

Critical Review:

In children with Autism, does peer support lead to more positive communication outcomes?

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The following literature review examined seven relevant research articles whose purpose was to determine the effectiveness of involving typically developing (TD) peers in communication intervention programs for children with Autism Spectrum Disorder (ASD). The search yielded six studies that employed a multiple baseline design across participants and one which utilized a randomized controlled trial (RCT) design. The results indicated that TD peer involvement in intervention programs yielded positive communication outcomes for children with ASD. The implications and limitations of the current research are discussed.

Introduction

Autism Spectrum Disorder (ASD) is a set of heterogeneous neurodevelopmental conditions, characterized by early-onset deficits in social communication, as well as unusually restricted and repetitive behaviours and interests (American Psychiatric Association, 2013). Of importance to the profession of Speech-Language Pathology, social communication deficits, such as inappropriate responses in conversation, misreading non-verbal interactions or having difficulty forming age-appropriate friendships are commonly observed in individuals with ASD (American Psychiatric Association, 2013). Chamberlain, Kasari, and Roteram-Fuller (2007) found that children with ASD had lower social involvement with their same-aged, typically developing (TD) peers. Similarly, an observational study by Bass and Mulick (2007) indicated that children with ASD spend less time interacting with their peers and more time in purposeless play or inactivity. When they do interact with peers, it was found that they have lower quality interactions and maintain a greater physical distance from peers (Bass & Mulick, 2007).

Ontario's Equity and Inclusive Education Strategy (2009) advocates for inclusive classrooms in Ontario schools, meaning that children with disabilities, including ASD, are spending more time in general education settings. This integration begins in preschool (Katz & Girolametto, 2013) and continues into high school (Carter et al. 2017). Initially, it was assumed that placing students with ASD in generalized classrooms would result in social benefits, however, findings have been mixed (Harrower & Dunlap, 2001). In fact, a study by Hilton and Liberty (1992) indicated that 78% of interactions within the classroom were instructional and occurred between the students with special needs

and their teachers, teaching assistants and peer tutors, rather than with regular classmates.

If the social communication deficits seen in individuals with ASD are not addressed, the gap will continue to widen between those with ASD and their TD peers. Social communication deficits place those with ASD at risk for social isolation, and can impact adult friendships, employment, mental health and overall quality of life (Hendricks & Wehman, 2009). Identifying interventions that successfully address social skills will likely enhance adaptive behaviour, social acceptance, and independence in individuals with ASD (Bellini, Peters, Benner, & Hopf, 2007).

Even with research-based intervention, children with ASD have been shown to have difficulty generalizing learned skills to new settings, while in the presence of novel people or materials (Owen-DeSchryver, Carr, Cale & Blakeley-Smith, 2008). This is where peer-mediated intervention (PMI) could be an effective and viable option to improve communication abilities in individuals with ASD. TD peers are natural experts at executing age appropriate conversations and interactions. PMI involves teaching TD peers strategies for social interaction with their peers with ASD, which ultimately increases the amount of opportunities for those with ASD to learn and practice their new skills in natural contexts (Carter et al., 2014). Since PMI can be delivered in natural settings, with peers who are seen on a regular basis, it could help those with ASD to generalize their newly acquired skills and achieve positive communication outcomes.

Objectives

The objective of this paper is to critically evaluate pre-existing literature on the effectiveness of involving TD peers in communication interventions for individuals with ASD.

Methods

Search Strategy: The following online search engines were used to locate relevant articles: Google Scholar, PubMed, Scholars Portal Journals and Science Direct. The following search terms were used: [(“Autism Spectrum Disorder” or “ASD”) AND (“Peer Intervention”)].

Selection Criteria

To meet the inclusion criteria of the literature review, the selected studies needed to: a) Include at least two individuals with ASD 21 years of age or younger, b) Use TD peers as the main vehicle for intervention, and c) Investigate at least one form communicative increase other than requests.

Data Collection

Results of the literature search yielded six studies that employed a multiple baseline design and one that employed a RCT design.

