Using Video Modeling to Determine the Effects on Play Skills of Elementary Students With Autism Spectrum Disorders

by
Carrietta L. Gaudio

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Approval Page

This applied dissertation was submitted by Carrietta L. Gaudio under the direction of the persons listed below. It was submitted to the Abraham S. Fischler College of Education and School of Criminal Justice and approved in partial fulfillment of the requirements for the degree of Doctor of Education at Nova Southeastern University.

Christine Reeve, PhD
Committee Chair

Katrina Pann, PhD
Committee Member

Kimberly Durham, PsyD
Dean
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Carrietta L. Gaudio
Name

August 17, 2019
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Abstract

Using Video Modeling to Determine the Effects on Play Skills of Elementary Students With Autism Spectrum Disorders. Carrietta L. Gaudio, 2019: Applied Dissertation, Nova Southeastern University, Abraham S. Fischler College of Education and School of Criminal Justice. Keywords: video modeling, play, autism, elementary school students

This applied dissertation was designed to enhance the play skills of elementary students diagnosed with an autism spectrum disorder. The current social skills programs available at the writer’s school did not specifically target improving play skills and were not geared toward individuals with autism. The traditional teaching techniques used in the classroom to teach play skills were not adequate, as students continued to show minimal growth on quarterly progress reports and repeated yearly goals focusing on play skills on their individualized education plans.

The writer conducted a study that compared the effects of video modeling and video self-modeling on play skill development. Neurotypical students served as the models in the video modeling intervention, and the students with autism served as the models in the video self-modeling intervention. Both interventions used Playmobil play sets and included detailed data sheets listing scripted play actions for each play set. An ABABCB multicomponent research design was utilized to allow for comparisons between video modeling and baseline conditions and between video modeling and video self-modeling intervention conditions.

Results of the study revealed that video self-modeling interventions were effective for increasing play skills for one participant with autism and video modeling interventions with added verbal prompts were also effective for the same participant. For the other two participants, neither intervention showed a significant increase on play skill acquisition. However, one participant varied the type of play behaviors he performed with the video modeling intervention.
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Chapter 1: Introduction

Statement of the Problem

The topic. A defining characteristic of students with autism is their constant struggle to develop age-appropriate social interactions both at home and at school. Social skills are crucial for effective communication, to acquire interpersonal relationship skills, and in order to function as a productive member of society. According to the American Psychiatric Association’s Diagnostic and Statistical Manual of Mental Disorders (5th ed.; DSM-5), to receive a diagnosis of autism spectrum disorder, an individual must have as one of the criteria “persistent deficits in social communication and social interaction across multiple contexts” (American Psychiatric Association, 2013, p. 50). In social learning theory, Albert Bandura theorized that people learn social skills from one another through observation, imitation, and modeling (Bandura, 1977). These learned social skills have been found in the literature to be critical in establishing friendships, maintaining jobs, and demonstrating a level of independence within the community (Gresham & Elliott, 1984, 1987; Rao, Beidel, & Murray, 2008; Semrud-Clikeman, 2007). The school environment is a natural place for social skills training with the availability of peers and teachers and the opportunities for ongoing and spontaneous interactions.

The research problem. The problem addressed in this study was that elementary-aged students diagnosed with an autism spectrum disorder were not demonstrating progress learning social skills, specifically play skills with peers, through traditional teaching techniques. This problem was evidenced by continued minimal progress on quarterly progress reports and repeated yearly goals focusing on play skills on students’ individualized education plans. Although there were a few programs targeted to improving social skills to students with autism available at the researcher’s school, such
as Social Thinking and Social Stories, neither of these programs focused explicitly on expanding play skills (Gray, 2010; Winner, 2006).

**Background and justification.** In the field of autism, there is a common saying where “if you have met one child with autism, you have met one child with autism.” Due to autism being a spectrum disorder, there is considerable variability in a student’s strengths and weaknesses. Some students with autism have significant cognitive disabilities, whereas other students display average cognitive abilities with significant social deficits (Bohlander, Orlich, & Varley, 2012; Gelbar, Anderson, McCarthy, & Buggey, 2012). Therefore, any intervention program targeting social skills needs to be individualized toward the student’s specific needs.

According to Gresham and Elliot (1984), social skills are defined as a “learned behavior that allow people to achieve social reinforcement and to avoid social punishment” (p. 293). They are specific behaviors that should result in positive social interactions and are composed of both verbal and nonverbal behaviors. By nature, people look for reinforcement when interacting with others in conversions and desire positive feedback through these interactions. For students with autism, this need for social reinforcement is not an innate skill but one that needs to be taught and developed through repetitive practice and feedback. Common social skill deficits for these students focus around play skills and include sharing, turn taking, and initiating and maintaining conversations with peers (Bellini, Peters, Benner, & Hopf, 2007). When students fail to develop appropriate peer relationships, they display a lack of interest in social interactions, a lack of social reciprocity, and the inability to understand social rules (Cotugno, 2009).

Although social skill deficits are a significant characteristic of individuals with
autism spectrum disorders and may possibly lead to significant academic, behavioral, and emotional difficulties, few students have received adequate instruction in this area (Bellini, Peters, et al., 2007). According to Rogers (2000), many students with autism are responsive to social skills strategies such as pivotal response training, prompting, environmental modifications, social skills play groups, social stories, and video modeling. Although these programs are geared specifically toward autism and use strategies that are reflective of the student’s social skill deficits, many lack the focus of generalizing and maintaining learned skills from one environment to another (Shukla-Mehta, Miller, & Callahan, 2010). Social skill interventions have shifted focus to involving peers and using child-initiated interactions within natural settings (Rogers, 2000). Video modeling is one promising approach that incorporates generalization of these skills to natural environments and has been used successfully to teach functional life skills, communication skills, and appropriate social behaviors in individuals with autism (Delano, 2007; Shukla-Mehta et al., 2010).

Temple Grandin, a well-known adult with autism, writes how many people with autism think in pictures and utilize visual supports to remember information (Grandin, 1995). In the classroom, visuals are used for daily schedules, on task strips, to label toy shelves in the play area, and in academic tasks to assist the student in knowing what work needs to be done. Visuals can also be used to teach play skills through utilizing social stories, social scripting, and video modeling with the addition of photographs of peers, which can be introduced during small group lessons to facilitate peer interactions. Video modeling is a teaching strategy that has been shown in the literature to produce rapid acquisition of skills in students with autism (MacDonald, Clark, Garrigan, & Vangala, 2005) and is defined as a “technique that involves demonstration of desired behaviors
through video representation of the behavior” (Bellini & Akullian, 2007, p. 266). There are several types of video modeling interventions used in the field of education, including video modeling, video self-modeling, and point-of-view modeling.

In video modeling, a student views a peer or adult performing the appropriate sequence for a target behavior, and previous research has shown that students with autism learn equally well from child and adult models (Buggey, 2005; Ihrig & Wolchik, 1988). Similar to video modeling, video self-modeling uses the “observation of the images of oneself engaged in adaptive behavior” (Dowrick, 1999, p. 23). Buggey, Toombs, Gardener, and Cervetti (1999) conducted one of the first research studies using video self-modeling on students with autism spectrum disorders. Their research focused on increasing verbal responses during play using a multiple baseline design, and positive findings led researchers to believe that video self-modeling could be a promising intervention tool for this population (Buggey et al., 1999). Point-of-view modeling uses no student or adult model. Instead, the experimenter carries the camera at eye or shoulder level to simulate the targeted skill being performed from the student’s perspective (Hine & Wolery, 2006). For all video modeling interventions, immediately after the student watches the video, he or she is given the opportunity to perform the targeted skills.

Video modeling has many benefits, including the portability of watching the videos in any environment, viewing the videos repeatedly, highlighting specific stimuli and behaviors, and being cost effective by making a video library to use with multiple students (Paterson & Arco, 2007). An additional benefit of video modeling strategies is the ability to edit irrelevant details and focus on specific skills targeted for improvement, which increases the attending behaviors of students while watching the video (Bellini & Akullian, 2007). Video modeling has shown to be effective for students with autism
because this approach utilizes a strong visual component, has a structured sequence, and includes generalization and maintenance strategies (Bellini & Akullian, 2007; Sherer et al., 2001).

Previous studies have used video modeling with students with autism to decrease off-task behaviors, teach play skills, and decrease disruptive transition behaviors (Coyle & Cole, 2004; D’Ateno, Mangiapanello, & Taylor, 2003; MacDonald et al., 2005; Schreibman, Whalen, & Stahmer, 2000). Video modeling has also been used with this population to increase communication skills, specifically perspective taking and spontaneous requesting (LeBlanc et al., 2003; Wert & Neisworth, 2003). This is an important area of research, especially with the autism population. By providing interventions for students with autism at an early age in areas of significant deficits, such as play skills, negative social implications may be avoided later on in life (Gelbar et al., 2012).

**Deficiencies in the evidence.** There is currently some evidence in the literature to support video modeling to teach play skills to individuals with autism. However, many of these studies have combined video modeling or video self-modeling with other instructional supports, such as reinforcement, social stories, computer instruction, and self-monitoring (Shukla-Mehta et al., 2010). Few studies have been conducted in which video modeling or video self-modeling was used as the sole intervention, and more research needs to be conducted on video modeling or video self-modeling used alone before either can be classified as evidence-based practices for changing behaviors in individuals with autism (Shukla-Mehta et al., 2010). Reviews of the literature in this area suggest future research comparing the treatment effects of video modeling to video self-modeling (Rayner, Denholm, & Sigafoos, 2009). The current study added to the body of
research knowledge on effective ways to teach play skills to students with autism and helped to fill the research gap in the literature.

**Audience.** The population targeted for this study involved 4- to 8-year-olds diagnosed with an autism spectrum disorder from self-contained special education classrooms in a public elementary school in the southeastern United States. The sample elementary school currently had 66 students diagnosed with an autism spectrum disorder, with 41 of those students being educated in self-contained special education classrooms. The benefits to the research participants in the current study had the potential to be numerous. Because social skill deficits represent one criterion for the autism spectrum diagnosis, the target populations involved in this study were given the opportunity to practice play skills through video modeling with the intention of improving their skills.

Play skills are important in the school environment to establish friendships, develop relationships with peers and teachers, and maintain appropriate conversations. Through this study, teachers gained a better understanding of possible successful techniques to teach play skills in their classrooms. This study also had the potential to lead to improved play skills programs being developed across the school for students with autism. By sharing this research with colleagues, parents, and other professionals in the field, the knowledge of how to effectively teach play skills increased. The concept of video modeling and video self-modeling were explained to others with the intent of possibly replicating videos for future use at home and with outside therapies.

**Purpose of the Study**

The purpose of the current study was to investigate the functional relationship between video modeling and the improvement of play skills in elementary-aged children with autism. This study aimed to achieve the following objectives: (a) to compare the
relationship between video modeling versus video self-modeling on the improvement of play skills, (b) to establish effective ways of generalizing and maintaining learned play skill behaviors, and (c) to reveal possible pre requisite skills needed to participate in video modeling intervention programs.

**Definition of Terms**

*Autism spectrum disorders* are a group of developmental disabilities characterized by impairments in social interactions, deficits in communication skills, and patterns of restrictive and repetitive types of behaviors (Centers for Disease Control and Prevention, 2012). Autism is defined as a spectrum disorder due to the variability in the pattern and severity of symptoms and in the onset of the diagnosis (Rice et al., 2013).

*Modeling* is defined as demonstrating expected behaviors, both intentionally and unintentionally, to an engaged viewer or listener (Buggey & Ogle, 2012).

*Play skills* represent one type of social skill that encompasses both individual or group interactions and are defined as “any spontaneous or organized activity that provides enjoyment, entertainment, amusement or diversion” (Parham & Fazio, 2008, p. 448).

*Social skills* are interpersonal exchanges between two or more people that incorporate both verbal and nonverbal communication (Matson, Matson, & Rivet, 2007). These exchanges could include interpersonal behaviors, self-related behaviors, academic-related skills, assertion, peer acceptance, and communication skills (Gresham & Elliott, 1987).
Chapter 2: Literature Review

This chapter begins with an overview of autism and the evolution of the disorder from Leo Kanner’s original work in 1943 to the current definition of autism in the fifth edition of the DSM. Autism has been shown to be the fastest growing disability in the United States, with research supporting the need for evidence-based interventions (Centers for Disease Control and Prevention, 2012). The theoretical frameworks of autism are introduced to discuss the history of the identification of autism, starting from psychodynamic and behaviorism theories to the current cognitive explanations of the disorder. The development of typical social skills and play skills is explained, leading to an overview of social interaction and play deficits shown by individuals with autism. Historical and current research is reviewed relating to social skill and play skill treatments, leading to recent research conducted on video modeling interventions. Finally, strengths and weaknesses of prior research are discussed, proving the need for the current study.

History of Autism

In his seminal article entitled Autistic Disturbances of Affective Contact, Leo Kanner portrayed autism through a series of 11 case studies of young children (Kanner, 1943). Through his interviews with families and direct observations in his clinic, he described these children as self-satisfied, oblivious to the world around them, repetitious, rigid and obsessive, and annoyed by any interference (Kanner, 1943). In regard to language, these children were delayed in their language development and had difficulties with echolalia, pronoun reversals, and generalizing the usage of language (Frith, 1991). Although the children differed in their degree of symptoms, common characteristics emerged that led Kanner to hypothesize that these children, who were originally thought
of as having childhood schizophrenia, had an entirely different condition not previously reported (Kanner, 1943).

The most common features seen among all 11 children included a marked inability to relate to people and situations around them and an obsessive desire for sameness (Kanner, 1943, 1971). Eugen Bleuler coined the term *autistic* in 1916 to describe a schizophrenic person’s lack of contact with the outside world, and Kanner used this label to identify the disorder in the young children he had been studying (Baker, 2013; Frith, 1991; Kanner, 1943). Kanner (1943) differentiated schizophrenia from autism by saying “the schizophrenic tries to solve his problem by stepping out of a world of which he has been a part; our children gradually compromise by extending cautious feelers into a world in which they have been total strangers” (p. 249). His explanation provided certainty that the children he had observed in his clinic portrayed the characteristics of early infantile autism as opposed to childhood schizophrenia as originally thought.

Hans Asperger wrote a groundbreaking paper in 1944 that is also relevant to the foundation of autism, although his work focused on the diversity of the disorder and the milder symptoms of autism (Asperger, 1944). The four children Asperger described in his case studies had marked impairments in social integration and nonverbal communication skills but displayed typical language development (Asperger, 1944). Many of these children spoke like adults using mature sounding language and vocabulary, but they displayed nonverbal communication deficits, such as fleeting eye contact, lack of sense of humor, odd gestures, impaired voice quality, and the inability to understand the pragmatics of conversation (Asperger, 1944; Frith, 1991).

The severe social deficits seen in these children caused major problems both at
home and in school with behavior and in relationships with family members, teachers, and peers. These children were described by Asperger as difficult and unmanageable, rarely doing what was told of them, having an inability to learn in conventional ways, and unable to cope with the demands of everyday life (Asperger, 1944). Similar to Kanner’s cases, the children seen in Asperger’s clinic craved preciseness. They required certain things to be in the same place and expected certain events to occur at the same time in the same way (Asperger, 1944). The work conducted by Hans Asperger was revolutionary in highlighting the degree of differences in the symptoms seen in individuals with autism; however, the actual clinical diagnosis of Asperger syndrome was not introduced until much later (Frith, 1991).

Despite the extensive research conducted by Kanner and Asperger with children and families, from 1943 until 1980, autism did not have a universal definition and was not recognized as an official diagnosis (Baker, 2013). During this time, autistic behaviors continued to fall under childhood schizophrenia, although a year after Kanner published his research, early infantile autism was added to the psychiatric nomenclature (Baker, 2013; Frith, 1991; Kanner, 1971). Autism was first mentioned in the second edition of the DSM in 1968 but only in the context of describing childhood schizophrenia (American Psychiatric Association, 1968; Baker, 2013; Kanner, 1971). In 1980, the third edition of the DSM separated infantile autism from schizophrenia, describing it as a pervasive developmental disorder, requiring six criteria for diagnosis (American Psychiatric Association, 1980). To meet the criteria for infantile autism, a child needed to show a lack of responsiveness to others, deficits in language development, peculiar speech patterns, and bizarre responses to the environment (American Psychiatric Association, 1980). In addition, a child could not display any symptoms of schizophrenia, such as
delusion or hallucinations, and autism symptoms had to be present before 30 months of age (American Psychiatric Association, 1980).

In the revised version of the third edition of the *DSM*, a more complex definition was introduced for autistic disorder, which required meeting eight of 16 criteria among the three domains of social interaction, communication, and restricted interests (American Psychiatric Association, 1987). Symptoms could now be present during infancy or early childhood, and pervasive developmental disorder not otherwise specified was introduced as a diagnosis for children meeting some but not all of the criteria for autistic disorder (Baker, 2013). In the fourth edition of the *DSM* and the revised version of the fourth edition of the *DSM*, the definition of autistic disorder was further refined, and other pervasive developmental disorders were introduced, including Asperger’s disorder, Rett’s disorder, and childhood disintegrative disorder (American Psychiatric Association, 1994, 2000).

Currently, in the fifth edition of the *DSM*, released in 2013, autism spectrum disorder is defined by impairments in only two categories: deficits in social communication and social interaction and restrictive, repetitive patterns of behavior (American Psychiatric Association, 2013). All other subcategories of autism, including Asperger’s disorder, previously recognized in the *DSM*, were eliminated. From the second edition of the *DSM* to the revised version of the fourth edition of the *DSM*, the criteria for diagnosis of an autistic disorder continued to expand, allowing more children to be labeled, thus proving that autism truly represented a spectrum disorder with children showing varying degrees of impairment. With the current more rigorous definition of autism in the fifth edition of the *DSM*, however, the true picture of autism as first described by Kanner was brought back into the forefront, highlighting the original
characteristics that reinforced his work.

**Prevalence of Autism**

As the diagnostic criteria for autism changed with the subsequent publications of the *DSM*, the prevalence of the disorder also increased. Previously, autism was considered a rare disability, affecting about one in 2,000 individuals; however, over the past 15 to 20 years, this number has been on a steady incline (Fombonne, 2009). In 2002, one in 150 children had an autism spectrum disorder (Centers for Disease Control and Prevention, 2013). The number rose in 2004 to one in 125 children, and, in 2006, one in 110 children were labeled with autism (Centers for Disease Control and Prevention, 2013). The most current data came from the Autism and Developmental Disabilities Monitoring Network, in which 11 to 14 sites across the United States reported the prevalence of autism from patient evaluation records.

In the 2012 report, which covered the 2008 surveillance year, the rate of autism was found to be one in 88 children, or approximately 1% of children in the United States (Centers for Disease Control and Prevention, 2012; Rice et al., 2013), and, in the 2014 report, which covered the 2010 surveillance year, it was estimated that autism occurred in one of every 68 children (Centers for Disease Control and Prevention, 2014). This is a 30% increase of autism cases reported in 2014 compared to 2012 reports (Centers for Disease Control and Prevention, 2014). Comparing the data from 2006 to 2012 reports, the prevalence of autism increased 23%, and, from 2002 to 2012 reports, the increase was 78% (Centers for Disease Control and Prevention, 2012). The Autism and Developmental Disabilities Monitoring Network also found that autism occurs in one of every 42 boys and one of every 189 girls (Centers for Disease Control and Prevention, 2014).

These current findings of the predominance of boys to girls being diagnosed with
autism support the early research of Kanner. Of the 11 children Kanner first interviewed in his case studies, eight were boys and three were girls (Kanner, 1943, 1971). A later review of the first 100 children with autism at John Hopkins Hospital displayed a similar ratio of four boys to one girl (Kanner, 1971). Although the research being conducted by the Autism and Developmental Disabilities Monitoring Network covers only a limited number of sites in the country, and the prevalence of autism cannot be generalized to the United States as a whole based on their data alone, there are comparable studies that reinforce the increase of the rate of autism. In a 2007 study of parent-reported cases, the National Survey of Children’s Health showed a rate of one in every 91 children having an autism spectrum disorder (Kogan et al., 2009).

Similarly, the National Health Interview Survey, published in 2011, demonstrated a four-times increase in the number of autism cases between 1997-1999 and 2006-2008 (Boyle et al., 2011). There is undoubtedly an autism epidemic in this country; however, the true reason for the increase remains a mystery. One hypothesis is that, with the rise in autism awareness and increased access to services and insurance providers, more parents are reaching out for assistance (Baker, 2013). Another theory is that the more inclusive definitions offered by the DSM have made it easier for families to receive the diagnosis (Baker, 2013). Whatever the reason, more children have an autism spectrum disorder than ever before, and additional research on effective interventions needs to be conducted in order to help these children succeed.

**Theoretical Framework**

Since the introduction of autism spectrum disorders, several theories, from psychological and behavioral to the current cognitive theories, have attempted to account for the disorder. In 1967, Bruno Bettelheim coined the term *refrigerator mothers* to
describe a theory of autism caused by emotionless parenting and a nonstimulating home environment (Hill & Frith, 2003; Rajendran & Mitchell, 2007). Bettelheim thought that parents were causing autism, and the subsequent symptoms were the resulting damage as children became autistic due to prolonged exposure in an unloving setting (Hill & Frith, 2003). This theory was disproven, however, as more research into the history and causes of autism was conducted.

The behavioral theory of autism attempted to explain the disorder as a group of impairments that could be corrected. Because much of behavior is learned, researchers believing this theory saw the behaviors of autism as ones that could be unlearned (Frith, 1991). Children who displayed repetitive play behaviors could be taught a variety of play sequences, and social and communication skill deficits could be improved with continual practice. Still, the practical application of the behavioral theory was repeatedly challenged, as children encountered new environments in which the previously learned skills did not generalize (Frith, 1991). The behavioral basis of autism does play an important role, however, in today’s behavior modification practices. Many children with autism receive teaching, both in school and home settings, based on principles of applied behavior analysis to learn socially appropriate behaviors and decrease maladaptive behaviors. Although the behaviorism view of autism was inaccurate at the time and the tendencies of children with autism are not learned, the ideas behind this theory are still relevant today.

