Culminating Projects in Special Education   Department of Special Education

5-2016

Augmentative and Alternative Communication: Effects on the Disruptive and Aggressive Behaviors of Students with Severe Disabilities

Christine M. Lund
St. Cloud State University, cmlund@stcloudstate.edu

Recommended Citation

Augmentative and Alternative Communication: Effects on the Disruptive
and Aggressive Behaviors of Students with Severe Disabilities

by

Christine Lund

A Starred Paper

Submitted to the Graduate Faculty of

St. Cloud State University

in Partial Fulfillment of the Requirements

for the Degree

Master of Science in

Special Education

April, 2016

Starred Paper Committee:
Janet Salk, Chairperson
Mary Beth Noll
Jodel Page

Table of Contents

List of Tables

Chapter 1: Introduction

People with severe disabilities have deficits in cognitive functioning, communication functioning, and adaptive behaviors that require special education services and supports. According to Minnesota state law, a child is considered to have a severe-profound developmental cognitive disability if his or her intellectual functioning is significantly below average and shows deficits in four of seven adaptive behaviors that include community participation, academic functioning, and communication skills (Minnesota Department of Education [MDE], 2015). The lack of cognitive functioning combined with the inability to communicate basic needs can lead to disruptive and aggressive behaviors (Mohammedzahari, Koegel, Rezaee, & Rafiee, 2014; Walker & Snell, 2013).

In order to address the disruptive and aggressive behaviors of students with severe disabilities, they must be taught to communicate their own wants and needs (Curtis, 2012). Specifically, they must be taught to employ augmentative and alternative communication (AAC) devices. AAC provide people with limited or no verbal abilities a way to communicate and encompass a range of strategies and assistive technology devices, including speech-generating devices, gestures and signs, and picture-supported communication systems (Sigafoos, 2010). Research suggests that finding the appropriate functional communication system can lead to a reduction in maladaptive behavior (Walker & Snell, 2013), although this can be a complex task. This starred paper examines how various types of AAC devices have been implemented with students with severe disabilities and the effects of AAC implementation on their disruptive and destructive behaviors.

Historical Background

People with intellectual and developmental disabilities have been subjected to numerous labels throughout history, many of which are now considered derogatory. For example, during the late 19th and early 20th centuries, terms such as *imbecile, idiot, moron, feebleminded, mentally retarded*, and *mental defective* were used to describe people with intellectual disabilities (Trent, Jr., 1995).

Children born with intellectual or physical disabilities faced extensive challenges in early recorded history. In ancient Greece and Rome, children identified as having a disability were regarded with scorn and faced maltreatment (Horn & Fuchs, 1987). Although major religions supported in writings and teachings the humane treatment of people with disabilities, abuse and neglect of those with significant disabilities remained prevalent (Horn & Fuchs, 1987).

Jean-Marc Gaspard Itard, a French physician, created the first documented skills-based curriculum for a deaf and mute child (Harbor & Maulik, 2010). French philosopher and educator Édouard Séguin, a follower of Dr. Itard, believed that *idiocy* could be cured through exercises and functional training that would lead to jobs outside the confines of the school (Trent, Jr., 1995). Schools were established that supported these beliefs; however, by the 1870s were forced to close due to lack of funding. At this time, the terminology evolved from *idiots* to *feebleminded*, and societal perceptions of people with intellectual disabilities also began to change. Thoughts of educational training were abandoned, and institutionalization was viewed as the best option in order to protect both society and the people themselves from societal ills (Trent, Jr., 1995).

The eugenics movement in the United States grew at the end of the 19th century under the guise of improving the human race through selective breeding. Justice Oliver Wendell Holmes, when stating his majority opinion for Buck v. Bell (1927), said "Three generations of imbeciles are enough" (Berson & Cruz, 2001, p. 300). Researchers at the time concluded heredity played a large role in such social maladaptive behaviors as criminality, sexual promiscuity, and mental retardation. Perceived solutions to these included bans on marriage for *defective* persons, involuntary sterilization, and institutionalization (Berson & Cruz, 2001, p. 304).

The institutional trend continued through the mid-20th century until the passage of the Education for All Handicapped Children Act of 1975 (PL 94-142), which guaranteed a free and appropriate public education (FAPE) for all children with disabilities (Browder, Spooner, & Meier, 2011). In addition to the FAPE provision for students between the ages of 3 and 21, PL 94-142 provided state and federal financial support, access to education in the least restrictive environment, and an individualized education program (IEP). A child's IEP must be updated annually with individually determined supports, a comprehensive evaluation conducted every 3 years, and the establishment of procedural safeguards with the right to due process (Hallahan, Kauffman, & Pullen, 2009).

The reauthorization of PL-94-142 in 1997 as the Individuals with Disabilities Education Act (IDEA) mandated that assistive technology must be considered for all students when developing an IEP. Assistive technology (AT) is defined as "any item, piece of equipment, or product system, whether acquired commercially off the shelf, modified, or customized, that is used to increase, maintain, or improve function capabilities of individuals with disabilities" (Snell & Brown, 2006, p. 599). When

students are unable to make adequate progress toward IEP goals, the team must discuss technology options that could enhance educational outcomes. For nonverbal students or those with limited communicative skills, specific AAC systems are recommended.

The most recent reauthorization of IDEA was in 2004, and it was titled Individuals with Disabilities Education Improvement Act. According to Mittler (2007), IDEA 2004 replaced the phrase "Consider whether the child requires assistive technology devices and services" to the phrase "Consider whether the child needs assistive technology devices and services" (p. 83). Mittler speculated that this language change may allow more children access to AT. The most significant change related to AT for students who are blind; the law requires that all instructional materials must be in accessible format and provided to individuals with print disabilities free of charge

Communication and AAC

The ability to communicate impacts all areas of life. "Communication competence is essential to the quality of life of individuals with complex communication needs, for it provides the means to attain personal, educational, vocational, and social goals" (Light & McNaughton, 2014, p. 1). The spoken word is the most common form of communication, but many students with severe disabilities are not able comprehend what is said and express themselves verbally (Snell & Brown, 2006). Speech impairments in students with severe disabilities can include non-symbolic communication, unintelligible speech, and the absence of speech altogether (Sigafoos, 2010). The inability to verbally communicate could be due to a number of issues, including motor impairments, cognitive disabilities, autism spectrum disorder, or sensory impairments (Snell & Brown, 2006).

Research indicates that students with severe disabilities are not able to communicate effectively, and certainly not as competently as their nondisabled peers (Snell & Brown, 2006; Walker & Snell, 2013). They may become frustrated and engage in disruptive and aggressive behavior. For students with severe disabilities, AAC is the only viable option for functional communication (Carter, 2003). Once it is determined that assistive technology and augmentative and alternative communication are necessary for educational success, the team must choose an AAC intervention that is right for the student.

The SETT Framework, created by Dr. Joy Zabala, gives educators an effective tool to make student-centered decisions to determine the AAC device that fits a student's needs (Zabala, 2005). Zabala outlined the four-step SETT process:

1. Student: student strengths, weaknesses, needs, and preferences are considered when choosing assistive technology

2. Environment: where instruction takes place, the physical arrangement of the room, materials and equipment commonly used in the environment, and expectations of student, staff, and family

3. Task: specific tasks that need to be completed in order to make progress toward IEP goals

4. Tools: devices, training, service, accommodations, and modifications needed to be successful in a given environment.

Zabala's SETT Framework emphasizes the need to make informed, student-centered decisions in order to fit the best device for the student. The key is to find evidence-based interventions to enable students to use AAC effectively (Sigafoos, 2010).

Research Questions

Two questions guided the development of this starred paper:

1. Which augmentative and alternative communication devices have been utilized to decrease the disruptive and aggressive behaviors of students with severe disabilities?

2. How effective are augmentative and alternative communication devices in reducing the disruptive and aggressive behaviors of students with severe disabilities?

Focus of Review

I reviewed 10 studies between the years 2001 and 2014. All studies were conducted in the United States and included participants between the ages of 1 and 18. Participants in the studies had severe communication needs and required communicative support. This may include children and youth diagnosed with a variety of disabling conditions. In addition, the participants manifested disruptive and/or aggressive behaviors. The research I located used primarily single-subject designs, although I did not limit my research to only these research designs.

In order to find peer-reviewed articles relevant to my topic, I conducted searches using Academic Search Premier, PsychINFO, and PDQT Open. Search terms that guided my research included keyword searches *with variations and combinations of these terms: augmentative and alternative communication* (AAC), *developmental disabilities*, *aggressive behaviors*, *disruptive behaviors*, *speech-generating devices*, *picture exchange communication*, *intellectual disabilities, functional communication training,* and *autism*. In addition, I conducted searches by looking through the tables of contents in the following journals: *Augmentative and Alternative Communication*, *Journal of Applied Behavior Analysis, Journal of Developmental and Physical Disabilities,* and *Intellectual and Developmental Disabilities*.

