Critical Review:
Does peer-mediated training of AAC systems improve social communication in children with autism?

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This critical review examined the existing literature to determine whether peer-mediated training of augmentative and alternative communication (AAC) systems improves social communication in children with autism spectrum disorder (ASD). A literature search yielded nine single-subject designs, which were critically evaluated based on level of validity and clinical importance. The evidence ranged from equivocal to compelling. Results showed modest to large improvements in social communication of children with ASD following peer-mediated AAC intervention. Overall, there is emerging evidence to support the use of peer-mediated AAC interventions as a means of improving social communication in children with autism.

Introduction

Children with autism commonly present with deficits in social communication, which is the ability to appropriately use language to interact with others. Twenty-five percent of children with ASD do not acquire functional communication skills, even with ongoing intensive speech therapy (Strasberger & Ferreri, 2014). Use of an AAC system may provide a means by which children with ASD can express themselves and participate in social interactions. Current research strongly supports the use of AAC systems such as speech-generating devices (SGDs) and the Picture Exchange Communication System (PECS) for increasing commenting, requesting, joint engagement, and turn-taking in children with ASD (Thiemann-Bourque, McGuff, & Goldstein, 2017).

Children with ASD also benefit from structured interactions with their typically developing (TD) peers. An inclusive classroom offers an ideal context for these rich communication opportunities (Trembath, Blandin, Togher, & Stancliffe, 2009). As per the 2009 Ontario Equity and Inclusive Education Strategy, children with ASD are now more likely to spend full or part days in a classroom with same-aged peers without disability. However, children who use AAC systems continue to face significant barriers to social interactions with TD peers, such as a lack of willingness or ability to independently seek out social interactions, inconsistent implementation of the AAC device by the educational team, and peers' uncertainty on how to interact with AAC users. These barriers are further exacerbated in children with autism due to their core deficit in social communication (Therrien, 2016).

Current research suggests that typically developing peers can be trained to initiate, respond to, and reinforce communication attempts of children with ASD (Cannella-Malone, Fant, & Tullis, 2010). Peer-mediated intervention (PMI) allows for increased social interaction and natural feedback from peers. The resulting communication successes may lead to greater desire in children with ASD to interact with their TD peers (Theimann-Bourque et al., 2017). While AAC and PMI are two separate evidence-based interventions, it is the goal of this critical analysis to determine whether combining these two approaches improves social communication in children with ASD.

Objectives

The objective of this review is to critically evaluate the existing literature to determine whether peer-mediated training of AAC systems improves social communication in children with autism.

Methods

Search Strategy

Online databases including Western Libraries, PubMed, Medline, Psych Info, and Google Scholar were searched using the following terms: (AAC) OR (alternative and augmentative communication) OR (SGD) OR (speech generating device) OR (PECS) OR (picture exchange*) AND (peer*) AND (ASD) OR (autis*) AND (social communication). Reference lists of included studies were used to obtain additional relevant articles.

Selection Criteria

Included studies were required to (a) have at least one child participant with ASD; (b) use an AAC device in intervention; (c) include peer-mediated intervention; and (d) measure changes in social communication as a result of intervention.

Data Collection

The literature search yielded nine articles that met the selection criteria, all of which used a single-subject design. Of these single-subject studies, six were multiple baseline design, two were multiple probe design, and one was A-B design.

Results

Multiple baseline designs involve measuring data for multiple participants, behaviours, or settings before and after intervention is administered over a varying temporal schedule. Intervention is introduced after behavioural stability is demonstrated during a baseline phase. Changes in behaviour that occur only when the intervention is administered can be directly attributed to that intervention. This design accounts for heterogeneity in the ASD population as each participant serves as his or her own control. Limitations include susceptibility to experimenter bias and small sample sizes.

