5-2016

Aggressive Behaviors in Students with Autism: A Review of Behavioral Interventions

Angela Cardinal
St. Cloud State University, angela.cardinal19@gmail.com

Aggressive Behaviors in Students with Autism: A Review of Behavioral Interventions

by

Angela Cardinal

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

May, 2016

Starred Paper Committee:
J. Michael Pickle, Chairperson
Mary Beth Noll
Kimberly Schulze
A Starred Paper

Table of Contents

List of Tables

Chapter 1: Introduction

Autism spectrum disorders (ASD) consist of three broad categories of deficits: problems in communication, socialization, and ritualistic and stereotypic behaviors (Prelock, 2005; Rodriguez, Thompson, Stocco, & Schlichenmeyer, 2013). There are also co-occurring problems with ASD that can be debilitating such as deficits in adaptive skills and numerous challenging behaviors (Matson & Cervantes, 2014). One of the most debilitating symptoms of ASD is physically aggressive behavior (Kanne & Mazurek, 2011). Matson and Jang (2014) defined this as "hitting, kicking, punching, hair pulling, property destruction, grabbing clothing, tantrums, spitting, throwing objects, and pushing" (p. 3387).

Regardless of the severity of behavior or disability, all students have the right to receive a free and appropriate education and are entitled to an Individualized Education Plan (IEP) that specifies their needs and goals (Hallahan, Kauffman, & Pullen, 2009; Kanne & Mazurek, 2011). For students with behavioral challenges, a Behavior Intervention Plan (BIP) is included as part of the IEP. The BIP is a "concrete plan of action for reducing the problem behaviors as dictated by the particular needs of the student" (Zirkel, 2011, p. 262) and includes positive and proactive strategies to teach new ways of adaptive behavior. The purpose of this starred paper was to review the literature that evaluates the efficacy of behavioral interventions designed to decrease the aggressive behaviors of students with autism.

Autism Diagnostic Criteria

The Centers for Disease Control and Prevention (CDC; 2015) estimates that 1 in 68 children have been identified with autism, and it occurs five times more frequently in boys than

girls. The diagnosis of autism has increased 123% since 2002 (CDC, 2015). Some attribute this growth to changes in diagnostic criteria and diagnostic substitution (King & Bearman, 2009).

In the 1950s and 1960s, autism was considered a form of *childhood schizophrenia*, and it was thought to be caused by mothers who were emotionally cold to their children (AutismSpeaks.org, 2013). It was not until the 1970s that autism was recognized as a biological disorder (AutismSpeaks.org, 2013), and these advances began to be reflected in the new versions of the American Psychiatric Association's *Diagnostic and Statistical Manual of Mental Disorders* (DSM) (AutismSpeaks.org, 2013). The DSM-III (American Psychiatric Association [APA], 1980) included autism as one of the Disorders of Childhood and Infancy. Although subsequent DSM versions continued to include autism in this category and describe the same general characteristics, over time the specific diagnostic criteria and terminology have changed.

The DSM-III referred to autism as *Infantile Autism* and for the first time, distinguished it from childhood schizophrenia. The DSM-IV (APA, 1994) and DSM-IV-TR (APA, 2000) expanded the definition of autism by designating subcategories of autism disorders under the umbrella of *Pervasive Developmental Disorders* (PDD). These included Autistic Disorder, Asperger's Disorder, and PDD-Not Otherwise Specified.

When the DSM-5 was published in 2013, the autism was changed to *Autism Spectrum Disorders*. Previous subcategories were eliminated, and symptoms were described in two broad areas: persistent deficits in social communication and social interaction across multiple contexts and restrictive, repetitive patterns of behavior, interests, or other activities. Autistic symptoms were rated in terms of the level of support children and youth require: Level 1 = *support,*

Level 2 = *substantial support,* and Level 3 = *very substantial support* (APA, 2013). Individuals at Level 3 have low verbal skills and may engage in maladaptive behaviors such as aggression or self-injurious behaviors. These individuals display aberrant behaviors in all settings, and in a school setting, a Behavior Intervention Plan is developed to address these behaviors.

Behavior Intervention Plans (BIP)

As evident in the Chapter 2 studies, many children with autism exhibit aggressive behaviors. To address these behaviors, positive behaviors supports are detailed in a student's BIP that is based upon information obtained from a functional analysis (FA).

The FA is a systematic process of identifying the purpose and the function of problem behaviors. It provides detailed information regarding the target behavior and target replacement behavior(s) by using indirect and direct methods are used to obtain relevant information. Indirect methods include interviews and record reviews, whereas direct methods include observation and investigation of environmental factors that serve to maintain inappropriate behaviors (Hanley, Jin, Vanselow, & Hanratty, 2014).

The BIP provides recommendations regarding environmental factors, schedules, reinforcement systems, teaching strategies, and responses to problematic behaviors. The BIP may also contain a section describing the use of emergency procedures, also referred to as restrictive procedures. Restrictive procedures are to be used as a last resort and only in the event of an emergency. The Minnesota Department of Education (2015) defined emergency as, "a situation where immediate intervention is needed to protect a child or other individual from physical injury" (p. 20). Education teams are required to document the use of less restrictive

measures in their attempt to redirect the student's behaviors prior to implementing more restrictive procedures. In the next section, some of these interventions are described.

Behavioral Interventions

A variety of behavioral management techniques have been used to reduce aggressive behaviors in children (Hallahan, et al., 2009; Kanne & Mazurek, 2011). These techniques are based upon the behavioral theories of John Watson and B. F. Skinner, who investigated the relationships between stimulus and response (Miller, 2006). Skinner espoused the idea that many behaviors are acquired through operant conditioning--the events taking place before (antecedent) or after (consequence) the behavior (Cooper, Heron, & Heward, 2007). He believed that learning occurred as a function of reinforcement and punishment of behavior. Operant conditioning research has been of particular importance in developing effective intervention strategies for students with autism.

Strategies that are used should be individualized to meet each child's specific needs, and they should be detailed in the student's BIP. The studies in Chapter 2 include a variety of behavioral intervention strategies that have been implemented to address the physically aggressive behaviors of students with autism. In this section, I briefly describe these strategies.

Reinforcement. Skinner, as cited in Miller (2006), formulated the law of reinforcement in 1938 that stated, "a behavior followed by a reinforcer will increase in probability" (p. 2). Maag (2004) defined positive reinforcement as "any stimulus when presented after the occurrence of a behavior that increases the future occurrence of that behavior" (p. 67). He also provided some guidelines for using positive reinforcement: ignore inappropriate behavior, reinforce desired behavior immediately and contingently, reinforce approximations of behavior,

and fade reinforcement from continuous in the beginning to intermittent "after behavior is established" (p. 75).

Negative reinforcement also increases the likelihood of the behavior happening again. Cooper et al. (2007) explained that the frequency of a behavior increases because "past responses have resulted in the withdrawal or termination of a stimulus" (p. 36). In other words, behaviors are reinforced by escaping or avoiding an aversive condition.

Differential reinforcement of alternative behavior (DRA). DRA is used to "increase the frequency of a desirable behaviors and to decrease the frequency of an undesirable behaviors" (Miltenbeger, 2001, p. 273). In this procedure, the preferred behaviors are reinforced, the extant and maladaptive behaviors are not reinforced. In order for DRA procedure to be effective, the desired behavior needs to be reinforced immediately and consistently. Reinforcement needs to be presented each time initially, and then reinforcement can be provided on a more intermittent basis.

Extinction. This behavioral technique involves withholding reinforcement of the behavior, which then reduces or eliminates the behavior. An example of this might be a child who engages in self-injurious behavior in order to gain adult attention. If an adult does not give the child any attention when he or she engages in the behavior, the behavior stops. Initially, when behavior is no longer reinforced, the frequency, intensity, and duration of the behavior typical increases before it eventually stops. This is referred to as *extinction burst* (Miltenberger, 2001).