Importance of the Topic

As a special education teacher of students with severe and profound developmental and cognitive disabilities, physical disabilities, and autism spectrum disorders, the topic of augmentative and alternative communication devices and their use and the effect on behaviors is of great importance in my classroom. All of my students have varying levels of communicative disorders and use a variety of speech-generated devices to communicate. Several of these students have significant disruptive and aggressive behaviors in addition to communicative disorders.

During the past 3 years, I have seen a significant increase in the number of aggressive behaviors my students exhibit. In my experience and according to the literature, there appears to be a correlation between a student's lack of ability to communicate basic wants and needs with the manifestation of behaviors (Walker & Snell, 2013). One of my goals as a teacher is to bridge the communication gap through the use of augmentative and alternative communication as a proactive approach in curtail behavior and to give students a healthy outlet for frustration.

Definition of Terms

Adaptive behaviors refer to practical activities of personal and social independence as well as the ability to respond appropriately and immediately to environmental demands and function in everyday life (Horn & Fuchs, 1987). There are seven domains of adaptive behavior considered for qualification for special education services under the category of developmental cognitive disabilities: daily living and independent skills, social and interpersonal skills, communication skills, academic skills, recreation and leisure skills, community participation skills, and work skills (MDE, 2015).

Angelman syndrome (AS) is a rare developmental disorder caused by a genetic defect. People with AS may have epilepsy, significant motor and communication defects, and an apparent happy demeanor (Raadstake et al., 2012).

Applied behavior analysis (ABA) is a teaching method to produce behavior changes that, through task analysis, break skills down into discrete intervention targets. An antecedent-behavior-consequence chain, with a strict structure and procedure, is then employed across many trials to impact the intervention targets (Landa, 2007).

Assistive technology is defined as "both a device and a service" that assists a student with the completion of everyday tasks and increases access to the educational environment. Assistive technology must be considered and discussed at all IEP meetings (MDE, 2003, pp. 1-2).

Assistive technology device is "a durable item, piece of equipment or system used to increase, maintain or improve the functional capabilities of children with disabilities" (Browder, Spooner, & Meier, 2011, p. 259). Assistive technology devices could be purchased or created and can range from low-tech to high-tech.

Assistive technology service refers to any service that assists in providing increased training and access to assistive technology. Assistive technology services can be provided by teachers, occupational therapists, physical therapists, speech-language pathologists, and mental health professionals (MDE, 2003).

Augmentative and alternative communication. AAC is the use of communication aids, systems, techniques, or symbols used to supplement speech in students with severe speech impairments. Augmentative and alternative communication encompasses a range of strategies and assistive technology, including speech-generating devices, gestures and signs, and picture-supported communication systems (Sigafoos, 2010).

Autism spectrum disorders (ASD) are a range of developmental disorders and is characterized with mild to severe impairments in the following areas: communication, social interaction, and restrictive, repetitive behaviors (MDE, 2015). Disruptive and destructive behaviors often manifest in individuals with ASD (Falcomata, White, Muething, & Fragale, 2012).

Behavior support plan provides the guidance for changing the behavior that can include altering the environment, changing teaching practices, and modifying how we respond to the student and the behavior (Snell & Brown, 2006).

Developmental cognitive disability, according to Minnesota state law, is a permanent condition resulting in significantly below average cognitive functioning as well as deficiencies in adaptive behaviors that result in the need for special education services (MDE, 2015).

Destructive behaviors, unlike disruptive behaviors, cause immediate danger and can be harmful to the individual and others. Physically destructive behaviors include hitting, kicking, biting, pulling, and damaging objects (Walker & Snell, 2013).

Disruptive behaviors include behaviors that interfere with activities and education of the individual or others, but do not cause immediate danger. These behaviors could include verbal behaviors and aggression such as yelling, interrupting, and threats, and physical behaviors such as elopement from the classroom and throwing themselves on the floor in the midst of a tantrum (Walker & Snell, 2013).

Eye gaze is a non-symbolic form of communication for nonverbal individuals who have intentional eye movement for communication. Eye gaze involves communicating by looking at an item (Minnesota Department of Education, 2003).

Functional behavior assessment (FBA) and functional analysis (FA) are evaluation tools used to assess the antecedent and consequence of problem behaviors and the relationship of the behaviors to the environment. After identifying the function of the disruptive and destructive behavior, positive behavior supports and strategies are developed (Snell & Brown, 2006; Radstaake et al., 2013).

A *target mand* is communicating a request. The purpose of manding is to increase communicative behavior while decreasing maladaptive behavior (Murphy & Barnes-Holmes, 2010).

Natural aided communication involves the inclusion of picture communication into the natural environment of the communicator (Abrams & Cafiero, 1991, as cited in Cafiero, 2001).

Non-symbolic communication describes communication that does not use words or sign language. Many students with severe disabilities rely on non-symbolic communication before AAC is introduced. Examples of non-symbolic communication include gestures, sounds, and eye gaze and can have varying degrees of intentionality (Browder, Spooner, & Meier, 2011).

Pivotal response training (PRT) is a behavior intervention derived from ABA therapy that occurs in a person's natural environment. PRT focuses on motivation, empathy, and self-initiation and management (Bozkus Genc & Vuran, 2013).

Speech-generating devices are programmable digital devices that offer voice output opportunities for people with limited or no verbal communication (Trottier, Kamp, & Mirenda, 2011).

Chapter 2: Review of the Literature

In this chapter, I review 10 studies that examine the effects of augmentative and alternative communication (AAC) devices on aggressive and disruptive behaviors. The studies in this chapter investigated the use of picture exchange communication systems (PECS), functional communication training (FCT), and speech-generating devices (SGD).

Picture Exchange Communication Systems

Picture exchange systems are the most commonly used picture exchange systems and have received significant attention over the past decade. It is an AAC system that uses pictures and symbols to communicate. When using PECS, a person exchanges one or multiple picture symbols for preferred items to make requests, build sentences, or answer questions (Cannella-Malone, Fant, & Tullis, 2009). In this section, I review four studies that investigated using picture exchange systems.

Frea, Arnold, and Vittimberga (2001) studied the impact of PECS on the aggressive behaviors of Tim, a 4-year-old highly aggressive boy. His aggressive behaviors included biting, hitting, and kicking children and adults in school and home settings. Prior to the study, school staff could find no consistent function to his behavior, despite several behavior analyses. School staff also had difficulty establishing Tim's cognitive ability due to aggression during assessments. Researchers conducted a functional analysis (FA) prior to the study and determined aggression was a preferred activity for Tim. Interobserver agreement averaged 94% for disruptive behaviors and 100% for communication responses.

Researchers conducted the multiple baseline study in Tim's preschool classroom during play routines. The classroom consisted of 12 students in addition to Tim, two paraprofessionals,

and one teacher. Students rotated through four play centers. Tim showed a preference for the manipulatives and home living centers. Researchers first applied PECS while Tim engaged in the home living center, followed by implementation in the manipulatives center. Data collected during the 10-min baseline sessions at each center included instances of behavior and communication responses, defined by the researchers as "Tim handing the picture while giving attention to both the communicator and picture" (Frea et al., 2001, p. 195). During baseline, four pictures featuring preferred items were secured to a board at each center. Researchers allowed free play at the centers with the communication board in proximity. Aggression toward peers was deflected by the researcher using body position to encourage continued free play for the peer while maintaining inattention to Tim.

Following baseline, researchers conducted 1-hr PECS teaching sessions with Tim for 2 consecutive days. In these sessions, an assistant prompted Tim to exchange a picture for a preferred food item whenever he reached for the treat. He would have to make the exchange before receiving the reinforcement. By the end of the first training session, Tim could independently exchange and discriminate among the four preferred picture choices that were gradually faded in distance from Tim. By the end of the training, the pictures were 15 feet from Tim and prompts were eliminated. Subsequent intervention sessions were similar to baseline but included the prompt, "What do you want?" when he displayed aggression in the Home Living center. Immediate reinforcement came with the exchange of pictures. Researchers gave Tim the requested item for 30-s, then the item was taken back with the prompt to "Go play" (Frea et al., 2001, p. 196).

Results of the study indicated Tim's aggressive behavior decreased following the introduction of PECS during play activities. Picture communication increased during the study.

At the home living center, occurrences of behavior decreased from an average of 3.9 per session during baseline to an average of 0.2 per session at the conclusion. Picture exchange increased from 0.0 occurrences during baseline to an average of 5.5 per session at the home living center. Aggression at the manipulatives center averaged 5.0 occurrences per session during baseline and was reduced to an average of 0.1 occurrences per session following the introduction of PECS. Picture exchange increased from 0.0 occurrences during baseline to an average of 6.2 exchanges at the manipulatives center.