Cannella-Malone, Fant, and Tullis (2010) investigated the effectiveness of a peer-mediated PECS intervention for increasing the social communication of two school-aged females with ASD. Participants were provided with a communication book with a Velcro strip across the front that displayed messages created with the PECS icons contained within the book. Both participants had previously used PECS, but not as their primary form of communication.

Two TD peers were trained how to use PECS respond to greetings and requests made by the children with ASD. Training strategies included role playing, prompting, and positive reinforcement. The peers demonstrated their ability to respond in one 15 minute session before providing the social skills intervention to the children with ASD during small group activities either at home or in a corner of the classroom. The children with ASD were given 15 seconds to greet, respond, or request before their peer prompted using a least-to-most hierarchy. Stability of baseline data was verified before proceeding with the intervention phase.

Data for the frequency and modality with which each child correctly used greetings, requests, and responses to communicate with their peer were collected during 3 to 13 baseline sessions, 4 to 14 intervention sessions, and one maintenance session (15 minutes per session). Maintenance data were collected at one month post-intervention for one participant. Social validity measures were completed by teachers and parents. Generalization measures were not included.

Statistical analyses were not employed. Visual analysis of results indicated that all children with ASD showed modest increases in their social interaction using PECS with their peer, and that other modes of communication (e.g., spoken, sign language) were used in addition to PECS when socializing. Maintenance data indicated that one participant continued to respond appropriately to peers one month following the intervention.

Strengths of this study include sufficient detail regarding the participant inclusion criteria and the procedure to allow for replication of the study, and well-defined variables and intervention conditions with examples of the observed behaviours. A limitation of this study was that samples of social interaction by typically developing peers were not collected, so comparisons with this population cannot be made.

Overall, this study provides suggestive evidence that the "PECS with Peers" program improves social communication in children with ASD.

Chung and Douglas (2015) evaluated the impact of paraprofessional facilitation of a peer intervention protocol on social communication in three school-aged males with autism who use SGDs. Six typically developing peers also participated in the study.

The intervention protocol consisted of seating the focus students close to peer partners, programming social messages into the SGDs, and a 35 to 50 minute paraprofessional training session. This study was unique because paraprofessionals, rather than peers, received training on how to identify opportunities for interactions amongst the children with ASD and their peers and introduced a self-monitoring sheet for them to record their own prompting behaviours.

Frequency of reciprocal interactions (initiations or responses), modality of communication, and physical proximity to both their peer and SGD was measured for each participant during 4 to 15 baseline sessions and 2 to 12 intervention sessions. Intensity of intervention was not otherwise specified. Children with ASD and their peers engaged in art or library activities in an inclusive classroom setting. Social validity was measured through student interviews and staff questionnaires. Generalization and maintenance measures were not included.

A range of descriptive statistics was provided; however, no further statistical analyses were conducted. Visual analysis of results yielded increases in reciprocal interaction between the children with ASD and their peers, use of SGD and gestures, and physical proximity to both peers and SGD, which extended to interactions with others in the classroom.

Strengths of this study included multiple efforts to ensure treatment fidelity, and observers received further training to review and clarify definitions of variables for which interobserver agreement fell below 80%. A limitation was that there were issues with attrition in that data were missing for one participant who was added after the first intervention point.

Overall, this study provides compelling evidence that paraprofessional facilitation of a peer intervention protocol is an effective method for promoting social communication in students with autism who use SGDs.

Kravits, Kamps, Kemmerer, and Potucek (2002) compared the effectiveness of using PECS and PECS + social intervention to improve the spontaneous communication and social interaction skills across home and school environments for a six-year-old female with autism. The description of the peers omitted key details such as the number, how they were selected, whether the same peers participated in both school settings, and the role of peers in the PECS intervention condition.

Peers received four training sessions of an unspecified duration where they learned strategies such as turn taking, sharing, asking and answering questions, and extending play interactions while using PECS. Intervention consisted of implementing PECS phases I-III during teaching periods and free play. In the PECS + social intervention condition, peers applied the strategies they learned in the training sessions.