Functional Communication Training (FCT). This intervention is a form of DRA and "develops an alternative communicative response as an antecedent to diminish the problem

behavior" (Cooper et al., 2007, p. 497). In other words, it is the process of teaching new communication skills to a student who displays challenging behavior and has no other effective means of communicating. Students can be taught to use signs, communication boards, pictures or word cards, among other communication methods.

Token economy. A token economy is a positive reinforcement approach in which tokens are delivered for desired behavior. Tokens are given as soon as possible after a desired behavior occurs, and they are later exchanged for a backup reinforce that is considered to be meaningful for the student (Flora, 2004).

Summary. To address the aggressive behaviors of students with autism, it is recommended that a variety or combination of interventions be used. Regardless of the intervention, it must be delivered consistently in order to create behavior change.

Research Question

This paper examines one research question. What behavioral interventions are effective in reducing the aggressive behavior of students with autism?

Focus of the Paper

The studies in Chapter 2 consist of single subject quantitative studies that examine behavioral, nonmedical interventions. Only studies conducted in the United States were included in this paper. The participants in these studies were students who were between the ages 3-18 years old, who had a diagnosis of autism, and who engaged in physically aggressive behavior. All of the participants in the Chapter 2 studies were diagnosed using DSM-IV or DSM IV-TR criteria.

Some keywords and combinations of keywords that I used to search for studies using Academic Search Premier and PsycINFO include: *aggression, behavioral interventions, behavior intervention plan, autism, restrictive procedures, positive behavior intervention supports.* I also reviewed the tables of contents in of the J*ournal of Applied Behavior Analysis* and *the Journal of Autism and Developmental Disabilities* for studies related to interventions for aggression in students with autism.

Importance of the Topic

Students with limited conversational skills may communicate their wants and needs in the form of maladaptive behaviors (behaviors that are undesired) such as crying, screaming, sitting down and refusing to do work, but also in the form of property destruction (ripping up work, throwing objects, tipping furniture) or aggression (e.g., hitting, kicking, biting, pulling hair, slapping). A BIP allows for consistent staff responses to maladaptive behaviors and allows for teaching replacement behaviors. Teaching students how to communication their wants, needs, and desires appropriately can decrease the maladaptive behaviors. A decrease in maladaptive behaviors will decrease the chances of injury to the students themselves, staff, or other students.

I currently teach in a Federal Setting 4 program called Reaching Independence through Structured Environments (RISE) program at the SouthWest Metro Educational Cooperative. This program provides services for students who exhibit maladaptive behaviors such as property destruction and aggression. Occasionally, students' behavior becomes dangerous to themselves or the staff and restrictive procedures are applied. However, such restrictive procedures are used only as a last resort. The team works heavily on behavior modifications, through the use of BIPs, to provide highly structured and consistent responses to maladaptive behaviors. To

effectively reduce the use of restrictive procedures and staff injuries, the team needs to expand their knowledge of different behavioral interventions for students with autism who engaged in aggressive behavior.

Definitions

Contingent movement: a procedure that requires a participant to "perform a behavior that is not topographically related to the misbehavior" (Maag, 2004, p. 405.)

Discriminatory stimulus (S^D): "stimulus that is presented when a particular behavior is reinforced" (Miltenberger, 2001, p. 492).

*Echolali*a*:* a "parrot-like repetition of what is heard often involves repetition." (Schoenbrodt, 2004, p. 73) and "is generally viewed as a communicative strategy in the absence of consistent, spontaneous verbal expression" (Schoenbrodt, 2004, p. 131).

Functional Behavior Assessment (FBA): systematic process of identifying the purpose and the function of problem behaviors (Hanley et al., 2014).

Generalization: application of skills occurring outside of a training situation (Maag, 2004). Students practice specific skills in a controlled setting until they are mastered, and then the skills are practiced outside of the controlled setting.

Mands: a type of verbal operant in which a speaker asks for what he needs or wants and is reinforced by receiving their request. Specific reinforcement also strengthens the mand and is directly related to the motivational operative (reason for the behavior) (Cooper et al., 2007, p. 530).

Overcorrection: having participants "repeatedly practice a positive behavior contingent on the performance of an inappropriate behavior" (Maag, 2004, p. 413). Foxx and Meindl

(2007) used the example, “if a student over turns a chair, he was required to not only straighten his own chair, but also to rearrange all the chairs and tables in the classroom” (p. 90).

Pronominal reversal: referring to oneself as “he,” “she,” or “you.”

Response cost: the loss of a reinforcer, a form of negative punishment (Cooper et al., 2007). Often presented in the form of the loss of one of the participant’s tokens in a token economy reinforcement system.

Stimulus delta (S^{Δ}*):* “a stimulus in the presence of which a given behavior has not produced reinforcement in the past” (Cooper et al., 2007, p. 705).

Chapter 2: Review of the Literature

This chapter reviews literature that examines the effectiveness of behavioral interventions designed to decrease aggressive and challenging behaviors of children with autism. Ten studies are presented in this chapter in chronological order that contain one or more of the interventions described in the previous chapter.

Behavioral Intervention Studies

Foxx and Garito (2007) developed a program to reduce aggressive and dangerous and disruptive behaviors of a 12-year-old boy with autism. Ned was a Romanian orphan adopted at age 2 by American parents. In the orphanage he was kept in a "cage like enclosure and fed from a communal baby bottle" (p. 70). Ned initially showed no response to verbal stimuli after adoption. Due to his severe behaviors, he was enrolled in several specialized school programs, and at the time of the study, he had just been discharged from an inpatient facility. The treatment program staff worked with the school district staff and his parents to implement a treatment program.

The study consisted of four phases to address six target behaviors: aggression, self-injury, dangerous behavior, disruptive behavior, induced vomiting, and inappropriate toileting. Baseline was conducted in 4 months, and the program was presented in 15-min segments called *Ned's way* and *our way*. During *Ned's way* an orange card was presented as the discriminatory stimulus (S^D), and he could have access to any reinforcer he wanted for 5 min by choosing it from a book. During *our way*, a green card was presented as a stimulus delta (S^Δ). During this time he was expected to comply for 10 min with staff or parent requests using a three-step guided compliance procedure: verbal, gestural, and physical prompting. He received praise

when he complied with either verbal or gestural prompting. Treatment was provided in a small classroom with Ned, teacher, a teacher's aide to report data, and a therapeutic support staff (TSS) from a human services agency. Foxx and Garito (2007) reported that Phase 1 was not implemented due to numerous attacks on peers and injuries to staff. They identified six target behaviors: aggression, self-injury, dangerous behavior, disruptive behavior, induced vomiting, and inappropriate toileting. During baseline, Ned engaged in destruction to furniture, disrobing and flushing clothing down the toilet, urination, bowel movements, and vomiting. He also removed 11 teeth, including three permanent ones. Due to the severity of these behaviors and attack on peers and staff, and he was removed from school to implement Phase 2 in another setting.

Phase 2 was initially implemented at his home and later transferred to a small room at his church. The special education teacher, teacher's aide, and TSS delivered treatment that consisted of differential reinforcement of alternative behavior (DRA) and token economy program for compliance with classroom rules. A response cost program was incorporated to the token economy. Crisis intervention procedures were implemented upon occurrence of aggression or self-injurious behavior (SIB). Physical restraint was employed as a last resort. An additional 15 min of instructional time was added as his behaviors improved.

During Phase 3 the program was implemented from June of 2004 to February, 2006, and initially continued at the church with a different special education teacher, the second author, a board certified behavior analyst, and the same TSS. In addition to the church treatment was also implemented in various community locations including the school playground. By the 5th month

of Phase 3 he was attended the program for a full day. The same reinforcement system was implemented along with a more complex token system.

Even though he was in a highly reinforcing environment, he continued to display target behaviors. Researchers added three procedures to address these behaviors: contingent physical exercise, overcorrection, and contingent movement. When Ned engaged in aggressive behavior, he was moved to an area to complete an exercise for a 15-min period. If he was aggressive during the exercise, he completed another exercise period and lost access to reinforcers. When he engaged in vomiting, inappropriate toileting, or noncompliance, an overcorrection/positive practice/restitution procedure was applied. Specifically, when he disturbed the environment he was required to extensively clean it. When he mishandled objects he was guided to handle them appropriately. Inappropriate toileting was addressed with overcorrection, and noncompliance resulted in repeatedly correct practice with no reinforcement. Contingent movement was applied when he made loud or prolonged noises. This consisted of having him run back and forth in the hallway outside of the room.