Frea et al. (2001) noted a limitation with this study. Due to the frequency and intensity of Tim's aggression, researchers determined that it was unlikely that a single factor was the reason for the decrease in his behaviors. The researchers determined that increased communication allowed Tim choices and control he was seeking, which contributed to the decrease in aggressive behavior.

Cafiero (2001) studied the use of natural aided language and picture communication boards to increase communication and decrease negative behaviors in a teenage boy with autism. Timothy was a 13-year-old African-American student in a public middle school program for students with autism. He was nonverbal with some vowel vocalizations. Timothy also used functional signs such as "toilet," "eat," and "drink" (Cafiero, 2001). Timothy exhibited a variety of destructive and disruptive behaviors including screaming, noncompliance, public urination, tantrums, spitting, mouthing objects, elopement, throwing objects, and grinding his teeth. At the time of the study, Timothy's tantrums occurred at a rate of 5 per day with duration of 20 to 30 min per occurrence. School staff interpreted his tantrums as a mode of communication for Timothy, but was unable to find specific communicative functions for these behaviors. Timothy was nonverbal with some vowel vocalizations.

Initially, Timothy used a PECS reinforcer board with 16 choices in grids. When he completed a task without behavior, a staff member verbally prompted him by asking, "What do you want?" and he chose a preferred activity from the board (Cafiero, 2001). This was used only for Timothy to make choices and not with communicative partners. His schedule of reinforcement started at every 30-s, but was increased to 5-min of in-seat behavior. In order to implement the natural aided language intervention, activity-specific language boards were created. Words for each board were chosen from the observed language of typically functioning peers. Trained staff engaged in simple conversations with Timothy while pointing to the words on his language boards. The language boards were used as a receptive language tool with the hope that Timothy's expressive language would eventually develop.

Data collection consisted of marking tallies on a replicate language board of the pictures used to initiate, respond, and comment. The researcher measured initiations of communication for the purpose of this study. A successful communicative initiation was Timothy independently approaching a trained staff member with his language board and selected one or more appropriate symbols. Once staff understood Timothy's request or command, they marked a tally on the specific pictures used as a communicative initiation. Although Timothy displayed a number of destructive and disruptive behaviors, elopement behaviors were measured for the purpose of this study. Elopement behaviors consisted of leaving the instructional area without permission. Staff collected data over a 22-month period.

Results showed an increase in language initiations and a decrease in disruptive behaviors. Baseline data showed low, stagnant levels of initiations prior to the introduction of natural aided language and picture language boards. Timothy's communicative initiations rose from 4 to 29 in a 22-month period. In terms of behavior, baseline data showed a mean of eight occurrences of

elopement behavior daily. Two months after the introduction of natural aided language, Timothy's elopement behavior dropped to a mean of three per day. No changes were made to his behavior plan during the study that could alter the results. Informally, the researcher and staff also saw a decrease in tantrum behaviors over the course of this study.

Cafiero (2001) concluded natural aided language had a powerful impact on Timothy's increase in communication and decrease in behavior, although other factors could have contributed to the reduction in behavior concurrently with the addition of language boards. Staff consistency and changes in staff attitude could be possible contributors to the positive changes. Cafiero noted this study needed to be replicated in a more systematic fashion to assess the validity of the behavioral findings.

Charlop-Christy, Carpenter, Le, LeBlanc, and Kellet (2002) examined the effects of using PECS to increase social-communication skills and decrease problem behaviors in three boys with autism enrolled in an after-school behavioral treatment program. Two of the boys engaged in disruptive behaviors and are included in this review. Jake was a 3-year, 8-month-old Chinese-American boy with no spontaneous speech and limited play skills. He relied on gestures to communicate. His problem behaviors included tantrums, elopement from instructional areas, taking objects from others, and throwing and kicking objects. Researchers stated the functions of these behaviors were the removal of preferred items and non-preferred task demands. Kyle was a 5-year, 9-month-old Korean-American boy with no spontaneous speech or gestural communication. His primary form of communication was leading adults to preferred items, pointing to preferred items, and pushing away non-preferred items. Kyle exhibited problem that included tantrums, elopement from instructional areas, grabbing items from others, and throwing

and banging objects. The function of Kyle's behavior was to obtain preferred items and to remove non-preferred task demands.

Researchers and staff conducted twice-weekly 15-min PECS training sessions in several locations in an attempt to begin the generalization of the skill. Training sessions took place in an observation room with a one-way mirror, an empty classroom, and each participant's home. Participants were trained to physically exchange a picture with an adult, who would then provide that object to him. Free-play and academic sessions were completed in an observation room with a one-way mirror. During free-play sessions, the room contained a variety of toys and the participants were free to explore the space and toys. During academic session, toys and academic tasks were enclosed in clear containers. The participants had no access to the toys until initiation of task demands.

PECS materials included a three-ring binder serving as a communication board with Velcro® for building sentences such as "I want" card, an "I see" card, a "no" card, and picture cards with preferred items (Charlop-Christy et al., 2002). Participants did not have access to PECS materials during academic sessions to allow researchers to assess any gains related to PECS. Free-play and academic sessions occurred before, during, and after PECS training sessions. Researchers conducted a preference assessment prior to PECS training to determine high-interest toys and activities.

Researchers used a multiple-baseline design to measure the impact of PECS on increasing communication and aggressive behaviors in weekly free-play and academic settings. Participants received five spontaneous speech and five verbal imitation opportunities during each academic and free-play session. To encourage spontaneous speech, therapists showed a preferred item to the participant and waited 10-s for vocalizations. When the participant

performed the desired task, he gained access to the item. Similar procedures were conducted to encourage verbal imitation with the expectation the participation imitate a modeled word or phrase to gain access to the preferred item. Free-play sessions consisted of 10-min play sessions between the participant and therapist. The therapist talked throughout the sessions and immediately responded to any of the participant attempts at communication. Academic sessions consisted of 10-min sessions when the participant engaged in individualized academic tasks.

Researchers collected data for spontaneous language and imitations, social-communicative behaviors, and problem behaviors in 10-s intervals. Frequency counts for trials that met the criterion of 80% correct independent responses were used during PECS sessions. Interobserver agreement for PECS sessions was ranged from 92-99% for session time and number of trials. Interobserver agreement for spontaneous and imitative speech trials was 94-95%. Social-communicative interobserver agreement was ranged from 84-95%.

Results of the study showed an increase in communicative behaviors in academic and free-play sessions. All participants met the 80% criterion for acquisition of PECS during an average of 246 trials and 170 min. Alex's spontaneous speech increased from 28% to 100% of trials, and imitation increased to 76% of trials during the initial study and 90% in academic post-training sessions. Jake increased his spontaneous speech from 0% to 83% and his imitations to 80% of trials in academic sessions. Kyle increased his spontaneous and imitative speech from negligible levels to 68% and 72% in academic sessions, respectively. In free-play sessions, Alex increased his spontaneous speech to 90% and his imitation speech to 80% of trials. Jake increased his spontaneous speech to 63% and imitation to 73% of trials and Kyle increased his spontaneous speech to 80% of trials and imitation to 72% of trials.

Social-communicative behavior increased for all participants in terms of eye contact, joint attention, and toy play. Jake increased his social-communicative play from 16% to 41% following PECS training. Requests and initiations increased from 2.9 during baseline to 38 per session following PECS training. Kyle increased his social-communicative play from 20% to 39% and increased requests and initiations from 2.8 to 27 following PECS training.

Problem behaviors for both Jake and Kyle decreased following PECS training. Jake engaged in tantrums and elopement behaviors in 14% of intervals during baseline, with an average of 24 disruptions and grabs per academic session. Tantrums and elopement decreased to 5% of intervals, and grabs and disruptions decreased to 9.5 per academic session following PECS training. Tantrums and disruptions during play sessions decreased from 15% to 2% of intervals and from 1.7 disruptions per play session to zero following PECS training. Kyle had similar results. Tantrums and elopement behaviors decreased from 7% to 0.5% of intervals during academic sessions and 13% to 0% for play sessions following PECS training. Disruptions decreased from 12.3 per session during baseline to 2.6 in academic sessions and 2.7 per session to 0.2 per session during play sessions.

This study reinforced the findings of other studies that found PECS training increased communicative behaviors and decreased problem behaviors. Charlop-Christy et al. (2002) cited the small sample size and the need for replication as limitations of the study. They also noted that PECS use and generalization were not the explicit focus of this study.

Ganz, Parker, and Benson (2009) investigated the use of PECS with three children with autism who had significant speech delays and no intelligible speech. Ethan was 3-years-old, Adrian was 6-years-old, and Jarek was 5.5-years-old. They attended a private school for

children with significant disabilities. In addition to determining the effects on maladaptive behaviors, the study determined if training generalized to other people and settings.