Outcomes were measured during two baseline conditions (with and without PECS present; total = 34 weeks) and two intervention conditions (with and without social intervention). Dependent variables included frequency of spontaneous language (10 minute sample periods) and duration and frequency of peer-mediated social interactions (5 minute sample periods) in the participant's home and during journal and centre activities at school. Measures of generalization, maintenance, or social validity were not included.

Visual and statistical analyses of results showed that the total frequency of spontaneous language (requests, comments, expansions) increased during both the home and school treatment conditions when PECS was used by the mother, teachers, and peers. The duration of peer interactions increased during journal time only, and the frequency of peer interactions increased during journal time and centre activities. Changes in peer interaction in the home setting were limited.

Strengths of this study included reinforcement assessment conducted prior to baseline to ensure that the materials engaging, intervention included a naturalistic component of free play, and interobserver agreement for frequency of spontaneous language and social interaction were strong. However, there were significant limitations in the details provided about peer training and length of intervention that makes this study difficult to replicate and reduces the validity of the conclusions.

Overall, the study provides equivocal evidence that peer-mediated PECS intervention improves social communication in children with autism.

Strasberger and Ferreri (2014) evaluated the efficacy of using the peer-assisted communication application (PACA) program to improve two-step responses in four school-aged males with autism using iPod-based SGDs.

The children with autism and five typically developing peers received training on how to communicate with the iPod-based SGD, as neither group had previous experience with the device. Peers received one additional training session on the responsibilities of the communication partner during the PACA phases (which are similar to PECS phases). Intensity of training was not otherwise specified. Peer participants were required to complete the training evaluation with 100% accuracy in order to proceed with the study. Intervention took place in a quiet room while the children with autism and their peers engaged in play-based activities.

Outcome measures were completed during 3 to 9 baseline sessions and 11 to 16 intervention sessions (with 10 opportunities to respond per session). Dependent variables included the number of prompted and unprompted two-step target sequences and question responses. An unspecified number of generalization probes occurred during play-based activities within an inclusive classroom. Maintenance data were collected for 2/4 children with ASD at one month follow-up over 1 to 3 sessions. Social validity questionnaires were completed by teachers.

Statistical analyses were not employed. Visual analysis of results revealed that 3/4 children demonstrated an increase in two-step responses, and 2/4 children demonstrated generalization across settings. Maintenance data yielded lasting intervention effects on communication skills after one month for 2/2 participants.

Strengths of this study include clearly and operationally defined participant and peer inclusion criteria, variables, conditions, and response types; inclusion of a preference assessment; and strong interobserver agreement and procedural fidelity. A limitation is that the researchers did not control for sequential effects since baseline measures were not conducted before each phase. Furthermore, external validity remains questionable as the researchers did not accept socially appropriate responses that were produced without using the iPod-based SGD (e.g., gestures, vocalizations, speech), and the tasks (e.g., stating name or indicting desired item) have restricted social value in naturalistic contexts.

Overall, this study provides somewhat suggestive evidence that peer-mediated intervention in conjunction with iPod-based SGD use improves social communication in children with autism.

Trembath, Balandin, Togher, and Stancliffe (2009) compared the changes in social communication for three non-verbal preschool children with autism after receiving peer-mediated naturalistic intervention, with and without a SGD. None of the children had previous experience with the SGDs, which were programmed with eight spoken social words.

During the training sessions, two illustrated stories were used to explain the baseline and intervention procedures to six typically developing peers. Training occurred during two 20-minute intervention sessions on consecutive days, wherein peers learned to implement the naturalistic teaching procedure and model SGD use during play interactions. During the intervention phase, peer mediators required consistent prompting from adults in order to effectively model the use of the SGD.