Results

Multiple Baseline Design:

A Multiple Baseline Design is a type of single case design, used to study treatment effects across multiple participants. Each participant acts as their own control group, with a baseline established for each participant through repeated observation. Interventions are implemented, and effects are demonstrated when changes from baseline performance are observed as a result of intervention (Ferron & Scott, 2014). Due to the wide range of variability in individuals with ASD, having each individual serve as their own control is an appropriate study design and results in level one evidence on the experimental design decision tree (Archibald, 2009).

Bambara, Cole, Kunsch, Tsai & Ayad (2016) investigated the effects of PMI on increasing overall conversational acts, initiations and follow up questions in students with ASD. The researchers were also interested in whether the PMI had a collateral impact on the focal students use of comments and total assertive acts (not obligatory responses), and if the participants and naive special educators would deem PMI to be socially acceptable. A total of 12 participants took part in this study, nine TD general education students aged 16-18 and three focal students with ASD aged 14-15. All observations, including baseline measures, took place over the lunch period and were video-recorded for 10 minutes. Over the course of 18 weeks, the baseline, training and post-training observations occurred three to four days a week.

Conversational acts were defined as verbalizations or gestures involving a focal student. These acts were coded and broken down into two categories, either an initiation, or a response. Acts identified as a response were then identified as either obligatory, a follow-up question or request, or a comment. The initiations and responses were coded as “prompted” if the peer gave a verbal or gestural prompt for the focal student.

Peer training was delivered in three separate sessions and included strategies to support conversation, strategies to promote initiation and strategies to promote follow-up questions. Following each training session, the new strategies were provided on cue cards for the TD peers. The students with ASD were also provided cue cards with initiation and follow-up question ideas. The information on the cue cards changed daily, depending on what the focal student wanted to talk about that day. The peers were provided with praise and corrective feedback based on the previous day’s interaction before starting the next conversation. This feedback was discontinued after the focal students demonstrated improvement from baseline, which began the post-training phase of the study. Appropriate social validity measures were included, and a visual analysis and appropriate statistical analysis was performed on the data.

The results of the study indicated that PMI substantially increased conversational acts in comparison to the baseline, and these effects remained above baseline during the post-training phase. In terms of initiations and follow-up questions, an increase was seen once the peers received training and began to implement the strategies. Even with variability amongst the three participants, the all measures continued to be above baseline, and a moderate to large effect size was found for initiations and follow-up questions post-intervention.

Overall, this study showed compelling evidence that PMI can be an effective technique to help students with ASD achieve positive communicative outcomes.

Carter et al. (2017) investigated if PMI is an acceptable method to increase social interaction and academic engagement in high school students with ASD within general education classrooms. A total of 17 participants took part in this study, thirteen peers between grades 9-12 and four focal students with ASD aged 16-19. The classroom educators were involved in establishing peer support arrangements, as well as to assist in facilitation for two of the four students with ASD. All observations took place during the first 20 minutes of the class period during the spring semester. The number of observations per

week and duration of the study were not specified. Social interactions and initiations were recorded using a partial-interval recording method, involving 15 s of observation and 15 s of recording. Momentary time sampling was used to measure academic engagement, proximity to others and class participation at the end of a 30 s interval. Interaction quality was measured using an appropriate measurement tool. All the peers participated in one 45-60-minute initial training session and were provided with written individualized support plans for their focal student. The training provided peer partners with social and academic strategies to interact with the students with ASD throughout the class period. Appropriate social validity measures were included, and data was analyzed using visual analysis only, no further statistical manipulation was completed.

The results indicated an increase in the number of recorded intervals containing social interactions with peers. However, the results also indicated limited improvement in recorded intervals containing social initiations. As well, the results revealed that social interactions within the classroom tended to take place with trained peer partners, rather than peers without training. There was a high amount of variability across the four students for academic engagement with a considerable amount of overlap between the baseline and intervention conditions. Social validity results indicated that peers really enjoyed the intervention and would like to continue their involvement, and that teachers saw positive change and found PMI easy to implement. Students with ASD had mixed responses to the intervention. Half of the students with ASD indicated that they enjoyed PMI and found it helpful, while one focal student was neutral on his participation but thought peer groups were beneficial, and one focal student refused to fill out a social validity questionnaire.