The current cognitive theories of autism attempt to distinguish between behaviors directly related to an autism spectrum disorder and behaviors due to outside factors such as the environment and family dynamics. Three relevant theories or hypotheses that are discussed included the Theory of Mind model, the Executive Dysfunction Hypothesis,
and the Weak Central Coherence Hypothesis. In the Theory of Mind model, individuals with autism lack the ability to take another person’s perspective and predict what that person would think or feel in specific situations (Happe, 1994; Rajendran & Mitchell, 2007). A common example of this is seen in the Sally-Ann test, in which a child sees one doll, Sally, hide an item in a basket and leave the room. The other doll, Ann, moves the item to a box while Sally is out of the room. When Sally returns, the child with autism is asked, “Where will Sally look for the item?” According to a study conducted by Baron-Cohen, Leslie, and Frith (1985), 80% of their participants with autism answered incorrectly and stated that Sally would look in the box, where the item actually was. Comparatively, most typical developing children would say that Sally would look in the basket, where she believed the item to be when she left the room (Baron-Cohen et al., 1985). This failure on false beliefs tasks has been replicated several times with children with autism, all receiving similar results (Happe, 1994). This deficit in the ability to consider another person’s mental thoughts may explain some of the cognitive impairments seen in individuals with autism; however, it is not the only explanation for the psychological deficits (Happe, 1994; Rajendran & Mitchell, 2007).

The concept of executive function was first studied in the 1906s by a team of researchers who wanted to correlate children’s behavior with their intentions (Yeager & Yeager, 2013). For neurotypical children, executive functioning skills are taught as a way to self-regulate behavior and include memory, problem solving, planning, impulse control, self-monitoring, and organization (Ozonoff, Pennington, & Rogers, 1991; Yeager & Yeager, 2013). For individuals with autism, these skills are particularly challenging. Hence, the Executive Dysfunction Hypothesis was speculated by a group of researchers who noticed that some of the symptoms of autism were similar to those seen in patients
with specific brain injuries (Rajendran & Mitchell, 2007). These symptoms included the need for routine and patterns, difficulty switching attention between stimuli, lack of impulse control, and a tendency to perseverate on items or topics (Rajendran & Mitchell, 2007). A strength of this theory is that it is the only one that currently explains both the motor and cognitive aspects of autism spectrum disorders (Rajendran & Mitchell, 2007), specifically, the self-stimulatory behaviors such as hand flapping, rocking, and spinning that are seen in many children with autism.

Using the Weak Central Coherence Hypothesis, researchers believed that individuals with autism processed information in small details and were unable to put the details together to form a big picture (Rajendran & Mitchell, 2007). This hypothesis is strengthened by the need for visual supports seen every day in classrooms with students with autism. These children use visual task strips to break down assignments, checklists to remember the items needed to pack up at the end of the day, and visual schedules listing each activity in their daily routine. Supports in the home environment also strengthen this hypothesis. Many parents and therapists use task analyses to break down a complex skill, such as brushing teeth or tying shoes, into smaller steps so the child with autism can learn one step at a time in the sequence and receive reinforcement for his or her progress toward the end goal.

All of the cognitive explanations above play a role in understanding the deficits in individuals with autism. The Theory of Mind model may be related to difficulties in joint attention and understanding emotions, the Executive Dysfunction Hypothesis may explain the inability to adjust quickly to new situations and changes in routine, and the Weak Central Coherence Hypothesis may justify the focus on minute details and inability to see the whole picture (Semrud-Clikeman, 2007). Because autism is a spectrum
disorder, individuals with the diagnosis range in their abilities from significant cognitive deficits to high cognitive levels with varied social deficits (Bohlander et al., 2012; Gelbar et al., 2012). The common core deficit, however, involves social skills, and children with autism need social skills training from an early age to ensure they will learn the necessary skills to be a successful adult.

**Typical Child Development**

**Social skills.** Typical social development occurs over time, beginning in infancy. In a seminal study by Banham Bridges (1933), infants from 3 weeks to 2 years were observed for trends of typical development. This study showed the first person an infant bonds with is the mother, beginning the social relationship between babies and adults (Banham Bridges, 1933). As infants, children explore the world through sensory input (Semrud-Clikeman, 2007). They hear a caregiver’s voice or the shake of a rattle, explore objects with their mouth, and turn to look at a sibling talking next to them. As preschoolers, children learn to interact with peers and form first friendships. Prior to this, the most important people in a child’s life were immediate family members.

In preschool, children are developing a sense of identity and a desire for self-expression (Banham Bridges, 1933). They are expected to manage the demands of a teacher, play appropriately with others, and resolve peer conflicts (Semrud-Clikeman, 2007). Once elementary school begins, the child’s main focus shifts from the family to the peer group, as peers become increasingly important for socialization and acceptance (Semrud-Clikeman, 2007). This focus on the peer group continues throughout high school. As adults, the social emphasis changes once again, as individuals make more objective decisions and self-evaluate the friendships they have developed over the years (Semrud-Clikeman, 2007). Navigating the complex, changing world of social skills is
challenging for the neurotypical individual, so, for an individual with autism, who already has deficits in social communication skills, learning the nuances of social skills can be a daunting task.

In the literature, there are multiple definitions of social skills. The peer acceptance definition classifies children who are accepted by their peers as being socially skilled (Gresham & Elliott, 1984, 1987). The behavioral definition defines social skills as situation specific behaviors that promote social reinforcement and hinder social punishment (Gresham & Elliott, 1984, 1987). Finally, the social validity definition identifies social skills as behaviors that predict important social outcomes and include both verbal and nonverbal communication skills (Gresham & Elliott, 1984, 1987; Rao et al., 2008). These social outcomes include acceptance by peers, popularity, and the judgment of others about a person’s behaviors. Examples of social skills include facial expressions, asking and answering questions, changing topics of conversation, giving and receiving compliments, and maintaining eye contact while speaking. Because social skills are strongly connected to language skills, typically developing children learn social skills while playing and talking to others.

To identify social skill problems in typically developing children, Gresham and Elliott (1984, 1987) classified social skill difficulties into four distinct categories, with the foundations lying in the performance of the targeted social skill and the emotional responses surrounding the social skill. These four categories included skill deficits, performance deficits, self-control skill deficits, and self-control performance deficits. Children who have skill deficits either lack the necessary social skills to interact appropriately with peers or do not know a critical step in the performance of the social skill (Gresham & Elliott, 1984, 1987). When assessing a social skill deficit, it is critical to
know the child’s knowledge of the skill or his or her past performance of the skill. Performance deficits exist when a child has the social skill in his or her skill set, but does not display the skill in the target environment (Gresham & Elliott, 1984, 1987). The deficiency could lie in the frequency of performing the skill or in the absence of opportunities to perform the skill. The important component when evaluating performance deficits is to first determine whether the child can perform the target skill, then develop appropriate interventions to improve the skill.

Self-control skill and self-control performance deficits involve an emotional component that hinders the development of the social skill. With self-control skill deficits, a child’s emotional response has delayed the skill acquisition possibly due to anxiety, fear, impulsivity, slower response times, or peer rejection (Gresham & Elliott, 1984, 1987). The two criteria for this type of social skill difficulty are the presence of an emotional response and not knowing or never performing the target skill. With self-control performance deficits, a child has the social skill in his or her skill repertoire but does not display the skill due to an emotional response and problems with antecedent and consequence control (Gresham & Elliott, 1984, 1987). The two criteria for this type of social skill difficulty are the presence of the emotional response and the inconsistent performance of the target skill. The key for determining a self-control performance deficit is to determine that the child knows the skill yet displays it infrequently or inconsistently.

**Play skills.** Just as social skill development occurs over time, play skill development progresses in a sequence as well. Belsky and Most (1981) validated this in their seminal study by researching the developmental progression of play with 40 infants, ages 7.5 months to 21 months. In their first year of life, infants engage in sensorimotor
play with the manipulation and mouthing of objects and toys (Belsky & Most, 1981; Lydon, Healy, & Leader, 2011). By the end of their first year, infants have mastered functional and relational levels of play. They begin to understand the function of objects during play and how to relate two objects together during play (Belsky & Most, 1981; Lydon et al., 2011). More advanced play skills develop in the second year of life, as children learn pretend play skills. Pretend play occurs when a child uses an object as another object, assigns characteristics to an object that it does not have, or references absent objects as if they were present (Baron-Cohen, 1987). There are two types of pretend play: functional and symbolic.

Functional pretend play uses toys in a conventional manner appropriate to the toy’s function (e.g., building a house with blocks, using plastic food in a play kitchen), whereas symbolic pretend play uses toys for a purpose in which they were not intended or to represent another object, such as using a block as a race car or using a plastic plate as a hat (Lydon et al., 2011; Terpstra, Higgins, & Pierce, 2002; Thiemann-Bourque, Brady, & Fleming, 2012). Belsky and Most (1981) referred to this type of play as substitution in their study because one play object is being substituted in the play sequence for another. Sociodramatic play is the most advanced play skill and is commonly observed in typically developing preschool children. Sociodramatic play includes role-playing activities and the child saying and doing things that are thematically related to the play items, such as playing dress up or playing teacher (Terpstra et al., 2002). This type of play can occur in isolation or in context with other children (Dauphin, Kinney, & Stromer, 2004).

There are four different levels of play when observing typical developing children. Isolated play involves a child playing alone in an activity or with an object,
most often with a favorite toy (Terpstra et al., 2002). Dyadic play has a common focus with two children engaging in a game or using the same toy (Terpstra et al., 2002). Group play involves the cooperation of more than two children, and examples include board games, recess games, and interacting with a set of toys (Terpstra et al., 2002). Finally, team play is competitive play between two or more groups and is often organized with rules and involves a more rigorous level of activity (Terpstra et al., 2002).

Within the various levels of play, there are many social interaction skills typical children will exhibit. These skills fall under three phases of social play: orientation, parallel or proximity play, and common focus (Bass & Mulick, 2007). Orientation skills involve being aware of another child’s presence by looking in the child’s direction or at the toys the child is engaged with, but not actively playing with the child (Bass & Mulick, 2007). Parallel or proximity play occurs when a child is playing independently alongside another child and using the same materials or involved in a similar activity as the other child (Bass & Mulick, 2007). Play with a common focus involves two or more children engaging in an activity using pragmatic language skills. These children are taking turns, waiting, sharing, asking and answering questions, commenting on play, and asking others to join into their play (Bass & Mulick, 2007).

Both social and play skills occur in a natural progressive sequence and are critical for typical development. These skills are usually taught in the home environment by parents and other siblings or in group settings such as play groups or day care. Play takes up most of a young child’s time and provides multiple opportunities to learn social and behavioral skills from playmates (Ozen, Batu, & Birkan, 2012; Terpstra et al., 2002). During play, children have the chance to practice social skills and begin to understand the consequences of social choices (Bass & Mulick, 2007; Terpstra et al., 2002). Well-
acquired social and play skills are crucial for a child’s development of cultural competence and increase children’s ability to function within the school environment and in society as adults (Bass & Mulick, 2007; Terpstra et al., 2002).

**Children With Autism Spectrum Disorders**

**Social skill deficits.** In the review of research, children with autism have deficits in social skills that may differ depending upon their age and functioning levels. Younger children may have limited eye contact and difficulty smiling, displaying joint attention, imitating, and pointing, and older children may show difficulties maintaining conversations, taking another person’s point of view, initiating interactions, reading nonverbal cues, and keeping friends (Bass & Mulick, 2007; Bohlander et al., 2012). These social skill deficits often lead to behavioral deficits, as these children show less spontaneous communication and more frequent eccentric behaviors (Bass & Mulick, 2007). Overall, children with autism are shown to make and receive fewer social interactions, respond to fewer initiations, and engage for shorter lengths of time as compared to their peers without disabilities (Kennedy & Shukla, 1995). They are unable to maintain reciprocity during a play scenario, display joint attention skills, and take the perspective of a peer in the room (Bellini, Peters, et al., 2007). These children do participate in social interactions with their peers; however, social interactions are not seen as preferred activities for many children with autism (McConnell, 2002).

As these children are integrated into settings with neurotypical peers, the social differences become even more significant. Without specific social skill support, children with autism in typical classrooms are subject to further isolation and social exclusion, as peers misinterpret their social behaviors as aloofness (Bass & Mulick, 2007). Starting as early as elementary school, teaching social skills is as important as teaching academic
skills because the social deficits seen in children with autism lead to problems with initiating and maintaining friendships and developing positive peer relationships (Gonzalez-Lopez & Kamps, 1997; Rao et al., 2008; Scattone, 2008).

Children with autism tend to have fewer friends, less satisfying peer relationships, and an increased feeling of loneliness as compared to their neurotypical peers (Bauminger & Kasari, 2000). They also have lower self-esteem, underachievement at school, and higher rates of bullying and teasing (Carter, 2009; Humphrey & Symes, 2010). Because these children tend to avoid social contact with others, neurotypical students find it difficult to maintain interactions with children with autism. Their social skill deficits may lead to behavioral deficits, as these students are unable to interact according to typical social conventions and may display disruptive behaviors to gain needed attention from their peers.

Although social skill deficits manifest early on in childhood, they are severely impaired during adulthood because individuals with autism must learn to navigate the social adult world without the support of a school environment. It is during this time that the social gap is the widest between neurotypical individuals and those with autism (Scattone, 2008). In adulthood, without intensive social skills training early on in life, individuals with autism depend solely on service providers and display little independence in social and occupational functioning (DiGennaro Reed, Hyman, & Hirst, 2011; Rao et al., 2008; Sansosti, 2010). Social skills are crucial for successful integration into society as an adult, and early intervention may be the key element to prevent future social dysfunction (Rao et al., 2008).

All of the social skill limitations mentioned above justify the substantial need for social skill instruction for children with autism. However, traditional, school-based social
skill programs are only minimally effective in teaching social skills to this population, and very few programs are specifically targeted for individuals with autism spectrum disorders (Bellini, Peters, et al., 2007; Krasny, Williams, Provencal, & Ozonoff, 2003). Social stories represent one intervention tool used to teach social skills to individuals with autism. A social story is a written explanation that includes text, illustrations, and titles to assist the individual with autism in understanding a social situation (Gray, 2000). Social stories can be written in a book format or presented electronically on a computer screen and are most effective when they are reviewed daily prior to encountering the social setting described in the story (Gray, 2000). One major limitation to using social stories is the amount of time needed to create individualized stories for each social situation and to tailor the story to the student’s specific needs. Social thinking is one social skills curriculum program used to teach social thinking skills to school-age students, including those with autism; however, the target audience is very specific. The curriculum is designed for students with social deficits, but average to above average verbal and nonverbal intelligence, which excludes those students with autism who struggle with both social and academic skills (Winner, 2006).

Previously developed social skill intervention models in the research literature included behavior modification, peer-mediated training, social stories, pivotal response training, joint attention training, and using a buddy system (Gonzalez-Lopez & Kamps, 1997; Lydon et al., 2011). These interventions were facilitated by a teacher or therapist and involved training peers, siblings, and parents to offer the interventions (Bohlander et al., 2012; Gonzalez-Lopez & Kamps, 1997). Skills were taught directly to the individuals with autism, through a group setting or individually, and sessions were conducted in a school or clinical setting (Bohlander et al., 2012; Gonzalez-Lopez & Kamps, 1997). The
ultimate goal for any social skills program is to improve the quality of life for a child with autism in integrated settings (Gonzalez-Lopez & Kamps, 1997).

In order for the social skills program to be beneficial for these children, the program needs to be designed to fit the instructional needs of a child with autism. The essential components in a social skills program targeting the autism population include making abstract concepts concrete, providing structure and predictability, scaffolding the language support, offering multiple and varied learning opportunities, including other focused activities, fostering self-awareness and self-esteem, and presenting the skills in a sequential and progressive manner (Krasny et al., 2003). The program also needs to teach specific skills required to navigate the social world, with social skill interventions beginning in preschool and continuing throughout middle and high school (Rao et al., 2008; Scattone, 2008). According to Cotugno (2009), to improve the effectiveness of a social skill program and target the program toward children with autism, professionals need to match the interventions with the specific skill deficits and increase the frequency of the interventions. Professionals should also provide instruction in a natural setting, implement the intervention to fidelity, and implement the intervention over longer periods of time to monitor for maintenance and generalization of skills.

**Play skill deficits.** One way typical children learn social skills is through play activities with other children. However, for children with autism, play often presents with challenging social interactions because deficits in the area of play skills are seen in many of these children (Lydon et al., 2011). Early research in London focusing on autism and play showed more impairments in symbolic and pretend play as compared to reality and functional play (Baron-Cohen, 1987). Later researchers noted deficits across all levels of play in children with autism, with symbolic play being the least observed and functional...
play being the most observed (Thiemann-Bourque et al., 2012). Pretend play skills continue to be the biggest deficit, as children with autism rarely engage in creative, spontaneous play (Baron-Cohen, 1987; Lydon et al., 2011). When these children are observed playing, it is common to see them using toys in a stereotyped and restrictive manner, with little variability in object manipulation (Bass & Mulick, 2007).

For a child with autism, the act of playing is typically characterized by repetitive motions that display a lack of symbolic and social quality (MacDonald, Sacramone, Mansfield, Wiltz, & Ahearn, 2009). These children might line up toys by shape or color or fixate on a particular piece of a toy, often focusing on objects that spin, vibrate, or make noise. Children with autism find play challenging and have repeatedly failed in previous play attempts. They have difficulty generalizing play skills across settings, people, and activities, and their deficits in language, imitation skills, and social interactions impede their success (Bass & Mulick, 2007; MacDonald et al., 2009). Social skills and play skills coincide, as conversations occurring during play are important prerequisite skills to making friends. Similar to the research on social skills, there are several behavioral approaches in the literature that have been used to promote play skills in children with autism (Stahmer, Ingersoll, & Carter, 2003). These include discrete trial training, pivotal response training, imitation training, live modeling, play scripts, and video modeling.

**Overview of Modeling**

According to social learning theory, most behaviors are learned through observations and modeling. Children learn from example and approximate what they see others in their environment doing (Bandura, 1977). Behaviors can be learned through direct learning experiences, in which children learn by performing the behavior or
through observational learning experiences, in which children observe another person in their surroundings performing the behavior (Bigge & Shermis, 1999). The process of observational learning is also referred to as modeling, in which an individual models a behavior, the child observes the behavior, and then the child performs the behavior.

However, simply providing a model and expecting the child to imitate the desired behavior without additional training does not ensure that the child will display the targeted behavior (Hosford, 1981). Many children, especially those with disabilities, need to observe a behavior being modeled multiple times before it becomes part of their behavioral repertoire because they are not influenced solely by observing behaviors once or twice (Bandura, 1977). These children need to internalize the observed behavior and commit it to memory after the model has been removed in order for them to perform it independently in the future. Modeling may be best for older children, with increased cognitive skills, as they would have a better chance of generalizing the learned skills to other environments with little additional training (Matson et al., 2007).

In social learning theory, the consequences of past behaviors influence the frequency and magnitude of future behaviors (Bigge & Shermis, 1999). This reinforcement creates expectations for the child for similar outcomes when the behavior is performed again in the future. During a modeling situation, children observe the actions of others and the corresponding consequences and adjust their own behaviors accordingly (Bigge & Shermis, 1999). This person-environment interaction is defined as a reciprocal process, as behaviors, personal factors, and environmental changes predict events for children and anticipate reactions when those behaviors are performed (Bigge & Shermis, 1999).

The process of observational learning, also known as vicarious learning, has four
distinct components: attention, retention, reproduction, and reinforcement (Bandura, 1977, 1986; Bigge & Shermis, 1999). In the attention process, children need to be attending to the individual’s behavior being modeled, and the behavior needs to serve a purpose for the child. In the retention process, children need to possess the cognitive and organizational skills to remember the behavior seen and reproduce it in a similar environment without the model present. In the reproduction process, children must have the physical ability and motor planning skills to reproduce the behavior independently. Finally, in the reinforcement process, the behavior being performed must be reinforcing to the child and have an intrinsic motivational value (Bandura, 1977). For children with disabilities, this process of observational learning is one that takes a considerable amount of time to learn and master independently. However, for children with autism who learn best through observations of repeated, predictable sequences, modeling may be an effective tool to teach critical skills (Stahmer et al., 2003).

Modeling is essential to every child’s education. Through modeling, children watch others receive feedback for certain behaviors, and the consequences given based on the behavior may influence future behavioral choices (Bandura, 1977). Parents serve as the initial models for children, but, as children get older, peers take over this role (Buggey & Ogle, 2012). In initial research done on modeling with individuals with autism, television models were more effective in sustaining the observer’s attention when compared to live models (Bandura, 1986). The longer time frame the observer attended to the model, the increased occurrence of observational learning (Bandura, 1986). Children with autism often have a strong preference for electronic media, such as television, movies, and computers, due to their need for visual information; therefore, some research has shown that children with autism attend longer to video modeling interventions.
compared to live model interventions (Cardon & Azuma, 2012). However, in one study comparing video modeling to live modeling to teach social communication skills to preschoolers with autism, one student had more success with the video modeling intervention, another student was more successful with the live modeling intervention, and the third had equally effective results with both interventions (Wilson, 2013).

**In-vivo modeling.** When using in-vivo modeling interventions, the model is presented live in front of the child. This method has been effective to teach play to children with autism (Stahmer et al., 2003). However, for many children with autism who can attend for long periods while watching television or the computer, utilizing video modeling techniques may be the linking component to teaching social skills.

