Critical Review:
Is the use of augmentative and alternative communication (AAC) devices associated with positive behavioural and social performance outcomes for students with complex communication needs in the classroom?

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

This critical review examines the association between augmentative and alternative communication (AAC) and social and behavioural performance outcomes in the classroom for students with complex communication needs. Four articles were included in this review. Research designs included two qualitative studies, one single group experimental design, and one multiple baseline single-subject design. Overall, the evidence gathered from this review suggests that AAC is effective in improving social and behavioural performance when paired with adequate facilitator training. Recommendations for clinical practice and future research are discussed.

Introduction

While the majority of children develop speech, language, and social skills rapidly in the early years, children with complex communication needs often encounter limited interactions with communication partners, limited environmental access, and a reduced number of communication opportunities (Light, 1997). Therefore, it is important to provide these individuals with a means of communication, such as augmentative and alternative communication (AAC). According to ASHA, AAC refers to all modalities of communication, separate from oral speech, that are used to express oneself (American Speech-Language-Hearing Association [ASHA], 2016). This involves symbols, aids, strategies, and techniques to enhance communication skills. Symbols can include signs, gestures, facial expressions, real objects, and pictures. Individuals of all ages, backgrounds, and socioeconomic groups who require assistance to meet communication needs can rely on AAC (Beukelman & Mirenda, 2005).

For the purpose of this critical review, the definition of "complex communication needs" refers to individuals with significant speech, language, and/or cognitive impairments that result from physical, sensory, and environmental causes. These impairments restrict the ability to communicate and participate in all aspects of life, including education, employment, family, and community (Beukelman & Mirenda, 2005). This places these individuals at a disadvantage in the classroom, so it is imperative that support is provided to help them achieve success at school.

Social performance, including the quality of peer interactions, is a significant factor contributing to children's psychosocial adjustment (Roff, Sells, & Golden, 1972). In addition, peer acceptance during the elementary school years strongly predicts later emotional adjustment (Cowen, Pederson, Babijian, Izzo, & Trost, 1973). Research has stated that problem behaviours can hinder not only a child's learning progress, but also the development of social relationships with peers (Hetzroni, 2003). These negative behaviours can be directed towards objects, other people, or oneself (Reichle & Wacker, 1993). Therefore, it is important to investigate ways to promote positive social and behavioural performance outcomes for children with complex communication needs in the classroom.

Objectives

The primary objective of this paper is to review and critically evaluate the existing literature regarding the use of AAC to improve social and behavioural performance outcomes in the classroom for children with complex communication needs.

Methods

Search Strategy

A variety of computerized databases were used: Psych Info, PubMed, Scholars Portal, and Scopus. Keywords used for the database search were: (children OR child OR pediatric) AND (complex communication needs OR high needs OR special needs OR disability) AND (AAC OR augmentative and alternative communication) AND (social) AND (behaviour) AND (classroom OR school). Reference lists of previously searched articles were used to obtain additional related studies. The search was limited to articles written in English.

Selection Criteria

The following criteria were used to identify studies for inclusion: students 21 years of age and younger, have complex communication needs, and use AAC devices in the classroom. The age of 21 was chosen given that students with disabilities can attend high school until that age.

Data Collection

Based on the search strategy used, four studies were identified, which satisfied all inclusion criteria. This included two qualitative research designs, one single group experimental design, and one multiple baseline single-subject design.

Results

Qualitative Research

Although qualitative research is considered a lower level of evidence, it is appropriate when the goal of the study is to characterize human experience naturally and to generate hypotheses regarding human behaviour. Therefore, it is an appropriate research method when considering the naturally occurring social and behavioural performance of children using AAC in the classroom.

Chung, Carter, & Sisco (2012) observed naturally occurring social interactions between students with autism or intellectual disability who used AAC and their typically developing peers or adults in general education classrooms. Sixteen students (ages 10 to 14 years old) were recruited from schools in one county within a midwestern state. Direct observations occurred over 12 weeks in general education classrooms. Each student was observed four times for a class period, with each observation lasting an average of 47.9 minutes. The observers included two doctoral students and one special education faculty member.