A multiple baseline design was used to find generalized outcomes. Following a reinforcement assessment, baseline data were collected during 5-min sessions. A toy and a corresponding picture were placed on a table in front of the participant. If the participant took a toy, he was allowed to hold it for approximately 5-s. The experimenter took the toy back, explaining it was "my turn," (p. 254). The participant was then provided opportunities to request the toy again, and these attempts were recorded.

Intervention consisted of ten 5-min PECS sessions. Similar to baseline, the participants sat at a table with a toy in front of him. In this phase, if the participant showed interest in the toy, the trainer physically prompted the participant to pick up the corresponding picture. The experimenter handed the toy to the child while holding the picture near the trainer's face, said the name of the toy, praised the child, and then placed the picture back on the table near the child. Prompts were faded until the child independently exchanged the picture for the toy.

Following the 10 intervention sessions, a 5-min probe session was conducted that was similar to baseline. No physical prompting occurred, but the experimenter verbally prompted the names of the items. If the child did not name the toy, the experimenter did so after 5-s. The toy was named while handing it to the child and giving him praise. If the participant used fewer than five pictures during a session, two 5-min PECS training sessions were implemented prior to the next probe. Probe training sessions continued until participants used five or more pictures to request preferred items five times over three sessions. One generalized outcomes and two maintenance probes were conducted following intervention. Interobserver agreement and treatment fidelity were assessed and averaged over 90% in each case.

Results showed that all three participants quickly learned to exchange pictures for preferred items. Furthermore, they generalized the use of some pictures with a novel adult and maintained picture use for several weeks following intervention. Specifically, Ethan's data showed he did not use pictures during baseline, but rapidly used pictures during intervention. He exchanged five pictures during generalization and during maintenance and then increased his use of pictures to eight at 23 weeks. He averaged 1.75 maladaptive behaviors during baseline. By the last session, no maladaptive behaviors were recorded, and this was maintained at 23 weeks.

Adrian also did not use pictures during baseline and, similar to Ethan, rapidly began using pictures. During intervention, his exchanged a mean of 8.6 pictures. However, this decreased to two pictures during generalization. Adrian displayed few maladaptive behaviors during baseline and remained at the same levels during intervention.

Jarek increased his picture use from zero pictures during baseline to an average of 6.6 pictures exchanged during intervention. During generalization, his picture use increased to nine pictures, but decreased to five pictures during maintenance. Jarek's maladaptive behaviors were highly variable, but decreased from an average of 3 to 2.3 during intervention. He displayed zero maladaptive behaviors during generalization, and two during maintenance.

This study showed that PECS had a substantial effect on picture use for all participants, although the effects on maladaptive behaviors were highly variable. Overall, PECS had no clear impact on maladaptive behaviors. Ganz et al. (2009) indicated these findings were not consistent with previous research and if the study was implemented for a longer period of time, more effects on behavior would be realized. The researchers also indicated the lack of a functional analysis may have indicated no desire for the tangible items. Maladaptive behaviors may not have been related to the items presented.

Functional Communication Training

Functional Communication Training (FCT) attempts to use appropriate functional communication as a replacement behavior for disruptive and destructive behaviors, which are placed on extinction (Schieltz et al., 2013). Like picture exchange systems, FCT is an AAC system that uses pictures or symbols to communicate wants, needs, and to make choices. In this section, I review three studies that used FCT to increase communication and reduce destructive and disruptive behaviors.

Hines and Simonsen (2008) evaluated the relationship of FCT's impact on using picture cards to request preferred items and reduce disruptive behaviors in a young boy with autism. Andrew was a 3.5-year-old male student at an afternoon preschool program. His expressive language was limited to vowel vocalizations, screams, and cries. Prior to the study, Andrew did not have FCT training and needed pervasive adult support to complete activities of daily living. Andrew exhibited disruptive behaviors such as inappropriate vocalizations, lying on the floor, and task avoidance. Researchers noted that Andrew frequently missed school due to illness and was often fatigued due to disrupted sleep patterns.

School staff members were unable to identify a clear antecedent to Andrew's behavior. However, from the FBA conducted at the beginning of the study, researchers determined the function of Andrew's behavior was to gain access to a preferred item, such as his alphabet puzzle or computer. Andrew continued engaging in problem behaviors until he gained access the preferred item.

Researchers used a single-subject AB alternating treatment design to determine the impact of FCT on using picture cards to request preferred items across the baseline, teaching, and maintenance phase. Two 10-min conditions were observed in an individualized controlled

setting away from other students and adults. Interobserver agreement averaged 77.9% between

the two researchers in this study.

Condition A included the presence of picture cards of preferred items visible to Andrew

but was placed behind the paraprofessional. When the paraprofessional placed picture cards in

front of Andrew, he was to hand the card to the paraprofessional to receive a preferred item. He

could also physically obtain the item himself before receiving the item of choice. Andrew

played with the item for 1 min. Condition B did not include the presence of picture cards of

preferred items. During the teaching phase, the preferred items and picture cards were presented

to Andrew with a verbal prompt such as "If you want X, give me the card" (Hines & Simonsen,

2008, p. 12). Once Andrew performed as requested, he received his item of choice. Researchers

used physical and verbal prompts when initially teaching picture exchange. These prompts were

faded as Andrew gained independence with the skill. The maintenance phase followed the same

procedures as the baseline phase.

Results of the study indicated Andrew's use of picture exchange for preferred items

increased following FCT training. Pictures exchanged averaged 9.0 during the teaching phase

and 11.3 during the maintenance phase. Researchers observed a decrease in disruptive behavior

during these phases. Researchers also compared occurrences of disruptive behavior between

Condition A (presence of picture cards) and Condition B (absence of picture cards). Baseline

data showed no definitive difference in behavior between Condition A and B, indicating no

relationship between the presence or absence of picture cards and behavior. Baseline behaviors

occurred during an average of 59.7% of 10-s intervals during Condition A and 70.3% of 10-s

intervals during Condition B. Appropriate engagement behaviors occurred in an average of

22.2% of intervals in Condition A and 15.3% of intervals in Condition B during baseline. No clear distinction occurred between the conditions.

Disruptive behaviors decreased and appropriate engagement behaviors increased in the teaching phase. Disruptive behaviors in Condition A of the teaching phase occurred in an average of 24.0% of intervals and 38.0% of intervals in Condition B. Researchers determined a relationship existed between the presence of picture cards and the decrease of disruptive behaviors. Appropriate behaviors, however, were lower in Condition A than Condition B during the teaching phase. Maintenance showed a continued decrease of disruptive behaviors, with occurrences in 9.2% of intervals when pictures were present and 10.3% of intervals when pictures were absent. No clear relationship between picture cards and behavior could be established during maintenance.

Hines and Simonsen (2008) noted several limitations of this study. This study included only one participant. Generalization to other students in other settings cannot be assumed. Researchers also noted several interruptions in data collection, such as participant illness and school vacations. Observations occurred in a controlled, distraction-free environment. Results could possibly vary when occurring in a classroom environment. The researchers suggested further studies be conducted to address these limitations and confirm the results.

Harding, Wacker, Berg, Winborn-Kemmerer, and Lee (2009) analyzed choice-making and positive and negative reinforcement during FCT for two children with significant developmental disabilities and destructive behaviors. Instruction and data collection took place in the living room of the child's home with each mother serving as a therapist. Tim was a 4-year, 4-month-old boy with "moderate mental retardation" who communicated with simple words such as "Mom" and "no" and used simple signs such as "please" and "cookie" (p. 445).

According to the FA, Tim's destructive behavior occurred with both positive and negative reinforcement. Alan was also a 4-year-old boy and was described as having moderate mental retardation. He could communicate using short simplistic phrases. His destructive behavior coincided with negative reinforcement.

The study was implemented in two phases. The assessment phase included a preference phase to identify preferred items or activities, an FA to identify the variables for the destructive behavior, and a choice assessment. Preferred items were trains for Tim and puzzles for Alan. FA results indicate that Tim's destructive behavior occurred during both task demands and preferred activities. Alan's destructive behavior occurred as a result of task demands. The choice assessment analyzed his desire for positive attention from his mother during play conditions. The second phase, the treatment phase, was divided into two conditions: FCT and FCT plus choice.

Procedures for the FCT-plus-choice condition included dividing the living room in half using tape, with the parent, preferred toy, and work task demand placed on one side—identified as the *task demand side*. No toys or people were on the other side, called the *alone side*. The child was then told, "You can play by yourself on this side, or play with your mom on this side. But your mom is going to ask you to do some work. That's your choice" (Harding et al., 2009, p. 448). The child was presented with picture choices and allowed to make a choice. On the alone side, no reinforcement was given for destructive behavior and the child was not permitted to bring the preferred toy over. On the task demand side, the therapist engaged the child in a work task. If the child completed the work task without inappropriate behavior, he was given a choice between more work or play. Choices were presented in picture form. Once play was chosen, he could engage with his preferred item contingent upon appropriate behavior.