During Phase 4 Ned was moved to a small classroom in the different primary school in the same district. Staffing was the same as baseline.

To analyze program outcomes, the six target behaviors were combined into one target category called *severe behavior*. Percentage results show that Ned's behaviors were reduced and maintained for 2 years. During baseline, severe behavior increased from fewer than 40 daily to 110 occurrences per day. During Phase 2, severe behaviors decreased dramatically initially but began to trend upward, which showed that change in location and increases in reinforcement were not effective. The daily rate of severe behavior decreased quickly in Phase 3 when

aggression was treated with negative consequences. By the end of Phase 3, all six target behaviors were reduced by a range of 88-100%. Phase 4 results showed that all six target behaviors were reduced by more than 95%, and three remained at 0%.

Foxx and Garito (2007) attributed the success of this program to 10 different factors. These included the fact that Ned learned to display alternate and appropriate behaviors in order to access preferred reinforcers and that he was no longer able to escape from educational and social demands. The increasing complexity of the program in response to behavior changes and intense parental and school district involvement were critical in the program's success.

Foxx and Meindl (2007) created a program that included a "high density of positive reinforcement, tokens, choice making, response cost, overcorrection, and physical restraint" (p. 83) to address the aggressive and destructive behaviors of a 13-year-old-boy with autism. Johnny lived at home with his parents and one older sister and communicated through the use of single word requests or gestures or taking the item. Johnny's aggression included hitting, kicking, pinching, biting, head butting, and using objects as weapons. Results of a functional analysis showed that these behaviors served primarily to escape demands or to obtain desired items. Due to the severity of his behaviors, the school was considering a change in placement from his self-contained classroom to a residential program.

Baseline data were collected for 3 months and consisted of the number of times each behavior occurred throughout his day, antecedent and consequence data, and descriptive behavioral reports. During baseline, Johnny's were ignored or he was redirected to engage in appropriate behavior. Aggressive and destructive behaviors averaged 102 incidents per day.

Johnny was moved to a new school to begin his intensive intervention plan. He was the only student in a 30' x 30' classroom containing tables, chairs, academic materials, and what parents identified as highly reinforced items, a DVD player and computer. The five elements of Johnny's intervention plan are described briefly in Table 1.

Table 1

Johnny's Intervention Plan

Token Economy System	This system was used only during 1:1 instructional time. Pictures of highly preferred items were placed in a large folder and give a price. The cost of the item initially all started at five tokens to increase Johnny's access to them. The cost of the items increased appropriately as success allowed and the behaviors improved; tokens were given for correct responses and appropriate behavior.
Differential Reinforcement of Other Behavior (DRO)	For every 5-min interval that Johnny did not engage in aggressive or destructive behavior, he was reinforced with a token (separate from system just described). When five tokens were earned, Johnny could turn them in for a highly reinforced activity. As success allowed, interval length and the required number of tokens increased.
Response Cost	When Johnny engaged in a target behavior, one token was removed. If the target behavior occurred during a reinforcement activity, the activity ended and work sessions resumed--allowing him the opportunity to earn tokens.
Overcorrection	Whenever Johnny turned over or threw objects in the room, he was required to not only pick up the overturned objects but also straighten up the entire room.
Physical Restraint	When Johnny engaged in aggressive or destructive behaviors escalated to the point where he "posed a danger to himself or others" (p. 90), he was restrained on a mat in a supine position. One staff held each arm and a third staff held the legs.

Aggressive and destructive behaviors were reduced by 95% from an average of 102 incidents per day to an average of 5.06 incidents per day within the first month of the intervention. By the 6th month, Johnny's behaviors were reduced to 0.29 incidents or near-zero level where it remained for another 6 months. Physical restraint was used nine times on the first day for a total of 180 min, five times on day 2 totaling 47 min, one time on day 3 totaling 14 min, zero times on day 4, and twice on day 5 totaling 14 min. Physical restraint occurred six times on different days during the remainder of the first month, with an average duration of 23

min. Six restraints were used in the last 10 months of treatment; however, no restraint was used during the last 7 of 8 months.

Results showed that Johnny's aggressive and destructive behaviors were quickly and successfully treated by this intervention and were maintained for 1 year. A review of previous interventions that were ineffective supported the use of restrictive procedures, response cost, and overcorrection as less restrictive measures. As success allowed and as Johnny took responsibility for his behaviors, his environment became less restrictive.

Lomas, Fisher, and Kelley (2010) delivered a preferred item and variable praise to determine the extent to which they could reduce problem behavior maintained by escape. Participants included two boys with autism who were in an intensive day treatment program. Aaron was 8 years old and Mark was 9 years old. A third boy participated in the study, but was excluded from review because he was diagnosed with Asperger's disorder. Both boys displayed aggressive and destructive behaviors. The 5-min sessions were conducted in a small padded room that contained tables, chairs, and program materials. A functional analysis procedure and an ABAB reversal design were employed as part of the study. Trained observers recorded target responses that included problem behavior and rate of demands and compliance.

A multi-element design as used for functional analysis, and a ABAB reversal design was used. A functional behavior analysis was conducted with each child. Once the functions of the behaviors were established, reinforcers were identified. Aaron identified a small toy car, and Mark identified various tangible items. The boys also identified a small edible reinforcer. The edible reinforcer was to be given in the demand setting, whereas the other reinforcers were used during the tangible condition.

The study consisted of three phases: baseline, tangible condition, and demand setting. The demand condition was identical to baseline. In the demand setting, the therapist presented sequential verbal, gestural, and physical prompts every 10 s within each trial until the participant completed the task or until the problem behavior occurred. Each trial was initiated when the participant has completed the previous task. If a problem behavior occurred during a trial, all prompting ceased for 20 s. Sessions in the demand condition were identical, with the exception of the therapist delivering a small, highly preferred edible item and verbal praise that was unrelated to the task or demand using a 15-s variable-timed (VT) schedule. Participants had access to their predetermined preferred activity for 2 min prior to the tangible session. When the tangible session began, the item was withdrawn and returned for 20 s and returned contingent upon occurrence of problem behavior. In so doing, the tangible condition served as the control condition.

Mark displayed elevated rates of problem behavior in the demand condition (an average of 1.1 occurrences per min) and low levels of problem behavior in the tangible condition (an average of 0.1 occurrences per min), suggesting that his problem behavior was reinforced by escape from the task. Aaron engaged in elevated rates of problem behavior in only the demand and tangible conditions (an average of 1.6 and 2.1 occurrences per min respectively), indicating his behaviors were reinforced by both gaining access to tangible items and escape of the demand.

Both participants displayed problem behaviors that were maintained by escape of the demand. Delivering a small edible and verbal praise at VT intervals during a demand setting reduced the problem behaviors in all three participants, and even increased compliance in one. The participants rarely accessed escape when the therapist delivered an edible item in VT

intervals. The preferred food item and verbal praise were effective in decreasing escape-reinforced problem behavior and increasing participants' compliance.

One limitation of the study is that because the food and praise were delivered simultaneously, it cannot be determined if one or the other would have been sufficient in manipulating the antecedent. It should be noted that behavior specific verbal praise was given contingent upon participants' compliance. This means that if the participants were motivated by the verbal praise and attention, compliance rates should have increased and the problem behaviors should have decreased during baseline. This was not observed.

Fischetti et al. (2012) conducted a study of three children with autism. Alfonso was 11 years old; Tino and Neroli were 9 years old. They engaged in noncompliant and problem behaviors (e.g., aggression, screaming, disruption, running away, verbal protests) when asked to terminate a preferred toy. Compliance was defined as "initiating within 10 s and following within 15 s of the verbal instruction" (p. 860). The five types of interventions are displayed in Table 2. Once a specific intervention had been identified and successful with a participant, the researchers increased the distance of the toy bin by 0.9 m until it matched the toy bin in baseline.

