Critical Review:
Is peer-mediated intervention effective for preschoolers with autism spectrum disorders for improving communicative outcomes?

Rachel Pessah
M.Cl.Sc SLP Candidate
University of Western Ontario: School of Communication Sciences and Disorders

Deficits in social communication skills are a key feature of autism spectrum disorders (ASD). Social communication skills are important to successful inclusion in a mainstream classroom and purposeful intervention is necessary to see gains in social communication (Gutierrez et al., 2007; Koegel et al., 2001). This critical review examines the effectiveness and maintenance of peer-mediated intervention on social communication skills in preschoolers with autism spectrum disorders. A literature search using computerized databases was completed resulting in four articles meeting the inclusion criteria. Study designs were all single-subject multiple baseline across participants. The articles were evaluated using a critical appraisal template evaluating the level of evidence, validity, and importance of the information included in the articles. Taken together, studies provide moderate support for the use of peer-mediated intervention for preschoolers with ASD. Limitations of the research and its clinical implications are discussed in the review.

Introduction

Impairments in social communication skills are a defining feature in individuals with autism spectrum disorders (ASD) (American Psychiatric Association, 2013). These deficits can include, but are not limited to, difficulties in initiating, taking turns, responding to peers, and sharing interests (American Psychiatric Association, 2013).

As a result of these social communication challenges, children with ASD often struggle to connect and build meaningful relationships with their peers. In order to create positive inclusion outcomes, children with disabilities must interact with and learn from typically developing peers (Odom, 2000; Simpson et al. 2003). Peer-mediated intervention (PMI) provides opportunities for supported positive inclusion with the goal of maintaining communication skills following intervention (Katz & Girolametto 2013, Lee & Lee, 2015). In PMI, one or more typically developing peer(s) are instructed to teach social communication skills to a child with ASD.

The development of social skills in the preschool years is paramount to the development of later social, academic and behavioural competence (McClelland & Morrison, 2003). Providing PMI during the early years of development builds a foundation of communication skills to build upon as children enter school. Although substantial evidence exists supporting peer-mediated intervention for social communication skills in school-aged children with ASD (Watkins et al., 2015), less is known about the effectiveness of PMI for preschoolers with ASD. Given the importance of early intervention, this critical review is interested in evaluating the evidence on the effectiveness of peer-mediated intervention on communication skills in preschoolers with ASD.

Objectives

The primary objective of this paper is to critically evaluate the recent literature examining the effectiveness of peer-mediated intervention on communication skills in preschoolers with ASD.

Methods

Search Strategy

Computerized databases including CINAHL, PubMed, and Scholar's Portal were searched using the following terms: ((peer-mediated intervention) OR (peer intervention) OR (peer training)) AND ((autism spectrum disorders) or (ASD)) AND ((preschool-aged) OR (preschooler) OR (young children)) AND ((social skills) OR (communication) OR (interactions)).

Selection Criteria

Studies selected for this critical review directly examined the effects of peer-mediated intervention on social communication skills in preschoolers with ASD. The study was limited to participants between the ages of 3;0 and 5;0. Only articles dated after 2005 were included.

Data Collection

The results of the literature search yielded 4 articles. All articles utilized a single-subject multiple baseline design. One of the articles also embedded an alternating treatment design.

Results

Single-subject design

Given the nature of peer-mediated intervention, single-subject designs are the most suitable objective method for attempting to observe changes in social communication after intervention or compare intervention effects. Interpretation of these studies must be made with reservation as a result of the small sample size and potential selection biases.

The studies relied heavily on visual interpretations of graphs and some of the studies included a percentage of non-overlapping data score (PAND) to determine if there were significant differences pre- and post-intervention. Although a PAND score is the most widely used metric for single subject designs (Schlosser, Lee & Wendt, 2008), it comes with several weaknesses. First, it can give a misleading interpretation of the results when compared with visual inspection. Second, any percentage above 50 is considered an effective intervention, therefore it has a low sensitivity to differences in strengths of intervention. Both statistical analyses and visual interpretations of graphed results should be used to compensate for limitations of both types of analysis.