Procedures for the FCT condition followed similar procedures from the FCT-plus-choice

treatment, with the absence of room division and the choice to avoid task demands.

Researchers alternated FCT-plus-choice treatment sessions and FCT treatment sessions

over 40 sessions for Tim and 57 sessions for Alan. Trained observers collected data by

documenting destructive behavior occurrences in 6-s intervals. Data collectors documented task

completion according to the number of tasks completed independently, completed with physical

assistance, and not completed. Interobserver agreement for destructive behavior and task

completion averaged 97% and 100%, respectively.

Results of the study indicated a substantial decrease in destructive behavior and an

increase in task completion during the second phase for both children. Tim displayed high levels

of destructive behavior and 0% task completion during baseline. When researchers introduced

FCT plus choice for the first time, Tim chose the demand area and continued to show a high

level of destructive behavior with fluctuating levels of task completion. FCT treatment was then

introduced and Tim's destructive behavior was reduced to 0%. Tim's destructive behavior

declined to minimal occurrences and task completion increased to nine per session by the end of

the study.

Like Tim, Alan chose the demand area during baseline and displayed destructive

behavior and little task completion. FCT plus choice and FCT was introduced in session 14.

From session 14 through session 28, Alan showed near zero levels of destructive behavior and

100% task completion. From session 28 through session 32, destructive behavior levels were

maintained (with the exception of session 28), but task completion levels decreased. FCT

treatment was reintroduced in session 33. Destructive behavior levels were near zero, and task

completion rates returned to 100% for the remainder of the study.

Harding et al. (2009) did not explicitly state limitations to the study within the document, but limitations can be inferred. This study involved participants in their respective homes with their mothers serving as therapists. Generalization to other participants in other settings cannot be assured without further research. Results may vary for the participants in a school or community setting with non-familial adults.

Falcomata, White, Muething, and Fragale (2012) used a combination of functional communication training (FCT) with a chained schedule of reinforcement to address the challenging behaviors of Danny, an 8-year-old boy with autism. Investigators first determined the multiple functions of the behaviors and then implemented the combined interventions. Functional analysis and intervention sessions were conducted in a self-contained room at a program clinic. Trained observers recorded frequency data on challenging behavior, target mands, and task engagement. Disruptive behaviors included but were not limited to throwing objects, climbing on furniture, and crawling under tables. Target mands were defined as vocal requests for items and task engagement was defined as the manipulation of items associated with specific tasks. A preference assessment was administered to determine high- and low-preference leisure activities. Interobserver agreement averaged for challenging behavior, target mands, and engagement between 90% and 94%.

Challenging behaviors, target mands, and engagement were assessed during four treatment conditions: attention, escape, tangible, and free play (the control condition). During the escape condition, academic activities were presented using a three-step prompting procedure. Prior to the start of each attention session, the therapist gave Danny 1-min of attention. Danny was then allowed access to low-preference leisure activities without attention from the therapist. Contingent upon occurrences of challenging behavior, the therapist attended to a low-preference

item for 30-s. Prior to the tangible condition, Danny was given access to high-preference items. When Danny displayed challenging behavior in the tangible condition, he was given access to high-preference items for 30-s. In the control condition, Danny was given attention in addition to access to high-preference items. Intervention included two conditions as part of a reversal ABAB design: FCT plus a chained schedule of reinforcement. During baseline, Danny was provided with access to high-preference leisure activities and attention. When the task began, access was removed and Danny was told to complete his work. When disruptive behavior occurred, the task was removed and he was given 30-s access to high-preference items.

During FCT and the chained treatment condition, Danny chose between a discriminative stimulus (S^D), which in this study was a wristband. When the therapist wore the wristband, a fixed ratio was employed (FR-1). He had 2-min of access to high-preference activities with no task demands. At the start of the session, the therapist wore the wristband and verbalized to Danny, "I have the wristband, it is time to put down the (item) and work. If you want the wristband, you need to ask for it" (Falcomata et al., 2012, p. 533). The wristband signaled access to high-preference items to Danny. When Danny verbally requested the wristband, the academic task was removed and high-preference leisure activities and attention were provided. During a 30-s interval, Danny had access to the wristband and each of his three reinforcers. At the end of the 30-s interval, the process was repeated.

A second FCT-plus-chained schedule phase required Danny to complete a 20-item math worksheet. Similar to the first session, directions were provided, but required him to complete the math problems before having access to the S^D. If he engaged in 5 consecutive s of off-task behavior, the therapist pointed to the math problem to encourage perseverance. Upon task completion, Danny was provided the wristband and access to his preferred activities.

Results showed that Danny displayed near-zero rates of disruptive behavior during free play, but did display disruptive behavior during the other three conditions. His rate of challenging behavior and requests for the wristband were measured in responses per min (rpm). These results indicated his behavior served multiple functions: Danny's desire to escape non-preferred activities and his need to gain attention.

During the FCT plus chained schedule, Danny displayed zero challenging behaviors and increased his verbal requests (1 rpm). When the math worksheet was introduced, his behaviors remained near zero (0.2 rpm), but the request rates also remained low (0.2 rpm). Unlike other studies that address behavior functions separately, this study approached each function concurrently. Antecedents and reinforcements were combined within the intervention. Falcomata et al. (2012) described this study as a "novel application of FCT and a chained schedule to treat challenging behavior" (Falcomata et al., 2012, p. 536).

Because this study included only one participant, results could differ when conducted with a larger population. Also, the study was conducted in a controlled setting and not a natural educational setting. Falcomata et al. (2012) encouraged future studies to assess the effectiveness of this treatment through multiple environments and participants.

Speech-Generating Devices (SGDs)

Speech-generating devices are programmable digital devices that offer voice output opportunities for people with limited or no verbal communication (Trottier et al., 2011). In this section, I reviewed three studies that included SGDs to reduce problem behaviors.

Franco et al. (2009) examined the effect of using FCT and SGDs to reduce the disruptive vocalizations of a young boy with autism. Brent was a 7.5-year-old boy with autism in a private school for children with autism. He was nonverbal and occasionally used augmented sign

language to request some preferred items such as "movie," "candy," "swing," and "music"

(Franco et al., 2009). Fine motor delays prevented further development of manual signs. Brent

could receptively identify 10 objects, follow simple directions, and complete simple gross motor

movements, but could not expressively imitate sounds or words.

Researchers conducted two studies to target Brent's disruptive behavior. Brent displayed

disruptive, inappropriate vocalizations in the form of "ee" sounds that interfered with his

learning and the learning of others (Franco et al., 2009, p. 149). The first study analyzed the use

of SGD to decrease the inappropriate vocalizations. Researchers conducted this part of the study

in four phases. Phase 1 and 3 involved a FA without SGD in four conditions: demand, tangible,

attention, and play. If vocalizations occurred during the demand condition, work and attention

was removed for 10-s. During the tangible condition, researched allowed Brent limited access to

his preferred items and no adult attention, which were then removed. He regained access to the

preferred items dependent on instances of disruptive behavior. Brent was allowed access to his

preferred items in the attention condition. When inappropriate vocalizations occurred, the

therapist gave 10-s of verbal praise and redirection. The play condition served as the control

condition. Brent had access to his preferred toy and verbal praise was given every 10-s.

Phases 2 and 4 included access to a *GoTalk* SGD. The *GoTalk* included 12 real pictures

with recorded single-word messages or phrases. Phase 2 consisted of a tangible condition with

access to his SGD and a tangible condition without access to the SGD. Phase 4 consisted of a

comparison of the use of the SGD in demand conditions. The first condition included the use of

the *GoTalk* indicating a desire to escape from task demands. The other condition did not include

a SGD. Researchers developed four different overlays for the demand, tangible, attention, and

play conditions. Only the phrases "come with me" and "I want a break" were accessible across multiple settings. Brent received training in using the device prior to data collection.

Trained observers collected data for the first aspect of the study focused on occurrences of inappropriate vocalizations in 10-s intervals during 5-min sessions in the FA. Data collected during the treatment condition used a scoring checklist with the terms "correct" and "error" for when the target behavior was performed with the appropriate consequence (p. 149). Interobserver agreement averaged 96% for the FA and 99% for the treatment condition.

Results of the FA indicate that his vocalizations served several functions and occurred in several conditions. During Phase 1, researchers documented a high level of vocalizations in the demand, tangible, and attention conditions. He engaged in inappropriate vocalizations 64% to 93% of intervals in the demand condition and 46% to 100% of intervals in the tangible condition. Target behavior occurred in 0% to 28% of intervals in the attention condition. During the no-SGD condition of Phase 2, vocalizations occurred in all conditions with a range of 37% to 80% of intervals. Vocalization rates were significantly lower with the introduction of the SGD in Phase 2 with a range of 3% to 20% of intervals.