Table 2

Types of Interventions

General Procedure	1-min trials consisting of 30-s pre-instruction period, the presentation of the instruction, and a 30-s post-instruction period. Therapist would say, "[child's name] put the [toy] in the bucket." Upon compliance, the therapist would say, "Thank you." Noncompliance resulted in the child retaining access to the toy.
Reduction in response effort	The researchers manipulated the distance of the toy bin relative to the child at 0.3 m and 3.0 m. The general procedure was used; if the child relinquish the toy, the therapist did not return the toy for the remainder of the 1-min trial. Upon completion of the 1-min interval, the therapist returned the toy to the play area, never directly back to the child.
Differential reinforcement plus effort reduction	Identical to response-effort condition, except that the therapist delivered a small piece of preferred edible item contingent on compliance.
Guided compliance plus effort reduction	Two-step process identical to response-effort condition, except noncompliance with initial instruction after 10 s resulted in repeating the instruction while using hand-over-hand guidance to help the child place the toy in the bin. If the child complied with the initial instruction within 10 s the therapist said, "Thank you" and the toy remained in the bin for the remainder of the interval.
Guided compliance plus differential reinforcement plus effort reduction	This condition was identical to guided compliance except the therapist provided a preferred edible while simultaneously saying, "Thank you" when the child complied with the initial task.

Results of the study showed that reduction in effort alone was not sufficient to influence Alfonzo's levels of compliance. Compliance immediately increased (M = 94%) when differential reinforcement was added. The researchers observed an increase in problem behavior when the toy bin was moved from 0.3 m away to 1.2 m away, and they had to increase the distance of the toy bin slowly from 0.3 m away to 0.91 m away to gain compliance.

Tino's results were sensitive to a reduction in response effort. During baseline, Tino's levels of compliance were low (M = 8%) and increased during the reduced response effort condition (M = 87%). This result was replicated when the researchers returned Tino to baseline (M = 0%) and increased again during reduced effort condition (M = 90%). The bin distance was

increased more gradually, and compliance was highly variable. Therefore, the addition of differential reinforcement was implemented, and distance faded successfully.

Neroli responded similarly to Alfonzo in that reduction of response effort did not influence compliance. Implementation of differential reinforcement resulted in highly variable levels of compliance (M = 27%; ranging from 0-40%). The combination of guided compliance plus differential reinforcement increased compliance to M = 73%. When replicated, the toy bin was increased successfully and compliance was maintained at M = 100%.

Fischetti et al. (2012) emphasized the need for individualized instructions by stating, "clearly what is effective for one child may be ineffective for another" (p. 863). Reducing the response effort (moving the bin closer) was effective for only one participant (Tino). In addition to moving the bin closer, guided compliance was necessary for Alfonso. Neroli needed both guided compliance and differential reinforcement to comply with the task.

Falcomata, Muething, Gainey, Hoffman, and Fragale (2013) evaluated functional communication training (FCT) and reinforcement schedule for treatment of aggression (defined as hitting, grabbing, throwing objects at people, and pinching) and disruption (inappropriate vocalizations, throwing objects, and destroying academic work) in a 7-year-old boy diagnosed with autism. Falcomata et.al noted that even though Alonzo had approximately 100 words in his vocal/verbal repertoire at the time of the study, he was not using his communicative skills to access attention, access preferred activities, or access breaks from a non-preferred activity. This review excludes results of a 12-year-old boy who was diagnosed with Asperger's disorder, as he does not meet the eligibility criteria for study participants in this paper.

In Phase 1 of the study the authors conducted: (a) a preference assessment to determine low- and high-preferred activities, and (b) a functional analysis consisting of four or five 5-min conditions including escape, attention, tangible, ignore, and free play. In the escape condition, an academic task was presented with vocal, gestural, and physical prompting. When Alonzo engaged in a challenging behavior, a 30 s break from the task was provided. In the attention condition, the therapist provided 1-min of attention before beginning the work session. During the work session, Alonzo was provided with low-preferred activities. The therapists diverted his attention until Alonzo engaged in challenging behavior, in which 30 s of attention was provided. Alonzo had access to highly preferred activities for 1 min before the tangible session. When the tangible session started, low-preference activities were provided, and access to highly preferred activities was restricted 30 s after Alonzo engaged in challenging behavior. The therapist presented no stimuli or attention during the ignore condition. During free play, Alonzo had access to the therapist's attention and highly preferred activities with no demands, and all challenging behavior was ignored. The functional analysis determined that Alonzo's challenging behaviors served multiple functions: escape of an undesired task, access to a tangible item, and attention from the therapist.

Phase 2 of the study was implemented to "establish and reinforce mands for the wristbands, and incorporate delays to reinforcement for the purpose of modifying the procedure to a chained schedule" (Falcomata et al., 2013, p. 730). During baseline condition, the therapist provided Alonzo with 1 min of attention and access to a highly preferred activity—with no demands. When baseline session started the therapist removed access to the highly preferred activities, told Alonzo, "It is time to work," while presenting him with academic work, diverting

his attention away from him, and providing a gestural prompt to begin the task. Work materials were removed for 30 s when Alonzo engaged in challenging behavior, and he gained access to a highly preferred activities and attention from the therapist for 30 s.

Several training trials were conducted to identify and implement a stimulus delta (S^D) as a wristband for which the mand was taught (i.e., "wristband, please"). The 1-min prior to training sessions was similar to baseline. When the session began, the therapist had the wristband and said, "I have the wristband, it is time to put down the (highly-preferred item) and work. If you want the wristband you will need to ask for it" (Falcomata et al., 2013, pp. 731-732). The therapist then removed the highly preferred activities and presented a work task. The only attention given was a gestural prompt to begin working. Contingent upon Alonzo stating the target mands (i.e., "wristband please"), the therapist removed the wristband, placed it on Alonzo's arm, removed the academic task, and provided attention and access to a highly-preferred activity for a 30-s interval. At the end of the 30 sec, the therapist took back the wristband and again presented the academic task.

Falcomata et al. (2013) eventually modified Phase 2 of the FCT to incorporate delays of 5-min. These sessions were similar to FCT sessions except that the timer was set for 5 min, the therapist wore the wristband the entire time, and each of the antecedents for challenging behavior was programmed to be present for the entire time. If Alonzo exhibited off-task behavior for 5 sec, a small gestural prompt was given. If the off-task behavior continued for another 5 sec, the timer was stopped. When Alonzo said, "Wristband please" following the interval timer, he was give immediate access to the wristband and 30 s of "escape, attention, and access to highly-preferred activities" (p. 732).

Results of the treatment suggested FCT was effective. During baseline, Alonzo's challenging behavior occurred at a rate of 1.3 responses per min (RPM), and he engaged in zero levels of mands for the wristband or functional reinforcers. In the initial FCT, Alonzo exhibited zero levels of challenging behaviors and elevated mands at rate of 2 RPM. During delay thinning, Alonzo engaged in low levels of challenging behavior at a rate of 0.03 RPM and elevated mands at a rate of .05 RPM. Alonzo exhibited zero levels of mands for specific functional reinforcers throughout the FCT condition. Alonzo's mands for the wristband effectively replaced his aggressive and disruptive behavior for accessing attention, escape, and access to preferred activities. However, specific mands for specific functional reinforcers were not promoted, and care providers were required to provide all functional reinforcers simultaneously.

In Phase 3, the authors modified the procedures and incorporated a chained schedule component by promoting specific mands for specific functional reinforcers to alleviate the need to deliver all simultaneously. Baseline was identical to that described in Phase 2; the 1-min interval prior to the session was also identical. The sessions contained two components. During the first component mands for the wristband (after initial 5-min of work) were reinforced on a fixed interval (FI) 5-min schedule of reinforcement. During the second component, when Alzono had possession of the wristband, mands for specific functional reinforcers: escape (e.g., "I want a break"), attention (e.g., "I want you to play with me"), and access to preferred activities (e.g., "I want computer") that occurred after the initial 5-min interval of work were reinforced on a concurrent fixed ratio (FR) schedule of FR-1.

