Critical Review: Does PECS intervention increase the initiation of requests in preschool children with ASD?

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This critical review examines the evidence regarding the Picture Exchange Communication System (PECS) intervention delivered by speech-language pathologists (S-LPs) in preschool children with Autism Spectrum Disorder (ASD) and its effects on the initiation of requests. A total of five studies were selected and reviewed (2 single-subject designs, 1 experimentally controlled group design, 1 cohort/follow-up design, 1 randomized group design). Overall, the results are suggestive of positive outcomes regarding the initiation of requests following PECS intervention.

Introduction

Autism Spectrum Disorder (ASD) is a developmental disorder marked by persistent deficits in social communication and interaction across a variety of contexts. It is also characterized by restricted and repetitive patterns of behaviours, interests or activities (American Psychiatric Association, 2013). In Canada, 1 in 66 children and youth (5-17 years old) are diagnosed with ASD – accounting for one of the most common developmental disabilities, nationally (National Autism Spectrum Disorder Surveillance System, 2018). Language and communication development are often impaired within this population. In fact, studies have shown that between 25-61% of children with ASD will use little to no functional speech to communicate (Weitz, Dexter and Moore, 1997).

Speech-language pathologists (S-LP) commonly implement augmentative and alternative communication (AAC) strategies to support communication in individuals with communication difficulties. AAC is a broad term that includes (but is not limited to) methods of communication using pictures, symbols, sign-language and speech-generating devices. One such AAC system is the Picture Exchange Communication System (PECS), which is often used with children with ASD to establish and support functional communication within a social context (Bondy & Frost, 2001). PECS consists of six instructional phases, using basic principles of applied behavioural analysis (e.g. shaping, differential reinforcement) to target communication initiation. In Phase I and II, children are taught to requests for items by exchanging a picture with a communication partner for the corresponding item. In Phase III, children learn to differentiate between preferred and non-preferred items. In Phase IV, children learn to request using full sentences. Phase V consists of teaching children to answer questions. Finally, Phase VI involves children learning how to comment in a variety of ways (Bondy & Frost, 2001).

PECS continues to be widely used as an AAC strategy for children with ASD for a number of reasons. Bondy and Frost (1994) note that unlike other AAC systems, PECS does not require children to have prerequisite skills (e.g. imitation or attending skills) to be successful. Secondly, the PECS protocol starts by teaching children to request for items first, rather than labelling, as in traditional speech and language therapy. According to Bondy and Frost (2001), children with ASD may benefit from learning how to request first, as it provides more concrete reinforcement. This is because children receive tangible items, ultimately creating a more natural and motivating environment. Finally, PECS is portable, cost-effective and can be used in a variety of difference contexts and environments (Charlop-Christy et al., 2002).

To date, literature on the role of S-LPs in language and communication interventions involving individuals with ASD remain limited. As speech and language therapy becomes increasingly accessible to families and children with ASD, it is imperative to be familiar with evidence-based practice in this area to best serve the needs of these individuals.

Objectives

The primary objective of this paper is to critically evaluate existing literature regarding the effectiveness of PECS in S-LP intervention in preschoolers with ASD for the initiation of requests. The secondary objective is to provide clinically relevant recommendations for S-LPs working in this population.

Methods

Search Strategy

For the current review, the articles included were hand-searched from a pre-existing database of consisting of 1033 articles. The database's search criteria were designed to be comprehensive to include all relevant articles. All searches included at least one identifier for ASD (e.g. autism or PDD NOS (pervasive developmental disorder – not otherwise specified)), at least one identifier for intervention (e.g. therapy, treatment, intervention) and S-LP (e.g. clinician, therapist, S-LP).

Selection Criteria

Studies selected for inclusion in this critical review were further required to involve delivery of the PECS by an S-LP to preschool children diagnosed with ASD under the age of 5;11 (years;months). Interventions involving professional students in speech-language pathology programs were also included in this critical review. Only studies examining the initiation of requests were selected for review.

Data Collection

Results of this literature search yielded five studies congruent to the aforementioned selection criteria. The articles reviewed had the following designs: 2 single-subject designs, 1 experimentally controlled group design, 1 randomized group design and 1 follow-up/cohort design.

Results

Al-dawaideh et al. (2013) conducted a single-subject delayed multiple baseline across participants design study examining the effects of PECS training on requesting in school-aged children (5-11 years) diagnosed with ASD. The participants received PECS training three times a week until the completion of the first three phases of PECS program, for a total of approximately 48 sessions. For the purpose of this review, results for only one participant will be examined, as other participants exceeded age criteria for the present review.

