A COMPARISON OF POINT OF VIEW VIDEO MODELING AND VIDEO SELF-MODELING

FOR PRESCHOOL-AGED CHILDREN WITH AUTISM SPECTRUM DISORDER

By

Lindsey Nicole Ogle

Approved:

____
Amye R. Warren
Professor of Psychology
(Director of Thesis)

____
Tom Buggey
Professor of Education
(Committee Member)

____
Richard Metzger
Professor of Psychology
(Committee Member)

____
Herbert Burhenn
Dean of the College of Arts and Sciences

____
A. Jerald Ainsworth
Dean of the Graduate School

A COMPARISON OF POINT OF VIEW VIDEO MODELING AND VIDEO SELF-MODELING FOR PRESCHOOL-AGED CHILDREN WITH AUTISM SPECTRUM DISORDER

By

Lindsey Nicole Ogle

A Thesis
Submitted to the Faculty of the
University of Tennessee at Chattanooga
in Partial Fulfillment of the Requirements
for the Degree of Master of Science
in Psychology

The University of Tennessee at Chattanooga

Chattanooga, Tennessee

May 2012

ABSTRACT

Video modeling interventions have been recognized as effective and evidence-based behavioral interventions for individuals with autism spectrum disorders; however, the effectiveness of different types of video modeling is still being explored. The present study examined the effectiveness of point of view video modeling compared to video self-modeling using a novel object retrieval task. A multiple baseline, across participants research design was used to assess four, three to four-year-old children with a primary diagnosis of autism. Although both forms of video modeling were successful in teaching the task to all of the participants, point of view video modeling resulted in faster acquisition. Possible explanations for the difference in effectiveness between the models are discussed.

DEDICATION

I would like to dedicate this study first to my brother, Matthew Ogle, second to my family, and third to the millions of families like my own affected by autism spectrum disorder.

ACKNOWLEDGEMENTS

The author expresses her sincere gratitude to the many people without whose assistance this thesis could not have been completed. First, sincere thanks are due to Dr. Amye Warren, my committee chair, for her guidance, patience, and reassurance not only during the thesis process, but also during my undergraduate years at UTC that prepared me for this project. I would also like to sincerely thank Dr. Tom Buggey who enlightened me though the opportunity to assist him in his research of the extraordinary promise of video modeling interventions and inspired the topic for this study. Thanks are also due to Dr. Rich Metzger for instilling in me a love of research as an undergraduate, and for the years of guidance and encouragement he has provided me since then. Expressed appreciation is also due to the teachers and staff at Siskin Children's Institute, namely Dr. Amy Casey, Gayle Coleman, Rachel Garber, Toni Carrigan, Danielle Lang, and Allison Thompson for their invaluable assistance in this study. Finally, the author would like to earnestly thank the parents of the children who participated in the study for their commitment to furthering the understanding and treatment of autism spectrum disorders.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF ABBREVIATIONS

DSM-IV-TR, Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision.

CDC, Centers for Disease Control and Prevention

CHAPTER 1

INTRODUCTION

According to the American Psychiatric Association Diagnostic and Statistical Manual of Mental Disorders – IV – Text Revised (*DSM-IV-TR,* 2000, 70-84), autism spectrum disorders are childhood developmental disorders typically diagnosed prior to the age of three characterized by impairments in social interaction, impairments in communication, and restricted, repetitive, and stereotyped patterns of behavior, interests, and activities. Autism is a spectrum of related disorders, including classic Autistic Disorder, Rett's Disorder, Childhood Disintegrative Disorder, and Pervasive Developmental Disorder Not Otherwise Specified, otherwise known as atypical autism, which differ in severity but have the same fundamental characteristics of impairment in social interaction and restricted, repetitive, and stereotyped behavior, interests, and activities (DSM-IV-TR, 2009). Impairments in social interaction are defined qualitatively and can range from impairment in verbal and nonverbal social communication skills, failure to develop appropriate peer relationships, lack of interest in and initiation sharing experiences with others, and a lack of social and emotional reciprocity (DSM-IV-TR, 2009). Impairments in communication are qualitatively defined and range from a delay or total lack of spoken language, impairment in the ability to maintain a conversation, repetitive or scripted use of language, or impairment in social imitative play (DSM-IV-TR, 2009). Restricted, repetitive, and stereotyped patterns of behavior, interests, and activities are qualitatively defined as patterns of interest that are abnormal either in intensity or focus, adherence to nonfunctional routines or rituals, stereotyped and repetitive motor mannerisms, or preoccupation with parts of objects. Stereotyped and repetitive behavior exhibited either through repetitive body movements or with objects is colloquially referred to as self-stimulatory behavior or stimming.