The results indicated that social interactions occurred two-thirds of the time. However, the majority of interactions occurred with adults as opposed to peers. It is important to note that the authors found a difference in communicative functions occurring with typical peers and adults. During interactions initiated by students with disabilities to their peers, the most common communicative functions were developing social closeness and transferring information. When initiated with adults, expressing wants and needs was the most common communicative function, followed by developing social closeness. Interactions initiated by adults or typically developing peers were most often to provide comments and instructions.

The recruitment and inclusion strategies for participants were described in detail. Chung et al. (2012) provided a clear definition of "social interaction" and clearly reported how data was collected. Furthermore, the observers were trained for three to four weeks prior to the study using videos, discussions, readings, and practice in actual classrooms and more than one analyst was used, which increases the credibility of the findings.

While one can hypothesize that direct observation was selected as the method in order to maintain natural interactions, the authors did not explicitly state their rationale. In addition, student observations occurred in only one of each of the students' general education classes. Communicative functions and interactions can vary across contexts. As a result, this study provides suggestive evidence regarding the effectiveness of AAC on social interactions in the classroom, but should be considered with caution until observations take place in a variety of settings to provide more accurate conclusions.

Carter (2003) evaluated the communicative spontaneity of 23 children (ages 7 to 16) with severe and multiple disabilities using AAC in the classroom. Diagnoses included cerebral palsy and epilepsy, with some children having additional hearing and visual impairments. Classroom teachers completed questionnaires in order to provide information about each child's primary and supplementary modes of communication and detailed explanations of their expressive AAC systems. Upon arrival at school, a research assistant videotaped each student until two hours of classroom activities were observed. Observations involved individual and group work, morning snack, free time on the playground, and transitions between activities. Two observers were used – the author and a research assistant with a speech pathology degree – and they independently observed and coded the videotapes.

Similar to the findings of Chung et al. (2012), the majority (98%) of communicative acts occurred with adults rather than peers. While non-symbolic and speech communication were relatively spontaneous, symbolic AAC systems required prompting. With regards to pragmatic function, 99% of all communication involved requesting, offering, and rejecting/protesting. Overall, the results suggest that AAC is associated with limited peer interaction and it does not appear to improve social performance relating to spontaneity in the classroom.

In-depth descriptions of participant selection, data collection, and analysis were provided for the

majority of measures. However, the author did not report questionnaire details, which makes it difficult to replicate by other researchers and it raises questions about the content included on the questionnaire. Prior to the start of the study, observers received at least twelve hours of training for data coding, until 80% reliability was obtained on all variables, which increases credibility of findings. Interobserver reliability was obtained for identifying and coding communicative acts and multiple analysts were used for findings, which increases the credibility of research findings.

Contrary to the previous study (Chung et al., 2012), Carter (2003) included observation of a variety of activities, which provides more reliable data concerning social interactions. It is noteworthy to mention that the children attended a special school for severe and multiple disabilities, which means there was no access to typical peers for interactions. This could contribute to the limited peer interactions observed in this study. Considering the strengths and limitations, this study provides somewhat suggestive evidence regarding the effectiveness of AAC on improving social interaction in the classroom. These results should be considered cautiously since all of the children required AAC when interacting with others.

Single Group Experimental Design

The use of a single group design involves pre-test and post-test measures, and is therefore considered to be a moderate level of evidence. Baseline measures are determined and then treatment is applied to a group of subjects and measured again. Since only one group is used, the design does not allow for control or comparison groups. However, this is an appropriate research method for illustrating behaviour improvements after implementing AAC.

Hetzroni (2003) explored the effectiveness of implementing AAC as a school-wide positive behaviour support plan in order to enrich communicative behaviours and reduce problem behaviours of 67 children (ages 6 to 21) with intellectual disabilities. Diagnoses included developmental disability, Down syndrome, autism, cerebral palsy, Fragile-X syndrome, and cri-du-chat syndrome. A team approach was used for staff to determine classroom schedules and programs for the students. All staff members received AAC training from two speech-language pathologists (SLPs) and implemented AAC strategies for all educational goals, along with introducing symbols into every class activity. The SLPs followed up with the staff throughout the year to assist with problem solving and to act as role models in the classrooms. Methods of communication and problem behaviours were reported pre- and post-intervention (at the beginning of the school year and at the end) using the same communication and behavioural inventory completed for each student by the classroom staff. Two independent coders, blind to the research purposes but trained to use the coding form, collected the data from the inventories. Descriptive statistics were used to assess the difference in responses from the beginning to the end of the school year.