**Video modeling.** Video modeling is a type of video-based instruction that uses an individual, other than the participant, as the model. In the literature, this is known as videos with other as the model or instructor-created videos (Palechka & MacDonald, 2010). Modeling and imitation represent the basis of teaching with video modeling, as the participants learn through the observation and imitation of others on the screen (Gul & Vuran, 2010; Lydon et al., 2011). Video modeling focuses on visual cues through a digital media device, such as the computer, television, or a tablet (Lydon et al., 2011). Verbal instructions given on the video are supplemented with visual cues for individuals who have deficits in auditory processing skills (Cihak, 2011). This intervention may be beneficial for those individuals who shy away from social interactions and for those who have limited reinforcers to use in traditional rote teaching techniques (Lydon et al., 2011).

Strengths of a video modeling intervention are numerous in the research. Video modeling can be individualized for each student, and the focus of the video can be easily changed if progress is not evident (DiGennaro Reed et al., 2011). Video modeling has
been effective in school and play settings, requires minimal initial instructions and training, and the video can be played repeatedly (Flynn & Healy, 2012; Ogilvie, 2011). Using a video may save time, compared to acting out the scene, and it is possible to portray real life examples of the desired skills (Ogilvie, 2011; Ozen et al., 2012). In a video modeling intervention, the video is positive and focuses on the successful behaviors of the participant (Buggey & Ogle, 2012). It promotes independence, as the prompting levels are removed during the editing process (Buggey & Ogle, 2012; Ganz, Earles-Vollrath, & Cook, 2011). When using video modeling, the technology delivers the instruction within a short time frame so that is easily to implement within a classroom setting, which enables the teacher to have time to work with other students (DiGennaro Reed et al., 2011).

This intervention has also been successful for a wide range of ages and abilities. Research has shown that video modeling is highly effective for students having mild to profound autism and moderately effective for those with other developmental disabilities (Flynn & Healy, 2012; Mason, Ganz, Parker, Burke, & Camargo, 2012). The success of video modeling interventions with this population may be due to students with autism being better visual learners than auditory learners (Buggey, 2007; Ganz et al., 2011; Ozen et al., 2012). Videos tend to have minimal distractions compared to the natural environment because the extraneous information and inappropriate behaviors are filtered out when the video is edited (Buggey, 2007; Buggey & Ogle, 2012; Hine & Wolery, 2006; MacDonald et al., 2009). The researcher has the flexibility to control the content of the video to provoke a maximum level of interest from the participant (Ganz et al., 2011; Palechka & MacDonald, 2010; Wang, Cui, & Parrila, 2011). There is also a lack of demands for students with autism to socially interact when watching a video (Buggey,
These students may prefer the videos compared to watching actual models because the video is only a one-way interaction and focuses on visual skills as compared to social interactions (Cihak, 2011; Lydon et al., 2011; Ozen et al., 2012). Videos tend to be predictable and controllable for students with autism, and the variations in the model’s performance are reduced (Lydon et al., 2011; Stahmer et al., 2003).

Video modeling with others as the model has been successfully implemented in previous research with video-based activity schedules, pretend play skills, and training staff to implement discrete trial training procedures (Catania, Almeida, Liu-Constant, & DiGennaro Reed, 2009; Cihak, 2011; Lydon et al., 2011). The best models for the videos may be ones who are most similar to the observer in terms of age, appearance, and ability levels, as the observers may identify more with the models by maximizing their similarities and increase the likelihood of generalizing the targeted skills (Bandura, 2001; Ganz et al., 2011; Kagan, 1958; Ogilvie, 2011). However, one study by Mechling and Moser (2010) that examined the preferences of students for watching themselves, adults, or peers on a video completing routine daily tasks showed minimal differences in preferences between the video choices across all five participants.

Because children with autism spectrum disorders do not typically respond well to social advances made by others, video modeling is a way to teach these play skills using the modality of video that many children with autism respond well to. In a study by Nikopoulos and Keenan (2004b), video modeling was found to promote social initiation and increase reciprocal toy play. Competing behaviors, such as isolated play, stereotypy, and sitting on the floor, were reduced as initiation and reciprocal play increased. These findings were generalized across toys, settings, and peers and were maintained at 1-
month and 3-month follow-up intervals.

Pretend play is crucial for language development in children, beginning with cause-and-effect toys and progressing to symbolic play with action figures (MacDonald et al., 2005). However, for children with autism who do not develop these play skills, scripted play can be taught utilizing video modeling techniques. MacDonald et al. (2005) used video modeling to produce longer scripted play sequences with two boys with autism. The intervention increased both boys’ verbalizations during play, and the results were maintained over time.

Children with autism also show deficits in their independent play skills and are often seen displaying ritualistic or repetitive play, such as lining up toys or spinning wheels on vehicles (Paterson & Arco, 2007). These play deficits can reduce a child’s opportunity for developing interactive play skills with peers. With video modeling interventions, verbal and motor play increased for four elementary-aged boys with autism during an independent play setting, and repetitive motor play decreased (Paterson & Arco, 2007). Results remained consistent after the video modeling intervention was removed during follow up 1 week later.

**Video self-modeling.** Video self-modeling is another type of video-based instruction that uses the participant as the model to perform the target behavior. This intervention first appeared in the research literature in the 1970s, with a seminal study by Creer and Miklich (1970), who used two video self-modeling tapes to decrease socially inappropriate behaviors in a 10-year-old boy with asthma, living in a residential treatment center. Other early promising research using the self as a model included a study with a 26-year-old incarcerated male who listened to a self-model audio tape to decrease stuttering and a study with a 4-year-old retarded hyperactive boy who watched a self-
model video to increase independent play skills (Dowrick & Raeburn, 1977; Hosford, 1974). There are two types of video self-modeling: positive self-review and feed forward.

Positive self-review shows optimal examples of the target behavior, and feed forward depicts a skill not yet attained or demonstrated in certain settings with a focus on showing positive, potential future behaviors (Buggey, 2012; Collier-Meek, Fallon, Johnson, Sanetti, & Delcampo, 2012; Dowrick, 1983). There is a strong body of research supporting video self-modeling with a range of ages and behaviors, including neurotypical individuals and those with physical impairments, and across various settings, including classrooms, hospitals, and day programs (Buggey, 2012; Collier-Meek et al., 2012; Dowrick & Raeburn, 1995). For individuals with an autism spectrum disorder, video self-modeling is a promising intervention to target social skill deficits (Gelbar et al., 2012).

Video self-modeling may be successful because people learn best from individuals that closely resemble themselves (Gelbar et al., 2012). The video created in this intervention focuses on the participant’s areas of strength and shows a visual representation of the participant’s success at performing the target skill (Buggey, 2012; Collier-Meek et al., 2012). The literature has shown a high correlation between self-efficacy and success with video self-modeling interventions; however, it is unsure whether the gains in the target skill are due to the video self-modeling or an overall improvement in self-efficacy and confidence as a result of watching oneself in the video (Bandura, 2001; Buggey & Ogle, 2012). Video self-modeling has been successfully implemented with social behaviors, social skills, speech and language, social communication, motor skills, behaviors from emotional disabilities, modifying behaviors, academic skills, and functional skills, as well as to decrease off task behavior (Bellini,
Point-of-view modeling. Point-of-view modeling is a third type of video-based instruction and is shot from a third-person perspective. The video shows only the model’s hands and arms or the specific task being performed (Palechka & MacDonald, 2010; Tetreault & Lerman, 2010). In a point-of-view modeling intervention, the participant is seeing the target skill from his or her own perspective (Tetreault & Lerman, 2010). The main advantage of this type of video modeling intervention is that it significantly reduces irrelevant stimuli from the environment (Tetreault & Lerman, 2010). There has been little research conducted with point-of-view modeling, with limited studies exploring this type of video modeling intervention. One study used point-of-view modeling paired with a food reinforcer to increase social behaviors in three participants with autism (Tetreault & Lerman, 2010). The video and food alone increased social behaviors for two of the individuals, and, with added prompts, the behaviors of the third increased as well (Tetreault & Lerman, 2010). However, with such a small body of research to review, the results of point-of-view modeling are inconclusive at this time.

Video prompting. Video prompting is the final type of video modeling intervention in which prompts are built into the video. This allows the researcher to show one part of the video, pause the tape, and then give the participant the chance to perform the previously shown step before moving on to the next part of the video (Ogilvie, 2011).

For all video modeling interventions, there are set steps to creating an effective video. First, the researchers need to identify a target skill to prioritize, assess, and operationally define (Collier-Meek et al., 2012; Ganz et al., 2011). Baseline data should be collected on this skill to determine a starting point for the intervention and to ensure
the skill selected is one that is not already in the participant’s repertoire (Ganz et al., 2011; Ogilvie, 2011). Next, social skill scales, behavior rating scales, or ecological assessments are conducted to compare abilities of the participants to other peers in similar situations (Ganz et al., 2011; Gonzalez-Lopez & Kamps, 1997). These assessments will assist in determining that the target skill is appropriate for the age and developmental level of the participants and give direction in selecting possible models for the videos. Then, permission is obtained for all participants in the study, including all adults who may appear in the videos or assist in implementing the video interventions (Collier-Meek et al., 2012; Ogilvie, 2011). The training of the models is next, if using a video modeling or point of view modeling intervention, and a script is written for the models to follow, breaking down the targeted skill into smaller, teachable steps (Sansosti, 2010). If using a self-modeling intervention, the adult providing the prompting to the participant will be trained on the script. Then, the environment where the videos will be taped is prepped, and the videos are created and edited (Ogilvie, 2011).

In reviewing the research, effective videos for a video modeling intervention have varied in length from 30 seconds to 13 minutes, depending on the skill targeted and the age and complexity of the participants (Bellini & Akullian, 2007). For video self-modeling interventions, the optimal length of the clip is 2.5 minutes (Dowrick & Raeburn, 1995). After the videos are created, the intervention phase begins. Videos should be shown daily, at the same time and immediately prior to the expected demonstration of the desired skill (Ogilvie, 2011). The videos should be watched in the location in which the skill is expected to be performed, and the same materials should be used in both the video and in the live setting (Ogilvie, 2011). Adults should limit their verbal interactions with the participants before, during, and after the viewing of the
videos to allow for an accurate picture of the effects of the video modeling interventions (Bellini & McConnell, 2010). Data are collected on the effectiveness of the interventions and evaluated by the researcher as the information is being recorded (Collier-Meek et al., 2012; Ogilvie, 2011). Finally, a plan for generalization and maintenance of the target skill is developed to ensure the participant can perform the skill outside of the treatment environment.

As video editing software and techniques improve, there has been a growth in research in all areas of video modeling, both in journal articles and dissertations (Buggey & Ogle, 2012). However, even with this increase, there are a few weaknesses to utilizing video modeling interventions that are highlighted in the literature. Implementing video modeling has been slow in settings outside of research institutions (Buggey & Ogle, 2012). This may be due to the time required to edit the created videos and the knowledge needed about the video-making process (Buggey & Ogle, 2012; Palechka & MacDonald, 2010; Scattone, 2008). In video self-modeling, the participants with autism may not be as cooperative or able to perform the required skill without extensive adult prompting, therefore adding time and complexity to the editing process (Scattone, 2008).

**Justification for Further Research**

**Social skills.** In reviewing the previous research on social skills, both video modeling and video self-modeling have been shown to be equally effective social skills interventions for children with autism (Scattone, 2008). Single case studies have composed more than 90% of the studies reviewed, with a multiple baseline design being the most common methodological design (Matson et al., 2007). In a review of 29 studies on using technology to teach social skills, a majority of the research used a video or digital video disc as the intervention component, with initiation being the most
commonly targeted skill, followed by play skills (DiGennaro Reed et al., 2011). One third of these studies focused on multiple social skills (DiGennaro Reed et al., 2011). Since 1979, studies focusing on increasing social skills for individuals with autism have been conducted using modeling paired with reinforcement more often than other interventions (Matson et al., 2007).

When doing social skills training paired with reinforcement, the frequency and duration of peer interactions have increased for those with autism (Gonzalez-Lopez & Kamps, 1997). When including neurotypical peers in the intervention, maladaptive behaviors have also decreased in individuals with autism because the peers model successful behaviors and inclusion strategies (Gonzalez-Lopez & Kamps, 1997). Another benefit to using neurotypical peers in a social skills intervention program for students with autism is that the peers learn to persist with the social interactions even when the feedback from the students with autism is minimal (Gonzalez-Lopez & Kamps, 1997). It is more appropriate and beneficial to teach social skills in their natural context, although many of the studies reviewed using video modeling taught social skills in artificial environments, such as therapy rooms (Gul & Vuran, 2010).

**Play skills.** In the previous research on play skills, functional play was the most common type of play studied and observed (Thiemann-Bourque et al., 2012). This may have been due to the ease of defining and measuring play skills as a dependent variable (DiGennaro Reed et al., 2011). There was a strong relationship in the studies reviewed between play skills and the probability of future language production in students with autism, Down’s syndrome, and other developmental delays, showing that communication and play skills are interrelated and both should be accounted for when developing an intervention program (Thiemann-Bourque et al., 2012). When comparing students with
autism, Down’s syndrome, and neurotypical individuals, one study showed that fewer students with autism displayed pretend play skills as compared to the neurotypical students and those with Down’s syndrome, suggesting that the deficits seen in play skills are more specific to an autism spectrum disorder (Baron-Cohen, 1987). The generalization of play skills in the research was promoted by the availability of typical peers and frequent natural opportunities to practice the newly acquired skills (Bass & Mulick, 2007).

**Strengths and weakness of prior video modeling research.** In the literature, video modeling with other as model and video self-modeling were the two video modeling interventions cited most frequently, especially with children with autism (Bellini & Akullian, 2007; Buggey & Ogle, 2012). Both video modeling and video self-modeling were effective interventions to teach language and communication skills, social skills, behavior, and task instruction (Ganz et al., 2011; Gelbar et al., 2012). In the more than 40 published studies on video modeling with individuals with autism over the past 20 years, more than half targeted social behaviors as the dependent variable, and of 47 video self-modeling studies reviewed with individuals with a wide range of disabilities and including neurotypical individuals, 44 showed positive results (Buggey & Ogle, 2012; LeBlanc, 2010). In 42 studies specifically focusing on video modeling with social skills or play skills, the video interventions had a significantly greater impact on play skills as compared to social skills (Mason et al., 2012).

Video modeling interventions have shown positive results across a wide range of behaviors, disabilities, ages, and countries. In a study conducted in Turkey, video modeling was shown to be effective in teaching sociodramatic play to three 9-year-old males with autism (Ozen et al., 2012). Video modeling interventions have also been used
to teach motivating social skill lessons to a middle school student with emotional and behavioral disabilities (Cumming, 2010). Dowrick and Raeburn (1995) used video self-modeling to increase a range of target behaviors including motor skills, self-help skills, and leisure skills for 18 participants ages 5 to 13 with varying physical disabilities. In this study, 14 of the children showed progress with the video self-modeling intervention and maintained the skills for 1 year (Dowrick & Raeburn, 1995). Another study, based on Bandura’s social learning theory, evaluated the effectiveness of using video self-modeling to improve social communication skills with four preschoolers, all diagnosed with autism (Wert & Neisworth, 2003). The intervention resulted in significant increases in spontaneous requesting for all participants and maintenance was seen over a 6-week period (Wert & Neisworth, 2003).

In reviewing video modeling research specifically with individuals with autism, video modeling interventions were found most effective for elementary aged students (Mason et al., 2012). Younger students may benefit more from video modeling compared to older students, as older ones progress slower than younger ones (Wang et al., 2011). There were no significant differences found among IQ scores, verbal skills, gender, or severity of autism (Lydon et al., 2011; Mason et al., 2012); however, in a study of preschoolers, there were high correlations between cognitive development and increased play and language skills (Thiemann-Bourque et al., 2012). In a review of research on social skills treatments for children with autism, modeling was found best for older children with higher cognitive skills (Matson et al., 2007). Video modeling appeared to be more effective for students with autism spectrum disorders when they were identified prior to the study as being able to learn through observation and when they had previous experience or success using video modeling interventions (MacDonald et al., 2005).
When researchers did not evaluate the participant’s ability to watch a video for a predetermined amount of time, participants in the study were not as interested in the video, therefore affecting the results of the study (Wert & Neisworth, 2003).

Using video modeling with students with autism spectrum disorders can be a successful intervention tool due to several factors. Many of these individuals are visual learners, have different visual attending patterns when compared to typical peers, and have a preference for the video model compared to the live model (Cardon & Azuma, 2012; Wilson, 2013). These students may spend less time attending to people and stimuli in person and may miss significant nonverbal cues due to a lack of attending to a person’s face while he or she is talking (Cardon & Azuma, 2012). Because visual attending is influenced by the mode in which the information is being presented, individuals with autism often show selective attention when viewing a computer or television screen, therefore making video modeling an effective intervention (Buggey, 2005; Buggey et al., 1999; Cardon & Azuma, 2012). The content of a single video watched multiple times is predictable and consistent, and extraneous variables that are often distracting to students with autism spectrum disorders can be filtered out (Buggey et al., 1999).

In the research, video modeling interventions were most effective for students with autism spectrum disorders who displayed a low rate or nonexistence of the target behavior at the beginning of the study. In the study by LeBlanc et al. (2003), all participants consistently failed when given assigned tasks during the baseline sessions, and, in a study by Wert and Neisworth (2003), spontaneous requests were minimal or nonexistent for preschool children at the beginning of the study. When selecting participants with some level of the target behavior already in their repertoire, behaviors may increase during the baseline phase of the study before treatment is ever introduced.
When this occurs, it is impossible to conclude that the video modeling interventions are directly related to the change in target behaviors because the students already had some knowledge and ability to perform the desired skills (Simpson, Langone, & Ayres, 2004).

Results of the research had stronger validity and reliability when the experimental design included generalization and maintenance phases and when the researchers collected data on interobserver agreement. Data were collected on generalization with related toys or tasks (LeBlanc et al., 2003; Nikopoulos & Keenan, 2004b; Paterson & Arco, 2007), across settings (Apple, Billingsley, & Schwartz, 2005; Mancil, Haydon, & Whitby, 2009; Nikopoulos & Keenan, 2004b; Schreibman et al., 2000; Wert & Neisworth, 2003), and across peers (Nikopoulos & Keenan, 2004b). Maintenance data were included at various intervals across studies ranging from 1-week to 3-month intervals (Buggey, 2005; LeBlanc et al., 2003; MacDonald et al., 2005; Mancil et al., 2009; Nikopoulos & Keenan, 2004a, 2004b; Paterson & Arco, 2007; Schreibman et al., 2000; Wert & Neisworth, 2003). Follow-up data were also collected using parent observations (Buggey et al., 1999). Interobserver agreement data were collected in several of the studies and showed a high level of agreement between two or more observers (Apple et al., 2005; Buggey et al., 1999; MacDonald et al., 2005; Mancil et al., 2009; Nikopoulos & Keenan, 2004b; Ozen et al., 2012; Paterson & Arco, 2007; Schreibman et al., 2000; Simpson et al., 2004; Wert & Neisworth, 2003).

Treatment fidelity was strong in several of the research studies as well. The strengths of using behavioral observations was explained in one article that reviewed various ways to measure change in social interaction skills in young children with autism (Cunningham, 2012). These included using multiple observers to score the observations, conducting the observations over several sessions, observing the child in naturalistic
settings, comparing observed behaviors to that of neurotypical peers, and combining observation data with other assessment tools (Cunningham, 2012). It may also be helpful to record all the sessions and use a procedural checklist when reviewing the implementation of the interventions (Cardon & Azuma, 2012; Gonzalez-Lopez & Kamps, 1997; Tetreault & Lerman, 2010; Wilson, 2013).

In an overview of how to construct self-modeling videos, the authors noted that the treatment is strengthened when the parent permission requirements are outlined and written consent from all adults involved in the study is included (Collier-Meek et al., 2012). In one study looking at video self-modeling with preschoolers, the researcher had direct correspondence daily in person or through email with the teachers collecting the data to ensure the treatment was being delivered as instructed (Buggey, 2012). It is also important to isolate the treatment and provide no other treatments for the target behaviors for the duration of the study (Dowrick & Raeburn, 1995).

When using toys to teach play skills, the chosen toys should be familiar and developmentally appropriate to the participants in the study but isolated so the toys are only available during the treatment phase (Gul & Vuran, 2010). This will ensure that the change in the participant’s play skills are due to the video modeling interventions and not due to increased opportunities outside of the study to access the materials. In reviewing many of the studies on video modeling and children with autism, almost all of the research included a well-defined procedures section; however, very few studies monitored and reported treatment integrity, questioning how well the research was conducted (DiGennaro Reed et al., 2011).

Observer or student training was offered in a few of the studies reviewed to ensure that the procedures designed by the researchers were carried out as described in
the method section. This training was provided to teachers and students on the use of social stories (Mancil et al., 2009), using discrete trials with students on how to request items (Wert & Neisworth, 2003), and with observers on learning the behavioral definitions used in the study (Paterson & Arco, 2007). By incorporating these trainings into the research design, the procedural reliability of the studies was increased. Procedural reliability was also strong in studies that clearly defined the target behaviors in measurable and reliable terms (Apple et al., 2005; Buggey, 2005; Ozen et al., 2012; Schreibman et al., 2000; Wert & Neisworth, 2003). In a review of 29 studies focusing on technology to teach social skills to children with autism, almost all of the studies operationally defined the procedures and target behaviors (DiGennaro Reed et al., 2011). This would be especially critical when collecting data on ambiguous behaviors such as aggression or self-injury. By utilizing a well-written definition for the target behavior, the researchers ensured that multiple people observing the same participant obtained the same behavioral data.

Weaknesses in the research reviewed were often explained in the limitations of the study and led to possible areas of future research. One concern with using scripts as part of the video modeling intervention was in the ability to fade the scripted language and generalize to spontaneous communication. In the study by MacDonald et al. (2005), the participants acquired scripted language as part of the play scenario but were unable to generalize their communication to other play environments. When comparing students with autism to students without autism in the same study, social skills improved using video modeling interventions for students with autism but not at the same rate as was seen in students without autism (Cotugno, 2009).