Outcomes were measured by determining the number of communicative behaviours produced by the children with autism that elicited a verbal or non-verbal peer response. Data were collected in 3 to 11 baseline sessions and 2 to 13 intervention sessions at the preschool in 10-minute intervals of child-selected play activities. One to three generalization probes were conducted at routine snack time. Maintenance and social validity measures were not included.

Visual and statistical analyses of results revealed that participants showed greater social communication in the peer-mediated naturalistic teaching with an SGD condition as compared to peer-mediated naturalistic teaching alone. These improvements were generalized to a snack condition.

Strengths of this study include random assignment of peers to the with-SGD and without-SGD conditions, programming speech generating devices with vocabulary items which could serve a range of communicative functions, and strong interobserver and intraobserver agreement. Limitations included lack of participant and peer inclusion criteria, participant drop-out, and the possibility of carryover effects between the intervention and generalization conditions. Furthermore, the researchers commented that caution should be taken when generalizing the results to other children with autism, as the participants in this study varied in their individual learning characteristics, which may have influenced the effectiveness of the intervention.

Overall, this study provides compelling evidence that peer-mediated teaching with an SGD has a positive impact on social communication in children with ASD.

Trottier, Kamp, and Mirenda (2011) examined whether the social communication skills of two 11-year-old males with ASD improved after receiving peer-mediated intervention to teach SGD use. The SGDs, which the students with autism were already using to request but not to interact socially, were programmed with 15 to 17 social spoken messages.

Six typically-developing peers were trained in one 15-minute session to wait three to five seconds before providing a verbal or gestural prompt during the target students' turns in a game in order to encourage spontaneous SGD use. Study phases included baseline (a minimum of 3 sessions, 7 to 14 minutes long), and two intervention phases (for each: nine 13-minute sessions, two to four times per week), all of which took place while playing games in a classroom. Trainer prompts and feedback were provided during intervention Phase 1 but not 2.

The primary dependent variable was the number of communicative acts produced by the students with ASD, which were coded as prompted vs. spontaneous, and appropriate vs. inappropriate. The researchers also measured the number of prompts each peer received from the trainer. Appropriate social validity measures were completed by teachers. Generalization and maintenance measures were not included.

Statistical analyses were not employed. Visual analysis of results suggested that all students with ASD showed fair to high levels of improvement in their prompted and spontaneous social communication from baseline to intervention, and that peers successfully acquired the skills needed to support SGD use by students with ASD in social game routines.

Strengths of this study included detailed information on the participants and procedures for replication; an evaluation of modality, spontaneity, and appropriateness of communicative acts; and documentation of frequency of trainer-to-peer and peer-to-student with ASD prompts to provide a more comprehensive understanding of the peer training process. A potential limitation is questionable ecological validity, as the intervention context was highly structured.

Overall, this study provides compelling evidence that peers can be trained to support SGD use in students with ASD, and that peer-mediated SGD training improves social communication in students with ASD.

Multiple probe designs, which are a variation of multiple baseline designs, involve intermittent measures or "probes" during baseline rather than a continuous collection of data. In addition to participants serving as their own controls, a multiple probe design is appropriate for this research because it is less time consuming, thus accounting for the time constraints of the school year. Limitations include small sample sizes and potential experimenter bias.

Therrien (2016) assessed the efficacy of a peer interaction intervention for improving social communication in five preschool males with a diagnosis or characteristics of ASD. All children with ASD used low-technology AAC devices at school only. The iPad AAC devices used in this study were programmed with visual scene displays (VSDs) for each page of four selected storybooks. The children touched functional "hot spots" within each VSD to ask or answer a question, call attention to part of the picture, or relate the picture to their experience.

Six typically developing peers and the children with ASD received one training session together with 10 turn-taking opportunities. Modeling, prompting, and feedback was used to support the peers and children with ASD in identifying opportunities for communicative turn-taking using the iPad and providing enough time for their partner to take a turn. Aside from initial instruction to share a storybook, the participants did not receive any prompting outside of the training.

