helpful.

Effects of PECS on Maladaptive Behaviors

“Communication skills deficits and stereotyped behaviors are frequently found among people with pervasive developmental disabilities like autism. These communication and behavioral oddities of autism are often considered to be difficult to treat and challenging” (Malhotra, S., Rajender, G., Bhatia, M., & Singh, T., 2010, pg. 141). According to research studies, following implementation and use of PECS, there may be a decrease in many of the problem behaviors associated with autism (Ganz & Simpson, 2004; Bondy & Frost 2001).

“Typically developing children learn the nature of communication as early as six to nine months of age when they begin to develop interactive routines with mom or dad” (Bondy & Frost, 2001, p. 728). These interactions between caregiver and child may include such communication attempts as babbling, but they do not precede the development of spoken language. These interactions involve approach and behavioral strategies. Unlike children who are typically developing, children using PECS may be non-verbal and may not be able to use strategies such as increasing the loudness of their voice or volume when initial communication attempts go unacknowledged and as a result must be taught different strategies for initiating communication and gaining the attention of their communication partner. Children

using PECS compensate for lack of or limited verbal communication by physically reaching further to get to the hand of their communication partner, or by physically traveling farther to get to their communication partner (Bondy & Frost, 2001, pg. 730).

Inability to communicate effectively with their environment can be extremely frustrating for children with ASD. Once these children are able to make their needs and desires known they are likely to experience fewer outbursts and other maladaptive behaviors.

Charlop-Christy, M., Carpenter, M., Loc, L., LeBlanc, L. A., & Kellet, K. (2002) studied a series of behavior targets including tantrums, grabbing, out-of-seat behavior and disruptive behaviors for three children with ASD. This study was conducted in both academic and play settings. Following PECS training there was an overall decrease of 70 percent of negative behaviors across various settings. Four behaviors were eliminated entirely (Charlop-Christy et. al., 2002).

Malhotra et al. (2010) investigated the effects of PECS on decreasing maladaptive behaviors of a seven-year old male with ASD. PECS training was carried out in 32 sessions over a period of three months. PECS was used in conjunction with various behavioral techniques. At the conclusion of this study, the participant showed a 60% improvement in behavior (Malhotra et

al., 2010). After training in PECS, problem behaviors often subside as the benefits of communication become more substantial. PECS may affect behaviors associated with ASD by reinforcing an adaptive behavior by using behavioral techniques such as differential reinforcement and task direction. Children with ASD may benefit from structure and routine which PECS provides.

A previously mentioned study conducted by Ganz and colleagues (2004) aimed to determine if PECS is an effective treatment method to decrease maladaptive behaviors associated with ASD. In this study, three children with autism ranging in age from three to seven years of age were trained in PECS. Each of the three participants had no prior experience with PECS or exposure to PECS, preverbal or limited functional speech, and were in need of AAC (Ganz et al., 2004). This study was conducted in each participant's elementary school classroom to promote generalization of skills. Following implementation of PECS, problem behaviors such as tantrums and out of seat behavior were minimized.

Rationale Advantages of PECS

PECS is an effective communication system for children with ASD. Successful implementation of PECS presents several advantages: "PECS teaches social aspects of communication

initially; the first skill the child learns is to approach a communication partner in order to request a desired item" (Bondy & Frost, 2001, p.742). Once this skill is learned, PECS use is expanded so that the child develops an extensive vocabulary, sentence structure, and other communication functions.

An advantage of PECS is that it capitalizes on simple motor skills that are relatively easy to acquire or already in the child's behavioral repertoire, including reaching for, picking up, and handing over a picture card (Bondy & Frost, 2001). Therefore, PECS can be rapidly utilized by children with severely limited behavioral repertoires to ensure some degree of effective communication from the very beginning of the intervention. Also, unlike sign language, pictures used in PECS are easily understood by most members of the community without extensive training, and can be used in a variety of settings. (Berkowitz & Burberry, 1989).

In an effort to explore the variety of settings and generalization of PECS, a study was conducted by Ganz and colleagues (2009). In this study, three children were trained in PECS. This study was conducted in both an office setting and a classroom. Initially during the study, a researcher acted as the participants' communication partner. Following these researcher-participant interactions, an unfamiliar adult was selected to be the child's communication partner. This was done to measure

generalization of PECS use. At the conclusion of this study, the participants were able to successfully request items using PECS and were also able to use this skill with unfamiliar adults.

Evidenced Based Practice

Research is currently focusing on evidence-based practice associated with the impact of PECS on social approach, behavior management, and the relationship between PECS use and the co-development of speech (Flippin, Reszka, & Watson, 2010, p.742). For many children with ASD, PECS is associated with enhancement of social and communication growth.

