

### **Critical Review:**

Peer attitudes toward a school aged AAC user: Does use of high vs low tech device matter?

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The attitudes of communication partners may have a significant effect on communication expectations and overall success. Research in the area of Augmentative and Alternative Communication (AAC) has continued to identify characteristics of the individual client or factors of the physical AAC system that influence the attitudes of communication partners. This critical review examines literature exploring two levels of technology (high tech vs. low tech) that may influence peer attitudes toward a school-aged child using an AAC system. Studies include between-group and within-group research designs exclusively and were critically evaluated. The collective evidence in this area was inconclusive. Clinical implications and recommendations are provided.

#### ***Introduction***

The field of Augmentative and Alternative Communication (AAC) has been a growing area of research as it operationally serves as a voice for those in society with the most severe communication impairments. AAC involves any form of communication method that replaces or supplements oral speech (Dressler, Bland & Baumgartner, 2016). As general technology continues to advance, the field of AAC rapidly changes. Therefore, AAC devices can vary drastically in regard to level of technology. High tech devices involve specialized equipment including Dynavox, Eye Gaze Technology, and speech generating devices. Low tech aided AAC techniques include switches and picture/letter communication boards. Research is warranted in the area of AAC technology as some researcher's questions whether consumer level technology yields more acceptance from peers who also use technology on a daily basis. Research has suggested that technology causes people to assume higher intelligence and competence and therefore, may be more accepted in the general population (Gonzales, Leroy & De Leo, 2009). Understanding the preferences surrounding level of technology on peer attitudes could further identify characteristics of AAC systems that support peer acceptance and promote inclusion in the classroom.

Hyppa-Martin et al. (2016) states that the well-being of children who use AAC is enhanced by their ability to participate in meaningful contexts. In the classroom setting, AAC can help facilitate classroom participation, enhance learning, and further impact quality of life (Dressler, Bland & Baumgartner, 2016). Currently, many children with AAC devices are being integrated into mainstream classrooms with typically developed peers. As education policy moves toward a more

inclusion-focused approach, it is essential to build positive inclusionary experiences for children who use AAC devices. Therefore, obtaining a better understanding of the attitudes and expectation of classmates may further support a child's social wellbeing and classroom participation abilities. Blockberger et al. (1993) described attitudes as feelings and beliefs that predispose someone to act in a certain way. The attitudes and expectancies that others bring into communication exchange can undoubtedly affect the success of interaction. Attitudes toward communication may determine with whom, how, and what topic is discussed (McCarthy & Light, 2009). Hergenrath & Rhodes (2007) suggest that poor attitudes may contribute to less successful communication exchanges as they create barriers for initial communication opportunities and overall success. Understanding the impact of attitudes on communication success highlights an important opportunity to determine factors that influence attitudes toward an AAC system and its user. Therefore, this review aims to compare the attitudes of school-aged children toward their peers who use high tech or low tech AAC techniques.

#### ***Objectives***

The primary objective of this paper is to critically evaluate existing relevant literature regarding the attitudes of school-aged children toward their peers who use AAC techniques that differ in regard to level of technology (high tech vs. low tech).

#### ***Methods***

##### Search Strategy

A variety of internet databases including Western electronic database and Google Scholar were searched with the following keywords: (aac OR augmentative

and alternative communication) AND (attitudes) AND (children OR school-aged OR child) AND (peer OR friend OR classmate) AND (informal interaction) AND (high tech OR sgd OR speech generating device).

#### Selection Criteria

Articles were eliminated if they did not require an attitude component. Attitudes must be rated on standardized measurement scale. Articles that were strictly teacher or parent experience/perception with inclusion of students who use AAC were not included.

#### Data Collection

The articles selected to be included in this review comprised of one within-group repeated measures (cross-over treatment study) and four between-groups experimental designs.

### *Results*

#### Between-Groups Design

Four of the selected studies included a between-groups research design. This design limits the number of conditions exposed to each participant. Considering the young age of the target population, reducing demands and the length of sessions may limit the chance of boredom and fatigue affecting results. This design serves to minimize learning and carry-over between conditions as participants are never exposed to other independent variables. Limitations of this design include the requirement for more participants to detect statistical difference. The literature collected typically involved a narrow group of participants that were restricted in age, geographical location, and socioeconomic status (SES). Narrow and small sample sizes may limit the ability to generalize to the broader population.