Overall, this study provides some evidence that PMI may be an effective technique to increase social interactions within general education classrooms but is less effective in improving initiations and academic engagement in students with ASD. As well, the social interactions tended to occur with trained peers, not untrained peers. This provides suggestive clinical importance and validity evidence that PMI is an effective and viable option for increasing positive communication outcomes for students with ASD.

Kamps, Mason, Thiemann-Bourque, Feldmiller, Turcotte & Miller (2016) investigated the effect of explicit social skills training using visual cues within peer networks to increase communication for

students with ASD. The participants included four children with ASD aged 6-7, and each child was provided a peer network of four to six TD peers from their general education classroom. The researchers provided the teachers with a three-hour workshop on intervention implementation, modelled each new social skill and provided weekly feedback, coaching and consultation throughout the study.

Each session involved 10 minutes of the adult leading instruction using a social script, 10-15 minutes of free play where adult allowed the students to practice new skills without interruption, and then five minutes of feedback and prizes for social communication skill use. Over the course of three months, peer networks were implemented three times per week for 25-30 minutes. Generalization probes were administered later in the school day during center time or physical education classes, where session materials were not available, but TD peers were present. All baseline and intervention sessions were video-recorded during the free-play portion of the session, with no information on generalization probe administration. Appropriate social validity measures were included, and a visual analysis and appropriate statistical analysis was performed on the data.

The results of the study indicated that once intervention began, communication acts increased with minimal overlap with baseline data, and responses increased for three of the four participants. Large, statistically significant effect sizes were found for increases in communication acts and change in the number of responses. Generalization probes indicated that participants demonstrated an increased amount of communication acts, comments and requests, although the degree of increase varied amongst participants. The social validity revealed that school personnel felt this intervention was feasible in terms of time, ease, and necessary resources, and that they saw improvements in the child with ASD's social interactions with both trained and untrained peers.

Overall, this study showed evidence that PMI can be an effective technique to increase students with ASD's communication acts within a general education classroom. Despite lack of details for the generalization probe administration, it appears that utilizing TD peers can result in increased initiations and responses that generalizes to activities outside of peer network sessions with trained and untrained peers. Therefore, this study provides compelling clinical importance and validity regarding the use of peers to increase positive communication outcomes for students with ASD.

Katz & Giolametto (2013) investigated if PMI promoted longer and more frequent social interactions for children with ASD, and if PMI was feasible in a daycare setting. The researchers also wanted to know whether outside observers noticed positive communication outcomes due to intervention. Across three childcare centers, three preschool children with ASD aged 5-6 (one per center), six TD peers (two per child with ASD) and three Early Childhood Educators (ECEs) were selected. All observations, including baseline measures, took place in the preschool classroom for 20 minutes and were videotaped over the course of four months. At 4-5 weeks post-intervention, two more 20-minute play sessions for each child with ASD and each trained peer were videotaped to collect data on maintenance of social skills.

The intervention involved two training sessions for the ECEs, five half hour social skills training sessions taught by the first author and the ECE to the child with ASD and the TD peers, and then twelve 20-minute play sessions where the ECE implemented the program and helped to scaffold the children's participation using white boards to promote memory of the strategies. Every session, including baseline, was 20 minutes, always involving 10 minutes of block play followed by 10 minutes with play dough.

An interval coding system was used every 6 s to code for the presence or absence of joint interaction, as well as to determine the length of the interactions between the children. Appropriate social validity measures were included, and used visual analysis and appropriate statistical analysis was performed on the data.