Frequency of symbolic communicative turns for both children with ASD and their peers was measured during a 10-minute storybook sharing session using the iPad. Baseline and intervention sessions took place one to three times per week across three months, with no more than one session per day, in a quiet room within an early childcare centre. Each phase included two generalization probes that were conducted within a classroom and used different storybooks. Two dyads were excluded from the generalization measures. Social validity questionnaires were included. Maintenance was not assessed.

Visual and statistical analyses of results yielded that 4/5 participants increased turn-taking with peers in the absence of adult support. The fifth participant showed increased turn taking during the training sessions but not the independent sessions with peers. Average joint attention improved for all dyads.

Strengths of this study are that participant and peer inclusion criteria, experimental variables, intervention conditions, and intervention effects were defined in extensive detail; a thorough rationale for selection of research design; and strong interobserver reliability and procedural fidelity. A limitation was that the primary coder was not blinded to the goals of the study.

Overall, this study provides compelling evidence that peer-mediated AAC intervention improves social communication in children with ASD.

Thiemann-Bourque, McGuff, and Goldstein (2017) investigated whether combining SGD instruction and peer-mediated teaching approaches improved the social communication skills of three minimally verbal or non-verbal preschool children with severe ASD. None of the children had previous experience with a SGD, and one of the three had been recently introduced to PECS. The SGDs were programmed with recordings of four spoken single- or two-word phrases for requesting objects and two social comments.

Peer training consisted of three 30-minute sessions wherein three typically developing peers received an illustrated book to describe the Stay-Play-Talk method, role playing, feedback, and reinforcement. The baseline and intervention conditions were naturalistic as it took place in the classroom during centre activities in the presence of other students and adults not involved in the study. For five minutes prior to each intervention session, the trainer reviewed the Stay-Play-Talk protocol and guided each peer through two successful reciprocal interactions before moving aside to observe. Children were prompted in a least-to-most hierarchy if no communication was noted after 30 seconds.

The following outcomes were measured in six-minute intervals during 5 to 7 baseline sessions over 19 to 36 days and 18 intervention sessions over 10 weeks: rate of communication with peers (initiations and responses, mode, function), reciprocity (number of reciprocal communication exchanges), and engagement (physical proximity and orientation to peers). Generalization was measured following the introduction of cause-and-effect toys after six weeks of intervention and during snack time during the final two weeks of intervention. In both cases, the symbols and vocabulary of the SGD were switched according to the new communicative context. Generalization contexts were not included in the baseline phase and not staggered in accordance with multiple probe design. Maintenance and social validity measures were not included.

Visual and statistical analyses revealed that the number of communication acts, reciprocity, and engagement increased moderately for all children in the snack condition, two children in the cause-effect toys condition, and one child in the centre-activities condition. The majority of these communicative acts

were requests made with the SGD. Larger effects on communication were noted for the peers.

Strengths of this study include a naturalistic procedure, detailed participant and peer inclusion criteria, operationally defined variables, appropriate visual analyses and calculation of effect size, and strong interobserver reliability and procedural fidelity. A limitation of this study is inconsistent attendance for one of the participants following the first intervention point.

Overall, this study provides suggestive evidence that a peer-mediated approach to training SGDs results in improved communication, reciprocity, and engagement for children with autism.

A-B designs involve a baseline ("A") phase and an intervention ("B") phase. If there is change from phase A to B, then the intervention is proposed to have an effect. An A-B design is appropriate for this research because it is less time consuming than a multiple baseline design, and participants serve as their own control. A limitation to this design is the inability to determine whether changes in the dependent variables are due to confounding factors or an intervention effect.

Thiemann-Bourque, Brady, McGuff, Stump, and Naylor (2016) evaluated the effects of peer-mediated PECS intervention on social communication for four minimally verbal preschool children with autism. All children had been using PECS for six months to one year prior to the study with adult partners, which consisted of a standard set of core symbols plus an individualized set of symbols.