The author found that as students' communication skills increased by the end of the school year, problem behaviours significantly decreased and were replaced with more appropriate behaviours. This demonstrates that AAC can help improve negative behaviour in the classroom.

Detailed descriptions of participant demographics (gender, age, diagnosis, and severity level), selection criteria, and research procedures were reported. A wide range of ages was included, considering students from kindergarten to high school. A copy of the behavioural inventory was included in the appendix, which allows other researchers to replicate the study. Including an adequate sample size, a wide range of ages, and students of both genders increases the likelihood of generalization of these findings.

These positive results noted with the implementation of AAC are contrary to the findings of other studies (Carter, 2003; Chung et al., 2012). It is unknown whether the results are due to the staff training or the fact that there was a team approach involving the teachers, SLPs, music and art therapists, physiotherapists, occupational therapists, home economics and agriculture teachers, the computer teacher, and the school counsellor. It is also possible that AAC is associated with more positive results for behavioural performance, as opposed to social performance. Considering the strengths and limitations of this study, it provides suggestive evidence regarding the success of implementing AAC to reduce problem behaviour.

Multiple Baseline Single-Subject Design

Since single-subject research designs involve studying participant(s) while systematically applying or suspending treatment conditions, they are a moderate level of evidence. This design allows for the participant(s) to act as their own controls. In addition, it illustrates individual differences and treatment effectiveness. Multiple baseline designs allow results to be noted across participants and behaviours. This is an appropriate research method

when investigating interactions between typically developing peers and students with complex communication needs using AAC. Not only does it demonstrate the effectiveness of treatment, it allows for multiple participants to be included.

Causton-Theoharis & Malmgren (2005) explored the success of a training program that taught paraprofessionals how to facilitate interactions between students with autism or cerebral palsy and their typically developing peers. Participants included four pairs of paraprofessionals and elementary students (ages 6 to 11). Data regarding student interactions were collected using the Peer Interaction and Paraprofessional Facilitative Behaviour Observation Instrument (PIOI). Data collection was staggered for each paraprofessional/student pair. Each pair was observed over a nine-week period – five weeks of data collection and a four-week suspension of data collection – followed by two maintenance probes. Individual observations consisted of ten-minute intervals during academic classes. In order to determine the current frequency of peer interactions, baseline data were collected for a minimum of three days or until stable baselines were achieved. Post-intervention data was collected until consistent data trends occurred.

The results indicated that the frequency of interaction increased between students and their peers from baseline to post-intervention, and remained relatively consistent at the time maintenance data was collected.

A clear rationale was provided for school and student recruitment, along with descriptions of each child's communication skills at the time of the study. Each of the paraprofessionals received a one-on-one four-hour training session and two observers were used simultaneously, which increases the reliability of the findings. The detailed explanations of definitions, participants, paraprofessional training, intervention, data collection, design, and results permits future researchers and clinicians to easily replicate the study. However, it is important to note that all participants were males, which could restrict generalization of results to females with complex communication needs.

One limitation to the study is that the authors mentioned that prior to the study, one of the participants was known to hit and scream at his paraprofessional when he was upset. There was no further mention of his behaviour during or post-intervention. It would have been valuable for the authors to discuss whether or not the intervention showed a change in his problem behaviour in addition to his social interactions. In addition, many of the facilitative techniques implemented in the study incorporated AAC, such as assistive devices, communication cards, selected American Sign Language signs, and interactive technology devices. However, the study did not investigate which of the techniques proved to be most beneficial for students with complex communication needs. It is unknown whether social interactions were improved due to AAC techniques, other facilitative techniques (e.g. partnering the target student with peers, redirecting verbal communication about the target student directly to the student), or a combination of AAC and other techniques. Consequently, this study provides suggestive evidence regarding the effectiveness of improving social interactions with peers for students with complex communication needs when combined with facilitative techniques.

Discussion

This critical review examines the effectiveness of AAC in improving social and behavioural performance outcomes for students with complex communication needs. Two of the four studies reported limited peer interactions between children requiring AAC and typically developing peers. The other two studies found improvements in social and behavioural performance when caregivers received training to facilitate the use of AAC. One study found that incorporating AAC into daily school activities can increase communication skills and decrease negative behaviours in the classroom, when paired with staff training. The other study reported an increase in the number of peer interactions associated with facilitator training.