This implied that continual training is needed for these students in the core deficit
areas of social skills and communication outside of the research study parameters. When using multiple independent variables, such as scripting, video modeling, and teacher prompting within the same study, it was impossible to assess which variable influenced the target behavior without isolating the independent variables in separate studies (Buggey et al., 1999). However, when video modeling was used as the sole intervention, the researchers could not conclude that it was the best intervention to increase social skills, just one effective intervention (Schreibman et al., 2000).

Weaknesses in the research reviewed were also seen in the procedures section and were often not explained in further detail throughout the study. In a large overview of social skills treatment studies for children with autism spectrum disorders, there were no clear references made to assessments used to obtain the autism diagnosis in a majority of the studies, and the disability was often assumed by observing the child or talking to the teacher (Matson et al., 2007). In an analysis of studies on video modeling interventions to teach social skills, 81% of the studies gave no explanation for choosing the dependent variable (Gul & Vuran, 2010).

In another study looking at the effectiveness of video self-modeling to promote social initiations, the dependent variables were chosen based on developmentally appropriate skills for a typical child, instead of evaluating the prior social skills of the child with autism and choosing a dependent variable based on those evaluation results (Buggey, 2012; Flynn & Healy, 2012). The amount of time needed to create videos using peer models was also mentioned in one study, suggesting the need to use adult models in the future to decrease the video’s production time (Apple et al., 2005). Overall, in several studies, there was no rationale provided for the selection of the target behaviors and no discussion of social validity (Matson et al., 2007).
The social validity of research is important to consider prior to a study and to evaluate again at the conclusion of the study (Matson et al., 2007). In teaching social skills, the social validity of the target skill is crucial as the skills taught should be at the child’s developmental level and ones that will impact future social skill development (Gul & Vuran, 2010; Terpstra et al., 2002). Because most children with autism spectrum disorders are included in regular education classrooms, they are exposed to increased social pressures and demands, highlighting the importance of starting social skills training at a young age (Rao et al., 2008). Unfortunately, collecting data on the social validity of research is not a common practice. In a review of 21 studies on using video modeling interventions to teach social skills, only 33% of the studies reported on the social validity of the research (Gul & Vuran, 2010).

In studies that did report on social validity, there were various methods used to strengthen the data. These included informal interviews conducted throughout the study (Buggey, 2012), interviewing the participants before each session and at the end of the study (Apple et al., 2005; Ozen et al., 2012), and using a Likert scale to measure the acceptability of the interventions (Bellini, Akullian, et al., 2007). Social validity data incorporating the target behaviors included selecting the behavior based on the importance for the child (Dowrick & Raeburn, 1995), suggesting the use of a systematic method to prioritize and choose the target behavior (Matson et al., 2007), and selecting the behavior based on previous assessment results and consultation with other professionals (Wilson, 2013). Other studies reviewed for social validity used an Intervention Rating Profile to determine the acceptability and practicality of the interventions or sent copies of the videos home for parents to implement to increase the likelihood of generalization (Ogilvie, 2011; Wilson, 2013).
Much of the video modeling research reviewed here specifically focused on extending and supporting previous research conducted in the field on video modeling, social skills, or play skills (Apple et al., 2005; MacDonald et al., 2005; Mancil et al., 2009; Owen-DeSchryver, Carr, Cale, & Blakeley-Smith, 2008; Paterson & Arco, 2007; Schreibman et al., 2000). Video modeling encompasses the observational learning component of Bandura’s social learning theory (Bandura, 1977; Delano, 2007). However, there is conflicting research on whether video modeling interventions are more effective when used alone or as part of a treatment package. A large meta-analysis of single case studies focusing on video modeling interventions with other as model showed no significant differences in treatment effects when video modeling was used alone compared to when video modeling was part of the intervention package (Mason et al., 2012). However, a previous overview of the research on video-based instruction to teach social and communication skills showed strong support for including prompting, error correction, and reinforcement into the intervention plan to acquire, maintain, and generalize the targeted skills (Shukla-Mehta et al., 2010).

Video modeling has been combined with self-monitoring to increase off-task behaviors, with self-management to increase compliment-giving behaviors, with observational learning and small groups to teach sociodramatic play skills, and with activity schedules to increase play with novel activities (Apple et al., 2005; Coyle & Cole, 2004; Dauphin et al., 2004; Ozen et al., 2012). This research supports that video modeling used alone may not be enough to significantly increase skills for children with autism, and the intervention may need to be used in conjunction with other treatments, such as scripting, feedback, prompting, or video self-modeling, to increase the success rate (Dauphin et al., 2004; Delano, 2007; Ozen et al., 2012). However, video modeling
interventions used alone have been effective to teach reciprocal pretend play skills to children with autism and to increase adaptive behavior skills for children with cerebral palsy and spina bifida (Dowrick & Raeburn, 1995; MacDonald et al., 2009).

Video modeling results have also been inconsistent with preschoolers (Buggey & Ogle, 2012). This may be due to several factors in addition to their young developmental age including the severity of the disability, the inability to recognize oneself in video self-modeling interventions, the complexity of the target behaviors, poor attending skills, and the inability to recognize important features in the video (Buggey, 2012; Buggey & Ogle, 2012). In one study with a 4-year-old and a 5-year old, video self-modeling was effective in increasing unprompted social interactions, and the rate of interactions remained high during the maintenance phase when the video intervention was withdrawn (Bellini, Akullian, et al., 2007). However in a more recent study with some of the youngest participants on record, video self-modeling did not appear to affect the frequency of social initiations of three preschoolers (Buggey, 2012). The study was repeated with the same participants a few months later, again showing no gains in interaction skills (Buggey, 2012). However, limited research shows that video modeling interventions may be more effective for young children when included as part of an early intervention program paired with other treatments (Gelbar et al., 2012; MacDonald et al., 2009).

Because a small sample size is used in most single-subject research studies, there is a constant threat to the validity of the research (Buggey, 2012). Large-scale group studies focusing on the comparison of different strategies for children with autism using video modeling to impact play skills are nonexistent (Matson et al., 2007), so previous research on video modeling needs to be reproduced with varying ages in various settings as results from single-subject studies are strengthened with multiple replications (Horner
et al., 2005). Also, comparisons to other studies are critical because there is no one universal measure for increasing behaviors for individuals with autism (Cunningham, 2012).

This would strengthen the likelihood that video modeling would be seen as an evidence-based practice for students with autism spectrum disorders. Currently, all video modeling interventions meet criteria for research-based practices (Bellini & Akullian, 2007; Gul & Vuran, 2010; Horner et al., 2005). However, video modeling is still emerging as an evidence-based intervention for individuals with autism spectrum disorders (Bohlander et al., 2012). To be considered an evidence-based intervention, the literature must contain a minimum of five published studies across three research teams in various locations, at least 20 participants in the studies, and three demonstrations of positive experimental effects (Gelbar et al., 2012).

Future research using video modeling interventions should focus on evaluating the reinforcing effects of watching the videos (Paterson & Arco, 2007), comparing video modeling, video self-modeling, and point-of-view modeling (Gelbar et al., 2012), and fading adult prompts quickly to limit prompt dependency and to decrease the chances of the adult being seen as a discriminative stimulus (Apple et al., 2005; Nikopoulos & Keenan, 2004b; Paterson & Arco, 2007). Also, future research should explore the characteristics of students who respond positively and negatively to video modeling interventions with varying behaviors (Gelbar et al., 2012), evaluate different arrangements such as small-group interventions versus individual interventions (Ozen et al., 2012), and focus on generalizing the target behaviors to other environments, people, and tasks (Mancil et al., 2009; Nikopoulos & Keenan, 2004b; Paterson & Arco, 2007; Wert & Neisworth, 2003). The social validity of using video modeling with children with
autism to teach play skills is significant due to their severely impaired skills in this social domain (Buggey et al., 1999; Nikopoulos & Keenan, 2004b). By increasing play skills with this population, children will be able to interact and socialize more with their non-disabled peers in both educational and social environments.

**Methodological design.** In the articles reviewed, single-subject research designs were utilized in a majority of the studies. A multiple baseline design across participants (Apple et al., 2005; Baron-Cohen, 1987; Buggey, 2005, 2012; Buggey et al., 1999; Catania et al., 2009; LeBlanc et al., 2003; Nikopoulos & Keenan, 2004a, 2004b; Owen-DeSchryver et al., 2008; Schreibman et al., 2000; Simpson et al., 2004; Wert & Neisworth, 2003), across play sets (Baron-Cohen, 1987; MacDonald et al., 2005, 2009; Thiemann-Bourque et al., 2012), across target behaviors (Buggey, 2005; Ozen et al., 2012), across phases (Dauphin et al., 2004), or across tasks (LeBlanc et al., 2003) was chosen as the experimental design for several studies. An alternating treatments design was utilized in multiple studies to compare the effectiveness of the following: static pictures to video modeling (Cihak, 2011), pivotal response training to video modeling (Lydon et al., 2011), video self-modeling to video alone (Dowrick & Raeburn, 1995), instructor-created videos to commercially available videos (Palechka & MacDonald, 2010), live shows to video shows (Cardon & Azuma, 2012), and live modeling to video modeling (Wilson, 2013).

A multiple baseline design with a withdrawal phases to assess generalization across toys was utilized in one study (Paterson & Arco, 2007), and both an ABA and an ABACA withdrawal design were used in another study to decrease off-task behavior (Coyle & Cole, 2004). A reversal design with two intervention components, social skills training and social skills training plus reinforcement, was demonstrated in a study to
increase social interactions between children with autism and their typical peers (Gonzalez-Lopez & Kamps, 1997), whereas an ABABCB reversal design was chosen in another to compare the effects of video modeling versus paper based social stories (Mancil et al., 2009). Two studies reviewed did not encompass a single-subject research design but used pretest and posttest data with social competence and language scales to assess the effectiveness of video modeling on increasing joint attention, play skills, and social skills (Cotugno, 2009; Kroeger, Schultz, & Newsom, 2007). A final study joined both research designs, single subject and pretest and posttest, to increase perspective-taking skills (LeBlanc et al., 2003).

In summary, the definition of autism has evolved from the early work of Leo Kanner and Hans Asperger in the 1940s to the more refined criteria of today, which classifies an individual with autism as having deficits in social communication skills and restrictive behavior patterns (American Psychiatric Association, 2013; Asperger, 1944; Kanner, 1943). As the definition of autism has changed over the past 70 years, the prevalence has increased exponentially, with current data reporting autism to occur in one of every 68 children (Centers for Disease Control and Prevention, 2014). There are various arguments as to why autism has increased so rapidly, including a more inclusive definition of the disorder, a fight for early identification leading to increased opportunities for early intervention services, and more parents wanting the diagnosis to provide for insurance coverage for therapies (Baker, 2013). Regardless of the reasons for the increase, autism spectrum disorders are on the rise, and more research needs to be conducted with this population in order to better understand effective intervention strategies.

Research on social skills and play skills interventions is crucial for children with
autism because social deficits are a defining criterion for the initial diagnosis. One intervention that has received a substantial amount of attention in the research literature is video-based instruction. Video modeling and video self-modeling are the two most common types of video-based instruction researched, and both have shown positive results with individuals with autism (Bellini & Akullian, 2007; Buggey & Ogle, 2012; LeBlanc, 2010; Scattone, 2008). Single case studies have composed much of the video modeling research, with multiple baseline designs being the most common research design selected (Matson et al., 2007).

Strengths in the previous research reviewed included a well-written procedures section detailing step-by-step directions for conducting the study and incorporating maintenance and generalization phases into the research design (DiGennaro Reed et al., 2011). Future areas of research highlighted in the literature included further comparisons of video modeling to video self-modeling intervention techniques, investigating the characteristics of students who respond well to video modeling interventions, and generalizing the learned skills to other settings and individuals (Gelbar et al., 2012; Paterson & Arco, 2007).

**Research Questions**

Based on a comprehensive review of the literature, the following research questions were established to guide this applied dissertation:

1. What is the effect of video modeling and video self-modeling on play action skills for early elementary school students with autism?

2. How are play skills effectively generalized and maintained in environments other than the targeted environment?

3. What prerequisite skills are necessary to be a successful participant in video
modeling interventions?
Chapter 3: Methodology

The purpose of this study was to examine the relationship between video modeling and the possible increase in play skills in elementary-aged students with autism spectrum disorders. This chapter explains the selection procedures of the target population from the sample school, including both students and education professionals as participants. A video modeling intervention was compared to a video self-modeling intervention, and the instrument used to measure the effectiveness of these treatments is described. The procedures section outlines in detail the specific steps needed to conduct this study, with independent, dependent, and extraneous variables discussed. Justification for choosing a single subject, multiple baseline research design is given, with an analysis of the outcomes. Finally, threats to internal and external validity are explained, and a timeline for the current study is provided.

Participants

The target population involved 4- to 8-year-olds, both neurotypical students and students diagnosed with an autism spectrum disorder according to the criteria listed in either the revised version of the fourth edition of the DSM or the fifth edition of the DSM (American Psychiatric Association, 2000, 2013). Both of these editions of the DSM were used since the participants with autism were diagnosed at various times when the manuals were released. The autism diagnosis was confirmed by reviewing prior school psychoeducational reports as well as current individualized education plans. The researcher enrolled three students with autism for this study, and they were chosen based on parental consent, teacher willingness to participate, previous experience with visual strategies, and level of attending behavior, defined as the ability to look at a videotape playing on a screen for at least two continuous minutes.
The first participant with autism, JG, was 6 years 9 months at the beginning of the data-collection phase of the study. He was able to independently greet peers and adults and communicated using short phrases. He preferred to work on tasks by himself in the classroom and often separated himself from his peers. He did not like to participate in either small nor large group activities with peers and would become verbally frustrated when prompted to join other students. JG would play functionally with toys, but his play was often repetitious, and he did not have a variety of toys he would willingly play with.

The second participant with autism, RM, was 5 years 0 months at the beginning of the data-collection phase of the study. He enjoyed being around other children and talking with adults and peers. He communicated using phrases and full sentences and was able to request, comment, and ask and answer questions. He enjoyed playing with a variety of toys; however, he was often rough in his play and would crash many of the toys or put them in the trash. RM was also selective about which peers he would play with and preferred being in close proximity to younger children.

The third participant with autism, RB, was 8 years 11 months at the beginning of the data-collection phase of this study. He was able to greet adults and peers with prompting but did not request his wants and needs during the school day unless asked by an adult. He would typically give one-word answers to questions and needed an occasional teacher prompt to answer. RB would parallel play and show interest in his peers, but never initiated play with others. He required prompting to take turns, his play was often very repetitious, and play items would be brought close to his face or put in his mouth during play.

Neurotypical students in this study were defined as elementary-aged peers who did not have any known developmental disabilities and received academic instruction full
time in a general education classroom. These peers were used as models in the video modeling intervention phase of the study, and the researcher enrolled five neurotypical students to participate. These students ranged in age from 7 years 2 months to 8 years 11 months and consisted of three boys and two girls. The students were chosen based on parental consent and teacher willingness to participate.

Education professionals were also participants in this study and included one autism specialist, two special education teachers, one speech and language pathologist, and one classroom assistant. These participants assisted in implementing the video modeling and video self-modeling intervention phases of the study and collecting data. All of the education professionals were selected based on willingness to participate, availability of their schedule, and number of student participants on their caseload.

**Setting**

The current study was conducted at a public elementary school in a small town located in the southern section of the United States, containing preschool through fifth-grade students. At the sample elementary school, of a total of 1,118 students, there were 66 students diagnosed with an autism spectrum disorder, 79% male and 21% female. According to parent reports of these students, 65% were White, 18% were Black, 2% were Asian, American Indian, or Alaskan, 12% were mixed races, and 3% did not disclose. In addition, parents reported 44% were Hispanic and 56% were non-Hispanic. Of the 66 students with autism, 41 students received more than 60% of their weekly academic instruction in an intensive setting with a student to teacher ratio of 3:1.

All baseline and training video modeling sessions took place in the autism specialist’s office, where there was a large circular table in the center of the room with two chairs. There was also a carpeted area on the floor surrounding the table where play
sessions occurred. All sessions were videotaped using a Flip video camera. Generalization probes were conducted in the speech and language pathologist’s classroom and in the autism specialist’s office.

**Materials**

Two sets of Playmobil play sets were used for this study. The school bus play set was targeted for 4- to 10-years-olds and contained 12 pieces, and the airplane play set was also targeted for 4- to 10-year-olds and contained eight pieces. Videos were recorded on a Flip video camera, edited using the iMovie software on a MacBook Pro laptop, and watched by participants with autism on a MacBook Pro laptop.

**Measurement**

**Dependent variable.** According to Kennedy (2005), the dependent variable is the behavior being analyzed. It is called the dependent variable because the level of behavior being measured is dependent on the presence or absence of the independent variables (Kennedy, 2005). In this study, the dependent variable being measured was scripted play actions. This was chosen as the dependent variable based on a previous study by Hine and Wolery (2006), in which a point-of-view video modeling intervention was used to increase the play actions of preschoolers with autism through cooking and gardening tasks.

By increasing appropriate play actions, repetitive actions with toys, typically seen in children with autism, may decrease, possibly leading to more opportunities for adults to comment on play (Hine & Wolery, 2006). This may lead to increased opportunities to practice communication skills with both adults and peers and may allow children with autism to be more integrated into less restrictive educational settings (Hine & Wolery, 2006). For this study, scripted play actions were defined as motor responses with toys.
that matched the models seen in the video or motor responses that resulted in similar changes to the environment with the targeted toys. This definition was similar to previous research on pretend play skills using instructor-created videos and commercially available videos (MacDonald et al., 2009; Palechka & MacDonald, 2010).

**Instrument.** To measure scripted play actions, a data sheet was developed for each Playmobil play set listing the possible scripted play actions using the targeted toys. These data sheets were created following several observations of neurotypical children playing with each Playmobil play set and set the foundation for the play actions seen on the videos created. A detailed explanation of these observations is outlined in the procedures section below, and a data sheet for each Playmobil play set is included in Appendix D. During the study, a frequency count of observed scripted play actions was documented on the data sheet corresponding to the Playmobil play set being used. A tally mark was made next to each play skill on the data sheet in the appropriate row.

**Procedures**

**Selection of participants.** There was little support in the research on the effects of prerequisite skills on the success of video modeling interventions (Buggey & Ogle, 2012). However, several researchers had used similar prerequisite skills as a guideline when selecting target participants. These prerequisites included the ability to self-recognize (Buggey, 2012; Buggey & Ogle, 2012), display imitation skills (Ganz et al., 2011; Mechling & Moser, 2010; Ogilvie, 2011; Ozen et al., 2012) especially gross motor imitation, object imitation, and delayed object imitation skills (Palechka & MacDonald, 2010), follow verbal directions (Ozen et al., 2012), and exhibit the targeted skill, even briefly or with adult prompting (Buggey, 2012; Collier-Meek et al., 2012). The participants also needed to have individual education plan goals or priority educational
needs related to social and play skills (Cihak, 2011; DiGennaro Reed et al., 2011; Palechka & MacDonald, 2010), previous success with visual strategies or video based interventions (Mechling & Moser, 2010), and the ability to attend to both a video and a task for at least 2 minutes (Buggey & Ogle, 2012; Mechling & Moser, 2010; Palechka & MacDonald, 2010).

Participants with autism met the following criteria to be included in this study: (a) a confirmed diagnosis of an autism spectrum disorder from their most recent psychological report or individualized education plan (IEP), (b) ranged in age from 4 to 8 years old, (c) parental consent, (d) classroom teacher’s willingness to participate, (e) social goals on their current and previous year’s IEP related to peer or play skills, (f) fluent in English, (g) received 60% or more of their weekly academic instruction in an intensive setting, (h) previous experience with visual strategies, and (i) ability to attend to a video for at least 2 continuous minutes, as shown in Appendix A (Bonnet, 2012).

Participants were chosen using a nonrandom sampling procedure, and, once individuals met the inclusion criteria, they were added to a pool of possible participants for the study. The participants selected were then randomly chosen for the study using the online web tool called Random Name Picker.

For JG, his 2016 psychological report and current IEP confirmed the autism diagnosis. On his previous IEP, he had social goals related to initiating interactions and sharing with peers. On his current IEP, he had a social goal focusing on turn taking with peers. He also received 83% of his weekly academic instruction in an intensive setting. JG used a visual schedule in his classroom on a daily basis, completed daily independent work stations with visuals supports, and followed simple commands.

For RM, his 2017 psychological report and current IEP confirmed the autism
diagnosis. On his previous IEP, he had a social goal on initiating play with peers. On his current IEP, he had a social goal for sustaining interactions with peers for three exchanges. He also received 92% of his weekly academic instruction in an intensive setting. RM used a visual schedule in his classroom on a daily basis, completed daily independent work stations with visuals supports, and followed simple commands.

For RB, his 2013 psychological report and current IEP confirmed the autism diagnosis. On his previous IEP, he had a social goal for sustaining play with peers. On his current IEP, he had a social goal for turn taking with peers. He also received 73% of his weekly academic instruction in an intensive setting. RB used a visual schedule in his classroom on a daily basis, completed daily independent work stations with visuals supports, and followed simple commands.

Neurotypical students met the following criteria to be included as participants in this study: (a) ranged in age from 7 to 8 years old, (b) parental consent, (c) classroom teacher’s willingness to participate, (d) no known diagnosed disabilities, (e) a native English speaker, (f) received 100% of their weekly academic instruction in a general education classroom, and (g) showed interest in forming a relationship with a student with autism, as shown in Appendix B (Bonnet, 2012). Participants were again chosen using a nonrandom sampling procedure. Once individuals met the inclusion criteria, they were added to a pool of possible participants for the study. The participants selected were then randomly chosen for the study using the online web tool called Random Name Picker.