**Lilienfeld & Alant (2002)** developed a Communication Aid/Device Attitudinal Questionnaire (CADAQ) to measure school-aged children's attitude toward a peer with complex communication needs. The questionnaire evaluated the following domains of attitudes: Behavioral (intentions to behave in a certain way), Cognitive (beliefs), and Perception of Communicative Competence. 115 participants between the ages of 11-13 who had no previous experience with people with severe disabilities were selected from a mainstream school. Participants were randomly assigned to two groups that were comparable by age and gender. Each group was required to watch a video of a student with no functional speech engage in a 4.50-minute conversation using a DeltaTalker with synthetic voice output or the same video without the synthetic voice output. CADAQ was completed after viewing. Order effects were limited by only exposing each group to one

condition. Appropriate statistical tests were employed, accurately reported, and appeared to be sensitive to differences in attitude response. Results suggest that school-aged children reported more positive attitudes toward the voice output group in the Behavioral and Communicative Competence domains. There were no significant differences in attitudinal response in the Cognitive domain. Additional analysis demonstrated that girls yielded more positive attitudes than boys.

The authors acknowledged that a single question was unfit for the study and resulted in satisfactory rating of internal consistency. Participants represented a narrow group of children which limits generalization beyond this population. The selection criteria was not extensive beyond age and gender of participants. Additionally, groups were reported similar at baseline by teacher perception and not statistical analysis (e.g., cognitive status, SES). This piece of literature is suggestive that high tech AAC devices with synthetic voice output are associated with more favorable attitude ratings.

**Hyppa et al. (2016)** performed a between-group study to compare attitudes of first grade students toward a same-aged peer communicating in two conditions: Ipad with speech output vs. non-electronic communication board. 115 students across three elementary schools were randomly assigned to two groups to view a video of a typically developed child using either the Ipad or communication board in a 35-turn conversational exchange. Participants completed the standardized questionnaire, Assessment of Attitudes Toward Augmentative and Alternative Communication (AATAAC), and answered questions regarding preference of system for themselves and the focus child. Results yield no significant difference in attitude ratings regarding level of technology used. Participants reported stronger preference for the electronic AAC device over non-electronic for the focus child and their own personal use. Gender was found to be a significant variable, with females reporting more favorable attitudes.

The study was successful in minimizing order effects by presenting only one condition to each participant cohort. Additionally, confounding variables such as appearance and extent of physical disability were accounted for by only showing the hand of the focus child. Consequently, attitudes may have differed if the condition was presented in a more naturalistic way. The number of participants included in the study may restrict generalization to a narrow range of population (Grade 3 students). Overall, this article is strongly suggestive that there is no difference in attitude toward level of technology after viewing a 35-turn conversational exchange.

**Blockberger et al. (1993)** assessed attitudes toward a non-verbal child using three different AAC techniques: unaided, aided non-electronic, and aided electronic. 249 fourth grade students viewed a video of a non-verbal child and an adult engaging in 22-conversational turns using one of the three communication techniques. Participants were randomly allocated, and eligibility was well documented. Information was collected regarding participants experience with children with disabilities and reading comprehension abilities. Attitudes were measured using the Chedoke-McMaster Attitudes toward Children with Handicaps (CATCH) scale. Gates-MacGinitie Test of Reading was administered and demonstrated that reading abilities were not a confounding variable in this study. Results yielded no difference in attitudes across AAC technique. Additional analysis demonstrated that positive attitudes were associated with higher reading comprehension levels, previous experience with people who have disabilities, and females.

The study methodology was well scripted and allows for replication. Statistical analysis was well reported. Population size is adequate considering design however, participation criteria was largely based on teacher reporting/perception. The outcome measurement scale is well established with good statistical standing, however, was not intended to be used to assess disabled children who used AAC. This study is strongly suggestive that technology level has no significant effect on peer attitudes toward a child using an AAC device in a 22-turn conversation.