Clinical Implications

There is a lot of new research on the treatment of ASD and it is important that speech-language pathologists provide effective intervention services for this population. With PECS intervention, children with ASD will be given a chance to develop an effective means of communication. With increasing numbers of children being diagnosed with ASD, perhaps with PECS intervention there could be decreasing numbers of communication impairments and delays. It is also important for speech-language pathologists to maintain connections with parents, teachers, and other potential communication partners to encourage growth and generalization of PECS intervention.

PECS is introduced to children to help them acquire functional communication skills. According to the authors of the article "Effectiveness of the Picture Exchange Communication System (PECS) on Communication and Speech for Children With Autism Spectrum Disorders: A Meta-Analysis," "the developers of the program describe PECS as an augmentative and alternative communication system and are careful not to claim that PECS improves speech for children with ASD, however, speech is a frequently measured outcome variable in PECS literature" (Flippin, Reszka, & Watson, 2010, p. 187).

Although PECS does not make a claim to increase or hinder acquisition of speech, many caregivers and professionals are still concerned that the use of the picture-based system could be detrimental to the potential acquisition of speech (Bondy & Frost, 2001). However, the article mentioned above supports PECS as a method for increasing both verbal and non-verbal functional communication (Flippin, Reszka, & Watson, 2010, p. 187).

Future Research

The current research supports the claim that PECS may provide children with ASD a means of communication and may increase speech production in some individuals. It would be beneficial if future research could explore generalization across a variety of pictures and symbols, settings, and

communication partners through teaching caregivers and people who interact with the child to use PECS regularly.

One area of future research on the effectiveness of PECS could focus on larger sample sizes. Many studies focus on small sample sizes of children with ASD by utilizing single-subject rather than larger designs.

Current research is also limited in that it does not examine how effective caregivers and various communication partners perceive PECS to be, or whether all the phases of training are needed in the process of implementing PECS. The variance in time required for effective implementation should be assessed in future research studies.

Another area to be examined in future research of PECS would be the effects of PECS implementation on older individuals with ASD. In general, PECS is introduced to younger children during the years they would typically be developing language skills. The use of PECS with an older population would open up new areas of future research.

Conclusion

ASD is a lifelong disability. There is no cure, nor is there any one single treatment. Current research supports the claim that PECS can provide children with ASD a means of functional communication and may increase speech production in

some individuals. PECS is one of many treatment options that has the goals of helping to minimize the signs of autism as well as maximize learning. A positive advantage of this program is that it covers a wide range of abilities. This allows professionals, parents, and teachers to begin working with children with ASD in their pre-language years. PECS may be used in a variety of settings which provides children with many opportunities to generalize their acquired skills in their environment and everyday life.

This treatment program also provides an individualized and flexible curriculum, which means different individuals with different symptoms of ASD can all use PECS; they just have different goals to work on (Prizant & Boll, Episode 60, n.d.). PECS is an individualized program and, as such, training yields different results for different children. Not all children trained in PECS developed speech abilities following implementation of the program. Each participant in the studies mentioned is an individual and treatment should be individualized as well in order to maximize potential and positive gains. Further research is required to determine the effects of PECS on speech development of children with ASD.

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APPENDIX

In the first phase of PECS training, children are taught to similarly communicate without using spoken words. In this phase, one of a child's favorite items is placed in sight but out of reach. If the child appears interested in the item, the adult communicative partner gives the child a picture card. They then learn to approach a communication partner (reach toward), engage in a specific behavior (give a picture), and receive a desired outcome (the item pictured on the card). Phase 1 is designed to teach a physical behavior that will be considered communicative.

In the second phase, "children are taught to persist in the communication attempts despite a variety of obstacles or when lesson parameters change slightly" (Bondy & Frost, 2001, pg. 730). As described by Kate Liddle in the article, "Implementing the Picture Exchange Communication System (PECS)," this phase teaches the children "persistence and distance" (Liddle, 2001, pg. 392). In this phase, generalization is taught by eliminating prompts that may be cueing the child to initiate communication.

In the third phase, "discrimination training begins by presenting the child with a choice of two pictures and then demonstrating that choosing and exchanging a particular picture results in specific consequences" (Bondy & Frost, 2001, pg. 732).

During the fourth phase, the child is taught to construct simple sentences on sentence strips such as "I want _____" to communicate. During this phase, "the communication partner reacts by turning the strip back to the child and reading it back to him or her while delivering the requested item" (Bondy & Frost, 2001, pg. 734).

In the fifth stage, the communication partner asks the child "What do you want?" and the child is then taught to respond to this direct question.

In the sixth phase, the child is taught to comment on something the child observes using sentences such as "I see _____."

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