The results of Phase 3 suggested that the use of FCT and chained schedules of reinforcement that consisted of requesting access to specific reinforcers decreased rates of Alonzo's challenging behaviors from baseline of 1.2 RPM to 0.6 RPM. This combination also resulted in varied elevated mands for the wristband: escape = 0.2 RPM; access to highly preferred activity = 0.2 RPM. Alonzo made only one mand for attention; this was observed during one session.

Although Falcomata et al. (2013) determined that FCT treatment and chained schedule of reinforcement were effective at treating challenging behaviors that served multiple functions, the study had several limitations. First, the treatment structure did not address situations in which one or more identified functional reinforcers were not available, and targeted work tasks involved minimal attention from the therapist to complete. It was also difficult to determine the cause of emergence of mands for specific functional reinforcers (e.g., "I want a break." or "I want you to play with me") during the baseline conditions because mands for preferred items during baseline co-occurred with challenging behaviors.

Wacker et al. (2013) conducted a study on functional communication training for parents of 17 children diagnosed with autism spectrum disorders who displayed problem behaviors. Five of the subjects in this study met the criteria for this literature review and ranged in age from 56-80 months. Their parents served as therapists, although they had no formal training in behavior treatment prior to their participation in this study. The parents received coaching from a behavior consultant using a personal computer-based program and webcam through the University of Iowa's Children's Hospital. An assistant recorded parent data.

Problem behaviors included aggression, self-injury, property destruction, screaming, elopement, repetitive behavior, and dangerous behavior. An FCT was conducted weekly for 60 min for each child, and all programs consisted of FCT for escape and tangible conditions. Problem behavior was recorded using a 6-s interval.

FCT escape. Child 1 was first taught to comply with a demand and then mand for a break to play. The parents played with their child for 20 to 30 s, and then showed him a picture/word card that said "work" and the verbal prompt, "It's time for work. When we are done you can play." Specific verbal instructions were presented. The parent praised the child if he completed the task. If the child did not complete the task, hand-over-hand guidance was provided, and then another task was presented without physical assistance. The child was required to complete the task independently before receiving praise and giving him the opportunity to mand for a break. Work tasks increased to 10 work tasks as success allowed, and 1 child was able to increase to 20 work tasks.

Once the work task was completed, the parent presented a "play" card and a verbal prompt of "Do you want to do more work or play?" If the child generated the appropriate mand, he was praised and received a 1- to 2-min break to play with toys and the parent. If the child did not generate the appropriate mand, the parent prompted, "Say 'play,'" or "touch the card if you want to play," and hand-over-hand guidance was used. Problem behaviors presented during work sessions were blocked and did not provide escape from the work task. Problem behaviors presented during the break resulted in the break ending and returning to work.

FCT tangible. Child 2 received FCT tangible training, which involved the child requesting toys after having to wait for increasing periods of time. The session began with the

parent providing 20 to 30 s of access to the toys while receiving attention from their parents. The parents then blocked access to the toy for a specific period of time and required the child to generate the mand "more." A timer was used to indicate how long the child needed to wait before the mand would be honored. When the timer sounded, the child was prompted to mand for the toy—often by saying, "When we're done playing, you can play." Wait time increased from 2 s to 2 min over the course of the treatment. The target behavior presented during wait times was blocked, and the child did not gain access to the toy. Problem behaviors presented during play times resulted in the ending of play and the beginning of a wait time. Results indicated that it took an average of 16 sessions to reach 90% reduction in problem behaviors, compared to an average of 25.5 sessions in an earlier study by the authors. Four participants participated in FCT escape conditions with problem behaviors being present in 6.67% of intervals to 21.33% of intervals. One child participated in the FCT tangible session with problem behavior being present in 18% of intervals. By the end of the treatment all five participants reduced their problem behaviors by 100%.

Hanley et al. (2014) conducted a study with a goal to decrease problem behaviors and increase the amount of time two boys with autism would comply with adult instruction. Dale was 11 years old, and Bob was 8 years old. Dale was reported to have trouble tolerating periods of time when adults did not honor his request. This was especially true when adults interrupted his preferred activity with a directive to complete a different task. Because of this, Dale was rarely required to engage in adult-led activities to avoid problem behaviors. Bob had trouble regulating his emotions when adults said "no." He engaged in "meltdowns" (screaming and

aggression) when his iPad time was interrupted or terminated, when teachers corrected his math work, or when he was directed to a non-preferred academic activity.

Functional analysis and treatment sessions were conducted in a therapy room (4 m by 3 m) with materials needed. Visits for treatment occurred 3 to 4 days per week, and sessions were conducted three to six times per visit. Session duration for Dale was 5 min, which increased to 10 min halfway through his assessment. Session duration for Bob was 4 min and increased to 6 min halfway through his assessment. From an open-ended functional assessment interview, a functional analysis was conducted to test reinforcement contingencies. In the control condition, the reinforcers were available throughout the session. During each test condition, the reinforcers were removed every 30 s and returned only contingent on problem behavior. Various materials were accessible across each corresponding test and control conditions, and reinforcers that were not suspected as part of the control contingency were available non-contingently in both control and test sessions.

Results from Dale's functional assessment suggested that problem behaviors occurred primarily in response to adults interrupting his activities or denying his requests. In the control session, Dale was given uninterrupted access to the activities of his choosing, no demands were made, and the analyst honored all reasonable requests. In the test condition, the analyst interrupted the ongoing activity initiated by Dale and instructed him to complete homework. A three-step prompting system was used to promote compliance. Praise was delivered upon compliance. However, the occurrence of problem behavior resulted in the removal of demands and access to the activity he originally initiated. Test conditions did not isolate attention, escape,

or tangible separately because the functional analysis revealed they often occurred simultaneously.

Bob's functional assessment suggested that his problem behavior was elicited when adults interrupted or redirected his play or corrected his math work. He typically engaged in behaviors to obtain his iPad or math workbook. In the control conditions, Bob was allowed to play with his iPad or solve math problems. The adult was present and commented, but did not interrupt, redirect, or correct him. In the test conditions, the analyst interrupted and redirected Bob's iPad play or interrupted, redirected, or corrected his math problems. When problem behaviors occurred, the analyst immediately stopped and allowed Bob 30 s to play with his iPad or answer math problems how he wished.

Treatment for the two boys consisted of six phases. Phase 1 involved teaching a simple Functional Communication Response (FCR) to replace problem behavior. The FCR "my way please" was taught to Dale and Bob to terminate adult instruction and regain access to preferred activities. If Dale or Bob did not engage in the response within 5 s, the adult verbally prompted the response.

After Dale and Bob demonstrated independence in the FCR for at least two sessions, Phase 2 began and focused on increasing the complexity of the FCR. The complex FCR taught the boys to slowly and softly say "excuse me" while making eye contact with an adult and to wait for acknowledgement before slowly and softly requesting an item by stating "May I have ____, please?" Access to reinforcers was withheld if problem behaviors occurred.

Phase 3 consisted of an adult introducing delays and denials and teaching a specific response by saying "no" or "not now" at a rate of 3 for every 5 FCRs. This condition was

created to further support the reinforcement contingency determined from the functional assessment. During this phase the child used the FCR and the analyst denied access. If the problem behavior occurred after the denial, the analyst granted access to the item, further demonstrating that the child would engage in the behavior to obtain access to an item.

During Phase 4, the participants chained simple responses such as "okay" during denial- and delay-tolerant training. Three of every five FCRs resulted in a denial or delay, and the child was to take a breath and say "okay" while looking at the adult. The requested reinforcer was provided immediately.

During Phase 5, the boys chained more difficult responses during denial-and-delay-tolerance training. Delay of the reinforcer was extended as success allowed and required Dale to comply with adult instructions and Bob to tolerate redirection. Phase 6 was developed to evaluate generalization of the treatment outside of the sessions. Parents were coached on implementation of treatment.