Education professionals met the following criteria to be included as participants in this study: (a) gave consent, (b) employed at the school in which the study took place, (c) time available in their schedule, (d) member of educational team for one or more student
participants in the study, (e) a minimum of 3 years of experience working with individuals with autism, and (f) fluent in reading and writing English, as shown in Appendix C (Bonnet, 2012). Participants were also chosen using a nonrandom sampling procedure. There were only five participants who met the inclusion criteria, so they were all included in the study.

**Prestudy.** Before beginning baseline data collection for this study, there were several prestudy procedures that occurred. The researcher observed neurotypical children playing with each of the two Playmobil play sets to establish the scripted play actions for each play set that was depicted on the videos, data were collected on attending behavior for the participants with autism, and both the neurotypical students and the education professionals were trained on the intervention components. These prestudy procedures are defined in greater detail below.

**Initial play observations.** Based on the suggested ages listed on the packaging of each Playmobil play set, the researcher observed neurotypical children at the research setting playing with each of the play sets. One play set at a time was placed on the floor in the researcher’s office, and the neurotypical children were given free access to play with the toys. Observations with each play set lasted 15 minutes and were conducted over 3 days for each play set.

**Play actions script.** Based on the data collected from the initial play observations, a list of scripted play actions was developed. To be included in the script, the play action must have been observed at least twice over the three observations. A play action script was written for each Playmobil play set (see Appendix D).

**Data on attending behavior.** For the participants with autism, data were collected on attending behavior that was exhibited during a 2-minute period while watching a
video. These data were collected in the special education classrooms and the Spanish classroom for a minimum of three 2-minute periods per participant. Each participant needed to score a minimum of 75% attending in all three sessions in order for baseline procedures to begin for that participant. Attending behavior was defined as the student’s eyes looking toward the video playing on the screen and was recorded in 10-second intervals. Numerous shows were used to gather these data, including routine classroom academic videos (e.g., phonics, math), preferred videos (e.g., PBS Kids, Dora), and unfamiliar videos to ensure that the participant could attend to any video on the screen, not just known videos. Data were taken while videos were shown to the participants on a television screen, a computer screen, and an iPad-2 screen to ensure that they could attend to a variety of video mediums. After the 2-minute time period, the participant was asked, “What did you just watch?” and the response was recorded in writing on the data-collection sheet (see Appendix E).

For JG, he averaged 77% attending over four sessions. When asked, “What did you just watch?” he answered in one to three-word phrases, and all his answers related to the video content he had just watched. For RM, he averaged 85% attending over six sessions. When asked, “What did you just watch? he answered in two to three-word phrases. For one video, RM answered, “I don’t know,” and he needed to be prompted by the researcher. For the remainder of the videos, his answers related to the video content he had just watched. For RB, he averaged 84% attending over nine sessions. When asked, “What did you just watch? he answered in a single word. For two videos, he did not answer; however, he was engaged for at least 75% of the intervals during those videos, so the attending data were counted. For the remainder of the videos, his answers related to the video content he had just watched.
Education professional trainings. Prior to the intervention phases of the current study, education professionals were trained on how to appropriately interact with the participants with autism while watching the videos. The education professionals were instructed to comment on the videos (e.g., “Look, Dave pushed the car to Jim”) and clarify anything seen on the screen (e.g., “See, Jody and Kim are feeding a bottle to the doll”). They were also be trained on how to provide redirection back to the videos if needed. Gestural prompts (e.g., tapping the participant’s arm and pointing to the screen) and verbal prompts (e.g., “look here”) were used.

The education professionals were also trained on how to cue the participants with autism when they encountered a social or play situation with a neurotypical peer outside of the training sessions. These interactions naturally occurred during recess, lunch, or a special area elective when the participants with autism were integrated with neurotypical peers as part of their normal school schedule. The education professionals were taught to verbally encourage the participants with autism to play with their neurotypical peers (e.g., “Go play in the sand with Michael”) or to interact during an activity (e.g., “Let’s color the ladybug with Sara”). In both training situations, the researcher observed the education professionals providing prompts and cues and offered corrective feedback as needed.

The researcher presented an overview of video-based instruction as well as recent research in the field to ensure the education professionals were well informed about the intervention components of the current study. The training occurred before school in the autism specialist’s office and lasted approximately 30 minutes. Both commercially made videos and instructor-created videos were utilized during this training.

Finally, all parties collecting data were trained on using the frequency count data sheet to record scripted play actions. During the sample data-collection period, both the
researcher and education professional took data on the frequency of scripted play actions while watching the video of neurotypical peers playing with one Playmobil play set. Sample data were recorded until both the researcher and the education professional reached 80% agreement over two consecutive sessions. The education professional was then deemed competent to collect data.

*Neurotypical student trainings*. Once the scripted play actions were listed for each Playmobil play set, the researcher trained the neurotypical student participants on the scripted actions for each play set. The training occurred in the researcher’s office, and the researcher modeled the scripted actions using the Playmobil play set. The neurotypical students then practiced the actions using the Playmobil play set, and data were collected on the frequency count data collection sheet described in the instrument section above. The students continued to practice and receive corrective feedback from the researcher until all participants demonstrated the scripted play actions with 100% accuracy over two training sessions.

The researcher also conducted a sensitivity training for the neurotypical student participants explaining autism and the common characteristics of the disability using the book *All About My Brother* (Peralta, 2002). The training consisted of reading the book as a small group, answering any questions that arose as a result of the story, and visiting a special education classroom. This training was held in the researcher’s office and lasted approximately 1 hour.

*Creation of videos*. For this study, two videos were created for each participant with autism: one for the video modeling intervention and one for the video self-modeling intervention. The online web tool, Random Name Picker, was again used to randomize the selection of Playmobil play sets for each participant with autism for both the video
modeling and the video self-modeling interventions. For JG, he watched the airplane video for the video modeling intervention and watched the school bus video for the video self-modeling intervention. For RM and RB, they both watched the school bus video for the video modeling intervention and watched their own airplane video for the video self-modeling intervention.

For the video modeling intervention, the videos were composed of the neurotypical student participants acting out the scripted play actions for each Playmobil play set they were trained on in the training described above. There were two videos created for the video modeling intervention, one using each Playmobil play set, that was shown to the participants with autism. For the video self-modeling intervention, the video showed one participant with autism acting out the scripted play actions for one of the Playmobil play sets. Each participant with autism had his own video to watch; therefore, several videos were created for this stage of the study.

**Video modeling.** These videos were created in the autism specialist’s office and showed two neurotypical student participants acting out the scripted play actions for one Playmobil play set. The toys were placed on the carpet, and the participants were instructed to play with the toys as they were taught in the training sessions. The play session was recorded and edited into one 50-second to 60-second video clip showing the scripted play actions listed on the frequency count data sheet. These procedures were replicated with the second Playmobil play set, so two videos were created for the video modeling intervention.

**Video self-modeling.** These videos were also created in the autism specialist’s office and showed the participant with autism acting out the scripted play actions for one Playmobil play set. The toys were again placed on the carpet, and the researcher
prompted the participant with autism to engage in the scripted play actions. The prompts used were nonverbal only and consisted of physical or gestural prompts from behind or from the side. As soon as a prompt was delivered, and the participant with autism began to engage in the scripted play action, the researcher removed her hands from the video shot in order to tape the student playing as independently as possible. When the student stopped playing, the researcher immediately reengaged and delivered additional prompts as needed. This process continued for the duration of the taping session. Once all the scripted play actions were performed, the video was edited to remove the prompts and presence of the researcher and only showed the participant with autism engaging in play. The video clip was 50 seconds to 60 seconds in duration, and the procedures were repeated for each participant with autism, resulting in multiple video clips for the video self-modeling intervention.

**Research design.** A single-subject design was chosen for this study after reviewing the previous research on video modeling and realizing the increasing need for evidence-based practices for students with autism (Horner et al., 2005). The design was an ABABCBC multicomponent design across participants because this allowed comparisons to be made between video modeling and baseline conditions and between video modeling and video self-modeling intervention conditions (Cooper, Heron, & Heward, 2007). This design seemed to be the most appropriate choice because it included a brief return to baseline after the video modeling intervention. From then on, the sole effects of the video modeling and video self-modeling interventions were seen on the dependent variable.

In the literature on interventions for autism, researchers often used single subject designs to view the causal relationships between interventions and behaviors to determine
the effectiveness of individual programs (Odom et al., 2003). A similar research design was also used successfully in prior research with children with autism to decrease pushing (Mancil et al., 2009). Through a single subject research study, the individual learner can be evaluated and best educational practices can be developed (Horner et al., 2005).

In this study, Baseline Phase A was conducted over six sessions and alternated between the two Playmobil play sets, with three data points included for each play set. For Intervention Phases B and C, videos were created showing student participants engaged in play with each play set. For the video modeling intervention, a 50- second to 60-second video was shown to the target participant with autism displaying two neurotypical peers playing with one Playmobil play set. For the video self-modeling intervention, another 50-second to 60-second video was shown to the target participant with autism displaying the participant himself playing with the second Playmobil play set. Generalization probes were also incorporated at the conclusion of the study.

**Independent variables.** According to Kennedy (2005), an independent variable is the intervention being manipulated. The researcher decides when to apply the intervention, when to remove it, and to what degree, and this variable is independent of the experimental situation (Kennedy, 2005). Because this was a comparative study, the researcher looked at two independent variables: video modeling and video self-modeling. Video modeling is defined as a “technique that involves demonstration of desired behaviors through video representation of the behavior” (Bellini & Akullian, 2007, p. 266). The first videos created were composed of one Playmobil play set and showed neurotypical students interacting during play. Similar to video modeling, video self-modeling uses the “observation of the images of oneself engaged in adaptive behavior”
(Dowrick, 1999, p. 23). In the second videos created, a different Playmobil play set was used, and the focal point of the video was the participant with autism engaged in play. As part of both video modeling and video self-modeling interventions, the images were captured on video, edited into short 30-second to 60-second segments, and repeatedly viewed by the participants to learn skills as part of a training program (Dowrick, 1999).

**Extraneous variables.** This single-subject research design study had the potential to present several possible extraneous variables. These variables were events that influenced the participant’s behavior but were not included as independent or dependent variables (Kennedy, 2005). One possible extraneous variable was the unintentional influence of neurotypical peers during social or play interactions with the participants with autism. During structured observations with the Playmobil materials, the researcher manipulated the environment so that the participant was being cued to display the behaviors seen in the video model.

However, for the remainder of the day when the experimenter was not observing the participants with autism in social or play interactions, neurotypical peers could prompt the participants with autism to interact, and the participants with autism could be increasing their knowledge of play skills from their peers as opposed to from the video. This was controlled by training the classroom teachers and classroom assistants on types of cues used to help the participants with autism respond appropriately in a social play situation. The cues used during this study when the researcher was present were the same ones used by the classroom staff. The researcher also observed the teachers and assistants providing this level of prompting and offered feedback where necessary.

A second possible extraneous variable was peer behavior. Although the neurotypical peers used in this study were trained on how to respond to the interactions of
the participants with autism, the peers may not respond appropriately. Selecting neurotypical participants that appeared highly interested in forming a relationship with the participant with autism helped control for this variable.

A third extraneous variable to consider was the possible perseveration on watching the videos from the participants with autism. This fixation on a certain item or routine is common in many individuals with autism and is related to their weaknesses in executive functioning (Rajendran & Mitchell, 2007). Initially, this may have been a helpful obsession because the researcher wanted to hold the participant’s attention and focus on the play skills being taught. However, once skills were acquired and the participants with autism moved into generalization probes, the videos were shown less frequently. To control for possible tantrums by the participants with autism on days the videos were not being played, a visual schedule was made for the participants with autism showing the days the videos were to be shown and the days the videos were not be shown (see Appendix F). In addition, a video icon was made for the classroom visual schedule on days when the videos were to be watched (see Appendix G).

**Baseline.** In addition to the inclusion criteria for selection of the participants, several steps were taken in the baseline stages of this research study to ensure validity and establish criteria for the participant’s play skills deficits. Participants with autism were observed in the autism specialist’s office during play activities with each Playmobil play set. The Playmobil play sets were placed on the carpet, one at a time, and the participants with autism were given free access to the toys. During the observations, data were collected using frequency count and recorded on the scripted play action data collection sheet for that Playmobil play set. These observations lasted 5 minutes for each play set and were conducted over 3 days for a total of three times per play set.
When playing with the school bus play set, JG consistently performed three of the play actions over three sessions (opens the bus door, puts a child in a seat, pushes the bus). RM consistently performed two of the play actions over three sessions (turns on lights, pushes the bus). RB consistently performed four of the play actions over three sessions (opens the bus door, closes the bus door, puts a child in a seat, puts the driver in a seat).

When playing with the airplane play set, JG consistently performed one of the play actions over three sessions (flies the plane). RM and RB consistently performed seven of the play actions over three sessions (takes off plane roof, puts plane roof back on, puts a passenger in the plane, puts a passenger in a seat, puts the pilot on the plane, puts the pilot in a seat, pushes the plane).

Special education classroom teachers and the autism specialist completed a Likert scale social interaction checklist for the participants with autism, rating their play and social skills when interacting with both peers and adults. This checklist included questions related to playing during break time, participating in games, and talking and sharing with peers and included a place for teachers to write additional information as needed about a particular behavior, as shown in Appendix H (Janzen, 1998).

For JG, behaviors noted as rarely occurring in the classroom included playing with peers during break, talking to other children, helping, sharing, and showing concern for others, responding to peer’s questions, and participating in games with peers. Seldom were his peer interactions noted to be of a positive nature. For RM, behaviors noted as rarely occurring in the classroom included playing with peers during break, participating in games with peers, talking to other children, and helping, sharing and showing concern for others. His peer interactions were noted to never be of a positive nature. For RB,
behaviors noted as rarely occurring in the classroom included playing with peers, participating in games or group activities with peers, responding to peer’s or teacher’s questions, helping, sharing and showing concern for others, and talking to other children. Seldom were his peer interactions noted to be of a positive nature. The results of this checklist assisted the researcher in ensuring that the selected participants with autism had play skill deficits that were consistently shown in the classroom environment.

Finally, parents filled out a checklist listing possible reinforcers for their child with autism. The checklist encompassed social, tangible, sensory, and edible motivators and included a space for parents to write additional items that did not fit into one of the above categories (see Appendix I). For JG, his favorite toys included cars, stuffed animals, and puzzles. For RM, his favorite toys included cars, racetracks, a soccer ball, and squirt guns. For RB, his favorite toys included cars, trains, the iPad, and Nintendo. The purpose of the motivational checklist was for the researcher to confirm that the Playmobil play sets used in the proposed study were novel toys and ones the participants with autism did not view as highly preferred to play with at home. None of the participants with autism had planes or school buses listed as favorite toys, although all three participants appeared to enjoy playing with vehicles of some kind. In addition, the motivational checklist gave the researcher ideas about possible motivators if the participants with autism needed reinforcement in any phase of the study.

**Intervention.** Once a stable or decreasing baseline was established, the intervention phase of the study began. Both video modeling (VM) and video self-modeling (VSM) intervention phases followed similar procedures. The video modeling intervention involved the following steps:

1. The 50-second to 60-second video was shown to the participant with autism
depicting neurotypical peers playing with one Playmobil play set.

2. The video was shown in the autism specialist’s office, with the participant with autism seated at the table and away from distractions.

3. The video was shown once per session.

4. Immediately after being shown the video, the participant with autism was brought to the carpet with the Playmobil play set and given the verbal cue, “It’s time to play.”

4. The frequency of scripted play actions displayed by the participant with autism was recorded on the data sheet for that Playmobil play set.

5. As needed, the participant with autism was given prompts back to the toys using verbal (e.g., “Let’s play with the bus”) or gestural (e.g., tapping the participant’s arm and pointing to the toys) prompts.

6. After 5 minutes, the participant with autism was given the verbal cue, “It’s time to clean up.”

7. The participant with autism was assisted in putting away the toys.

8. This intervention phase continued to be implemented until the data collected showed a stable or upward trend.

9. Once this trend was established, there was a brief return to baseline conditions as explained earlier.

10. Then the video modeling phase, as explained above, was reintroduced until the participant with autism reached mastery criteria, which was defined as 80% or higher over three consecutive sessions. Once mastery was achieved, the next phase of the study began.

The video self-modeling portion of the intervention process adhered to the
following steps:

1. The 50-second to 60-second video was shown to the participant with autism depicting the participant himself playing with the second Playmobil play set.

2. The rest of the steps of this intervention phase were identical to those shown above for the video modeling intervention, including the mastery criteria.

During baseline and interventions phases, triangulation was used to ensure the data collected were accurate. Creswell (2012) defined triangulation as “the process of corroborating evidence from different individuals, types of data, or methods of data collection” (p. 259). In addition to the frequency count used during structure play, all of the play intervals, including baseline, were videotaped by the researcher and reviewed for accuracy of frequency data.

**Validity.** The validity of any measurement tool is a way to assess whether the tool measures what it is intended to measure (Creswell, 2012). By looking at the frequency count of scripted play actions from this research, the data collected should make sense, should be meaningful, and should enable the researcher to draw conclusions about the impact of the independent variables on the dependent variable. Numerous studies on students with autism and social skills have used frequency counts as a method for data collection. These studies included research on increasing compliment-giving behaviors (Apple et al., 2005), decreasing pushing (Mancil et al., 2009), and improving social interactions (Kroeger et al., 2007; Owen-DeSchryver et al., 2008; Simpson et al., 2004).

The extent to which the independent variables, video modeling and video self-modeling, were implemented in this study, is referred to as treatment integrity (Gresham, Gansle, & Noell, 1993). A daily tally chart was used in the autism specialist’s office to ensure participants were watching the prescribed video clip on the correct day (see
The chart was displayed on the wall and listed the date and the corresponding video. The researcher was responsible for checking off that (a) the video was shown and (b) the participant attended to the video.

One possible threat to internal validity in this study was sequencing effects, also known as carryover effects. This is a common threat with all repeated measures designs as behaviors observed in one condition have the possibility of affecting the behaviors observed in other conditions (Kennedy, 2005). In this study, the play skills displayed in the video modeling condition may have affected the rate of acquisition of the play skills in the video self-modeling condition. Certain play skills may already have been learned from the video modeling condition that may have carried over into the video self-modeling condition. To control for sequencing effects, the researcher chose two Playmobil play sets, one for the video modeling condition and another for the video self-modeling condition. Also, the scripted play actions for each play set were different, so if one play skill was learned with the play set in the video modeling condition, it was not the exact same play skill expected for the second play set in the video self-modeling condition.

Reliability. The reliability of a measurement tool ensures that the scores recorded are stable, consistent, and able to be replicated among different administrators at various times (Creswell, 2012). To increase reliability, data were collected by the researcher and trained education professionals who were independent of this study and had at least 3 years of experience working with students with autism in school-based settings. By using familiar adults, this helped to control for observer effects on the participants (Mancil et al., 2009). An overview of video instruction was shared with the staff as well as recent research on using video instruction to increase skills in students with autism. In addition,
all parties collecting data were trained on using the frequency count data sheet.

Interobserver agreement was also collected during baseline and intervention phases. Interobserver agreement refers to the “monitoring of the consistency with which dependent and independent variables are being measured during a study…[and to] establish the degree to which measures that are being taken of people’s behavior are consistent” (Kennedy, 2005, p. 112). During baseline, the researcher and education professional collected interobserver agreement on the frequency of displaying scripted play actions for 50% of sessions. During the video modeling intervention phases, the researcher and education professional conducted interobserver agreement during 34% of the play sessions, and, during the video self-modeling intervention phases, interobserver agreement was collected for 36% of the play sessions.

Interobserver agreement was calculated by taking the number of agreements divided by the number of agreements plus the number of disagreements and multiplying by 100. For baseline and video modeling sessions, interobserver agreement was 93%. For the video self-modeling sessions, interobserver agreement was 92%. Across all conditions, for those sessions where the researcher and educational professional did not agree on the number of scripted play actions observed, both adults reviewed the videos for accuracy until an agreement was reached. Interobserver agreement was not collected for the two generalization probes.

**Follow-up.** Upon mastering any new skill, students need to be able to take the learned skill from the teaching environment into the natural environment and continue to perform the skill over time. This transfer of learning beyond the classroom where the skill is taught is a true measure of mastery across different people, various stimuli, and multiple environments.
**Generalization.** Generalization is defined as “the occurrence of relevant behavior under different non-training conditions” (Stokes & Baer, 1977, p. 350). The literature has shown that students with disabilities have difficulty generalizing learned skills across environments (Cooper et al., 2007). Therefore, it is crucial to include a generalization phase for research that includes these students as target participants. For this study, generalization of similar response chains were recorded in two probes: (a) in a different environment (e.g., in the special education classroom, in the general education classroom) and (b) with toys other than the Playmobil play sets. Data on generalization were collected on the same frequency chart as the one used during the intervention phases.

**Maintenance.** Maintenance is the extent to which the behavioral response persists over time (Cooper et al., 2007). It is effective when a student learns a skill in the confines of a systematic teaching environment; however, the skill becomes even more valuable when sustained over time, outside of the controlled setting. For this research study, the maintenance phase began once the participant with autism had reached mastery criteria (80% correct) on the scripted play actions over three consecutive sessions. Because data were collected on the effects of two independent variables, video modeling and video self-modeling, maintenance occurred as separate phases for each independent variable, depending on how quickly the participant reached mastery criteria.

**Data Analysis**

Analyzing data involves looking at graphs from a research study and noting the trends and variability in the data points. By studying the data, conclusions can be made about the effects the independent variables have on the dependent variable and what further research needs to be done to strengthen the validity and reliability of the study.
Results from single-subject research designs are usually presented in both line graphs and narrative forms to give the reader a visual representation of the data as well as a detailed written explanation of the results (Kennedy, 2005). The data from this study were analyzed in three separate graphs, one for each participant with autism and explained in further detail in the next chapter.