The second aspect of the study assessed the use of the SGD in lieu of inappropriate vocalizations in the gymnasium and playground settings. For this part of the study, a multiple-baseline design was used in both settings. Baseline, intervention, and follow-up data were collected. FA results indicate challenging behavior occurred in response to demands and access to preferred activities. Baseline sessions began without SGD in both settings. Brent was given access to the SGD every 15 s during intervention. Brent's requests using the SGD were honored and vocalizations were ignored. Follow-up sessions were conducted 3-months after the intervention. Trained observers measured 10-s intervals of engagement and inappropriate

vocalizations. In the follow-up sessions, researchers analyzed Brent's message choices on the SGD. Researchers used a checklist with the terms "escape" and "tangible," with a tally given for escape if Brent activate the "I want a break" button and a tally for tangible when Brent chose tangible items (Franco et al, 2009).

Results indicated a relationship between the introduction of SGD and the decrease in inappropriate vocalizations. Results also showed the SGD training generalized across multiple settings to increase engagement and decrease inappropriate vocalizations. During baseline, engagement in the gymnasium ranged from 0% to 10% of intervals and a mean of 2% of intervals on the playground. Inappropriate vocalizations were high in both settings, with a mean of 88% of intervals in the gymnasium and 94% of intervals on the playground. Following the introduction of SGD in the intervention stage, engagement increased and vocalizations decreased in both settings. Engagement increased to a mean of 59% in the gymnasium and 68% on the playground. Inappropriate vocalizations decreased to a mean of 40% in the gymnasium and 28% on the playground. Results were maintained during follow-up sessions, with high engagement and low vocalizations in both settings. In the gymnasium, engagement averaged 73% and inappropriate vocalizations averaged 6%. On the playground, engagement averaged 77% and inappropriate vocalizations averaged 10%. Brent used his device for escape 10 times and 32 times for tangibles in the gymnasium. On the playground, he used the device six times for escape and 48 times for tangibles.

Franco et al. (2009) noted several limitations with this study. The participant in the study received little instruction in the use of his SGD. Researchers also noted that although SGD use successfully generalized across multiple settings, it was not assessed with multiple

communicative partners. Another limitation was that message choice information was only gathered in follow-up sessions.

Radstaake et al. (2012) investigated the impact of FA and FCT on decreasing challenging behaviors exhibited by three children with Angelman Syndrome (AS). In addition to a confirmed AS diagnosis, each of the participants in the study had a severe intellectual disability and were nonverbal. Amy was a 7-year-old with a developmental age of 1.6 years and communicated intermittently with points and gestures. Bob, age 15 with a development age ranging from 6 months to 1 year, reached for desired objects in lieu of communicating through gestures. Cody was 6 years old and had a developmental age between 1.5-2.5 years of age. Like Amy, Cody occasionally used gestures and points to communicate.

The study employed an ABAB design and was conducted in the classroom setting at the participants' day care center; no other children were in the classroom. Researchers used Cohen's *d* to measure the impact of FCT on decreasing challenging behavior. The FA results determined Amy and Cody's behaviors served the function of escape from task demands, whereas Bob's behaved to obtain desired tangibles. The participants' challenging behavior included destructive behaviors such as biting self and others, hitting self and others, hair pulling, and kicking.

Analysis of behavior and communication occurred across seven conditions. Sessions were 2.5-min in length with no more than three consecutive sessions at a time. Amy participated in five conditions, Cody in four conditions, and Bob in three conditions. One teacher and two researchers observed every session. Table 1 provides an overview of the conditions, participants, and procedures.

Table 1

Conditions and Procedures

CONDITIONS	PARTICIPANT(S)	PROCEDURES
Play	Amy and Cody	Participants received constant attention from teacher and no consequences for challenging behavior.
Attention	Amy and Cody	The teacher left the room to talk to an adult. Once behavior occurred, the teacher physically deflected the physical aggression, gave the verbal command to stop, and then turned again to talk to the adult.
Tangible-edibles	Bob	Extra bread was given contingent upon occurrences of challenging behavior.
Tangible-toys	Amy, Bob, and Cody	Removal of a preferred toy began each session. Once challenging behavior occurred, each participant gained 20 s with their preferred toy.
Demand-work	Amy and Cody	When participants did not meet task demands and exhibited challenging behavior, task demands were removed and 20-s time outs were implemented. Participants could leave their seat. Following the time out, the task demands were reintroduced.
Demand-drink	Amy	Amy often exhibited challenging behavior following drink requests. This condition follows the same procedures as the demand-work condition, except Amy was not allowed to leave her seat following behaviors.
Alone	Bob	Attention and toys were removed upon the occurrence of behaviors. No consequences were given following the behaviors.

Researchers used PECS as a replacement behavior for Amy, but an object was used instead of a picture. Amy received a prompt following a precursor behavior, but with no consequences when the challenging behavior occurred. Replacement behaviors for Cody and Bob involved the use of SGDs.

Results showed Amy's behaviors were more likely to occur during the demand-escape condition ($p = 0.07$) than in any other condition in the study. FCT had a large impact ($p = -4.5$) on Amy's behaviors.

The majority of Bob's behaviors also occurred in the demand-escape condition. Bob's behaviors decreased with FCT ($p = -0.06$). Teacher physical contact was found to be an

antecedent to his behavior ($p = 0.424$) in the demand-escape condition and showed a substantial

decline ($p = -1.25$) following the introduction of a *BigMack* SGD in FCT.

Like Bob, FCT had a medium impact on Cody across conditions. Unlike Bob and Amy,

no clear pattern of precursor behaviors were found in Cody, as he would engage in aggression

with the introduction of a task demand across conditions. Researchers found that destructive and

disruptive behaviors decreased with the introduction of a *BigMack* SGD ($p = -0.05$). FCT had a

more pronounced impact on physical aggression toward his teacher ($p = -1.1$).

Results indicated FA and FCT can decrease the incidence of challenging behavior in

people with AS. Radstaake et al. (2012) noted that data did not include the use of speech-

generating and other communicative systems by the participants as they were not trained to use

the devices until this study.

Moore, Gilles, McComas, and Symons (2010) investigated the effect of FCT with the use

of an AAC device on the self-injurious behavior of a young child with traumatic brain injury

(TBI). Justin was an 18-month-old boy who was severely injured by a babysitter at age 6

months, which resulted in TBI and significant developmental delays. He also had visual

impairments and a seizure disorder. Justin's behaviors included tantrums and screams for his

mother as well as eye-pressing self-injurious behavior (SIB). He was significantly attached to

his mother and engage in maladaptive behaviors if she did not respond to him.

Communicatively, Justin performed vocal utterances.

For the purpose of this study, researchers focused on the use of FCT with an AAC device

as a replacement behavior for Justin's eye pressing. Researchers used a within-subject ABA

reversal design with a FA. The study occurred in the child's home. An incident of eye pressing

was defined by researchers as "touching his eye or eyelid with any finger or part of his hand and

depressing the right lens of his glasses onto his eyelid by pressing it onto any part of another person's body or any object" (Moore et al., 2010, p. 1513). Trained observers recorded eye-pressing occurrences and non-occurrences in 10-s intervals. Interobserver agreement for assessment and treatment sessions ranged from 82-100%.

Researchers conducted a FA with an ABCBC design to determine a primary function of Justin's eye-pressing SIB. A variety of test conditions were used to assess possible functions, such as access to preferred items, positive reinforcement, escape from demands, and sensory reinforcement. The control condition for the FA included maternal attention and physical contact, access to preferred items, and elimination of demands. In Condition A, Justin sat in a chair without assistance and in Condition B with physical support from his mother. Both sessions were maternal-led. Therapists led Condition C. Results from the FA indicate the primary function of Justin's SIB was to gain attention from his mother.

FCT intervention used a *BigMack* SGD to garner attention from his mother as a replacement behavior for Justin's SIB. Device training included Justin sitting independently with the device in his lap. When his mother left the room, researchers physically assisted him in activating the device with the recorded message, "Mommy come here" (Moore et al., 2010, p. 1514). Upon activation of the device, Justin's mother immediately returned to the room and provided him with verbal and physical attention.

Following FCT training, researchers employed an ABA reversal design, with the A condition providing no attention for SIB and 10-s of maternal attention following the activation of his SGD, and the B condition providing 10-s of attention for SIB and none for SGD activation. Results for Condition A showed Justin activated the device in 100% of intervals before SIB occurred. SIB occurred in 13% of intervals in condition A. During Condition B, the

reversal condition, SGD activation decreased to 58.3% prior to occurrences of SIB and increased to 48.7% in intervals with SIB. Upon the return to Condition A, SGD activation increased to 100% and SIB intervals decreased to 21.3%.