Results of the study determined that when Dale was allowed to engage in a preferred item uninterrupted, his problem behaviors were near or at zero levels. The authors reported that Dale's functions were loosely translated to getting "his way." Bob's problem behaviors were maintained in a similar manner and also by ceasing adult interruption and prompts. The test conditions and functional analysis served as a baseline. Functional Communication Response resulted in immediate elimination of problem behavior for both Dale and Bob. Dale's FCRs, tolerance responses, and compliance persisted despite the fact that his requests were only honored about 40% of the time. Bob appeared to generalize the extinction of his problem behavior from the math context to the iPad context through the use of FCR. The generalization

appeared in reverse order. That is, despite having "his way" only 20% of the time, Bob's problem behaviors were at zero levels. In addition, he was consistently engaged in the task at hand and exhibited complex FCR and tolerance responses.

Dupuis, Lerman, Tsami, and Shireman (2015) conducted a multiple baseline study with a 6-year-old boy with autism who engaged in severe aggression in the presence of specific sounds. The FA was conducted using noise and tangible conditions and determined the highest levels of aggression occurred in the tangible (toys) and escape (noise) conditions. The highest levels of aggression occurred in response to the therapist singing "Wheels on the Bus" even when presented a low levels. The lowest level of aggression occurred in the lowest levels of sound at 30 dB and 60 dB.

The intervention introduced a gradual reduction of aggression at 30 dB with the first sound. Aggression increased during reversals to baseline and remained low as the sound was increased to 75 dB and replaced with live singing. Similar results were maintained for the remaining two sounds and as the reinforcement schedule was thinned.

This study showed that positive reinforcement decreased problem behavior maintained by negative reinforcement. The researchers discovered that one song ("Wheels on the Bus") evoked problem behaviors even when presented at low audible levels. This intervention was extended to circle time when children and adults sang songs. At the 3-month follow-up data collection, Brandon received one small piece of food every min, and no aggression was reported.

Saini, Greer, and Fisher (2015) conducted a series of studies to address the aggressive behavior of Isaac, a nonverbal 5-year-old boy with autism and multiple severe behaviors including pica, coprophasia (the eating of feces), and scratching and pinching others. All studies

were conducted in small therapy room that allowed for behavior observation and environmental control. All observations lasted 5 min, and data were collected on the frequency on aggression, disruption, and duration of time interacted with preferred items. Interobserver agreement ranged from 94-100%. Highly trained staff conducted all session due to the nature of his aggressive behavior.

Study 1. An FA was conducted in four conditions to test if the problem behavior was maintained by escape of instruction, access to adult attention, access to preferred tangible items, or toy play. Rates of aggression and disruption were compared to response rates during a control condition that contained no instruction and allowed continuous attention and access to preferred items. Results showed moderate of high levels of behavior in all conditions except toy play, which showed increased levels of responding. Researchers determined disruption was maintained by automatic reinforcement, and aggression served no clear function across all conditions.

Study 2. An FA of aggression was conducted to test whether aggression was maintained by escape attention, or automatic reinforcement. During the test for aggression maintained by social escape, Isaac levels of aggression decreased form a mean of 0.9 responses per minute to 0.2 responses per minute. The removal of the therapist contingent upon aggression decreased aggressive responses.

During the ignore condition, Isaac engaged in moderately consistent levels of aggression (M = 2.7 responses per min). When no consequence was provided for aggression he continued to aggress towards the therapist. According to the authors, continued social interaction may elicit

aggression, attention may function as a reinforcer, and therapist removal may function as a punisher.

Study 3. The authors hypothesized that aggression was automatically reinforced by the sensory consequence of scratching or pinching. The therapist's skin was covered by thick fabric, and to ensure that his aggressive responses were not maintained by reactions, continuous attention was provided across all three sessions. During the final two conditions in Study 3, Isaac was provided access to different areas of exposed skin of the therapists to determined response to exposed and covered areas.

Results revealed that when the body part was exposed Isaac engaged in moderate levels of aggression (*M* = 2.1 responses per min). Aggression decreased when skin was covered (*M* = 0.5 responses per minute). When skin was again made available, aggression increased (*M* = 4.0) and decreased when skin was covered (*M* = 0.5). These results suggest that sensory consequences maintained pinching and scratching behaviors.

Study 4. The fourth study evaluated the ability of 13 other items to compete with aggression during three conditions: ignore, competing items (CI), and competing items with response cost (CI+RC). During the two ignore baseline phases, Isaac engaged in moderate to high levels of aggression (*M* = 3.4 responses per min). When competing items were introduced, aggression decreased to zero levels and item interaction was high (*M* = 97.8%). During the two CI phases, aggression reduced to zero or near zero, and item interaction was high (range from *M* = 94.1-97.8%). When response cost was added, aggression again decreased to near zero, and item interaction remained at the same high levels. When response cost was removed, aggression

levels decreased to $M = 0.9$ responses per min during the final three sessions, even though he remained highly engaged with repeating items.

This study demonstrated the benefit of combining various approaches to clarify FA results. The primary finding of this study was that aggression was maintained by automatic reinforcement. The authors indicated this was reported only in three other cases. Although Isaac's pinching and scratching were maintained by automatic reinforcement, researchers were unable to identify the primary reinforcement source.

Slocum and Vollmer (2015) compared functional (escape) and nonfunctional (edible) reinforcers in the treatment of escape-maintained problem behavior for two boys diagnosed with autism. Although three other participants were included in this study, they are not addressed in this summary because they meet the eligibility criteria specified for this Starred Paper review. Braiden was a 4-year-old boy who communicated with gestures and a few modified words and also engaged in hitting, kicking, biting, and scratching behaviors. Stephen, a 7-year-old boy who could not speak vocally but used a few sign approximations to communicate his needs, engaged in grabbing, hair pulling, and pinching behaviors. Experiments were conducted in a small room with a one-way observer window, and interobserver agreements averaged between 96-97% for both boys. Table 3 presents the findings of a functional analysis of the five conditions performed in the study.

Table 3

Functional Analysis Conditions

No interaction	Participant and experimenter alone in a room with no other materials. Experimenter did not engage with the participant or provide any programmed consequences for problem behavior.
Attention	Participant and experimenter in a room with materials such as a book. The participant had continuous access to a moderately preferred tangible. Session began with the experimenter saying, "I have work to do, play with your toy." Contingent on any instance of problem behavior the experimenter would provide brief reprimand (e.g., "Don't do that," "That hurts; ouch!"
Tangible	Before the start of the tangible session, the participant briefly interacted with a preferred leisure activity or an edible item. The experimenter removed the item at the start of the session. Contingent upon problem behavior, the participant was provided 20 to 30 s of the leisurely activity or with a single piece of the edible.
Play (control)	Experimenters provided continuous access to a highly preferred tangible item and continuous access to attention from the experimenter. No demands were placed, and no consequences were provided.
Demand	Experimenter delivered instruction continuously throughout these sessions using a three step least-to-most prompting procedure. Instruction began with a vocal instruction, and brief praise contingent upon correct completion. If the participant gave an incorrect response, or no response (within 3 s) the experimenter would again provide verbal instruction and modeled correct behavior, with praise contingent upon completion. If the participant gave an incorrect response, or no response (within 3 s), the experimenter would repeat the verbal instruction and physically guide the participant to complete the instruction. If problem behavior occurred any point during instruction the examiner provided 30 s of escape.

The authors compared the positive and negative reinforcement for compliance to treat problem behavior that was maintained by escape using a reversal design embedded within a multi-element design. Baseline was identical to the demand condition, except that a 3-s intertrial interval was incorporated to control delivery time in positive reinforcement condition. The positive reinforcement condition was identical to baseline except that contingent upon compliance, the experimenter delivered a small edible items selected from a previously administered preference assessment. A new instruction was issued after 3 s, regardless of whether the participant completely consumed the previously delivered item--thus ensuring the intertrial interval. Problem behavior continued to produce a 30-s break. The negative

reinforcement condition differed from baseline in that the experimenter delivered a 30-s break contingent upon compliance (problem behavior continued to produce 30 s of escape).