The results of the study indicated that the children with ASD increased the number and length of their interactions with TD peers, and these improvements were maintained 4-5 weeks post-intervention. Social validity measures indicated that ECEs felt they could effectively teach TD peers to communicate with the children with ASD, could continue to independently implement the intervention strategies, and felt that the child with ASD benefited from the intervention. Independent outside observers from a language development class at a community college also watched the tapes and felt that each target child took more turns and engaged in extended interactions more frequently at maintenance than at baseline.

Overall, this study demonstrated evidence that PMI can be an effective technique to help children with ASD achieve positive communicative outcomes. Although this study had heavier adult involvement

than other PMI studies, the TD peers were also very young. Despite more adult involvement, the TD peers were still the main interventionists and the results proved that they could be effective with scaffolding from the ECE, even at a young age. Therefore, this study shows compelling clinical importance and validity that involving peers, even at preschool age, is an effective and viable option to increase positive communicative outcomes for children with ASD.

Owen-DeSchryver, Carr, Cale & Blakeley-Smith (2008) investigated the impact of peer training intervention on social interactions between students with ASD and their TD peers. The participants included two second grade students with ASD and one fourth grade student with ASD who were assigned two to three TD peers. Over the course of six months, observations during baseline, intervention and post-intervention were done one to two times per week at random for about 10-15 minutes during lunch, and about 15-20 minutes during recess from 3-6 meters away. The intervention phase lasted about two weeks while peers were completing the training, and the post-intervention stage lasted about 14 weeks after the peers received training.

After baseline data was collected, peers participated in three 30-45 minute training sessions in the school provided by the first or fourth author. During training, peers were provided with a rationale for peer intervention, a discussion of the strengths and weakness of the classmate with ASD, and a guided discussion to provide concrete information and strategies to use during their interactions with the students with ASD. The peers could write or draw pictures as a visual reminder of the strategies. For all phases, the data was collected using a frequency recording system. Initiations by student with ASD and by trained and untrained peers, as well responses by students with ASD and responses by trained and untrained peers were coded and analyzed. No information regarding statistical analysis was provided.

The results of this study indicated that during peer intervention and in post-intervention, initiations by both trained and untrained peers towards the students with ASD increased, and the mean rate of initiations from the students with ASD increased for two of the three participants. Responses from students with ASD and the peer response to an initiation from a student with ASD also increased from baseline to post-intervention.

Overall, the reported findings of this study suggest that PMI can be an effective technique to increase interactions between students with ASD and their TD peers, as responses and initiations from both groups increased. The reported results also suggest that training a small sub-set of TD peers can influence untrained peers, which ultimately improve the social network of students with ASD. Despite these findings, there was little detail was provided on the frequency recording system, and no information was provided regarding methods of statistical analysis. Therefore, this study can only provide equivocal clinical importance and validity regarding PMI as an effective and viable option to increase positive communication outcomes for students with ASD.

Thiemann-Bourque, McGuff & Goldstein (2017) investigated the effects combining PMI with speech generation device (SGD) instruction on communication, reciprocal interactions and engagement between minimally verbal/non-verbal preschool children with ASD and their TD peers. They also investigated if preferred toys and the snack context influenced their levels of engagement. The participants included three preschool children with ASD and one TD peer per child with ASD from the same classroom. All baseline and intervention sessions took place at typical preschool center activities (i.e. floor play, play dough, etc.) and were videotaped. The primary coder collected the data live using 15s interval coding and could review the videotape if necessary. A secondary coder used the videotape to assess coding reliability.

Baseline observations were obtained with no adult prompts other than “sit at the table and play nicely”. Before beginning intervention, the first and second author trained the peers for 30 minutes a day over three days in a separate room, without the children with ASD. During training, the authors broke down *Stay, Play, Talk* into individual sub-steps using pictures and words that matched each skill. The researchers utilized the *Play* steps of “share toys” and “take turns playing”, and taught SGD use as a way to *Talk* with friends. Peers were taught the skills, watched two adults role play the skills, practiced with an adult, received feedback and reinforcement, and reviewed the steps taught that session.

