Effectiveness of the PECS Phase III app and choice between the app and traditional PECS among preschoolers with ASD[☆,☆☆]

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ABSTRACT

We investigated the efficacy of a tablet-computer-based Picture Exchange Communication System (PECS) application for use with three preschoolers with ASD and investigated participant preference for the app versus traditional PECS (i.e., with a physical communication book) once the participants demonstrated minimal levels of mastery of both. We implemented a single-case multiple baseline design to determine the efficacy of the app. Results indicated that participants rapidly demonstrated above-chance level mastery of the app. Following mastery, two participants demonstrated a preference for the app, while the other preferred the traditional PECS communication book.

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The Centers for Disease Control and Prevention ([CDC], 2012) recently reported overall autism spectrum disorder (ASD) prevalence estimates, revealing an overall estimated ASD prevalence of one out of 88 children aged 8 years in 2008 (CDC, 2012). Compared with the data for 2006, the estimated ASD prevalence in this report showed a 23% increase (CDC, 2012). A core characteristic of individuals with ASD is a delay in receptive and expressive communication, and approximately half of these individuals do not develop speech to the degree required to meet their basic needs (Alpert & Rogers-Warren, 1985; American Psychiatric Association [APA], 2000; Cafiero, 2001; Ganz et al., 2011). These deficits combined with increasing numbers of individuals diagnosed with ASD have led to a pressing need for identification of evidence-based practices, particularly for those who cannot use conventional means of communicating (i.e., speech).

Augmentative and alternative communication (AAC) systems have been implemented to compensate for deficits in functional communication and language skills in individuals with complex communication needs (Ganz, Davis, Lund, Goodwyn, & Simpson, 2012). AAC systems function as a supplement to speech or as an alternative means of communication

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(Mirenda, 2003). AAC includes unaided communication systems, including manual signs and gestures, and aided communication systems such as the Picture Exchange Communication System (PECS; Frost & Bondy, 2002) and speech generating devices (SGD; American Speech-Language-Hearing Association [ASHA], 1997).

AAC systems have been shown to be effective in improving various skill areas of individuals with autism, particularly communication skills (Charlop-Christy, Carpenter, Le, LeBlanc, & Kellet, 2002; Johnston, Nelson, Evans, & Palazolo, 2003), social skills (Kravits, Kamps, Kemmerer, & Potucek, 2002; Nunes & Hanline, 2007), challenging behaviors (Ganz, Parker, & Benson, 2009; Olive, Lang, & Davis, 2008; Thompson, Fisher, Piazza, & Kuhn, 1998), and academics (Schlosser & Blischak, 2004; Schlosser, Blischak, Belfiore, Bartley, & Barnett, 1998; Schlosser et al., 2007). Recently, meta-analyses have aggregated results of numerous single-case studies, indicating that both PECS and SGDs have moderate to large effects on communication skills in young children with ASD (e.g., Ganz, Davis et al., 2012; Ganz, Earles-Vollrath et al., 2012; Ganz et al., 2011). Further, single-case studies have demonstrated that both SGDs (ASHA, 1997) and PECS (Frost & Bondy, 2002) have been effective in improving communication skills in young children with ASD. Single-case researchers have investigated the efficacy of use of SGDs for improving language and communication skills of children with ASD, finding increased functional communication as a result (Olive et al., 2007, 2008; Schepis, Reid, Behrmann, & Sutton, 1998; Schlosser et al., 2007).

PECS, one of the AAC systems most frequently implemented with individuals with ASD, is comprised of six phases (Frost & Bondy, 2002). In Phase I, the child makes a request using a picture exchange (i.e., the child gives a picture depicting a preferred item to a communicative partner, then the child is given the item). A person who plays a role as a prompter sits behind of the child and prompts him or her to exchange the picture when the child attempts to get, or reaches for, the item. In Phase II, the same procedures are applied and the distance between the child and the communicative partner and between the child and his or her communication book is increased. The communicative partner moves further away from the child and the prompter prompts the child to exchange a picture, moving across the space to access the communicative partner. Beginning in Phase III, there is no prompter, and the child is taught to discriminate between multiple symbols on a communication book. Phase IV involves teaching the child to use a sentence structure using an "I want" picture. In Phase V, the child is taught to answer questions, such as "What do you want?" Finally, in Phase VI, the child is taught how to answer other questions, such as "What do you like?"