Moore et al. (2010) indicated FCT with SGDs had an immediate impact on the reduction of SIB and the increase of functional communication. However, the authors noted results could differ with other children with TBI and SIB. Another limitation included the lack of follow-up data to determine maintenance of skill, elimination of SIB, and generalization into other settings.

Summary

In this chapter, I reviewed 10 studies that investigated the effects of PECS, FCT, and SGDs on the disruptive and aggressive behaviors of students with severe disabilities. Table 2 provides a summary of these findings, which are discussed in Chapter 3.

Table 2

Chapter 2 Studies

AUTHOR (DATE)	PARTICIPANTS/SETTING	DATA ANALYSIS	PROCEDURE AND RESULTS
PICTURE EXCHANGE COMMUNICATION SYSTEMS			
Frea et al. (2001)	4-year-old nonverbal boy with autism in a general education preschool setting during designated play time.	Multiple-baseline design	Behavior decreased in both the play area and manipulatives center with the introduction of picture communication.
Cafiero (2001)	A middle school-aged boy with autism and a history of disruptive and destructive behaviors in a middle school special education classroom.	Single-subject functional analysis	His receptive and expressive picture language increase as well as his positive behaviors.
Charlop-Christy et al. (2002)	Three boys with autism ages 3-12 in an afterschool behavioral treatment program.	Multiple-baseline design	PECS instruction led to an increase in social-communicative behaviors and, as a consequence, a decrease in problem behavior.
Ganz et al. (2009)	Three students with autism in a private school that serves preschool and elementary students with significant disabilities.	Multiple-baseline probe design	PECS intervention had a substantial effect on picture use. The impact of maladaptive behavior was highly variable and no clear connection was made.

Table 2 (continued)

FUNCTIONAL COMMUNICATION TRAINING			
Hines & Simonsen (2008)	A preschool-aged male nonverbal student with autism in an afternoon preschool program.	Single-subject case study design	Picture use to request desired items increased through FCT as well as desirable behavior.
Harding et al. (2009)	Two preschool-aged boys with significant disabilities in the living room of each child's home.	Two phase investigation with functional analysis	Decrease in destructive behavior and an increase in task completion in both participants
Falcomata et al. (2012)	One 8-year-old boy with autism.	Analogue functional analysis	Functional communication training plus a chained schedule of reinforcement decreased disruptive and destructive behaviors with multiple functions.
SPEECH-GENERATING DEVICES			
Franco et al. (2009)	7-year-old nonverbal boy with autism at a private school for students with autism.	Functional analysis	Inappropriate vocalizations decreased and engagement in appropriate activities increased and was maintained with the implementation of a speech-generating device.
Radstaake et al. (2013)	Three children age 7-15 with Angelman Syndrome with severe intellectual disabilities and no functional speech at a daycare center.	Analogue functional analysis	Challenging behavior decreased in all children with FCT.
Moore et al. (2010)	18-month-old boy with traumatic brain injury in his home.	Within-subject ABA design	FCT with the use of an AAC device reduced eye-pressing behavior.

Chapter 3: Conclusions and Recommendations

Children with significant cognitive disabilities often engage in aggressive and disruptive behaviors to communicate their wants and needs (Carr & Durand, 1985 and Carr et al., 1997 as cited in Walker & Snell, 2013). Augmentative and alternative communication (AAC) devices can provide children with a means of communicating their wants and needs without engaging in maladaptive behaviors. In Chapter 1 of this paper, I provided relevant background information on the history and theory of AAC. Chapter 2 summarized findings of 10 research studies that described the effects of AAC on the reduction of disruptive and destructive behaviors of children with significant disabilities. In this chapter, I discuss the conclusions I drew from these studies and the implications for future research and current practice.

Conclusions

Nine of the 10 studies examined in this literature review found that AAC strategies had a substantial impact on reducing disruptive and destructive behaviors in children with severe disabilities. All studies employed a small sample size of one to three participants who ranged in age from 18 months to 15 years. Most of the participants in the studies examined had limited or no exposure to AAC strategies prior to intervention.

Two questions guided the development of this starred paper and factored into the studies chosen for review in Chapter 2. For my first question, I investigated what specific AAC devices and strategies were used to decrease the disruptive and aggressive behaviors of students with severe disabilities. The 10 studies employed picture exchange communication systems (PECS), functional communication training (FCT), and speech-generating devices (SGD). Most studies examined in this paper had overlapping strategies. For instance, all of the SGD studies employed FCT strategies.

Four studies in Chapter 2 employed the use of PECS to reduce disruptive and destructive behaviors. Although all four studies showed an increase in functional communication, three of the four studies using PECS as the communication intervention decreased maladaptive behavior (Cafiero, 2001; Charlop-Christy et al., 2002; Frea et al., 2001). Ganz et al. (2009) found varying results with the three participants and could not conclusively state PECS effectively reduced problem behaviors. Researchers noted a functional analysis was not conducted in this study, which could have affected outcomes.

Three studies in Chapter 2 focused on FCT as a replacement for problem behaviors. All three studies showed a decrease in maladaptive behaviors and an increase in desirable behaviors. Harding et al. (2009) and Falcomata et al. (2012) noted an increase in task completion, and Hines and Simonsen (2008) observed that an increase in appropriate communication coincided with a decrease in problem behaviors. Researchers conducted all three studies in controlled settings and did not explore generalization into different environments.

The behaviors exhibited by participants in the three SGD studies had varying degrees of severity. Behaviors ranged from inappropriate vocalizations (Franco et al., 2009) to physical injury to self and others (Moore et al., 2010; Radstaake et al., 2012). Two different SGDs were used in these studies. Moore et al. (2010) and Radstaake et al. (2012) used a *BigMack* single-message communication switch, and Franco et al. (2009) used a *GoTalk* device with 12 message options. As Moore et al. (2010) explained, the SGD used was specific to the participant and may not be as effective with others. Devices were chosen specific to each participant's needs and skills.

The second research question addressed the effectiveness of AAC devices and strategies in reducing the disruptive and destructive behaviors of students with significant disabilities.

Researchers in 9 of the 10 studies concluded AAC strategies contributed to the reduction of maladaptive behaviors. Ganz et al. (2009) noted although the participants in the study did not show significant reductions in behavior, these conclusions were not consistent with other research. The 10 studies were conducted in different environments and with participants who had a wide range of ages and abilities. Despite this, researchers determined conclusively that communication facilitated by the use of AAC devices and strategies was an effective replacement for disruptive and destructive behaviors.

The impact on maladaptive behaviors occurred quickly, but few studies assessed the maintenance of skills over time and generalization of skills across environments. However, Franco et al. (2009) found the use of a SGD reduced behaviors in multiple school environments. Frea et al. (2001) and Cafiero (2001) noted outside factors not assessed in their studies could be contributing factors to the reduction in behavior.

Recommendations for Future Research

When analyzing the research, I found common threads in recommendations for future research among the authors of these studies. Many authors recommended additional studies to assess generalization of skills. Researchers conducted most of the training and gathered data in controlled environments. Acquisition of skills and aggressive behaviors may differ in a typical school environment or in the community.

Future research needs to be conducted with the intention of monitoring behavior and communication over longer periods of time. Several of the studies in Chapter 2 considered the reduction in maladaptive behavior a byproduct to the original intention of the study. Future studies could have an explicit focus on the connection between the increase in communication and he decrease in disruptive and aggressive behavior.

The studies reviewed in Chapter 2 had small sample sizes, with sizes ranging from one to three participants. Most researchers noted this to be a limitation. For instance, Falcomata et al. (2012) stated that results of the study may be difficult to apply to a broader population. Although it is prudent for researchers to list this as a limitation, it may not be a limitation after all. Strategies to reduce maladaptive behavior and increase communication should be highly specific to the student. As noted by Zabala (2005), AAC strategies and devices should be individualized and specific to the student's abilities, environment, and tasks.

In addition to the limitations and recommendations by the researchers, I have several recommendations for my personal growth as a special education teacher. One concern I have with the research is the lack of maintenance and generalization data. Most of the studies did not assess the long-term impacts of the intervention. School staff and family members need to have the requisite skills to continue the communicative training with fidelity and adjust as needed. Behaviors often change over time and can change when interventions are put in place. Chances of the intervention continuing to maintain low maladaptive behavior instances across long periods of time can be difficult to ascertain. My recommendation for future studies would be to perform systematic, longitudinal studies on the impact of communication interventions on decreasing maladaptive behaviors.