All of the studies provided a rich description of participants and inclusion criteria. However, it is important to acknowledge some of the methodological limitations of the four studies analyzed. All four studies used small sample sizes and included more male subjects than females. Another challenge is that the research included in this critical review incorporated a combination of studies conducted with students in general education classes and specialized classes for students with disabilities. Furthermore, none of the authors demonstrated reflexivity. The possible presence of their own biases was not acknowledged. This is particularly important when considering qualitative research. Together, these limitations restrict the transferability of findings. Overall, the studies suggest that AAC can improve social and behavioural performance

outcomes in the classroom when paired with caregiver training.

Conclusion

In conclusion, current literature suggests that the use of AAC on its own does not appear to improve social or behavioural performance outcomes of students with complex communication needs (Carter, 2003; Chung et al., 2012). However, when AAC is paired with adequate training, improvements in social and behaviour performance are noted (Causton-Theoharis & Malmgren, 2005; Hetzroni, 2003). Although conflicting results were found among the four studies, it is possible that the negative findings could be due to a lack of training. Overall, the results suggest that success with AAC in the classroom requires adequate facilitator training. However, before this evidence can be considered conclusive, future research is recommended.

Clinical Implications

Given that research and evidence is limited to four studies, it is recommended that clinicians are cautious when implementing the results into their clinical practice. Nevertheless, clinicians should still consider the suggestive evidence provided in these studies when implementing AAC in the classroom for students with complex communication needs. The findings suggest that AAC, when combined with adequate training, has the potential to improve social and behavioural outcomes for students with complex communication needs. Future research is recommended to strengthen current evidence and to explore the training of communication partners to promote social and behavioural success for individuals with complex communication needs.

Additional research is required to address the previously discussed limitations within the review. Recommendations for future research include:

I. The effects of combining AAC and communication partner training on the social and behavioural performance of children with complex communication needs.
II. The specific types of AAC that is most beneficial for improving social and behavioural performance outcomes for children with complex communication needs in the classroom.
III. The effects of AAC for children with complex communication needs in general education classrooms compared to specialized classrooms for children with disabilities.

References

American Speech-Language-Hearing Association (2016). *Augmentative and alternative communication (AAC).* Retrieved from http://www.asha.org/public/speech/disorders/AAC/

Beukelman, D. R., & Mirenda, P. (2005). *Augmentative and alternative communication: Supporting children and adults with complex communication needs*. Baltimore, MD: Paul H. Brookes.

Carter, M. (2003). Communicative spontaneity of children with high support needs who use augmentative and alternative communication systems I: Classroom spontaneity, mode, and function. *Augmentative and Alternative Communication, 19*(3), 141-154.

Causton-Theoharis, J.N., & Malmgren, K.W. (2005). Increasing peer interactions for students with severe disabilities via paraprofessional training. *Exceptional Children, 71*(4), 431-444.

Chung, Y., Carter, E.W., & Sisco, L.G. (2012). Social interactions of students with disabilities who use augmentative and alternative communication in inclusive classrooms. *American Journal on Intellectual and Developmental Disabilities, 117*(5), 349-367.

Cowen, E. L., Pederson, A., Babigian, H., Izzo, L. D., & Trost, M. A. Long-term follow-up of early detected vulnerable children. *Journal of Consulting and Clinical Psychology,* 1973, *41,* 438-446.

Hetzroni, O.E. (2003). A positive behaviour support: A preliminary evaluation of a school-wide plan for implementing AAC in a school for students with intellectual disabilities. *Journal of Intellectual & Developmental Disability, 28*(3), 283-296.

Light, J. (1997). ‘‘Let’s go star fishing’’: Reflections on the contexts of language learning for children who use aided AAC. *Augmentative and Alternative Communication*, *13*, 158-171.

Reichle, J., & Wacker, D. P. (1993). *Communicative alternatives to challenging behavior: Integrating functional assessment and intervention strategies*. Baltimore, MD: Paul H. Brookes.

Roff, M., Sells, S. B., & Golden, M. M. *Social adjustment and personality development in children.* Minneapolis: University of Minnesota Press, 1972.