**Beck et al. (2002)** conducted a between-group experiment to determine if communicative competence (e.g., level of prompting, hesitations) and augmentative technique (low vs. high tech) influence attitudes of school-age children toward a peer using AAC. 67 children in fourth and fifth grade, who were found to be familiar with disabilities, were randomly allocated to 1 of 4 video conditions. These four conditions reflected individual interactions between competence and level of technology (e.g., low competence interaction with low tech device; low competence interaction with high tech). Each video involved the hand/arm of the child with disabilities and full profile of an adult as they engaged in a 20-turn conversational exchange using a high tech DeltaTalker with DecTalk synthetic voice or a non-electronic picture communication board. The two communicative competence conditions were scripted and differed statistically in regard to the child's response latency, number of required prompts, and total time for conversation. Upon viewing, each child completed the AATAAC, an established standardized measure, to evaluate attitudes on a Likert scale.

Appropriate statistical testing was used and clearly reported. Results demonstrate no significant effect for grade level, type of technique used, or competence of the AAC user on attitude ratings. Gender was found to be a significant variable, with females rating more favourably overall.

Participants represented a very narrow group of children which limit generalization beyond this population. Participation criteria only included familiarity with children with disabilities, determined by a two-question questionnaire. The outcome measurement items yielded high internal consistency, although was not intended to measure sensitivity to variables such as communicative competence. Overall, this study is suggestive that components of AAC technology and communicative competence have no significant effect on peer attitudes toward a child engaging in a 20-turn conversation exchange on an AAC device.

#### Within-Groups (Repeated Measure) Design

A within-group experimental design was employed in one of the selected studies. In this design, participants serve as their own control and therefore, results in fewer confounding variables (e.g., age, gender and SES). This design reduces the probability of errors related to individual differences among participants. Consequently, the order in which participants experience each condition may influence their performance. Within-group designs require distinct randomization and counterbalancing to avoid practice and carry-over effects.

**Dada et al. (2016)** conducted a within-group cross over design to examine the attitudes of school-aged children toward an unfamiliar, typically-developed peer using two different AAC systems: Ipad with Proloquo2go and synthetic voice output or a low tech communication board. 78 children were recruited and separated into two groups. Groups were balanced in regard to age, gender, years in school and home language. Group 1 viewed an unfamiliar peer using the Ipad and then a second video of the same peer using the low tech technique. The cross-over design resulted in Group 2 watching the videos in reverse order. Upon viewing, participants filled out the standardized Communication Aid/Device Attitudinal Questionnaire (CADAQ), which divided attitudes into three domains: cognitive, behavioral and communicative competence. Results yield that both groups had more positive attitudes toward high tech communication technique on specific dimensions of the CADAQ, although results were not consistent across all domains of the questionnaire. Additional analysis demonstrate that female participants responded with more positive attitudes in all attitudinal domains.

Strengths of this study include a clear selection criterion for participants. Additionally, results demonstrate no statistical difference between groups or within individual performance on each dimension of the questionnaire. The measurement tool, although literarily established, only had satisfactory internal consistency. A nested ANOVA was completed and demonstrated borderline effects for Cognitive and Behavioral domains, suggesting sequence of viewing influenced participant performance. Additionally, the stimuli video was described as 'similar,' but did not identify statistical consistency or provide detail of the conversation. A major shortcoming of this study was the use of a typically developing peer as the target AAC user. This technique limits generalization to typical communication situations which commonly involve children with disabilities. Overall, this study is suggestive that high tech AAC techniques are associated with more positive attitudes toward same aged peers with communication needs.

### *Discussion*

The summative conclusions of these studies are highly mixed with all five studies representing varying levels of suggestive conclusions. Based on the lack of conclusive research, a strong clinical conclusion cannot be made. The literature demonstrates contradictory evidence; with two studies yielding significant effect of high technology device on peer-rated attitudes (Dada et al., 2016; Lilienfeld & Alant, 2002) and three suggesting no effect (Hyppa et al., 2016; Blockberger et al., 1993; Beck et al., 2002). The research concluded by Hyppa et al. (2016) and Blockberger et al (1993), which suggest that technology level does not influence peer attitudes, had more rigorous methodology and may offer a more appropriate representation of the proposed research question. However, the glaring contradiction in conclusionary evidence is concerning. The conclusions by Dada et al. (2016) and Lilienfeld and Alant (2002), which suggest that level of technology had a significant effect on attitudes, had several noticeable differences in comparison to the other studies regarding methodology and procedures. Firstly, these were the sole articles to measure outcomes with the CADAQ. This questionnaire is specific to AAC technology, however, is reworded in attempt to be more relatable to each individual study condition. The questionnaire is reworded to ask questions about the specific device and further emphasizes the use of the focus child's name. These personalized features may bring more attention to the device used and may result in children feeling a deeper sense of emotional connection to the focus child. Therefore, the standardization and consistency of this questionnaire across different studies warrants suspicion. Secondly, these two studies opted to show the