Comorbid Disorders

There are many comorbid intellectual, psychiatric, behavioral, and mood disorders associated with autism spectrum disorders (DSM-IV-TR, 2000, 72; Leyfer, et al., 2006). Most individuals with classic Autistic Disorder have an associated diagnosis of mental retardation that can range from mild to profound, and there may be abnormalities and unevenness in the development of cognitive skills regardless of the individual's overall intellectual ability (DSM-IV-TR, 2000, 71-72). In individuals with classic Autistic Disorder, nonverbal ability often exceeds verbal ability (DSM-IV-TR, 2000, 72). Individuals with Asperger's Disorder, however, have no significant delay or impairment in cognitive ability or language ability but do exhibit impairment in social interaction and restricted, repetitive, and stereotyped behaviors, interests, and activities (DSM-IV-TR, 2000, 84).

Imitation ability in individuals with autism may also be delayed in relation both to typical peers and individuals with other developmental disabilities (Smith & Bryson, 1994; Stone, et al., 1997). Smith and Bryson (1994) concluded in their review of the literature that there does seem to be a pattern of low performance on imitative tasks in comparison with other developmental disorders, but that imitative ability appears to be related to be positively related language ability. Stone, et al. (1997) also found that children with autism tend to have lower imitative ability when compared to children with developmental delay and typically developing children. Imitation of body movements and nonmeaningful actions appears to be more difficult than object imitation and meaningful actions for all children suggesting that although children with autism tend to be delayed in their development of imitation ability the pattern of development is not disorganized (Stone, et al., 1997).

Leyfer, et al. (2006) found that in a sample of 109 children ages 5-17 (Mean = 9.2) with a primary diagnosis of autism and borderline to average intellectual ability (Mean = 82.55), 72 percent had at least one impairing DSM-IV Axis 1 psychiatric disorder even though they were not preselected to have a comorbid disorder. The most common were specific phobias (44%), Obsessive Compulsive Disorder (37%), Attention Deficit Hyperactivity Disorder (31-55%), and Major Depression (10-24%). The authors did not find that Generalized Anxiety Disorder (2%) was comorbidly related to autism, but suggest that anxiety may be a personality trait of many children with autism and that the criteria for Generalized Anxiety Disorder may not be reflective of their actual anxiety level (Leyfer, et al., 2006). In addition, Leyfer, et al. (2006) discovered that most children had three diagnoses meaning that individuals with an autism spectrum disorder are at high risk for having multiple disabling psychiatric disorders concurrently. Therefore, interventions for individuals with autism spectrum disorders must take into account potential comorbid disorders, particularly anxiety disorders and attention deficit hyperactivity disorder, when attempting to change behaviors or teach new skills, as these disorders may make it very difficult for a child to effectively learn.

Rate of Autism Diagnoses

Autism spectrum disorder is relatively common in the United States with approximately 1 in 88 children of both sexes, and 1 in 54 boys, being diagnosed with the disorder by the age of eight according to the most recent Centers for Disease Control and Prevention report (2012). The current rate is a 23% increase from the 1 in 110 rate in 2009 and a 78% increase from the 1 in 150 rate found in 2007 (CDC, 2012). Thus, finding effective treatments and specific behavioral interventions for individuals with autism spectrum disorder is now more important than ever before because the population of children with the disorder in the United States appears to be rapidly growing.

Intervention

Early Intervention. Repeatedly research has shown that early intervention prior to the age of five is the most effective practice for individuals with autism spectrum disorders as gains at a young age can dramatically reduce the detriments associated with the disorder as the child gets older (Hume, et al., 2005). Young children with autism not only tend to respond quickly to treatment, but also respond more quickly than young children with other developmental disorders (Hume, et al., 2005; Rogers & Vismara, 2008). However, methods of early intervention are variable. Different methods are constantly being developed and tested with only a few eventually recognized as evidence-based practices for the treatment of autism (Hume, Bellini, & Pratt, 2005; Rogers & Vismara, 2008). According to Rogers and Vismara (2008), early intervention as a whole appears to be successful when looking at the entire population of individuals with autism spectrum disorder, but few studies have been randomized controlled treatments. Thus decisions on what is or is not an evidence based treatment for autism spectrum disorder are being made primarily upon meta-analyses of the results of multiple less methodologically sound studies (Rogers & Vismara, 2008). Furthermore, Downs and Downs (2010) found that even though there is substantial research to support the importance of early intervention, the specific practices currently utilized within many early intervention programs are inconsistent with the recommended practices for young children with autism.