As a special education teacher, I would be interested in research studies conducted using different AAC devices. In addition to low technology AAC options such as a *BigMack,* and PECS, many of the students in my classroom use an *iPad* with communicative symbol-based applications such as *Proloquo2Go* and *Go Talk NOW.* Investigations into the effectiveness of these systems on reducing aggressive behaviors would be beneficial for the students in my program.

This literature review can have an immediate impact on my teaching practice. As a special education teacher for students with significant disabilities, many of my students have limited receptive and expressive communication and use AAC devices and strategies to communicate. Some of these students exhibit disruptive and destructive behavior. Although I knew the maladaptive behaviors exhibited were not a personal affront to me as their teacher, this literature review gave me further drive to assess the behaviors and understand what was being communicated. I found myself employing with my students some of the behavior reduction strategies, verbiage, and communication strategies used in the studies. Also, the knowledge gained from the review of literature has aided in the development of a behavior support plan for one of my students.

Effective strategies to give my students a voice in their education is my priority. The research conducted in the studies will impact how special educators of students with significant disabilities like me will select AAC strategies and devices. Communication devices and strategies need to be highly individualized. Although high-technology options such as *iPads* might be attractive, basic visual supports especially for students with limited exposure to communicative strategies could be sufficient to meet the needs of a particular student.

Summary

Many children with severe disabilities lack functional communication skills. Deficits in these skills can lead to maladaptive behavior as a consequence due to the lack of ability to communicate. As special educators, we need to take a proactive approach to eliminate these disruptive and destructive behaviors by giving children a healthy outlet for their frustrations. That outlet can be the ability to communicate basic wants and needs. As Cafiero (2001) aptly stated, communication is a "basic human right" (p. 187).

References

Berson, M., & Cruz, B. (2001). Eugenics past and present: Remembering Buck v. Bell. *Social Education, 65,* 300-306.

Bozkus Genc, G., & Vuran, S. (2013). Examination of studies targeting social skills with pivotal response training. *Educational Science: Theory and Practice, 13*, 1730-1742.

Browder, D., Spooner, F., & Meier, I. (2011). *Teaching students with moderate and severe disabilities* (1st ed.). New York, NY: Guilford Press.

Buck v. Bell. 274 U.S. 200. (1927). Retrieved from http://web.b.ebscohost.com.libproxy. stcloudstate.edu/ ehost/detail/detail?sid=707bd717-a10f-4b7f-87949b864d880559%40 sessionmgr115&vid=4&hid=128&bdata=JnNpdGU9ZWhvc3QtbGl2ZSZzY29wZT1zaX Rl#AN=21213072&db=aph.

Cafiero, J. (2001). The effect of augmentative communication intervention on the communication, behavior, and academic program of an adolescent with autism. *Focus on Autism & Other Developmental Disabilities, 16,* 179-189.

Cannella-Malone, H., Fant, J., & Tullis, C. (2009). Using picture exchange communication system to increase the social communication of two individuals with severe developmental disabilities. *Journal of Developmental and Physical Disabilities, 20,* 149-163.

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

Charlop-Christy, M., Carpenter, M., Le, L., LeBlanc, L., & Kellet, K. (2002). Using the picture exchange communication system (PECS) with children with autism: Assessment of PECS acquisition, speech, social-communicative behavior, and problem behavior. *Journal of Applied Behavior Analysis, 35,* 213-231.

Curtis, D. (2012). *Identifying an optimal and early communication modality for students with autism and intellectual disability* (Doctoral dissertation). Retrieved from PDQT Open. (Publication No. AAT 3510078).

Falcomata, T., White, P., Muething, C., & Fragale, C. (2012). A functional communication training and chained schedule procedure to treat challenging behavior with multiple functions. *Journal of Developmental & Physical Disabilities, 24,* 529-538.

Franco, J., Lang, R., O'Reilly, M., Chan, J., Sigafoos, J., & Rispoli, M. (2009). Functional analysis and treatment of inappropriate vocalizations using a speech-generating device for a child with autism. *Focus on Autism and Other Developmental Disabilities, 24,* 146-155.

Frea, W., Arnold, C., & Vittimberga, G. (2001). A demonstration of effects of augmentative communication on the extreme aggressive behaviors of a child with autism within an integrated preschool setting. *Journal of Positive Behavior Interventions, 3,* 194-198.

Ganz, J., Parker, R., & Benson, J. (2009). Impact of the picture exchange communication system: Effects on communication and collateral effects on maladaptive behaviors. *Augmentative and Alternative Communication, 25,* 250-261.

Hallahan, D., Kauffman, J. M., & Pullen, P. (2009). *Exceptional learners: an introduction to special education* (11th ed). Boston, MA: Pearson Education.

Harbor, C., & Maulik, P. (2010). History of developmental disability. In J. H. Stone, &

    M. Blouin (Eds.), *International encyclopedia of rehabilitation.* Retrieved from

    http://cirrie.buffalo.edu/encyclopedia/en/article/143/.

Harding, J., Wacker, D., Berg, W., Winborn-Kemmerer, L., & Lee, J. (2009). Evaluation of

    choice allocation between positive and negative reinforcement during functional

    communication training with young children. *Journal of Developmental and Physical*

    Disabilities, 21, 443-456.

Hines, E., & Simonsen, B. (2008). The effect of picture icons on behavior for a young student

    with autism. *Beyond Behavior, 18,* 9-17.

Horn, E., & Fuchs, D. (1987). Using adaptive behavior in assessment and intervention: an

    overview. *Journal of Special Education, 21,* 11-26.

Landa, R. (2007). Early communication development and intervention for children with autism.

    Mental Retardation and Developmental Disabilities Research Review, 13, 16-25.

Light, J., & McNaughton, D. (2014). Communication competence for individuals who require

    augmentative and alternative communication: A new definition for a new era of

    communication? *Augmentative and Alternative Communication, 30,* 1-18.

Minnesota Department of Education. (2003). *Minnesota assistive technology manual.*

    Retrieved October 9, 2015 from http://education.state.mn.us/MDE/EdExc/

    SpecEdClass/index.html.

Minnesota Department of Education. (2015). *Minnesota administrative rules, developmental*

    cognitive disabilities. Stat. 3525.1333 (2007). Retrieved from https://www.revisor.

    mn.gov/rules/?id=3525.1333.

Mittler, J. (2007). Assistive technology and IDEA: Regulations. In C. Warger (Ed.), *Providing access to the curriculum for students with disabilities.* Arlington, VA: Technology and Media Divison (TAM). Retrieved from http://www.tamcec.org/pdf/AssistiveTech %20and%20IDEA%20Regs.pdf.

Mohammedzaheri, F., Koegel, L., Rezaee, M., & Rafiee, S. (2014). A randomized clinical trial between pivotal response training (PRT) and structured applied behavior analysis (ABA) intervention for children with autism. *Journal of Autism & Developmental Disorders, 44,* 2769-2777.

Moore, T., Gilles, E., McComas, J., & Symons, F. (2010). Functional analysis and treatment of self-injurious behaviour in a young child with traumatic brain injury. *Brain Injury, 24,* 1511-1518.

Murphy, C., & Barnes-Holmes, D. (2010). Establishing complex derived manding with children with and without a diagnosis of autism. *Psychological Record, 60,* 489-504.

Raadstake, M., Didden, R., Lang, R., O'Reilly, M., Sigafoos, J., Lancioni, G., … Curfs, L. (2013). Functional analysis and functional communication training in the classroom for three children with Angelman Syndrome. *Journal of Physical and Developmental Disabilities, 25,* 49-63.

Schieltz, K., Wacker, D., Harding, J., Berg, W., Lee, J., & Padilla Dalmau, Y. (2013). An evaluation of manding across functions prior to functional communication training. *Journal of Developmental and Physical Disabilities, 22,* 131-147.

Sigafoos, J. (2006). Self-determination: Can we let the child determine the 'best' treatment? *Pediatric Rehabilitation, 9,* 1-2.

Sigafoos, J. (2010). Introduction to the special issue on augmentative and alternative communication. *Journal of Developmental and Physical Disabilities, 22,* 101-104.

Snell, M., & Brown, F. (2006). *Introduction of students with severe disabilities* (6th ed). Upper Saddle River, NJ: Pearson Education, Inc.

Trent Jr., J. (1995). Suffering fools. *Sciences, 35,* 18-23.

Trottier, N., Kamp, L., & Mirenda, P. (2011). Effects of peer-mediated instruction to teach use of speech-generating devices to students with autism in social game routines. *Augmentative and Alternative Communication, 27,* 26-39.

Walker, V., & Snell, M. (2013). Effects of augmentative and alternative communication on challenging behavior: A meta-analysis. *Augmentative and Alternative Communication, 29*, 117-131.

Zabala, J. (2005). *Using the SETT framework to level the learning field for students with disabilities.* Retrieved from http://www.joyzabala.com/uploads/Zabala_SETT_ Leveling_the_Learning_Field.pdf.