All four studies utilized an interval coding system ranging in length from 6 seconds to 1 minute. Using an interval coding system could result in reduced detection of intricacies within each interval.

A study conducted by Katz and Girolametto in 2013 used a single-subject design to examine the effects of peer intervention on social interactions of children with ASD. At each of 3 child care centers, following 4-6 baseline sessions, 2 typically developing children were given 4 training sessions to engage 1 preschooler (4.1 - 5.1 years) with ASD in play. Training was well described. After training, the child with ASD completed 12 play sessions (6 with each peer) during which a supervising educator prompted the peers to use specific strategies on a communication board. Following intervention (4-5 weeks), one maintenance session with each peer was completed without prompts. Results of visual inspection of the graph paired with a PAND score of 100% indicated that all three children with ASD showed significant gains in the number and length of their interactions with peers, and maintained their gains.

The children with ASD ranged in their levels of functioning. The characteristics and diagnostic information for each target child was well described. Peer interventionists were selected by each educator. As well, the relationship prior to the study between the interventionists and the child with ASD is not discussed beyond that they had a previous interest in interacting with the child with ASD.

Katz and Girolametto (2013) utilized a 6 second interval coding system to measure the number of extended joint interactions (3 or more non-interrupted turns) and the average length of the extended interactions during each 20 minute play session. The authors provided a clear description of the outcome measures and analysis procedures. Participants were well described and were randomly assigned to each of the multiple baselines and dyads were also randomized. The activities (blocks and playdough) were counterbalanced. The study reported an acceptable fidelity check and blinded interrater agreement. Teachers' ratings of acceptability and feasibility were high, indicating that they believed the intervention was highly effective and could be easily incorporated into a day care setting.

In conclusion the importance and validity of this study provide strong evidence for the use of PMI due to the use of counterbalancing, social validity ratings, interrater agreement, acceptability and feasibility ratings. However, evidence relating to maintenance of gains must be interpreted with caution as these results were based on only one session occurring one month following intervention.

Kohler et al. (2007) conducted a study using a single-subject design to examine the impact of a buddy skills package on the social interactions between a preschooler with autism (4.9 years) and her peers. Following baseline (6-21 sessions), participants underwent 8 sessions of training that focused on the strategies of "Play, Stay, and Talk." Intervention (9 sessions) included teacher feedback, praise, and picture cards to support peers' interactions with their classmate with ASD (praise and feedback was not directed towards the target child). During the maintenance phase (3-18 sessions), teacher feedback and praise were eliminated and the picture cards remained as visual cues. A 10 second interval coding system measured the frequency, reciprocity, and length of positive social interactions (positive comment or intentional physical contact). No PAND score was computed. Results of visual inspection indicated that the child with ASD had an increase in frequency, length, and reciprocity of interactions by the end of the study and maintained these changes.

Several limitations exist within this study. The authors did not state how the typically developing children were selected, their ages, how they were assigned to each pairing, or how they rotated pairs working with the target child. The study only included one child with ASD (4.9 years). The details and characteristics of the

child with ASD's diagnosis were well described. The researchers did not provide details on the preschool teacher's knowledge or training on the "Buddy Skills package."

Further limitations exist within the study's methodology. First, during coding, the observer did not note which peer was the recipient of the target child's interactions. Second, blinding was unclear as the individual doing the coding/observing was not identified. As well, the authors reported acceptable interrater agreement, although details regarding these procedures were lacking. Third, the study utilized a staggered baseline but do not state participants were chosen for each start point.

The importance and validity of this study is moderately strong as a result of inadequate information provided about selection and randomization of participants, instructor training, and unclear data collection methods.