Results showed that problem behavior was maintained by negative reinforcement in the form of escape from instruction for Stephen, and by both escape and access to tangible items for Braiden. Problem behavior remained at low or zero levels when positive reinforcement was used for both boys. Behavior remained at lower levels when negative reinforcement was used, although the behaviors remained at baseline levels. While Braiden never engaged in high levels of compliance, his compliance increased during the positive reinforcement conditions. Stephen showed larger reduction of problem behaviors in the positive reinforcement condition than the negative reinforcement condition, and he engaged in similar levels of compliance in both conditions. Compliance was more prevalent during the positive reinforcement condition than in the negative reinforcement condition, and positive reinforcement in the form of contingent access to an edible decreased problem behavior for both participants.

A potential limitation of this study is the 5-min intervals. Longer sessions with an edible item could have resulted in overuse of the edible and made it ineffective. The study also did not address generalization in other settings, situations, or different instructions.

Summary

This chapter presented a review of 10 studies that evaluated the effectiveness of interventions that targeted the challenging and aggressive behaviors of children with autism. Table 4 provides a summary of each study's findings, which are discussed in Chapter 3.

Table 4

Summary of Chapter 2 Studies

AUTHOR (YEAR)	PARTICIPANTS/SETTING	PROCEDURES/ INTERVENTIONS	FINDINGS
Foxx & Garito (2007)	Ned, a 12-year-old boy diagnosed with autism, who engaged in severe aggression, self-injury, dangerous and disruptive behavior, induced vomiting, and inappropriate toileting	Reinforcement, tokens, choice making, contingent exercise, overcorrection	Increased during the first phase, maintained during the second phase, decreased to zero or near-zero following treatment
Foxx & Meindl (2007)	Johnny, a 13-year-old boy diagnosed with autism, who demonstrated aggressive and destructive behaviors	Token economy, choice making response cost, physical restraint	Reduced to zero or near-zero levels
Lomas, Fisher, & Kelley (2010)	Two boys with autism ages 8 and 9 years. Both displayed aggression and destructive behavior. One engaged in yelling and the other in self-injurious behaviors	Varied time delivery of food items and praise	Reduced problem behaviors
Fischetti et al. (2012)	Three children diagnosed with autism who displayed aggressive behaviors, one was 11 years old, and two were 9 years old	Differential reinforcement	Reduced noncompliant behavior
Falcomata et al. (2013)	Alonzo, a 7-year-old boy diagnosed with autism with a history of aggressive and disruptive behaviors	FCT, chained schedules of reinforcement, replacement behavior	Decreased challenging behavior that held multiple functions
Wacker et al. (2013)	17 children with autism who displayed aggression, self-injury, destructive and disruptive behaviors and their parents	FCT	Reduced problem behaviors by an average of 93.5%
Hanley et al. (2014)	Two boys diagnosed with autism and who engaged in noncompliant behaviors: Dale was 11 years old and Bob was 8 years old	Functional Communication Training	Reduced to zero problem behaviors
Dupuis et al. (2015	6-year-old male with autism who engaged in severe aggression evoked by sounds	Non-contingent reinforcement and time out from positive reinforcement	Decrease in aggressive behaviors evoked by sounds
Saini, Greer, & Fisher (2015)	5-year-old-boy diagnosed with autism spectrum disorders, non-verbal, with aggression	Functional analysis, extinction, response cost	Reduction of problem behaviors to near zero.
Slocum & Vollmer (2015)	4-year-old and 7-year-old boys with autism, limited verbal skills, with aggression	Functional analysis, positive reinforcement, negative reinforcement	Reduction of problem behavior in the positive reinforcement conditions.

Chapter 3: Conclusions and Recommendations

The focus of this paper was to examine the literature that evaluated the effectiveness of behavioral interventions in reducing problem behaviors of students with autism. I chose this topic because of my current teaching position in a Federal Setting 4 program called Reaching Independence through Structured Environments (RISE) through the SouthWest Metro Educational Cooperative. The RISE program provides services for students with autism who present behavioral challenges such as aggression, property destruction, and self-injury.

I have personally experienced multiple injuries from my students' aggressive behaviors. Over the course of 3 years, I have had scratches to my skin and cornea; bruises from hits, kicks, and throwing of objects; hair pulling; strained muscles; soft tissue damage to my thumb; and a facial fracture. Yet, my desire to help students find appropriate ways to express their wants and needs keeps me going. I have witnessed great success with proper behavior interventions that are driven from functional analysis, and I wanted to research the topic in more depth.

Conclusions

All 10 studies I reviewed in Chapter 2 showed significant reduction in problem behaviors to zero or near-zero levels by the end of their treatments. Although the studies presented similar strategies (e.g., wait time, functional communication training [FCT], token systems), each one was individualized based upon the participant's level of problem behaviors, need, and abilities. Fischetti et al. (2012) emphasized the importance of determining the function of each child's behaviors and providing individualized interventions based upon the function of the behavior.

Each study employed functional analyses (FA). Although each FA is designed slightly different in application, most contained the same conditions: escape, tangible, attention, and play. These conditions were established to enhance or even provoke the problem behavior to

determine the function (the why) of the behavior. I believe this step is the most important step in each study. Without this process, the true meaning behind the problem behavior would be missed, and treatment would not address it.

There also are some underlying ethical concerns when it comes to performing a FA. Depending upon how long the participant had engaged in his or her problem behavior, creating conditions that honor the problem behavior request could further support the participant's perception that "this works to get what I want." For some individuals who engage in self-injurious behaviors or severe aggression towards others, performing a test condition that allows the participant to scratch (Saini et al., 2015) is further exposing the researchers and participants to injury. One study examined aggression evoked by sound (Dupuis, Lerman, Tsami, & Shireman, 2015). Students with autism can be highly sensitive to lights, sounds, and smells. Continued exposure to adverse sensory stimuli could inhibit the child's abilities to recover. Researchers need to be cautious when implementing conditions in FA.

Three studies (Dupuis et al., 2015; Fischetti et al., 2012; Slocum & Vollmer, 2015) used food as a primary reinforcer during their treatments. Slocum and Vollmer found that despite recent empirical attention to the role of positive reinforcement for treating problem behaviors that are maintained by negative reinforcement, it is unknown if it is the procedure or the use of an edible. The use of edibles could cause the participant to satiate (become fully satisfied) and compromise the extent to which the edible items work. This suggests practitioners should consider carefully the use of food as a reinforcer when developing interventions for aggressive behavior.

Hanley et al. (2014) and Wacker et al. (2013) evaluated the expense and cost of treatments. All of the studies had a behavior analyst on the team, as well as assistants, and teachers. Hanley et al. estimated that a treatment session for each participant cost $200 per hour ($125 for behavior analyst and $75 for assistant), in addition to the time to generate the report and validate assessments. Expenses totaled between $5,900 and $8,650. In the Wacker et al. study, the weekly cost for delivering FA for the participants was $58 per child, compared to in-vivo cost of $335 per child. The cost for Functional Communication Training (FCT) using telehealth was approximately $60 per visit over 192 weekly visits, making the total cost of the telehealth group $11,500.00, compared to the cost per visit for in-vivo of $291 per visit over 192 weekly visits totaling $55,872.00. Wacker et al. concluded that the results of their telehealth study was "comparable to in-vivo treatments, but offered a substantial reduction of cost" (p. 46).

Five studies evaluated if their participants were able to generalize their skills in to other settings, environments, or with other instructions (Dupuis et al., 2015; Foxx & Garito, 2007; Foxx & Meindl, 2007; Hanley et al., 2014; Wacker et al., 2013). The research in these studies found that when supports were decreased systematically as success allowed, the participants could be successful in generalization their learned skills. Two studies followed the study participant for up to 1 and 2 years after the study, and found the participant continued to have low levels of problem behavior (Foxx & Garito, 2007; Foxx & Meindl, 2007). Participants were able to have access to other areas of the school, which in turn increased the number of other learning opportunities. Spending time working on generalization increased participants' chances of keeping their problem behavior at low levels and provided them with opportunities to access other environments and activities.