Results showed that the participant demonstrated an increase in requests over the first three phases of PECS intervention. The participant was also able to generalize this skill across people in most opportunities and in all settings. No statistical analyses were performed on the obtained results. The researchers used interobserver agreement to increase reliability of coded independent variables; however, the researchers did not explicitly state whether the observers were blinded to the study's purpose.

Overall, this study presents equivocal evidence regarding improvements in speech requests following PECS intervention. Results described in the study were based off observations and no other standardized tasks were used to evaluate participant performance. Weaknesses of the study include small sample size, and many procedures such as method for participant selection and method for observer selection were not described. Taken together, these factors may be suggestive of potential selection or researcher bias.

Carson et al. (2012) conducted a single-subject, changing criterion study to measure changes in speech production (speech requests) in preschool children with ASD following PECS training. They also investigated whether these changes were correlated to pre-intervention characteristics, such as adaptive functioning and symbolic representation skills. The study included three participants that met the study's specific, well-described inclusion criteria. Participants visited an S-LP once per week, for 30-40 minutes over a period of five months for a total of approximately 18 sessions per participant.

The researchers completed pre-intervention assessments and obtained speech production data periodically throughout intervention to compare with post-intervention outcomes. The researchers provided rationales for the domains assessed, and assessed each domain using valid, appropriate measures. Such measures included the Preschool-Language Scale (PLS) for the assessment of language (expressive and receptive) and the Vineland Adaptive Behaviour Scale (VABS) for the assessment of adaptive functioning and socialization. Pre- and post-intervention language samples were obtained across three, 20-minute periods, each approximately one week apart to provide a representative language sample. Differences between pre- and post-intervention protocols were documented and justified. The methods employed in the study are clearly described, such that they are easily understood and can be replicated in the future.

Results of the study compared raw scores for speech requests pre- and post-intervention. They found that two participants increased their frequency of requests (using sounds and words) following PECS intervention, whereas one participant showed relatively no change following the intervention. The study used inter-observer agreement to increase reliability of observations. No further statistical

analysis of the results was employed, which may be considered as a weakness of this study. With regards to the second objective of study, the researchers found that stronger imitation skills increased the likelihood of the child using functional speech to request following PECS intervention for one participant.

Overall, this study provides suggestive evidence of positive speech outcomes after PECS intervention, particularly, initiating requests. The study did not account for the maturation of the participants; therefore, it may have been possible that changes in initiating requests would have occurred in the absence of PECS, especially as a control group was not included in the study. In addition, this study's small sample size makes generalization difficult.

Lerna et al. (2012) conducted an experimentally controlled group study, which aimed to investigate the effects of the first four stages of PECS on social-communicative behaviours of children with ASD. Of the social-communicative behaviours examined in this study, the current review will focus on request initiation following intervention.

The study included 18 participants (18-60 months), assigned to either PECS (experimental group) or conventional language therapy (CLT) (control group) intervention, which was not randomized, but determined by the participant's proximity to the PECS training location. As such, quality of services may account some of the differences in results. Participants in both groups received therapy three times per week, in 30-minute sessions over six months for a total of approximately 72 sessions per participant. Inclusion criteria for the participants, outcome measures with appropriate standardized assessments, and overall methods for study were clearly described. The researchers provided appropriate rationales for the outcome measures, which included the Autism Diagnostic Observation Scale (ADOS) and the VABS. Examiners who conducted assessments at pre- and post-intervention times were blinded to the purpose of the study. Operational definitions were provided for the dependent measures investigated in the study.

The results from the statistical analysis showed that groups were well-matched on demographics and pre-treatment outcome measures. The analysis showed significant group differences in requests following PECS intervention compared to CLT. Specifically, frequency of requests was noted to be significantly higher in the PECS group compared to the CLT group. Overall, this study provides suggestive evidence of an increase in frequency of requests following PECS intervention.

Lerna et al. (2014) conducted a follow-up (cohort) study to Lerna et al. (2012). The purpose of this study was to assess the social-communicative skills of children 12 months following PECS intervention completion. The researchers contacted participants who received PECS or CLT intervention in the Lerna et al. (2012) study. All participants received the same pre- and post-assessment from the initial study upon follow-up, which were administered by examiners who were blinded to the purpose of the study. Psychometric data, functional measures of adaptive behaviour and assessment of social-communicative variables were collected through both unstructured (unstructured free play with examiner) and standardized tasks (VABS, ADOS). In the follow-up study, researchers differentiated between verbal and non-verbal requests to account for the changes reported by parents with regards to expressive vocabulary development. The researchers employed a blinded inter-rater reliability method to ensure coded variables were valid and reliable.