**Anticipated Outcomes**

The outcomes of this study included determining the effects of video modeling on the acquisition of play skills. The researcher also compared rates of acquisition of the dependent variable for video modeling and video self-modeling interventions. Finally, effective ways to generalize play skills were explored.

**Timeline**

Once participants were selected and consents were received, this study was conducted over 18 weeks. Prestudy procedures including the initial play observations and creating the play action scripts and videos lasted 2 weeks. Baseline data and training for the neurotypical students and education professionals lasted 1 week. The intervention phases, including both video modeling and video self-modeling lasted 15 weeks. Generalization probes were conducted over 2 days at the end of the 15 weeks.
Chapter 4: Results

The purpose of the current study was to examine the functional relationship between video modeling and the improvement of play skills in elementary-aged children with autism. Three participants with autism were enrolled in the study, and a single-subject ABABCBBC multicomponent design across participants was used to compare the effects of video modeling and video self-modeling. Data from the study were analyzed using a line graph for each participant showing the effects the independent variables (i.e., video modeling and video self-modeling) had on the dependent variable (i.e., scripted play actions). Narrative summaries and tables of the data were also included for each participant to further explain the data provided in the line graphs. Based on a comprehensive review of the literature, the current study was guided by the following research questions:

1. What were the effects of video modeling and video self-modeling on play action skills for early elementary school students with autism?

2. How were play skills effectively generalized and maintained in environments other than the targeted environment?

3. What prerequisite skills were necessary to be a successful participant in video modeling interventions?

Research Question 1

To address the first research question, the number of scripted play actions observed during baseline and after introducing the video modeling and video self-modeling interventions was examined. Attempts and actual occurrences of displaying the scripted play actions were both noted and counted on the frequency chart. These results were displayed in line graphs and tables for each participant with autism (see Appendix
Individual results for JG. When reviewing the data for the airplane play set, there were few differences seen in the percentages of scripted play actions observed across baseline, video modeling, return to baseline, and the first return to video modeling conditions. For JG, video modeling alone did not appear to have a significant effect on the percentages of scripted play actions performed because the numbers were similar across all conditions. He performed the first six play actions consistently across all conditions and always flew the plane. He did complete an additional play step (i.e., put luggage or purse in passenger’s hand) in all the sessions during the first return to video modeling condition, but this was the only play action step that was consistently different from baseline conditions. He never landed the plane to complete the scripted play actions as seen on the video but instead continued flying the plane in a circle around the round table until it was time to clean up at the 5-minute mark. JG did not meet mastery criteria as defined in the procedures section using the video modeling intervention alone; however, this intervention was discontinued, and the video self-modeling phase was introduced because the data were stable over the eight play sessions.

When reviewing the data for the school bus play set, during baseline, percentages of scripted play actions were low, and they remained low in the return to baseline condition following the video modeling intervention with the airplane play set. This shows that the video modeling intervention with the airplane play set did not have a carryover effect on the school bus play set. When video self-modeling was introduced with the school bus play set, JG reached mastery criteria with only three sessions. For the first two sessions, JG completed the play sequence in 4 minutes 17 seconds and 3 minutes 31 seconds, respectively, which was shorter than the defined 5 minutes that was used for
all other play sessions. For the third session, he took longer to complete the play sequence, so video recording lasted 6 minutes 9 seconds. For all sessions in this video self-modeling phase, JG gave the verbalization, “did it,” when he was done with the play steps, so the researcher knew he had finished playing. When video self-modeling was reintroduced, the percentages of scripted play actions remained at mastery criteria. JG verbalized, “did it,” when he was done with the play steps for two of the sessions. For the third session, he verbalized, “yeah,” when he was finished. For a majority of the video self-modeling sessions, JG omitted the same two play steps (i.e., walked a child up the stairs and walked the driver up the stairs).

Because JG was able to complete the scripted play actions with the school bus in the video self-modeling condition to mastery criteria and give a clear verbalization that he was done with the play action steps, the researcher wanted to see if an added verbal prompt would assist him in reaching mastery criteria with the airplane play set. The verbal prompt, “land the plane,” was given in the first session after 4 minutes of video recording to see if JG could complete the play sequence given a defined moment to stop flying the plane. With this added prompt, JG completed the play sequence and only omitted two steps from those seen in the video. He gave the verbalization, “Okay, we did it,” when he was done.

In the second session, the researcher did not provide the verbal prompt to see if JG could carry over the scripted play action of landing the plane from the previous session without the added prompting. Without the verbal prompt, he displayed a similar number of scripted play actions as seen in the video modeling conditions earlier and continued to fly the plane in a circle for the 5 minutes. In the final session, the researcher did not provide the verbal prompt; however, when given the cue, “It’s time to clean up,”
as part of the procedures, JG landed the plane and completed more of the scripted play actions, only omitting three steps from those seen in the video. Due to this, video recording lasted 5 minutes 31 seconds for this session in order to capture the rest of the play sequence. At the completion of the play sequence, JG gathered up all the pieces of the airplane play set to put them away, which signaled to the researcher that he was done playing.

Generalization probes were conducted with JG using the school bus play set only because that play set yielded the most consistent data at 80% or higher of observed scripted play actions over two video self-modeling conditions. The first generalization probe was performed with another school bus play set that was similar to the Playmobil play set. The school bus was a Vtech toy and the people that went inside were four Fisher-Price Little People characters. The possible scripted play actions differed slightly from the school bus Playmobil play set, but the total number of scripted play actions were the same for both school bus play sets at 18 play actions steps. The probe was conducted in the autism specialist’s office, in the same condition and setting as the previous video self-modeling sessions using the school bus play set. For this generalization probe, JG completed 14 of 18 scripted play actions. There were five scripted play actions that differed with this school bus play set, and JG was able to complete them all independently without being trained on the play actions.

The second generalization probe was performed with the same school bus Playmobil play set as used in the previous video self-modeling conditions, but in the speech and language pathologist’s classroom. Her classroom had a large rectangular table towards the side of the room, with four chairs surrounding it. The probe was conducted on the carpet next to this table. For this generalization probe, JG completed 16 of 18
scripted play actions, but it took him longer to complete the play sequence and videotaping lasted for 5 minutes 45 seconds. JG gave the verbalization, “We got it,” when he was done with the play steps for this generalization probe.

After analyzing the data for JG, he reached mastery criteria with the video self-modeling intervention after only three sessions and maintained the level of mastery for an additional three sessions when the video self-modeling intervention was reintroduced. He also generalized these play skills to another setting, the speech and language pathologist’s classroom, and to another version of a school bus play set. For the video modeling intervention, when it was initially introduced, JG only completed an average of 56% of the scripted play actions. After the video self-modeling condition, when the video modeling condition was reintroduced with the addition of the verbal prompt, “Land the plane” or “It’s time to clean up,” JG completed an average of 85% of the scripted play actions. Therefore, the researcher can conclude that for JG, video self-modeling was an effective intervention for the school bus play set, and video modeling with an added verbal prompt was an effective intervention for the airplane play set.

**Individual results for RM.** When reviewing the data for the school bus play set, there were little differences seen in the percentages of scripted play actions observed across baseline and all video modeling conditions. During the third video modeling intervention condition, RM demonstrated more or an equal amount of scripted play actions in the first two sessions as compared to the previous video modeling intervention condition. This led the researcher to hypothesize that there may have been carryover effects from the video self-modeling intervention condition on the increased number of scripted play actions observed during this video modeling condition. During the first session, the researcher recorded for 6 minutes to see if the longer amount of time would
lead to an increased number of scripted play actions performed, which it did. During this first session, RM performed the highest amount of scripted play actions with the school bus play set during the study, with the exception of one baseline session and one previous video modeling session. However, these results were not constant, and the data showed a downward trend over the next two sessions.

Therefore, for RM, video modeling did not appear to have a lasting effect on the percentages of scripted play actions performed because the numbers were similar across all conditions. He performed two play actions consistently across all conditions (i.e., turned on lights, pushed the bus), but the remainder of the steps were seen throughout all conditions with a lot of variability. Two play actions were never seen across any of the conditions (i.e., walked a child down the stairs and walked the driver down the stairs). During the video modeling conditions, RM needed gestural prompts (researcher pointed to toys) during two sessions to continue playing with the school bus play set, as he walked away from the toys or looked out the window. RM did not meet mastery criteria as defined in the procedures section using the video modeling intervention; however, this intervention was discontinued, and the video self-modeling phase was introduced because the data were stable over the nine play sessions.

When reviewing the data for the airplane play set, there were also few differences seen in the percentages of scripted play actions observed across baseline and video self-modeling conditions. For RM, video self-modeling also did not appear to have an effect on the percentages of scripted play actions performed because the numbers were similar across all conditions. He performed some play actions fairly consistently across all conditions (i.e., took off plane roof, put plane roof back on, put a passenger in the plane, and pushed the plane), but there was a lot of variability in the other play actions. The
beginning 10 play action steps were seen more often than the last 6 play action steps.

During one session of the video self-modeling condition, RM was looking out the window instead of playing with the airplane play set. However, he independently returned to the toys within a few seconds, and no prompting was needed from the researcher. During another session, he required a verbal prompt, “Play with the plane please,” as he looked out the window twice during that session. During the video self-modeling intervention phase, RM became very aware that he was being videotaped and often looked at the researcher or attempted to look at himself on the video camera screen. Once this behavior was noted, the researcher ensured that she was always looking at RM through the lens on the video camera and not providing direct eye contact.

During the third session of the return to video self-modeling phase, the researcher collected data for 7 minutes to see if the longer amount of time would lead to an increase in the number of scripted play actions performed, but this was not the case. The number of scripted play actions was similar to those seen in previous sessions. RM did not meet mastery criteria as defined in the procedures section using the video self-modeling intervention; however, this intervention was discontinued, and the video modeling phase was reintroduced because the data were stable over the 11 play sessions.

After analyzing the data for RM, he was not able to reach mastery criteria for either the video modeling or the video self-modeling interventions. Neither intervention showed a significant increase in percentage of scripted play actions that were sustained across multiple sessions. By looking at the specific play action steps observed for both the school bus play set and the airplane play set across both conditions, there was not a substantial difference in the types of play actions seen in baseline versus the video modeling or video self-modeling conditions. Therefore, neither intervention assisted RM
in increasing the number or type of play action steps performed with either play set.

**Individual results for RB.** When reviewing the data for the school bus play set, there were little differences seen in the percentages of scripted play actions observed across baseline and all video modeling conditions. Therefore, for RB, video modeling did not appear to have a significant effect on the percentages of scripted play actions performed because the numbers were similar across all conditions. He performed two play actions fairly consistently across all conditions (i.e., put a child in a seat, pushed the bus), but the remainder of the steps observed were seen throughout all conditions with a lot of variability. Two play actions were never seen across any of the conditions (i.e., walked a child down the stairs and walked the driver down the stairs), which were the same two play actions not performed by RM in the same condition.

However, by analyzing the specific play action steps observed, the researcher concluded that RB did increase his knowledge of scripted play actions using the video modeling intervention. During the return to video modeling condition, RB displayed additional scripted play actions not previously seen in earlier conditions. In five of the sessions, he attempted to or actually put the backpacks on the students, and in two of the sessions, he attempted to put the hat on the driver. In three of the sessions, he turned on the lights, and in five of the sessions, he pulled out the stop sign, pushed in the stop sign, or performed both scripted play actions. During three of the sessions in this condition, RB required either the verbal prompts, “play with bus” or “time to play,” or gestural prompts (researcher pointed to toys) to continue playing with the toys. In one session, he required the verbal prompt, “no mouth,” to take play items out of his mouth on two separate occasions.

As seen above, RB did require more prompting than the other two participants
during the intervention sessions. In addition to the prompting already described, during three of the video modeling intervention sessions, RB needed prompting from the researcher to continue interacting with the play set. For one session, he sat on the floor for the last 30 seconds of videotaping without playing. The researcher provided the verbal prompt, “time to play,” but RB continued to just sit without playing. For another session, he required the verbal prompt, “come play,” after 20 seconds of not interacting with the toys. For an additional session, RB required the verbal prompt, “time to play,” on two separate occasions because he was scratching a bug bite on his arm instead of playing with the toys. RB also mouthed items in the play set during the intervention sessions. He required the verbal prompt, “no mouth,” to take play items (child and backpack) out of his mouth on three separate occasions during data collection. RB did not meet mastery criteria as defined in the procedures section using the video modeling intervention; however, this intervention was discontinued, and the video self-modeling phase was introduced because the data were stable over the nine play sessions.

When reviewing the data for the airplane play set, the highest number of scripted play actions observed was during the return to baseline condition. In this condition, RB performed two play action steps during both sessions that he never performed in any other session (i.e., walked a passenger within 6 inches of the plane and walked the pilot within 6 inches of the plane), even after the video self-modeling intervention was introduced. This result initially led the researcher to believe that these were carryover effects from the video modeling condition with the school bus play set. However, because these two steps were only seen during this brief return to baseline and not consistently observed in either of the two video self-modeling conditions, this was not the case.
Across the other sessions, there were few differences seen in the percentages of scripted play actions observed. For all sessions, RB consistently performed the first six play actions, and often displayed the same three play actions (i.e., pushed the plane, flew the plane, landed the plane). RB continued to require prompting during this play set as well. During two sessions, he required the verbal prompt, “no mouth,” to take play items out of his mouth. RB did not meet mastery criteria as defined in the procedures section using the video self-modeling intervention; however, this intervention was discontinued, and the video modeling phase was reintroduced because the data were stable over the 10 play sessions. For RB, video self-modeling did not appear to have an effect on the percentages nor the type of scripted play actions performed because the numbers were similar across all conditions.

After analyzing the data for RB, like RM, he was also not able to reach mastery criteria for either the video modeling or the video self-modeling interventions. Neither intervention showed a significant increase in percentage of scripted play actions that were sustained across multiple sessions. By looking at the specific play action steps observed for both the school bus play set and the airplane play set across both conditions, there was not a substantial difference in the types of play actions seen in baseline versus the video self-modeling conditions with the airplane play set. However, there were several play action steps in the video modeling condition with the school bus play set that RB learned during the intervention sessions. Therefore, although neither intervention assisted RB in increasing the number of play action steps performed with either play set, video modeling did help increase the type of play action steps performed with the school bus play set.

**Research Question 2**

To address the second research question, generalization and maintenance
conditions were examined. Only one of the participants with autism, JG, reached mastery criteria that were consistent across one of the intervention phases, video self-modeling, using the school bus play set. Generalization probes for this play set were conducted across a second setting and by using a second similar play set. During these probes, the video was not shown to JG. He performed the scripted action play skills on his own, without the assistance of the video. Maintenance probes were not conducted due to time constraints with the end of the school year approaching and the researcher not having access to JG over the summer.

For the generalization probe with a similar play set, JG performed 14 of 18 scripted play actions, and for the generalization probe in a different setting, JG displayed 16 of 18 scripted play actions. Although the number of scripted play actions observed in the probe with the similar play set was lower, and slightly below mastery criteria (78%), these data were still significant. The Vtech toy school bus and the four Fisher-Price Little People characters represented a novel play set for JG, and the scripted play actions written for this play set included five play actions that JG had never been exposed to or expected to perform with the Playmobile school bus play set. However, he performed all five scripted play actions independently with no prior training, which showed true generalization from one play set to another similar one. For the generalization probe conducted in the speech and language pathologist’s classroom, JG performed above mastery criteria (89%) and at similar percentages to those previously seen in both video self-modeling conditions. This was significant because it showed that he was able to transfer the scripted play actions performed from the training setting, the autism specialist’s office, to a novel setting, another classroom.

Although according to the data, video self-modeling was a more effective
intervention for JG, he also showed promising results with video modeling and added verbal prompts to increase play skills, with two of the data points from the second video modeling condition above mastery criteria (88%, 81%). Generalization probes were not conducted with the airplane play set, however, because JG required the added verbal prompt to complete the play sequence. When the verbal prompt was removed, the percentage of scripted play actions dropped back down to 50%, which was consistent to the percentages seen in the first video modeling condition.

After reviewing the data for JG, the researcher concluded that play skills could be effectively generalized in environments other than the targeted environment by first using video self-modeling to teach the play skills. Once the play skills were learned, the play set could be transferred to another classroom with similar results or another comparable play set could be introduced with similar results. Additionally, video modeling with added verbal prompts may be an effective way to generalize play skills. This was important to note because video modeling is typically an easier intervention to implement because the videos are easier to create. Video self-modeling requires a lot of editing of the videos to remove the prompts, so it may not be as widely used due to time constraints.

**Research Question 3**

To address the third research question, evaluating necessary prerequisite skills for successful video modeling interventions, several sources of data were reviewed. These included the data on attending behavior while watching a video, the number of prompts needed by each participant during the intervention conditions, and the narratives for each participant’s results of the video modeling and video self-modeling interventions. Because JG was the only participant for whom video modeling interventions caused an increase in the percentages of scripted play actions, the researcher examined the
differences in his data versus the other two participants.

**Data on attending behavior.** The data that were reviewed for this section included both the data on attending behavior taken before the interventions began, and the data on attending behavior collected while watching the videos for the video modeling and video self-modeling intervention conditions (see Figure). During the prestudy phase of this research, all three participants with autism attended to the 2-minute videos for at least 75% of the intervals that data were collected. Numerous videos were used to document attending skills during this phase, including routine classroom videos, preferred videos, and unfamiliar videos.

![Figure](image-url)  
*Figure.* Bar graph comparing averages of attending behavior across prestudy, video modeling, and video self-modeling conditions for all three participants.

During all intervention conditions, the same data were collected on attending behavior while watching the videos as were collected during the prestudy procedures.
The only difference was in the length of the videos. During the prestudy phase, the videos watched were 2 minutes in length. During the video modeling and video self-modeling intervention phases, the videos watched were 50 seconds to 60 seconds in length. Data on attending behavior were initially collected for 2 minutes based on information gathered from previous research (Dowrick & Raeburn, 1995), but the videos created for the intervention phases were much shorter in duration based on studies reviewed in the literature (Bellini & Akullian, 2007; Lee, Lo, & Lo, 2017; MacDonald, Dickson, Martineau, & Ahearn, 2015). All data that were collected on attending was documented on the whole interval recording form in 10-second intervals for the duration of the videos, similar to the research by Jung and Sainato (2015).

During the video modeling interventions, JG watched 14 videos and averaged 87% attending. For the four intervals that required prompting, he needed three gestural prompts and one verbal prompt to continue watching the video. RM watched 15 videos and averaged 91% attending over the sessions. For the seven intervals that required prompting, he needed six gestural prompts and one physical prompt to continue watching the video. RB watched 15 videos and averaged 73% attending over the sessions. For the 20 intervals that required prompting, he needed 17 gestural prompts, one verbal prompt, and two physical prompts.

During the video self-modeling interventions, JG watched 6 videos and averaged 97% attending. For the one interval that required prompting, he needed one gestural prompt to continue watching the video. RM watched 14 videos and averaged 93% attending over the sessions. For the six intervals that required prompting, he needed one gestural prompt and five physical prompts to continue watching the video. RB watched 13 videos and averaged 86% attending over the sessions. For the 11 intervals that
required prompting, he needed eight gestural prompts and three physical prompts. Based on these data, a possible necessary prerequisite skill for successful video modeling is the ability to attend to a video with little prompting needed.

**Prompting during intervention conditions.** After reviewing the intervention data for all three participants, it was clear that JG was the only participant who did not require prompting to continue playing with the toys during either the video modeling or the video self-modeling conditions. For the other two participants, RM required a few gestural or verbal prompts as he would look out the window instead of play, and RB needed several gestural or verbal prompts as he would sit without playing or mouth play materials. Based on these data, a second possible necessary prerequisite skill for successful video modeling is the ability to interact independently with the play sets for the duration of the session and remain interested in the play sets presented.

**Results of video modeling and video self-modeling interventions.** When evaluating the results of the interventions for JG, he was the only participant who clearly indicated to the researcher that he had completed the play action sequence. This was done either by picking up the toys to put them away or by verbally stating that he was done (i.e. “did it,” “yeah,” “Okay, we did it,” “We got it”). JG completed the play actions steps in order and definitely understood that there was a clear beginning and ending to each play set. This may have been a result of the high percentages of attending behaviors to the videos watched in each of the intervention conditions, where he observed each play sequence in order from start to finish. Therefore, based on these data, another possible necessary prerequisite skill for successful video modeling is the ability to have a clear understanding of the beginning and end of a play sequence.

After reviewing the data on prerequisite skills for all three participants with
autism, the researcher concluded that there were three skills needed for success with video modeling interventions based on this study. These included the ability to attend to a video for 1 minute with little prompting, the ability to interact independently with the play sets and remain interested in the toys for the duration of the session, and the ability to clearly understand the beginning and end of a play sequence. These three skills were all seen in one participant (JG), and he was successful with video self-modeling interventions to increase scripted play actions with the school bus play set and was successful with video modeling interventions plus added verbal prompts to increase scripted play actions with the airplane play set.

**Summary**

After reviewing the results for this study, video self-modeling was determined to be an effective intervention to teach scripted play actions for one participant with autism (JG). He was able to reach and maintain mastery criteria over two phases of the intervention and generalized the skills to another setting and with a similar play set. However, due to time constraints, maintenance of these scripted play actions was not assessed. Video modeling with an added verbal prompt was also an effective intervention for the same participant (JG); however, mastery criteria were only shown over two sessions, and the generalization of the skills was not assessed. For the other two participants, RM and RB, neither of the interventions were effective enough to reach mastery criteria, however, for RB, video modeling attributed to an increase in the type of scripted play actions performed for the school bus play set.
Chapter 5: Discussion

The current study evaluated the functional relationship between video modeling and the increase of play skills in three elementary-aged children with autism. Video modeling, with peers as models, was compared to video self-modeling, with the participants with autism as models. Three research questions were addressed to look at the effects of the video modeling on play skills, to see how play skills were generalized to other environments, and to determine necessary prerequisite skills to successful video modeling interventions. One participant with autism, JG, improved his play skills with both video modeling and video self-modeling. However, video-self-modeling appeared to be more effective because the skills were maintained over two separate intervention sessions and generalized to another play set and to another setting. For the video modeling intervention, JG required an additional verbal prompt to complete the play sequence in order for him to be successful.