Recommendations for Future Research

Half of the studies I reviewed addressed generalization. Further studies should evaluate generalization and ways to systematically decrease the level of supports needed to keep the behaviors near or at zero levels. Generalization is particularly important when one considers the intensity of the intervention and the high staffing ratios and costs associated with acquiring these gains.

Falcomata et al. (2013) noted that further studies should evaluate the effectiveness of FCT and chained schedules of reinforcement to treat multiple functions of challenging behaviors with individuals who have with more limited communication abilities. This approach could be more difficult to implement with nonverbal forms for communication.

Wacker et al. (2013) indicated that further studies should address best conditions for telehealth delivery. Participants in these programs need to have high levels of integrity and would require families to record sessions that are not being conducted with the therapist present via telecast. This could add a great deal of stress for the families, who may not be well-trained or educated regarding the treatment or the theories behind them. However, at the same time, continuing to heavily involve parents in treatments allows for parents to have the skills to "reduce their child's behaviors and help them achieve more success in education and therapeutic programs" (Wacker et al., 2013, p. 47).

Implications for Practice

Many of the interventions are similar to the interventions I currently use in my program. I always individualize the interventions for each student's specific needs and use the data to increase student responses, wait time, and compliance. However, after conducting this review, I have a deeper understanding of the importance of spending ample time to determine the function of an individual's behavior through the use of FA.

I was a bit surprised that half of the studies did not address generalization. In my program, when success allows, we systemically decrease the level of supports so that students can learn to generalize their skills. My co-teacher and I have implemented a component in all of our student's schedules that we titled *skills generalization.* We provide opportunities for students to practice both their academic and behavioral skills outside of their typical setting. This can occur in different environments of the school, or even in the community at the grocery story, or public library.

I believe that the root of all maladaptive behavior is a means to communicate an individual's wants and needs. For children with autism, their aggressive behavior communicates their wants and needs in a way that has been working for them. It can be challenging to break that cycle and teach more socially appropriate ways of expression.

Summary

The number of individuals who are diagnosed with autism has grown tremendously in recent years, which means the numbers of students with autism and co-occurring challenging behaviors will also grow. If we are to reach children with autism and provide them with

appropriate replacement behaviors, we must first determine why they are engaging in the aggressive behavior. This will enhance educational outcomes and enrich their social lives.

References

American Psychiatric Association. (1980). *Diagnostic and statistical manual of mental disorders* (3rd ed.). Washington, DC: Author.

American Psychiatric Association. (1994). *Diagnostic and statistical manual of mental disorders* (4th ed.). Washington, DC: Author.

American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders* (4th ed., text rev.). Washington, DC: Author.

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Washington, DC: Author.

Autism Speaks.org. (2013). *Autism at 70–from Kanner to DSM-5.* Retrieved from https://www.autismspeaks.org/science/science-news/autism-70-%E2%80%93-kanner-dsm-5.

Centers for Disease Control and Prevention. (2015). *Autism. Frequently asked questions: Prevalence.* Retrieved from http://www.cdc.gov/ncbddd/autism/faq-prevalence.html.

Cooper, J. O., Heron. T. E., & Heward, W. L. (2007). *Applied behavior analysis* (2nd ed.). Upper Saddle River, NJ: Pearson Education, Inc.

Dupuis, D. L., Lerman, D. C., Tsami, L., & Shireman, M. L. (2015). Reduction of aggression evoked by sounds using noncontingent reinforcement and time-out. *Journal of Applied Behavior Analysis, 48,* 669-674.

Falcomata, T. S., Muething, C. S., Gainey, S., Hoffman, K., & Fragale, C. (2013). Further evaluations of functional communication training and chained schedules of reinforcement to treat multiple functions of challenging behavior. *Behavior Modification, 37*, 723-746.

Fischetti, A., Wilder, D., Myers, K., Yanerys, L. E., Sinn, S., & Rodrigues, R. (2012). An evaluation of evidence-based intervention to increase compliance among children with autism. *Journal of Applied Behavior Analysis, 45,* 859-863.

Flora, S. R. (2004). The *power of reinforcement*. Albany, NY: State University.

Foxx, R. M., & Garito, J. (2007). The long-term successful treatment of the very severe behaviors of a preadolescent with autism. *Behavioral Interventions, 22,* 69-82.

Foxx, R. M., & Meindl, J. (2007). The long-term successful treatment of the aggressive/destructive behaviors of a preadolescent with autism. *Behavioral Interventions, 22,* 83-97.

Hallahan, D., Kauffman, J. M., & Pullen, P. (2008). *Exceptional learners: An introduction to special education* (11th ed). Boston, MA: Pearson Education.

Hanley, G. P., Jin, C. S., Vanselow, N. R., Hanratty, L. A. (2014). Producing meaningful improvements in problem behavior of children with autism via synthesized analyses and treatments. *Journal of Applied Behavior Analysis, 47,* 16-36.

Lomas, J. E., Fisher, W. W., & Kelley, M. E. (2010). The effects of variable-time delivery of food items and praise and problem behavior reinforced by escape. *Journal of Applied Behavior Analysis, 43,* 425-435.

Kanne, S. M., & Mazurek, M. O. (2011). Aggression in children and adolescents with ASD: Prevalence and risk factors. *Journal of Autism & Developmental Disorders, 41,* 926-993.

King, M., & Bearman, P. (2009). Diagnostic change and the increased prevalence of autism. *International Journal of Epidemiology. 7,* 1224-1234.

Maag, J. W. (2004). *Behavior management: From theoretical implications to practical applications* (2nd ed.). Belmont, CA: Wadsworth Cengage Learning.

Matson, J. J., & Cervantes, P. E. (2014). Assessing aggression in persons with autism spectrum disorders: An overview. *Research in Developmental Disabilities, 35*, 3269-3275.

Matson, J. J., & Jang, J. (2014). Treating aggression in persons with autism spectrum disorders: A review. *Research in Developmental Disabilities, 34*, 3386-3391.

Miller, L. K. (2006). *Principles of everyday behavior analysis* (4th ed.). Belmont, CA: Thomson Wadsworth.

Miltenberger, R. G. (2001). *Behavior modification principles and procedures* (2nd ed.). Belmont, CA: Wadsworth/Thompson Learning.

Minnesota Department of Education. (2015). *Minn. Stat.§ 125A.0941 Restrictive procedures definitions.* Retrieved from http://eduation.state.mn.us/MDE/SchSup/ComplAssist/RestProc/index.html.

Prelock, P. A. (2005). *Autism spectrum disorders: Issues and assessment intervention.* Austin, TX: Pro-Ed.

Rodriguez, N. M., Thompson, R. H., Stocco, C. S., & Schlichenmeyer, K. (2013*).* Arranging and ordering in autism spectrum disorder: Characteristics, severity, and environmental correlates. *Journal of Intellectual & Developmental Disability, 38*, 242-255.

Saini, V., Greer, B. D., & Fisher, W. W. (2015). Clarifying inclusive functional analysis results: Assessment and treatment of automatically reinforced aggression. *Journal of Applied Behavior Analysis, 48*, 315-330.

Schoenbrodt, L. (2004). *Childhood communication disorders: Organic based*. Clifton Park, NY: Delmar Learning.

Slocum, S. K., & Vollmer, T. R. (2015). A comparison of positive and negative reinforcement for compliance to treat problem behavior maintained by escape. *Journal of Applied Behavior Analysis, 48,* 563-574.

Wacker, D. P., Lee, J. F., Padilla Dalmau, Y. C., Kopelman, T. G., Lindgren, S. D., Kuhle, J., Pelzel, K. E., …& Waldron, D. B. (2013). Conducting functional communication training via telehealth to reduce the problem behavior of young children with autism. *Journal of Developmental and Physical Disabilities, 25,* 35-48.

Zirkel, P. A. (2011). State special education laws for functional behavioral assessment and behavior intervention plans. *Behavioral Disorders, 34*, 262-278.