Once PMI began, each child with ASD received 15-18 sessions over the course of 10 weeks. Before starting a session, the research staff would review the social activity, show both the peer and the child with ASD an 8x8 laminated sign of *Stay-Play-Talk*, modelled use of input symbols on the SGD and guided the peer and focus child to engage in two

reciprocal interactions before stepping away to observe. If no interaction took place in 30 s, the adult would prompt the children using a hierarchy of least to most support. After six weeks of intervention, the researchers added a favourite cause and effect toy, and then three to five sessions after that, added the snack time context. The data was analyzed using visual analysis and appropriate statistical measures.

The results indicated improvements in the number of initiations by the children with ASD and their peers, however, the children with ASD had variable performance and tended to require about one adult prompt per minute. The children with ASD also showed more social communication during interactions involving cause and effect toys and snack. In terms of the trained peers, they demonstrated an increase in social communication acts immediately following the training, and an even higher increase during play with the cause and effect toy and at snack time. Tau-U effect size calculations for each separate child with ASD and as a collective group indicated a moderate effect size from baseline to intervention during centers. A large effect size was found for trained peers when analyzed separately and combined from baseline to intervention at centers

Overall, this study showed some evidence that PMI is an effective and viable option to increase positive communication outcomes in children with ASD who use a SGD. The training of peers on a SGD gave the peers and children with ASD a common platform to communicate, however, the children with ASD’s engagement during center time was still variable and required adult prompting. Although communication benefits for the children with ASD were seen during more motivating contexts such as snack time, more research needs to be done to confirm or refute the effectiveness for minimally or non-verbal children with ASD who use a SGD. Therefore, this study has suggestive clinical importance and validity that PMI can be an effective technique to help children with ASD achieve positive communication outcomes.

Randomized Controlled Trial (RCT):

Randomized controlled trials (RCT) involve dividing participants by chance into separate groups to compare different interventions, with one group being the control group (PubMed Health). The randomization means that groups will be similar, and the effects of the treatment received can be compared, because at the time of the trial, it is not known which treatment is best (PubMed Health). Research utilizing an RCT design provides level one evidence according to the experimental decision tree (Archibald 2009). However, RCTs can be expensive

and time consuming, and can come with ethical concerns, especially when the control condition receives no treatment (Bondemark & Ruf, 2015).

Kasari, Rotheram-Fuller, Locke & Gulsrud (2012) investigated if PMI is a more effective social skill intervention than direct intervention provided by an adult for students with ASD. The researchers were also interested in whether friendships and social networks of students with ASD would improve as a result of PMI. A total of 875 participants took part in this study, sixty students with ASD, and 815 TD peers participated in the PEER intervention condition. The students with ASD were randomized to a 2x2 factorial design in which the conditions were inclusion (control condition), PEER (PMI), CHILD (adult directed intervention) or both CHILD and PEER condition.

In the CHILD condition, the student with ASD met a trained interventionist for 20 minutes twice weekly for six weeks during recess or lunch periods. The CHILD condition aimed for the adult teach the student with ASD strategies for social engagement with peers. In the PEER condition, three TD peers from the same classroom as the child with ASD were taught strategies on how to engage with children with social challenges on the playground. For six weeks, peers were trained for 20 minutes twice weekly during lunch or recess, but target children were not identified. Instead, peers were taught how to identify isolated children and were given strategies on how to interact with children who had difficulty making friends.

A social network survey was administered to assess social network salience (SNS) and reciprocity of friendships before the intervention, after the intervention, as well as at follow-up, and to measure teacher perception of skills. To measure playground engagement, a timed interval behaviour coding system was used, where independent blind observers observed the target child for 40 s and coded for 20 s during recess or lunch play periods. Appropriate statistical analysis was used.

When measuring SNS, a significant main effect and an interaction effect on the PEER interventions, with a marginally significant more temporary main effect on the CHILD condition was found. SNS increased for groups whose intervention included a PEER component over groups that did not involve peers. A post-hoc comparison indicated that children who received both CHILD and PEER interventions had higher SNS than children who had received the CHILD intervention alone or no treatment, but the

effect was not significantly higher than those who received PEER only intervention. The same results were found at follow-up. In terms of playground engagement, the PEER condition was statistically significant compared to the CHILD condition at follow-up. The children randomized to the PEER condition had a more rapid decline in solitary engagement on the playground than the children randomized to other conditions.