full view of the child with disabilities in the video conditions. The other studies (Beck et al., 2002; Hyppa, et al., 2016) did not allow participants to view the focus child in order to control for appearance/disability. It can be argued that the viewing of the focus child may incline children to answer in a more sympathetic manner. Considering the lack of consensus, it is evident that more research is warranted in this area of study to make clinical guidelines.

Questions remain as to whether the procedures and structure of the present studies are the most effective methods to make conclusions regarding attitudes toward AAC techniques. There appears to be a gap in the literature concerning a standardized methodology to assess peer attitudes toward AAC users. A standard number of students for each study and viewing procedure is needed to address the grossly varied number of participants and inclusion criteria across the collected studies. Inclusion criteria often involved only a teacher report of student characteristics and abilities. This leaves considerable room for error in determining participant baseline equivalencies. The captured studies attempted to use age appropriate content in their video's (e.g., discussion of websites, pets, sports). However, the topics discussed differed greatly among the five studies and may further influence the attitudes of children watching the video. Therefore, further research must strive to create standardized content requirements, including length of conversation, topic of conversation, and words per individual utterance.

The lack of standardized method for assessing attitudes is a large flaw of this body of research. The present literature used three different measurement scales, with only two specifically created for AAC evaluation. In order to validate the current research, future studies may benefit from determining if the available measurement scales yield similar conclusions on the subject of attitudes toward AAC users.

A concerning limitation of the current available research is the unnatural conditions of the communication exchange that is evaluated by participants. Many aspects of the video stimulus are not representative of a typical conversational exchange. Most evidently, watching an interaction on a screen restricts participant's ability to visualize the situation in a natural context. The stimuli videos typically involved short conversational exchanges (ranging from 22 to 39 conversational turns), were scripted by adult researchers, and occurred only with an adult communication partner. These conditions are rarely natural communication experiences and may not be rated reliably by school-aged children. Additionally, it is important to consider the characteristics of typical conversational exchanges for

children of this age group. For example, children may consider conversations with adults to be more formal or authoritative, and therefore change their ratings accordingly.

Gender appeared to be a significant factor influencing attitude toward peers who use AAC techniques across all studies. Consistently, females were found to have more positive self-rated attitudes toward their peers. The influence of gender may be a result of this specific socio-demographic, where females are commonly reared to be more nurturing from a young age. Future research should aim to better control for the interaction of gender and socio-demographics in order to make appropriate recommendations concerning education and support for male peers.

### **Conclusion**

In order to improve the level of evidence in this area of research, the following research avenues are recommended:

- 1) Future research should employ study designs that offer stronger levels of evidence. Specifically, it may be beneficial to use larger sample sizes and broader populations to improve probability of generalization.
- 2) Future research should consider peer attitudes in response to levels of competence of the AAC user as a significant confounding variable.
- 3) As earlier discussed, future studies should focus on naturalistic communication exchanges. This may include preserving informal language, using natural responses, and focusing on children who use the device on a regular basis. Additionally, the procedure of using video stimuli should be restructured to reflect more naturalistic conditions.
- 4) Future studies would benefit from including statistical baseline measures for participants to improve validity and ability to replicate study.

Due to the mixed nature of the collected results and inherent weakness across study designs, a clinical recommendation to pursue a specific level of technology in AAC systems is not warranted. However, clinicians must take this information in consideration when counselling parents and caregivers on appropriate expectations of AAC devices. Clearly, technology cannot be viewed as the solution to communication barriers for children, but rather, can be used as a tool to facilitate competence and peer interactions. The AAC device itself is only a small part of inclusion. This information may serve as a catalyst for clinicians to shift their focus to peer awareness and familiarity

toward client's who may require AAC techniques. Therefore, clinicians may aim to implement more effective awareness and education programs to promote familiarity with AAC devices and their users.

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