Lee and Lee (2015) conducted a study with a single-subject multiple baseline design across participants to examine the effects of a comprehensive non-play-based social skills intervention package combining peer-mediated strategies and environmental arrangements on the peer interactions of three children with autism (3.9 - 4.2 years) in a Malaysian preschool. Following baseline (5-9 recordings), 9 typically developing children (approx. 4 years) completed training (5 sessions) on social initiation and correspondence for engaging with their classmate with autism at snack time, and 3 typically developing peers were grouped with each child with ASD. The authors utilized a 10 second interval coding system to measure the number of initiations, responses and reciprocal social interactions. Results of visual inspection indicated significant gains in the frequency of reciprocal interactions and verbal interactions for children with ASD and gains were maintained immediately after intervention with continued environmental arrangements. No PAND score was computed. Teachers' ratings of acceptability and social validity supported the use of the intervention package but revealed modest ratings on feasibility.

Limitations exist within this study. First, the teachers assigned themselves to the target child with whom they felt most comfortable. Second, details regarding the participants' pairings were limited. Third, environmental arrangements and peer-mediated intervention were employed simultaneously and therefore gains cannot be teased apart. Fourth, no PAND value was provided which makes it difficult to determine the level of effectiveness of the intervention(s).

Strengths exist within the above study. The participants were well described. The study also used an acceptable fidelity check. The evidence was further strengthened through interrater agreement with a blinded second rater, social validity, acceptability, and feasibility (applicability to environment) ratings.

The importance and validity of this study are strong, despite the potential experimenter bias as a result of acceptable fidelity checks, interrater agreement with a blinded second rater, and due to the inclusion of ratings of social validity, acceptability, and feasibility.

Trembath et al. (2009) utilized an alternating treatments design embedded in a multiple baseline design across participants to examine the effectiveness of peer-mediated naturalistic teaching with and without augmentative and alternative communication on communicative behaviours of 3 preschoolers with ASD (3-5 years). Prior to intervention, all six typically developing peers were trained (2 20 minute sessions) how to use the peer-intervention procedures and to model AAC. Peers were randomly assigned to either the peer-mediated intervention (PMI) alone condition or AAC and PMI condition. Children with ASD received both conditions (each condition was with a different peer) in random order. The authors used a 1 minute interval coding system to measure the number of communicative behaviours (any behavior produced by the child with autism, expressed using one or more communication modes that were potentially communicative). Results of PAND scores indicated that all 3 children with ASD increased their communicative behaviours immediately following the introduction of both interventions and generalized these increases to mealtime interactions with their peers that were not a part of the intervention. Upon visual inspection of the graphed results, the gains of 2 out of 3 of the participants appear fleeting. The authors stated only 1 of the 3 children maintained these gains, however no information regarding a maintenance phase was included.

The above study had several limitations that would make replicating the study a challenge. First, the study was not blinded as the researcher gave the participants the instructions, provided prompts, performed the video recording, and did the coding of the communicative behaviours. Second, it is unclear how the children with ASD were allocated to the different tiers in the multiple baseline design. Third, the authors stated 35 sessions were conducted but do not say over what period of time they took place. Fourth, the authors mention that one out of the three children with ASD maintained their gains; however, no information or data on maintenance is included in the article. Fifth, the researchers

calculated the number of communicative behaviours per minute. An interval of one minute is significantly longer than the other studies in this critical review and is not sensitive to the intricacies within each interval. Sixth, The authors defined communicative behaviours as any behavior produced by the child with autism, expressed using one or more communication modes that were potentially communicative, which makes it difficult for the researchers to provide any specific outcome measures regarding the types of communicative behavior that occurred. Seventh, only a single probe was used to test generalization to outside peers. Lastly, on visual inspection of the graphic data, it is clear that for two of the three participants there was a small increase in communicative behaviours initially but as intervention continued the communicative behaviours declined to baseline levels demonstrating that the intervention effects were fleeting, despite high PAND scores.

Strengths exist in the Trembath et al.'s (2009) study. The study included an adequate number of baseline sessions (3-11 depending on which baseline participants were assigned). A minimum of 3 baseline sessions is considered acceptable. The authors also included a blinded rater for their inter-observer agreement which lessens the experimenter bias that exists in their methodology. In addition, their use of a percentage of non-overlapping data score (PAND) and Pearson ϕ effect size allows for comparison to other studies and provides a measurement of the effects.