PECS has been widely researched via single-case research and meta-analysis of single-case research. PECS has been shown, via single-case studies, to be effective in increasing functional communication skills (Anderson, Moore, & Bourne, 2007; Chaabane, Alber-Morgan, & DeBar, 2009; Nunes & Hanline, 2007), increasing speech in some individuals (Olive et al., 2008; Ostryn & Wolfe, 2011), improving social skills (Charlop-Christy et al., 2002), and decreasing challenging behaviors (Chaabane et al., 2009; Charlop-Christy et al., 2002) in individuals with ASD. Recently, meta-analyses including several types of AAC systems have found that PECS had moderate to strong effects on targeted outcomes (i.e., communication via AAC), moderate effects on challenging behavior and social skills, weak to questionable effects on speech in individuals with ASD (Ganz, Davis et al., 2012), PECS and SGDs had greater impact on communication skills than other types of AAC systems, SGDs were more effective in treating challenging behavior than PECS (Ganz, Rispoli, Mason, & Hong, in press). However, little of the research on PECS or on SGDs included multiple AAC systems within a single study to easily permit comparisons.

Although there is evidence that aided AAC is effective for individuals with ASD, there are questions remaining regarding the relative effectiveness of different AAC systems and the relationship of participant preference to effectiveness. A small number of studies have compared acquisition of different AAC systems (Adkins & Axelrod, 2001; Gregory, DeLeon, & Richman, 2009; Tincani, 2004) and preferences of individuals with ASD for different AAC systems (Cannella-Malone, DeBar, & Sigafoos, 2009; Son, Sigafoos, O'Reilly, & Lancioni, 2006; van der Meer et al., 2012; van der Meer, Sigafoos, O'Reilly, & Lancioni, 2011). Preference regarding AAC system appears to vary by individual (van der Meer et al., 2011, 2012). For example, van der Meer et al. (2012) found that two of four participants did not consistently choose one AAC system over the others until they had met mastery criteria with each mode. The other two participants, on the other hand, showed a preference for one mode before they had received instructions on the AAC systems. Thus, questions remain regarding the relationship of preference for AAC systems following mastery of each phase.

Currently, handheld devices, including tablet computers, smart phones, and personal digital assistants, are becoming more ubiquitous in U.S. society, and researchers are beginning to investigate their effects as AAC systems for individuals with ASD on improving their academic, social, and communication skills (e.g., Gal et al., 2009; Madsen, Kaliouby, Goodwin, & Picard, 2008; Tentori & Hayes, 2010). Although studies involving the use of handheld devices have demonstrated improvements in targeted outcomes of individuals with ASD (Kagohara et al., 2012, 2013), the role of the participants' preference on AAC systems, particularly including handheld devices, has only begun to be investigated. However, preliminary data demonstrates that the reinforcing value of the use of handheld devices may result in improvements in performance of target skills (Neely, Rispoli, Camargo, Davis, & Boles, 2013). With these remaining questions, in this current study, the relationship of preference of individuals with ASD for AAC systems following mastery of use of those systems was investigated.

The purposes of this study were to investigate the efficacy of a tablet computer application for teaching students with autism to discriminate between pictures of preferred items and to determine if, once PECS Phase III was mastered with both the app and via a typical PECS communication book, the participants would demonstrate a preference of one AAC system over the other. The research questions included: (a) would there be a functional relation between instruction with a PECS Phase III app and correct discrimination between digital pictures when making requests for preferred items and (b) would the participants demonstrate a strong preference for one modality over the other?