Seven TD peers participated in 30 to 45-minute training sessions over four days based on the Stay-Play-Talk protocol, using an illustrated book to describe each step, role playing of each skill, feedback, reinforcement, and a review of the steps taught. During baseline and intervention, a six minute interval was coded during each 10- to 15-minute session, wherein the children with autism and their peers engaged in preschool routines such as art, sensory and fine motor activities, activity centres, and snack time. Trainers provided regular praise to peers for following the Stay-Play-Talk protocol and to the children with autism for communication attempts. Peers were prompted in a least-to-most hierarchy if no interactions were noted after 30 seconds.

Total frequency of peer-directed communication, mode (e.g., speech, PECS, gestures), function (gain attention, comment, request, share), and level of engagement were measured during five to seven baseline sessions over eight weeks and nine to 25 intervention sessions over nine to 16 weeks. Generalization measures to a cause-and-effect toy condition were collected for 3/4 children with autism. Maintenance and social validity measures were not included.

Visual and statistical analyses of the results showed a large intervention effect of increased peer-directed communication and levels of engagement for all children. Two of four children increased their commenting and sharing. A generalization effect was noted for 1/3 peers. Although there were significant changes to all participants' overall communication repertoire, this change can only be accounted for by increased requesting; intervention had minimal effects on other communicative functions.

Strengths of this study include clearly defined participant inclusion criteria and experimental variables, baseline and intervention activities embedded in naturalistic play-based routines, good to strong interobserver reliability, and strong procedural fidelity. A limitation is that results of this study may have been influenced by attrition, as one participant dropped out of the study before completing intervention training.

Overall, this study provides suggestive evidence that peer-mediated PECS intervention increases social communication, specifically requesting to peers, in children with autism.

Discussion

All nine articles examined in the critical review showed modest to large improvements in social communication for children with ASD following peer-mediated AAC training. Other benefits from PMI + AAC training included increases in communication using non-AAC modalities (Cannella-Malone et al., 2010; Chung & Douglas, 2015), turn taking (Chung & Douglas, 2015; Therrien, 2016; Thiemann-Bourque et al., 2017), proximity to peers (Chung & Douglas, 2015), duration and frequency of social interactions (Kravitz et al., 2002), joint attention (Strasberger & Ferreri, 2014; Therrien, 2016), and engagement (Thiemann-Bourque et al., 2016; Thiemann-Bourque et al., 2017).

Investing modest amounts of time into the training sessions have shown to be highly beneficial in improving peers' ability to identify opportunities for social communication and their comfort level with modeling and prompting the children with ASD to use the AAC system; this, in turn, supported the social communication of the children with ASD. There was a wide range in the content, strategies, and duration of each training session, and it remains unclear as to which factors in the training session lead to the most positive

outcomes in intervention. Strategies that were naturalistic, flexible, and relevant in a variety of conditions were more likely to be effective (Trembath et al., 2009). Cannella-Malone et al. (2010) discovered that the skill of responding was learned by the children with ASD from observing models from peers, who would respond when a child with ASD made a request. Determining which communicative skills can be acquired through observational learning could make the peer training sessions more efficient.

Naturalistic intervention settings increase the likelihood of incidental learning and generalization of skills, and improve ecological validity of the results. Only five studies embedded intervention within a naturalistic context such as an inclusive preschool classroom. Thiemann-Bourque et al. (2017) found that children with ASD showed substantial increases in social communication in a condition that included cause-and-effect toys because the children had higher levels of engagement and motivation to use their AAC device to obtain a strong, immediate reinforcer. Strasberger and Ferreri (2014) and Therrien (2016) used commercially available, inexpensive technology (i.e., iPod, iPad) as an AAC system, which has the added benefit of being more familiar with other children, thus increasing its naturalness. Conversely, Trembath et al., (2009) found that the ability of peers to encourage, recognize, and respond to the communicative behaviours of children with ASD was hindered by the multitude of distractions within the classroom setting. With the added noise, the authors also saw an increase in self-stimulatory and self-harming behaviours in one child with autism, which made it challenging for peers to engage with him. Therefore, while including naturalistic elements within intervention is paramount, it is important to find a balance to ensure that the children with ASD and their peers are able to stay focused and comfortable.