The post-treatment ANCOVA on the secondary outcome measures regarding friendships (nominations, rejections, reciprocal friendships) revealed that the PEER group had a significant main effect for the PEER condition that was not found for those in the CHILD group. No significant differences were found for nominations, rejections or reciprocal friendships at any point. The teachers also reported more social skill improvements post-treatment from children in the PEER condition.

Overall, this study showed compelling evidence that involving peers in intervention is preferred over adult-directed social communication intervention alone. The children with ASD's social networks increased through the PEER conditions, as the TD peers were taught to identify the students alone on the playground and were given strategies to engage these classmates in natural settings. The teachers of students who participated in the PEER condition noted significant improvement in their social skills post-intervention. Therefore, this study shows compelling clinical importance and validity that PMI is a viable and effective option to increase positive communicative outcomes for students with ASD.

Discussion

This literature review found the results of the selected studies be congruent, with an overall indication that the involvement of peers can result in more positive communication outcomes for individuals with ASD. The seven studies found that PMI resulted in a variety of positive communication outcomes, such as increases in communication acts (Bambara et al. 2016; Kamps et al. 2016); increases in initiations (Owen-DeSchryver, Carr, Cale & Blakeley-Smith 2008; Bambara et al. 2016; Thiemann-Bourque, McGuff & Goldstein 2017), increases in follow-up questions (Bambara et al. 2016), increases in the intervals containing social interactions (Carter et al 2017), increases in the number and length of interactions (Katz & Giolametto 2013) and increases in SNS and playground engagement (Kasari et al. 2012).

In addition, when follow-up or generalization probes were administered, the results of PMI tended to maintain post-intervention (Bambara et al. 2016; Katz & Giolametto 2013; Kasari et al. 2012). Owen-DeSchryver, Carr, Cale & Blakeley-Smith 2008 also suggest that their effects were maintained post-intervention, but with the lack of detail provided in their study, this should be interpreted with some caution.

The congruent results of the selected studies suggest that there is evidence to involve TD peers in intervention for individuals with ASD. The interventions driven by TD peers yielded improvements in social communication, such as increased initiations and the number and length of interactions. No negative results were found, and all administered social validity measures indicated that peers, children with ASD and educators mostly found PMI to be an effective option that was easily implemented. Although one study suggested that PMI might be more effective if supplemented with more adult support, this study also involved the use of a SGD, so this result may not be generalizable to other situations, where PMI could be more effective.

Overall, there are high levels of evidence to support the findings in this critical review, as studies were mostly well-designed multiple-base line studies and a well-designed RCT. Both of these designs provide level one evidence on the experimental design decision tree (Archibald, 2009), and given how highly variable this population is, a predominant use of multiple baseline design is appropriate, as each individual served as their own control.

Limitations

A repeated limitation of the selected studies was small sample size. Since there is a significant amount of variability amongst individuals with ASD, the small sample sizes cannot adequately account for the variation amongst those with the diagnosis of ASD.

A second limitation is that not all of the selected studies utilized generalization probes. Since individuals with ASD have known difficulty generalizing new information and skills to new situations, to be more confident in the results obtained, more rigorous post-intervention maintenance and generalization data collection would be beneficial.

Conclusion

Overall, a wide variety of positive communication outcomes were revealed as a result in involving TD peers in intervention. The studies found that PMI increased communication acts, initiations, and follow-up questions, resulted in more social interactions that occurred more often and for longer periods of time, as well as increased SNS and playground engagement. These findings provide a high level evidence for the use of PMI to address social communication deficits in children with ASD. However, the small sample sizes and lack of consistent generalization and maintenance data collection require the results to be interpreted with some caution.

Clinical Implications

Clinicians working with individuals with ASD should be aware of the benefits of involving TD peers in communication interventions.

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