Taken together, the importance and validity of this study are of moderate strength due to experimenter bias, inadequate information on allocation of participants, no information on the maintenance phase, small sample size, inferior calculation method, and confounding results on visual inspection.

Discussion

Overall, the findings of the studies indicate that peer-mediated intervention is effective at improving social communication skills in preschoolers with ASD. Katz & Girolametto (2013), Kohler (2007), and Lee & Lee (2015) found that improvements were maintained for at least one month following intervention. However, inherent weaknesses in the methodology, subject selection, and study design, weaken the strength of the evidence and the ability to confidently apply the findings to a clinical setting.

Future Research Considerations:
It is recommended that further research be conducted to confirm the most effective model for PMI delivery. In order to improve the level of evidence provided by the existed literature, it is recommended that future research take the following into consideration:

a) Further studies investigating whether the effectiveness of PMI is generalized to other environments.

b) Future research evaluating the effectiveness of PMI after longer maintenance phases (e.g., 6 months, 1 year).

c) A comparative study between PMI and other evidence-based intervention methods (e.g., Early Start Denver Model).

d) A comparison of social communication skills after PMI versus a control condition.

Clinical Implications

Although limitations exist within each of the studies, overall, the evidence provides moderate support for peer-mediated intervention improving social skills in preschoolers with ASD. The critical review provided important findings for which to direct future research.

Clinicians should accept that PMI can be effective in improving social communication skills in preschoolers with ASD. Based on the potential impact of social communication on interacting and learning from peers, it is essential to continue studying treatment effectiveness, generalization and maintenance.

References

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Arlington, VA: American Psychiatric Publishing.

Gutierrez, A., Jr., Hale, M. N., Gossens-Archuleta, K., & Sanchez, V. (2007). Evaluating the social behavior of preschool children with autism in an inclusive playground setting. *International Journal of Special Education*, 22(3), 25–29.

Katz, E., & Girolametto, L. (2013). Peer-mediated intervention for preschoolers with ASD implemented in early childhood education settings. *Topics in Early Childhood Special Education*, *33*(3), 133-143.

Koegel, L. K., Koegel, R. L., Frea, W. D., & Fredeen, R. M. (2001). Identifying early intervention targets for

children with autism in inclusive school settings. *Behavior Modification*, 25, 745–761.

Kohler, F. W., Greteman, C., Raschke, D., & Highnam, C. (2007). Using a buddy skills package to increase the social interactions between a preschooler with autism and her peers. *Topics in Early Childhood Special Education, 27*(3), 155-163.

Lee, S. H., & Lee, L. W. (2015). Promoting snack time interactions of children with autism in a Malaysian preschool. *Topics in Early Childhood Special Education, 35*(2), 89.

McClelland, M. M., & Morrison, F. J. (2003). The emergence of learning-related social skills in preschool children. *Early Childhood Research Quarterly*, *18*(2), 206-224.

Odom, S. L. (2000). Preschool inclusion what we know and where we go from here. *Topics in early childhood special education*, *20*(1), 20-27.

Schlosser, R. W., Lee, D. L., & Wendt, O. (2008). Application of the percentage of non-overlapping data (PND) in systematic reviews and meta-analyses: A systematic review of reporting characteristics. *Evidence-based Communication Assessment and Intervention*, 2, 163–187.

Simpson, R. L., de Boer-Ott, S. R., & Smith-Myles, B. (2003). Inclusion of learners with autism spectrum disorders in general education settings. *Topics in Language Disorders*, *23*(2), 116-133.

Trembath, D., Balandin, S., Togher, L., & Stancliffe, R. J. (2009). Peer-mediated teaching and augmentative and alternative communication for preschool-aged children with autism. *Journal of Intellectual and Developmental Disability*, *34*(2), 173-186.

Watkins, L., O'Reilly, M., Kuhn, M., Gevarter, C., Lancioni, G. E., Sigafoos, J., & Lang, R. (2015). A Review of Peer-Mediated Social Interaction Interventions for Students with Autism in Inclusive Settings, *Journal of autism and developmental disorders*, *45*(4), 1070-1083.