Generalization measures were included in four studies (Strasberger & Ferreri, 2014; Therrien, 2016; Thiemann-Bourque et al., 2017; Trembath et al., 2009). Two studies measured generalization from a quiet room to a naturalistic setting, and the other two studies measured generalization between two different naturalistic settings. The majority of children with ASD demonstrated at least slight increases in social communication during the intervention generalization probes compared to baseline generalization probes, which provides preliminary evidence for the potential benefits of incorporating novel settings into peer-mediated AAC training. However, there are several limitations to consider. First, only a small number of generalization probes were conducted in each study due to time constraints. Second, baseline measures were not collected for all behaviours examined in the generalization probes. Finally, given the marked social communication deficits in children with ASD, a longer period of intervention may have been needed before results could generalize to other settings.

Maintenance data provides valuable insights into how stable the intervention effects are over an extended period of time. A significant limitation of seven out of nine studies was that they did not include maintenance measures. Strasberger and Ferreri (2014) and Canella-Malone et al. (2010) both found a wide range in the durability of intervention effects during one maintenance probe at four weeks post-intervention. Unless these interventions are shown to produce maintainable changes that generalize to non-experimental contexts, the positive changes to social communication exhibited in the presented studies will always rely on constant access to trained peers in order make a sustained difference in the lives of children with ASD. Several studies suggested training all the peers in a classroom to ensure constant access to trained peers. This intervention could be easily implemented by teachers and paraprofessionals, as the social interaction skills addressed during training are already common components of preschool and early elementary school curriculums.

Five studies included social validity measures, which typically consisted of interviews or questionnaires completed by teachers, parents, paraprofessionals, SLPs, peer participants, and/or the children with ASD. The vast majority of adult respondents reported the interventions to be appropriate, effective, important, a worthwhile time commitment, and easy to implement. Anecdotally, several staff members and parents observed meaningful changes in social communication for children with autism and typically developing peers outside of the experimental setting. The peers and children with autism consistently reported the intervention to be enjoyable. Some suggestions to improve intervention across the studies included adding a training component for classroom teachers, using more naturalistic methods, applying this intervention to turn-taking, omitting the self-monitoring sheet, and including quantitative social validity measures. Although interviews and questionnaires are considered to be a weaker research design, considering the perspective of those directly and indirectly influenced by the intervention strengthens the social importance of this research.

Future research may include:

- Randomized control trials comparing the effects of (a) peer-mediated training of AAC systems, (b) AAC systems alone, (c) peer-mediated intervention

alone, (d) no intervention on social communication in children with autism
- Larger sample sizes
- Further investigation into generalization and maintenance of intervention effects
- A clear outline of the peer training and intervention intensity

Clinical Implications

Baseline measures across the studies consistently demonstrated that peer interaction is unlikely to occur on a regular basis without intervention. This was in part due to the social communication deficits of the children with ASD. TD peers rarely recognized the potentially communicative behaviours of the children with ASD nor did they provide meaningful responses prior to receiving training (Trembath et al., 2009). Peer mediated training of AAC systems has shown to be a time efficient intervention protocol that is easy to incorporate into a variety of preschool and elementary classroom activities. For these reasons, peer mediated training of AAC systems may be appropriate to implement with collaboration between the teachers and speech-language pathologist, with caution taken in consideration of the previously discussed limitations. Although the presented studies varied in their level of validity and clinical importance, overall, there is emerging evidence to support that peer-mediated training of AAC systems improves social communication in children with autism.

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