The results from the statistical analysis showed that there were significant increases in verbal requests for children who received PECS intervention. A significant increase was in verbal requests was only observed when comparing pre-intervention scores to 12-month follow-up scores. In general, this study provides suggestive evidence of long-term enhancements in specific social-communicative skills following PECS intervention. Participants from this study were not randomized to groups, and therefore may be considered a weakness. Additionally, this study has smaller sample size (N=14), compared to the previous study (N=18).

Yoder et al. (2006) conducted a randomized group experiment to compare the effects of Responsive Education and Prelinguistic Milieu Teaching (RPMT) and PECS for facilitating the development of social communicative skills. The social communicative skills investigated include requesting, turn-taking and initiating for joint attention. Of these measures, only requesting will be addressed in the present review.

A total of 36 participants were included in this study, 19 of which were assigned to PECS training. The process for participant selection was thoroughly outlined and well-described. The experimenters ensured all participants were randomly assigned to treatment groups and were from different families (e.g. not siblings). Participants in both groups received 20-minute intervention sessions, 3 times a

week over 6 months for an approximate total dosage of 72 sessions.

Tools used to measure changes were valid for the outcomes being measured. Outcome measures included the ESCS-Abridged (Early Social Communication Scale), an unstructured free-play session with the examiner, a measure of turn-taking and parent-child free play. Results gathered from this study indicate that PECS had a large effect in increasing requests compared to children receiving RPMT only if children exhibited very little initiating joint attention during pre-intervention assessment.

The researchers took many measures to ensure the validity of the reported results. Both treatment procedures described were designed to be as similar as possible on multiple dimensions to minimize effects of external factors on the results. The researchers also accounted for additional therapy participants may have received outside of the experiment through parent report. There was a high level of treatment fidelity in both treatments. Furthermore, the outcomes were ecologically valid measures of communication, assessed over various contexts. One weakness of the study was that examiners conducting the pre- and post-assessments were also the primary data-coders, and therefore, were not blinded to the children's treatment group. However, high interobserver reliability scores were reported. Overall, the results reported are highly suggestive that PECS may facilitate more generalized requests when compared to RPMT treatment in children exhibiting little initiation of joint attention prior to intervention.

Discussion

In reviewing the five articles selected for this review, taken together, these studies provide suggestive evidence that PECS training may increase requests in preschool children diagnosed with ASD. Furthermore, results from some of these studies suggest that children with very little joint attention skills or increased imitation skills prior to treatment may be of most benefit to PECS training.

Factors such as participant selection, randomization to groups and study design were inherent weaknesses in some studies and must be also be considered, as these factors reduce the strength of the evidence reported. In general, many of the studies included in this review reported relatively small sample sizes. The inclusion criteria were specific across some studies and may have contributed to exclusion of many screened participants. However, results from studies with small sample sizes may be valuable in that data obtained may be analyzed independently, per child. Children with ASD are an inherently heterogeneous group, and therefore individual analysis of results may yield data that is more representative of the ASD population.

Clinical Implications

PECS is popularly used as AAC strategy for children with ASD to learn how to initiate requests. The studies reviewed yielded suggestive evidence supporting this notion; therefore, S-LPs working with this population should consider using PECS as a method for increasing communicative acts (including requests) in therapy. Furthermore, a follow-up study has shown the maintenance of PECS training for up to 12-months post-intervention.

When considering the use of PECS in therapy, it is also important to consider the individual characteristics of each child with ASD. Additionally, one should also consider whether other interventions (such as RPMT) or a combination of interventions may be more beneficial. It is imperative that clinicians working in this population understand the heterogeneity of ASD, and therefore a single treatment may not be the solution.

Future Recommendations

To date, there is limited literature specifically focusing on the role of S-LPs in the care of children with ASD and specifically, PECS. As S-LPs become increasingly involved in the care of individuals with ASD, the need for higher level, evidence-based research also increases. As such, it is imperative to conduct more high-level research in this area with larger sample sizes in order for S-LPs to make evidence-based decisions in treatment for this population.

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