For the other two participants with autism, RM and RB, neither intervention showed a significant increase in play skills that was sustained over time. Nonetheless, for RB, he was able to increase the type of play action steps he performed with one play set, the school bus, during the video modeling intervention because he displayed several play skills during that intervention that were never seen in baseline conditions. It was determined that possible necessary prerequisite skills needed to be successful with video modeling interventions were the ability to attend to a video for 1 minute with little prompting; the ability to interact independently with the play sets and remain interested in the toys for the duration of the session; and the ability to have a clear understanding of the beginning and end of a play sequence.
Interpretation of Findings

For one participant with autism in this study, JG, the results seen were as predicted that video modeling increased play skills. JG was most successful using video self-modeling, with himself as the model in the video, and the skills demonstrated in this condition were generalized to another play set and to another setting with similar, consistent results. Video modeling with an added verbal prompt also increased play skills for JG, but results were only seen over two trials, and there was not enough time in the study to perform additional sessions or evaluate generalization or maintenance of this intervention. However based on the data, there is a strong probability that for JG the intervention of video modeling was responsible for the increase in play skills. For the other two participants with autism, RM and RB, the results seen were not as predicted, and video modeling interventions had little impact on the increase in the number of play skills performed over time. However, RB did increase his play skill repertoire with the school bus play set in the video modeling condition. Thus, there is a possibility that for him the intervention of video modeling was responsible for this increase.

Based on the data summarized in the previous chapter on possible prerequisite skills needed to be successful with video modeling interventions, the researcher hypothesized why video modeling interventions were successful for JG. Reviewing the attending data for JG, his percentages of average attending behavior steadily increased over the three study conditions. His level of attending was the highest in the video self-modeling condition, which was the intervention he was most successful with during the study. He also required the fewest number of prompts out of the three participants when watching the videos across prestudy, video modeling, and video self-modeling conditions. This is similar to data on prerequisite skills seen in research conducted in two
previous studies (Besler & Kurt, 2016; Williamson, Casey, Robertson, & Buggey, 2013), but contradicts previous research that the ability to attend to a video may be necessary but not required to learn with video modeling techniques (MacDonald et al., 2015).

JG also did not require prompting during any of the sessions, in either intervention condition, to continue playing with the toys for the 5 minutes. He remained interested in the play sets and would probably have continued playing even after the duration of the session if allowed. Previous researchers have looked at this aspect of interest in toys while using video modeling interventions. One study used only toys that were of interest to the participants and found that functional play with toys increased with video self-modeling interventions (Lee et al., 2017), and another study incorporated special interests in the video modeling intervention and saw an increase in engagement (Jung & Sainato, 2015), but an additional study used all novel play materials and also found an increase in novel play behaviors after video modeling (MacManus, MacDonald, & Ahearn, 2015). Therefore, it seems that more research needs to be conducted before determining if using preferred toys versus novel toys has a more significant impact on the effect of video modeling interventions.

All three participants with autism were given a clear beginning to the play sequence as the researcher gave the verbal cue, “It’s time to play,” and brought each participant to the floor where the toys were set up. However, JG clearly demonstrated to the researcher that he also understood the end of the play sequence for both play sets used in this study as he either verbalized he was done playing or cleaned up the toys and handed them to the researcher at the end of the session. At times, he did struggle to complete the play sequence in the 5 minutes allowed, but this was due to him working slower on each step in the play sequence and not due to him being distracted while
playing. When given more time to complete the steps, he displayed similar percentages of scripted play actions as previously performed. This was important to note because in other research, even when given more time, the participants could not complete the play sequence (MacManus et al., 2015). This was true for RM, showing that even with additional time, he still struggled with learning the scripted play actions seen in the video modeling interventions.

Although it was expected in this study that video modeling interventions would increase play skills, and it did for JG, there were several unexpected results as well. One of these was the addition of a verbal prompt in order for JG to be successful with the video modeling condition. After the video self-modeling intervention was delivered to JG, and he met mastery criteria, he was successful with the video modeling intervention when an additional prompt was given for him to land the plane and complete the play sequence. In all previous video modeling sessions, JG completed the necessary beginning play action steps and flew the plane, but he never landed the plane to take the passengers and pilot out until he was given the verbal prompt. It appeared that he got stuck on the play action step of flying the plane, continuing to fly in a circle for several minutes. This was an interesting behavior, as the school bus play set also did not have a clear definition of when to stop driving the bus and take the children and driver out, but JG was able to perform those steps independently.

The researcher is unsure what the difference was in the play sets that JG was able to complete the play action steps for the school bus with just the video self-modeling intervention but not for the airplane, without the added verbal prompt. It was noted anecdotally on the whole interval recording forms when attending behavior data was collected, that JG was the only participant who verbally commented on the videos as he
was watching them. During the video modeling condition, when peers were the models, JG said, “Hi kids,” and waved to the screen. During the video self-modeling condition, when he was the model, JG said, “What that?” several times during many of the sessions and said his name while pointing to the screen, clearly indicating that he knew he was watching himself play with the play set.

It is possible that, because JG knew he was in the video, he attended to this video more than to any other video. He may have performed better on the school bus play set because he noticed more of the play steps and saw himself completing the play sequence independently on the video. Although, JG did also attend to the video with the peers playing with the airplane and verbally commented when they were flying the plane, he may not have noticed all of the steps in the sequence and fixated on the step of flying the plane. Therefore, he needed the additional verbal prompt to land the plane and perform the other play steps.

There are conflicting results in previous research on the effects verbal prompts have on increasing skills using video modeling interventions. One study found no difference when adding prompts to video modeling interventions to teach pretend play skills to children with autism (Ulke-Kurkuoglu, 2015), but another study used video modeling paired with least-to-most prompting to successfully increase library skills to middle school students with autism (Markey & Miller, 2015). Similar to this study, researchers used video modeling plus prompting to teach initiation skills to children with autism, but the prompting provided was given when the participant was actually performing the behavior and was not an initial intention of the study (McDowell, Gutierrez, & Bennett, 2015).

Another unexpected result of this study was that the most verbal participant with
autism, RM, was not the most verbal during the intervention sessions. RM did not have any vocalizations during any of the video modeling sessions. RB displayed some vocalizations during both the video modeling and video self-modeling interventions, but they only occurred during a few sessions. With the school bus play set, he said, “stop” and “stop sign.” With the airplane play set, he said, “fly,” “airport,” and “airplane.” He also said, “Say cheese,” during two instances when he realized the researcher was recording him with a camera. However, JG, who had limited verbal skills, displayed many unscripted vocalizations during both the video modeling and the video self-modeling conditions.

It should be noted here that, for the video modeling videos, the peers were not taught any verbalizations to perform, however, there was play language heard on the video that was spontaneous from the peers and related to the play sets. On the video self-modeling videos, there were no verbalizations. During the video modeling intervention, JG was observed saying words or phrases such as, “airplane,” “put in,” “I land plane,” “he’s falling down,” “I’m flying airplane,” “he sit down,” “look, one more seat,” “where going?” “there we go,” “that’s a boy,” “get ready to fly,” and “hurry.” During the video self-modeling intervention, he was observed saying words or phrases such as, “one more,” “ok,” “we’re at school,” “get out,” “going,” “hat fell off,” “it falling,” “door open,” and “hold on.”

During all the intervention sessions across both conditions, JG displayed at least one vocalization and all vocalizations were related to the play set or the specific toy he had in his hand at the time. During many of the sessions, he displayed multiple vocalizations, all of which were unscripted and did not match any of those heard in the videos. This showed that JG was able to formulate vocalizations to match his play actions.
independently and created these vocalizations based on the skill set he already had not on skills he learned while watching the videos. These results were similar to three other studies that specifically measured unscripted verbalizations seen during video modeling interventions, and all saw an increase in the verbalizations heard as compared to baseline conditions (Duenas, Plavnick, & Bak, 2019; MacManus et al., 2015; Maione & Mirenda, 2006).

It was also noted that JG was the only participant with autism that consistently asked for help verbally during the intervention sessions when he needed assistance with a piece of the play set (i.e., backpack would not snap on one of the students, driver would not fit in the seat, or plane roof would not latch on). He would state, “I need help,” “help me,” “uh oh, what I do?” “how I do it?” “fall down,” “oh no,” or “stuck.” During these times, JG always attempted to complete the play action step before asking for help, so the step was counted as observed. However, after one attempt to complete the step, JG would quickly give up and ask for help. JG did not problem solve and try other ways to complete the play action step without needing adult help. The researcher always provided the help when requested.

For the other two participants with autism, RM asked for help once, and the researcher assisted. For the rest of the sessions with RM and for all the sessions with RB for both interventions, they were more likely to problem solve on their own (i.e., try the backpack on another student, move the steering wheel so the driver would fit, or take the hat off the pilot so the plane roof would close) instead of asking for help. Possible conclusions based on these observations could be that, because JG was given the help each time he asked, it increased the likelihood that he would ask quickly in the future or that RM and RB had better problem-solving skills in their repertoire and had previous
success using those skills as compared to JG.

Another unexpected finding from this study was also related to the anecdotal notes taken by the researcher on the frequency chart for scripted play actions. The play actions that were not related to the play sets for each session were written down for future comparison. For both RM and RB, although video modeling did not increase the percentages of scripted play actions, the researcher assumed that watching the videos would increase the appropriate play actions seen for both play sets. However, this was not the case for either participant. For RM, during the video modeling intervention with the school bus play set, play actions seen consistently between baseline and intervention sessions included throwing items into the school bus, crashing or tipping over the school bus, putting play set items on hood or roof of bus, putting a backpack on his finger or hanging a backpack on the school bus window, throwing items from the play set in the trash, and running over play set items with the school bus.

During the video self-modeling intervention with the airplane play set, play actions seen consistently across all conditions included putting play set items on the wings or tail of the plane, dropping, throwing or crashing the plane, spinning the plane in circles, and throwing play set items into the plane. For both play sets, RM displayed aggressive play (i.e., crashing, throwing, dropping items) throughout the entire study, and the interventions seemed to have little effect on decreasing these behaviors.

For RB, during the video modeling intervention with the school bus play set, he displayed play actions in both baseline and intervention conditions such as putting play set items in his mouth, putting play set items on the roof or hood of bus, driving bus on two wheels, putting backpacks or hat on his finger, and bringing school bus close to his face. During the video self-modeling condition with the airplane play set, play actions
seen consistently between baseline and intervention conditions included mouthing play set items, bringing airplane close to his face, spinning wheels, rocking plane back and forth on two wheels, tracing the body of the airplane with his fingers, and turning plane over. For both play sets, RB displayed sensory and repetitive type play behaviors (i.e., rocking and spinning plane, mouthing items, bringing items close to face) for the duration of the study, and the interventions appeared to have little effect on diminishing these behaviors. The anecdotal notes show that for both RM and RB, they continued to display inappropriate play actions with both play sets, even after being shown the videos from both intervention conditions repeatedly.

A final unexpected result from this study was that, for all participants, there were some play action steps in both play sequences that were either rarely or never performed. For the airplane play set, these included putting the cups in the passenger’s hand, putting the luggage in the passenger’s hand, parking the plane, taking the passengers and pilot out of the plane, and walking the passengers and pilot within 6 inches of the plane. There are several possible reasons as to why these play action steps were not performed as often as the others. When reviewing the videos created for the modeling and self-modeling conditions, it was not clearly shown to put the cups in the passenger’s hand. For the action of putting the luggage in the passenger’s hand, although the play step was shown on the videos, it was displayed quickly, and the participants could have missed seeing the step. The remaining steps (i.e., parking the plane, taking the passengers and pilot out of the plane, and walking the passengers and pilot within 6 inches of the plane) all occurred at the end of the play sequence, and many times, the participants never completed the entire play sequence, therefore omitting those steps.

For the school bus play set, there were a few play action steps that were rarely or
never seen in the intervention conditions. These included walking a child or the driver up
or down the stairs and walking a child or the driver within 6 inches of the school bus.

There are a few plausible reasons as to why these play action steps were not seen as often
as well. For the play action steps of walking a child or driver up the stairs, it was often
seen in the anecdotal notes that the participants put the children or driver in the bus either
through a window or through the top once the roof was removed. Similarly, for the steps
of walking a child or driver down the stairs at the end of the play sequence, it was often
observed that the figure was taken out through the roof. Because these play action steps
as well as the actions of walking a child or driver within 6 inches of the school bus also
occurred at the end of the play sequence, when the participant did not complete the play
sequence in its entirety, these steps were missed.

**Context of Findings**

The results from this study can be linked to several previous research studies that
each had similar components to the current study. Reviewing the recent research on video
modeling, Cihak and Schrader (2009) and Marcus and Wilder (2009) both found that
using the participant as the model in the video was more effective for some, but not all,
individuals with autism. In the first published study to support video self-modeling to
increase functional play skills with children with autism, Lee et al. (2017) found that
video self-modeling increased these skills and the play skills were generalized to other
 toys with a slight increase in number of skills seen as compared to intervention
conditions.

Video self-modeling was also shown to be effective for both behavioral and skill-
based skills, and neither age nor disability appeared to matter on the level of effectiveness
(Bowles, 2016). This is important because a review by Park, Bouck, and Duenas (2019)
on video modeling and video prompting with individuals with intellectual disabilities showed that both video modeling and video prompting were used most often to teach life skills and independent skills to those with intellectual disabilities because that was a primary deficit for the population. For individuals with autism, video modeling was used more often to teach social skills because that was the primary deficit. For both individuals with intellectual disabilities and individuals with autism, video modeling was used; however, the targeted skill set was different based on the overall common deficits seen in the population.

MacManus et al. (2015) also used video modeling to teach play skills and found that after video modeling novel play skills increased and skills emerged that were not seen in baseline conditions. Video modeling was used to evaluate academic engagement with elementary students with autism, and the researchers found that video modeling interventions increased on task behaviors during math class for two out of three participants (Schatz, Peterson, & Bellini, 2016). Reviewing two recent comparative studies on individuals with autism that incorporated video modeling, Wilson (2013) found that video modeling and in-vivo modeling were equally effective for one participant, while video modeling was more effective for the second participant and in-vivo modeling was more effective for the third participant. State and Kern (2012) found that in-vivo self-modeling was more effective for an adolescent with autism to decrease inappropriate behaviors with a teacher compared to video feedback. The results from the current study support this previous research in showing that video self-modeling was a more effective intervention for one participant, while video modeling was also effective when an additional prompt was added.

Several of the studies reviewed also had similar prerequisite skills or procedures
to the ones in the current study. Participants in one study needed to have IEP goals related to social skills, display difficulties with play skills with peers, and be able to follow directions (Jung & Sainato, 2015). In two other studies, participants had to have limited functional play skills, the ability to imitate others, or show interest in watching videos (Lee et al., 2017; Williamson et al., 2013). In a third study, participants watched videos for 2 minutes and then engaged in the activity for 5 minutes (Ulke-Kurkuoglu, 2015). In two studies examined, 5-minute play sessions were used for baseline and training conditions (Barton, 2015; MacManus et al., 2015), and, similar to the play skills recorded on the frequency count data sheet for this study, MacManus et al. (2015) did not require that the play actions be performed in a certain order. Therefore, allowing more variability in the play sequence for the participants.

Two studies used peers as models that were similar in age and characteristics to the participants (Marcus & Wilder, 2009; Sani-Bozkurt & Ozen, 2015), but, in one of the studies, both peer models and adult models equally increased pretend play skills in children with autism showing that the type of model used may not be of importance for some children (Sani-Bozkurt & Ozen, 2015). In the current study, the researcher did not account for differences in the peer models and used peers that met the inclusion criteria instead of models that were similar to the participants with autism.

The first study on using video modeling interventions for individuals with autism was published in 1985, and, since then, video modeling has become an evidence-based practice for increasing social communication skills for individuals with autism (Huaqing Qi, Barton, Collier, & Lin, 2018). However, there have been conflicting opinions among researchers as to whether video modeling is an evidence-based practice for increasing other skills within the autism population. One review of single-subject case studies found...
no research on evidence-based practices (Huaqing Qi et al., 2018), and an additional review of eight video modeling studies focusing on social skills interventions for participants with autism found that none of the studies had strong enough results to classify the intervention as evidence based (McCoy, Holloway, Healy, Rispoli, & Neely, 2016).

However, a review of single case studies showed video modeling as a promising intervention to support social interaction skill development in individuals with autism (Ozuna, Mavridis, & Hott, 2015), and the evidence-based criteria was met according to a meta-analysis by Wang and Spillane (2009). An additional literature review on all types of video-based instruction revealed solid evidence that the instruction was a successful intervention to increase social initiations for those with autism (Kabashi & Kaczmarek, 2017). Therefore, it appears that there is solid research, including the results from this study, concluding that video modeling may be a successful intervention for individuals with autism when evaluating certain skills but not enough conclusive data to show that it is an evidence-based practice for all skills for individuals with autism.

**Implications of Findings**

The findings of this study support Bandura’s (1977) social learning theory that individuals learn social skills from one another through observation, imitation, and modeling other’s behavior. Although only one participant (JG) met the mastery criteria in this study for the video self-modeling intervention and needed an additional prompt in order for the video modeling intervention to be successful, the results still support the social learning theory because the play skills were learned through observation and modeling. The results from a second participant (RB) also support Bandura’s theory because RB increased the variety of play skills he displayed with the school bus play set
after the video modeling intervention by modeling the peer’s behaviors seen on the video.

In the research, there are several comparison studies that evaluate video modeling with another treatment such as in-vivo modeling or video feedback (Charlop-Christy, Le, & Freeman, 2000; State & Kern, 2012; Wilson, 2013), but there continues to be only three studies focused on individuals with autism directly comparing video modeling to video self-modeling (Cihak & Schrader, 2009; Marcus & Wilder, 2009; Sherer et al., 2001). Even in studies focusing on individuals with other disabilities, there are only two studies in the literature that investigate the comparison of video modeling to video self-modeling (Decker & Buggey, 2014; Ozkan, 2013). In the studies with individuals with autism, one showed no difference in the rate of acquisition to answer conversation questions between video modeling and video self-modeling conditions (Sherer et al., 2001). In the other two, video self-modeling was a more effective or efficient intervention as compared to video modeling (Cihak & Schrader, 2009; Marcus & Wilder, 2009).

In the Cihak and Schrader (2009) study, both interventions were effective to acquire and maintain vocational skills, but one participant learned skills more effectively with video self-modeling, and two participants acquired skills more efficiently with video self-modeling. In the Marcus and Wilder (2009) study, all participants met mastery criteria with video self-modeling to identify or label letters, but only one participant met mastery criteria with video modeling. However, mastery was not met as quickly with video modeling as compared to video self-modeling. The current study supports the research done by Cihak and Schrader (2009) and Marcus and Wilder (2009), showing that video self-modeling was a more effective intervention for one participant.

According to this study, video modeling may be most appropriate for individuals
who are able to independently attend to a video, who can remain interested in performing the targeted skill for the duration of the training session, and who can understand the clear beginning and end of a task. According to previous research, video modeling was most successful with individuals who tended to shy away from social interactions, had trouble with traditional rote teaching techniques, and who were visual learners (Buggey, 2007; Ganz et al., 2011; Lydon et al., 2011; Ozen et al., 2012). As seen in this study with one participant, video modeling interventions were most effective with elementary-aged participants who had previous experience or success learning with video modeling (MacDonald et al., 2005; Mason et al., 2012; Williamson et al., 2013).

Video modeling results were also inconsistent in preschoolers (Buggey, 2012; Buggey & Ogle, 2012). In this study, all of the participants were of elementary age, but one participant, RM, did attend a preschool classroom full time. He was the only participant in the study that showed no improvements with video modeling interventions, which supports previous research. It was also important in previous studies to collect data on attending behavior to ensure participants could attend to the video and to choose target behaviors that were seen at low rates or were nonexistent (LeBlanc et al., 2003; Wert & Neisworth, 2003).

In terms of practice, this study shows that video modeling interventions can be implemented in classrooms by teachers and classroom assistants for students with autism. Although video self-modeling was a more effective intervention in this study, there is a large body of previous research also supporting the use of video modeling interventions, so either would be a useful tool in the school setting. With the increased availability of cell phone and tablets, it would be very feasible for a teacher to record a quick video, edit the content, and replay the video for the student, while taking data on the target behavior.
With many classrooms having tablets and computers, it would be easy for classroom staff to show the video daily to the student. However, it is important that individuals be trained on the implementation of video modeling in order for it to be most successful (Lory, Rispoli, & Gregori, 2018).

These trainings can consist of professional development offered through a school district, an online module, or by another education professional with experience using video modeling interventions. Parents can also be trained to use video modeling interventions at home with collaboration from the classroom teacher or from a private therapist. In the school setting, teachers could use peer models from a peer buddy program to create a library of videos showing peers performing a variety of skills (i.e., how to line up at lunch, how to greet a peer, how to pack a backpack at the end of the day). These videos could then be shown to students with autism based on their specific skill deficits with the intention of improving the skills through repeated exposure of the video models.

Limitations of the Study

There were several limitations to this study that compromised the external and internal validity. Carryover effects may have been seen with one participant, JG, after the video self-modeling condition, but the data are mixed. Once JG met mastery criteria in this condition, and video modeling was reintroduced, he displayed over 80% of scripted play actions for two sessions with the airplane play set. However, an additional verbal prompt was also given during these two sessions, so it may have been the prompt, not the effects of the video self-modeling condition, that increased the percentages of scripted play actions.

There were some complications with the selection of participants and the
participants actually chosen for this study. Participant recruitment took longer than expected for this study as there were hundreds of neurotypical peers that met the inclusion criteria, and individual phone calls were made to each family that was interested in the study. There were also two educational professionals that left the research site during the time the study was being conducted for personal reasons, therefore these two participants were only included for the baseline and training phases of the study.

During the study, the researcher noticed that both Playmobil play sets had small pieces, and all the participants with autism had difficulty with some components of the play set (i.e., snapping the hat on the driver, putting the cups in the airplane, putting the luggage in the passenger’s hand). These difficulties were not seen with the neurotypical participants during the training phase, so they were not developmental concerns. However, after talking with the teachers and reviewing IEPs, all the participants with autism displayed fine motor difficulties to some extent, and these may have impacted the participants’ ability to accurately display all the scripted play actions for each play set.

When creating the videos for both the video modeling and video self-modeling intervention phases, it was difficult to accurately capture each scripted play action separately, especially for the videos where the participants with autism were the models. The length of each video was under 1 minute, which was the recommended time for video modeling seen in previous research (Bellini & Akullian, 2007; Dowrick & Raeburn, 1995); however with these time constraints, each play action step was seen in the video only for a brief period of time. If the participant with autism was not attending to the video at that moment during the intervention phases, the step would have been missed. With the creation of the video self-modeling videos, even though the researcher
prompted each play action step, some of the steps were completed quickly by the participants with autism, and it was difficult to edit the videos to show each step clearly.

In previous research, it was recommended that the videos be shown at the same time each day for consistency, however this was not possible during this study (Ogilvie, 2011). The videos were shown to each participant to autism when it was convenient for the researcher and the participants based on the classroom schedule each day. There was also no set order in which the participants with autism worked with the researcher each day. Again, this was based on the schedule for the day and affected by school events and student absences. These factors may have impacted the internal validity of the study.

There was also a lack of generalizability for this study as only two generalization probes were conducted with the school bus play set with JG, and there was no time in to conduct generalization with peers. In addition, due to time constraints, there were no generalization probes conducted for the airplane play set with JG. There was also no time for maintenance probes to be conducted with JG because the study was completed at the end of the school year, and the researcher did not have access to the participants over the summer.

Due to the nature of single-subject research designs, this study had a limited sample size that impacted the external validity. Because the study was conducted at a single elementary school with a limited autism population, the results are difficult to generalize to other students with autism outside of the sample setting. In addition, because only a small number of the total population of students with autism was selected as participants for this study, the results obtained are not able to be generalized to other ages of students with autism within the targeted school.
Future Research Directions

The results of this study lead to several areas of future research in video modeling. Because there continue to be few studies comparing the effectiveness of video modeling to video self-modeling, more research comparing these two interventions needs to be conducted. Future research should also look at the unique characteristics of individuals with autism to determine if the severity of autism, the level of verbal skills, or the presence of repetitive behaviors affect the outcome of video modeling interventions. During this study, there were several unscripted verbalizations, especially with JG and RB, heard during both intervention phases, but data were only collected through anecdotal notes. Future research could look at these unscripted verbalizations and more accurate data could be collected on the number and types of verbalizations heard.

Other directions for future research with video modeling include comparing the effects of shorter versus longer videos, using preferred toys versus novel toys, and conducting a pre and post social checklist to interview teachers and parents about their views of the child’s skills before and after video modeling interventions. All future studies should also be designed with generalization and maintenance sessions, and extra time should be built into the study should intervention sessions run longer than expected. Although there have been conflicting reviews in the research as to whether video modeling interventions are included as evidence-based practices for individuals with autism (Bellini & Akullian, 2007; Bohlander et al., 2012; Huaqing Qi et al., 2018; Kabashi & Kaczmarek, 2017; McCoy et al., 2016; Ozuna et al., 2015; Shukla-Mehta et al., 2010; Wang & Spillane, 2009), additional research in this area can only strengthen the research base and lead to definite conclusions regarding video modeling as an evidence-based practice.
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Appendix A

Inclusion Checklist for Participants With Autism
Inclusion Checklist for Participants With Autism

Participant’s Name: ____________________________________________

Teacher’s Name: ____________________________________________

Date: __________

Completed By: ____________________________________________

Inclusion Criteria:

Does/Is the possible participant …

YES NO

1. Have a confirmed diagnosis of an autism spectrum disorder either from most recent school psycho-educational report or current individualized education plan (IEP)?

2. Aged 4 to 8 years old?

3. Have parental consent to participate?

4. Have the teacher’s willingness to participate?

5. Have social goals on the current IEP related to peer or play skills?

6. Have social goals on the previous year’s IEP related to peer or play skills?

7. Fluent in English?

8. Receive 60% or more of weekly academic instruction in an intensive setting?

9. Use a visual schedule?

10. Complete an independent work station with visual supports?

11. Follow simple visual commands (e.g. sit, quiet voice, wait, etc.)

12. Able to attend to a video for at least two continuous minutes? (data collected on form found in Appendix E)

13. Able to retell the content of the video watched? (data collected on form found in Appendix E)
Appendix B

Inclusion Checklist for Neurotypical Students
Inclusion Checklist for Neurotypical Students

Participant’s Name: ________________________________  
Teacher’s Name: ________________________________  
Date: ___________  
Completed By: ________________________________

Inclusion Criteria:

<table>
<thead>
<tr>
<th>Does/Is the possible participant …</th>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Aged 7 to 8 years old?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Have parental consent to participate?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Have classroom teacher’s willingness to participate?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Have no known diagnosed disabilities?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. A native English speaker?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Receive 100% of weekly academic instruction in a general education classroom?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Show interest in being a peer buddy for a student with a disability?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Appendix C

Inclusion Checklist for Education Professionals
Inclusion Checklist for Education Professionals

Participant’s Name: ____________________________________________________________

Relationship to Possible Student Participant: ________________________________

Date: ____________

Completed By: ______________________________________________________________

Inclusion Criteria:

Does/Is the education professional …

1. Giving consent to participate? ☐ ☐

2. Employed at the school in which the study will take place? ☐ ☐

3. Have time available daily to dedicate to the study? ☐ ☐

4. A member of the educational team (special education teacher, general education teacher, autism specialist, speech and language pathologist, or classroom assistant) for one or more of the possible student participants? ☐ ☐

5. Have at least three years of experience working with students with autism? ☐ ☐

5. Fluent in reading and writing English? ☐ ☐
Appendix D

Frequency Charts for Scripted Play Actions
School Bus Play Set

Participant’s Name: _____________________________________________

Date: ______________

Length of Observation: _________________________________________

Completed By: _________________________________________________

Phase of Study: Baseline  Video Modeling  Video Self-Modeling  Follow Up

<table>
<thead>
<tr>
<th>Scripted Play Actions for School Bus Play Set</th>
<th>Number of Times Observed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Takes off bus roof</td>
<td></td>
</tr>
<tr>
<td>Puts bus roof back on</td>
<td></td>
</tr>
<tr>
<td>Opens the bus door</td>
<td></td>
</tr>
<tr>
<td>Closes the bus door</td>
<td></td>
</tr>
<tr>
<td>Puts hat on driver</td>
<td></td>
</tr>
<tr>
<td>Puts backpacks on students</td>
<td></td>
</tr>
<tr>
<td>Turns on lights</td>
<td></td>
</tr>
<tr>
<td>Walks a child up the stairs</td>
<td></td>
</tr>
<tr>
<td>Puts a child in a seat</td>
<td></td>
</tr>
<tr>
<td>Walks the driver up the stairs</td>
<td></td>
</tr>
<tr>
<td>Puts the driver in a seat</td>
<td></td>
</tr>
<tr>
<td>Walks a child down the stairs</td>
<td></td>
</tr>
<tr>
<td>Walks the driver down the stairs</td>
<td></td>
</tr>
<tr>
<td>Pull out stop sign</td>
<td></td>
</tr>
<tr>
<td>Push stop sign back in</td>
<td></td>
</tr>
<tr>
<td>Pushes the bus</td>
<td></td>
</tr>
<tr>
<td>Walks a child within 6 inches of the bus</td>
<td></td>
</tr>
<tr>
<td>Walks the driver within 6 inches of the bus</td>
<td></td>
</tr>
</tbody>
</table>

Data Collection: Put a tally mark next to each time you observe the participant with autism displaying the scripted play action. The actions can occur in any order during the observation.
Airplane Play Set

Participant’s Name: ________________________________________

Date: ______________

Length of Observation: ______________________________________

Completed By: ______________________________________________

Phase of Study:     Baseline    Video Modeling    Video Self-Modeling    Follow Up

<table>
<thead>
<tr>
<th>Scripted Play Actions for Airplane Play Set</th>
<th>Number of Times Observed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Takes off plane roof</td>
<td></td>
</tr>
<tr>
<td>Puts plane roof back on</td>
<td></td>
</tr>
<tr>
<td>Puts a passenger on the plane</td>
<td></td>
</tr>
<tr>
<td>Put a passenger in a seat</td>
<td></td>
</tr>
<tr>
<td>Puts the pilot on the plane</td>
<td></td>
</tr>
<tr>
<td>Puts the pilot in a seat</td>
<td></td>
</tr>
<tr>
<td>Puts luggage/purse in passenger’s hand</td>
<td></td>
</tr>
<tr>
<td>Puts cup in passenger’s hand</td>
<td></td>
</tr>
<tr>
<td>Pushes the plane</td>
<td></td>
</tr>
<tr>
<td>Flies the plane</td>
<td></td>
</tr>
<tr>
<td>Lands the plane</td>
<td></td>
</tr>
<tr>
<td>Parks the plane</td>
<td></td>
</tr>
<tr>
<td>Takes a passenger out of the plane</td>
<td></td>
</tr>
<tr>
<td>Takes the pilot out of the plane</td>
<td></td>
</tr>
<tr>
<td>Walks a passenger within 6 inches of the plane</td>
<td></td>
</tr>
<tr>
<td>Walks the pilot within 6 inches of the plane</td>
<td></td>
</tr>
</tbody>
</table>

Data Collection: Put a tally mark next to each time you observe the participant with autism displaying the scripted play action. The actions can occur in any order during the observation.
Appendix E

Whole Interval Recording Form
Whole Interval Recording Form

Participant’s Name: ______________________________________

Completed By: ________________________________________

Title of Video: _________________________________________

Type of Video: Computer     Television     iPad-2

Phase of Study: Pre-study   Baseline     Intervention    Follow Up

Target Behavior: Attending to Video

Target Behavior Definition: Eyes looking toward video playing on screen

Total Observation Length: 2 minutes

Length of Interval: 10 seconds

<table>
<thead>
<tr>
<th>Date</th>
<th>Interval Number</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>+ or -</td>
<td></td>
</tr>
</tbody>
</table>

Total intervals behavior occurred (+):

Data Collection: + target behavior occurred for entire interval
- target behavior did not occur for entire interval

At the conclusion of the 2 minutes, please ask the participant, “What did you just watch?”

Participant’s answer: ______________________________________

_________________________________________________________

Is participant’s answer related to the video content?  YES  NO
Appendix F

Visual Schedule for Watching the Videos
Visual Schedule for Watching the Videos
Appendix G

Video Icons for Classroom Visual Schedules
Video Icons for Classroom Visual Schedules
Appendix H

Social Interaction Checklist Monitoring Tool
Social Interaction Checklist Monitoring Tool

Participant’s Name: __________________________
Teacher’s Name: ___________________________ Date: ___________

Directions: Check the column that best describes this student’s behavior. Then give examples to describe problems.

Code for rating frequency of each behavior and intensity of the problem
1 = Consistently uses/ No problem
2 = Often uses/ Mild problem
3 = Sometimes uses/ Moderate problem
4 = Seldom uses/ Increasing problem
5 = Never uses/ Major problem

<table>
<thead>
<tr>
<th>BEHAVIOR</th>
<th>RATING</th>
<th>DESCRIBE – give examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Plays with peers during break</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Responds to questions of peers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Participates in games with peers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Has particular peers with whom this child interacts</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Participates in group activities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Appears to enjoy time spent in group activities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Responds to teacher questions during whole group instruction</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Talks with other children in the classroom at appropriate times</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Helps other children with tasks</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Shares materials with other children</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. Shows concern (verbal or nonverbal) for the problems of other students</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. Shares feelings at appropriate times</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13. Interactions with adults seem to be of a positive nature</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14. Interactions with peers seem to be of a positive nature</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Appendix I

Motivational Checklist
# Motivational Checklist

<table>
<thead>
<tr>
<th>Name of Child:</th>
<th>Age:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Completed By:</td>
<td>Date:</td>
</tr>
</tbody>
</table>

Please check the box next to anything your child prefers.

<table>
<thead>
<tr>
<th>SENSORY:</th>
<th>SOCIAL:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. listen to music</td>
<td>1. play a game with a peer</td>
</tr>
<tr>
<td>2. deep pressure</td>
<td>2. enthusiastic praise</td>
</tr>
<tr>
<td>3. sensory brush</td>
<td>3. high fives</td>
</tr>
<tr>
<td>4. weighted blanket</td>
<td>4. time with favorite person</td>
</tr>
<tr>
<td>5. lotion</td>
<td>5. hugs</td>
</tr>
<tr>
<td>6. stress ball</td>
<td>6. happy faces</td>
</tr>
<tr>
<td>7. play dough</td>
<td>7. teacher helper</td>
</tr>
<tr>
<td>8. take a walk</td>
<td>8. sit next to a preferred peer</td>
</tr>
<tr>
<td>9. rocking chair</td>
<td></td>
</tr>
<tr>
<td>10. mirror</td>
<td></td>
</tr>
<tr>
<td>11. flashlight</td>
<td></td>
</tr>
<tr>
<td>12. scooter</td>
<td></td>
</tr>
<tr>
<td>13. therapy ball</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TANGIBLE:</th>
<th>FOOD/SNACKS:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. favorite toys:</td>
<td>1.</td>
</tr>
<tr>
<td></td>
<td>a.</td>
</tr>
<tr>
<td></td>
<td>b.</td>
</tr>
<tr>
<td></td>
<td>c.</td>
</tr>
<tr>
<td></td>
<td>d.</td>
</tr>
<tr>
<td>2. favorite movies/TV shows:</td>
<td>2.</td>
</tr>
<tr>
<td></td>
<td>a.</td>
</tr>
<tr>
<td></td>
<td>b.</td>
</tr>
<tr>
<td></td>
<td>c.</td>
</tr>
<tr>
<td></td>
<td>d.</td>
</tr>
<tr>
<td>3. books</td>
<td>3.</td>
</tr>
<tr>
<td>4. computer</td>
<td>4.</td>
</tr>
<tr>
<td>5. music</td>
<td>5.</td>
</tr>
<tr>
<td>6. magazines</td>
<td>6.</td>
</tr>
<tr>
<td>8. puzzles</td>
<td>8.</td>
</tr>
<tr>
<td>10. coloring</td>
<td>10.</td>
</tr>
<tr>
<td>11. drawing</td>
<td>11.</td>
</tr>
</tbody>
</table>

| ADDITIONAL:       |
|-------------------|-------------------|
| 1.                | 1.                |
| 2.                | 2.                |
| 3.                | 3.                |
| 4.                | 4.                |
| 5.                | 5.                |
| 6.                | 6.                |
| 7.                | 7.                |
| 8.                | 8.                |
Appendix J

Sample Daily Tally Chart
## Sample Daily Tally Chart

<table>
<thead>
<tr>
<th>Date</th>
<th>Video Prescribed (VM or VSM)</th>
<th>Video Played?</th>
<th>Participant Attended?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Edu Prof.</td>
<td>Researcher</td>
<td>Edu Prof.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Appendix K

Visual Representations of Participant Results
Visual Representations of Participant Results

Results for JG

Percentage of JG’s ability to demonstrate scripted play actions across baseline, video modeling (VM), video self-modeling (VSM), and generalization phases.
Shaded areas showing the actual or attempted scripted play actions completed for JG across baseline and video modeling sessions for the airplane play set.

<table>
<thead>
<tr>
<th>Condition</th>
<th>Baseline</th>
<th>Video Modeling</th>
<th>Return to Baseline</th>
<th>1st Return to Video Modeling</th>
<th>2nd Return to Video Modeling</th>
</tr>
</thead>
<tbody>
<tr>
<td>Session Number</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Takes off plane roof</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Puts plane roof back on</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Puts a passenger on the plane</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Puts a passenger in a seat</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Puts the pilot on the plane</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Puts the pilot in a seat</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Puts a luggage/purse in passenger's hand</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Puts a cup in passenger's hand</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pushes the plane</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flies the plane</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lands the plane</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Takes a passenger out of the plane</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Takes the pilot out of the plane</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Walks a passenger within 6 inches of the plane</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Walks the pilot within 6 inches of the plane</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Number of Total Scripted Play Actions Observed | 8/16     | 8/16           | 8/16               | 7/16                         | 8/16                         |

Shaded areas showing the actual or attempted scripted play actions completed for JG across baseline and video self-modeling sessions for the school bus play set.

<table>
<thead>
<tr>
<th>Condition</th>
<th>Baseline</th>
<th>Video Self Modeling</th>
<th>Return to Video Self Modeling</th>
</tr>
</thead>
<tbody>
<tr>
<td>Session Number</td>
<td>2</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>Takes off bus roof</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Puts bus roof back on</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Opens the bus door</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Closes the bus door</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Puts hat on driver</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Puts backpacks on students</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tries on lights</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Walks a child up the stairs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Puts a child in a seat</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Walks the driver up the stairs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Puts the driver in a seat</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Walks a child down the stairs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Walks the driver down the stairs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Walks the driver within 6 inches of the bus</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Walks the driver within 6 inches of the bus</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Results for RM

Percentage of RM's ability to demonstrate scripted play actions across baseline, video modeling (VM), and video self-modeling (VSM) phases.
Shaded areas showing the actual or attempted scripted play actions completed for RM across baseline and video modeling sessions for the school bus play set.

<table>
<thead>
<tr>
<th>Condition</th>
<th>Baseline</th>
<th>Video Modeling</th>
<th>Return to Baseline</th>
<th>1st Return to Video Modeling</th>
<th>2nd Return to Video Modeling</th>
</tr>
</thead>
<tbody>
<tr>
<td>Session Number</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Takes off bus roof</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Puts bus roof back on</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Opens the bus door</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Closes the bus door</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Puts hat on driver</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Puts backpack on students</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Turns on lights</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Takes a child up the stairs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Walks the driver up the stairs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Puts the driver in a seat</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Walks a child down the stairs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Walks the driver down the stairs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pulls out stop sign</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Push stop sign back to</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pushes the bus</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Walks a child within 5 inches of the bus</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Walks the driver within 6 inches of the bus</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of Total Scripted Play Actions Observed</td>
<td>5/16</td>
<td>4/18</td>
<td>5/16</td>
<td>5/16</td>
<td>5/16</td>
</tr>
</tbody>
</table>

Shaded areas showing the actual or attempted scripted play actions completed for RM across baseline and video self-modeling sessions for the airplane play set.

<table>
<thead>
<tr>
<th>Condition</th>
<th>Baseline</th>
<th>Return to Baseline</th>
<th>Video Self-Modeling</th>
<th>Return to Video Self-Modeling</th>
</tr>
</thead>
<tbody>
<tr>
<td>Session Number</td>
<td>1</td>
<td>3</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Takes off plane roof</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Puts plane roof back on</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Puts a passenger on the plane</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Puts a passenger in a seat</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Puts the pilot on the plane</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Puts the pilot in a seat</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Puts baggage/purse in passenger’s hand</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Puts cap in passenger’s hand</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pushes the plane</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flies the plane</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lands the plane</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parks the plane</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Takes a passenger out of the plane</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Takes the pilot out of the plane</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Walks a passenger within 6 inches of the plane</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Walks the pilot within 6 inches of the plane</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of Total Scripted Play Actions Observed</td>
<td>9/16</td>
<td>9/16</td>
<td>9/16</td>
<td>9/16</td>
</tr>
</tbody>
</table>
Results for RB

Percentage of RB’s ability to demonstrate scripted play actions across baseline, video modeling (VM), and video self-modeling (VSM) phases.
<table>
<thead>
<tr>
<th>Condition</th>
<th>Baseline</th>
<th>Video Modeling</th>
<th>Return to Baseline</th>
<th>1st Return to Video Modeling</th>
<th>2nd Return to Video Modeling</th>
</tr>
</thead>
<tbody>
<tr>
<td>Session Number</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Takes off bus roof</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Puts bus roof back on</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Opens the bus door</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Closes the bus door</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Puts hat on driver</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Puts backpacks on students</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Turns on lights</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Walks a child up the stairs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Walks the driver up the stairs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Puts the driver in a seat</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Walks a child down the stairs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Walks the driver down the stairs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pushes the bus</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pushes a child in a seat</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pushes a child within 6 inches</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Walks a child within 6 inches</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Walks the driver within 6 inches</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Shaded areas showing the actual or attempted scripted play actions completed for RB across baseline and video modeling sessions for the school bus play set.

<table>
<thead>
<tr>
<th>Condition</th>
<th>Baseline</th>
<th>Video Self-Modeling</th>
<th>Return to Video Self-Modeling</th>
</tr>
</thead>
<tbody>
<tr>
<td>Session Number</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Takes off plane roof</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Puts plane roof back on</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Puts a passenger on the plane</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Puts a passenger in a seat</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Puts the pilot on the plane</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Puts the pilot in a seat</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Puts luggage/purse in passenger’s hand</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pushes the plane</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flies the plane</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lands the plane</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parks the plane</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Takes a passenger out of the plane</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Takes the pilot out of the plane</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Walks a passenger within 6 inches of the plane</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Walks a passenger within 6 inches of the plane</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of Total Scripted Play Actions Observed</td>
<td>8/16</td>
<td>9/16</td>
<td>9/16</td>
</tr>
</tbody>
</table>

Shaded areas showing the actual or attempted scripted play actions completed for RB across baseline and video self-modeling sessions for the airplane play set.