Types of Interventions. Lord and Bishop (2010) identified three major types of interventions for individuals with autism spectrum disorders - psychopharmacological treatments, comprehensive treatment, and focused interventions (Lord & Bishop, 2010). Psychopharmacological treatments are treatments that focus primarily on biological, spiritual, and body based interventions such as medications, vitamins, special diets, massage, and music therapy (Wong & Smith, 2006). Wong and Smith (2006) found that approximately 52% of families of children with autism were using at least one psychopharmacological intervention for their child, 70% of which were biologically based. Comprehensive treatment models, such as pivotal response training or applied behavioral analysis, are behavioral interventions that tend to have a broad focus. These interventions are typically very time intensive and require as much as twenty to forty hours per week over a period of years (Lord & Bishop, 2010). Applied behavioral analysis is perhaps the most common evidence-based comprehensive treatment available for children with autism spectrum disorder with approximately 55% of special education teachers and school psychologists using the method almost every day with their students (Burns & Ysseldyke, 2009). Focused interventions, such as social story-based interventions, peer training, and modeling, are used to change a specific behavior or skill in a relatively brief amount of time compared to comprehensive treatments (Lord & Bishop, 2010). The majority of research on focused interventions tends to be single subject or small-n design because the treatments are individualized to the specific child or small group of children (Lord & Bishop, 2010).

Types of Modeling Interventions. Modeling is a particularly powerful focused intervention that has often been successfully used with individuals with autism spectrum disorders (Lord & Bishop, 2010). Modeling can either be active or passive (Biederman & Freedman, 2007). Active modeling is characterized by modeling techniques that require social interaction such as physical and verbal modeling and social responses (Biederman & Freedman, 2007). For example, modeling the word 'spoon' to a child and then asking them to repeat it be a form of verbal active modeling, whereas using hand-over-hand prompts to show a child how to use a spoon would be a form of physical active modeling. Conversely, passive modeling is characterized by modeling techniques in which the individual simply observes a model without interacting (Biederman & Freedman, 2007). One example of passive modeling would be showing a video of a child eating with a spoon to teach a child how to use a spoon. However, passive modeling is not limited to technology alone; it is a natural technique that typically developing children use to learn through observation and imitation of those around them.

Individuals with autism spectrum disorders may find active modeling difficult to comprehend because of its social component or may even find it threatening as social phobias are common in children with autism (Leyfer, et al., 2006). Video modeling, therefore, may be more appropriate and effective in teaching skills or behaviors. Video modeling may also tap into how a child with autism thinks and sees the world (Buggey, 2005). This view is based upon Temple Grandin's description of how she thinks "in pictures" and translates "both spoken and written words into full-color movies" (Buggey, 2005; Grandin, 1996, p. 3). Another explanation could be that video modeling is more effective because of its ability to hold the attention of individuals with autism (Charlop-Christy, et al., 2000). Biederman and Freedman (2007) confirmed when they observed over a period of seven years that children with autism, Down syndrome, and other developmental disorders do in fact respond better to passive modeling techniques in comparison to active modeling techniques when learning skills such as adaptive behavior, sign language, and alphabet printing. Thus, video modeling as a whole has extraordinary potential as a focused intervention for individuals with autism spectrum disorder.

CHAPTER 2

LITERATURE REVIEW

Video modeling interventions have been successfully used across the lifespan with many different populations of individuals; however, the method has received particular attention in the literature for individuals with autism spectrum disorders (Buggey & Ogle, 2012; Delano, 2007; Seida, et al., 2009; Rayner, et al., 2009). Video modeling, as a whole, has been repeatedly found to be an effective intervention for individuals with autism spectrum disorders (Rayner, et al., 2009). However, researchers have developed many types of video modeling interventions, and the effectiveness of the individual types is still being explored (McCoy & Hermansen, 2007). All types of video modeling have been used with individuals of different ages and diagnoses, but no consensus has yet been achieved as to which particular method of video modeling is more effective when compared to the others (McCoy & Hermansen, 2007). The first major division of video modeling interventions is the perspective of the video which can either be from an outside third-person perspective or from the point of view of the person intended to model the behavior or skill (Rayner, et al., 2009). The second major division is the characteristics of the person modeling the behavior or skill, and more specifically whether it is another person modeling or the individual him or herself-modeling the behavior or skill (Rayner, et al., 2009). There are also variations in technique and method limited to particular subtypes of video modeling such as using peers or adults as models in "other modeling" and point of view video modeling interventions (Rayner, et al., 2009). The different types of video modeling interventions are discussed in detail below and are represented in Figure 1.

Theoretical Foundations of Video-Modeling Interventions

Observational Learning. Albert Bandura's (1977) theory of social learning is regarded by many researchers as the foundation of video modeling research (Bellini & Akullian, 2007; Buggey, 2005; Rayner, Denholm, & Sigafoos, 2009). Bandura (1977) demonstrated that children can learn new skills by observing others perform the skills rather than just through personal experience alone. Video modeling is thus a logical step from spontaneous modeling in the naturalistic environment. Bandura (1977) found that observers would imitate the observed skills even without the presence of direct reinforcement and would generalize the socially learned skills to other environments.

Bandura (1977) also noted that a child's attention and motivation toward the model are essential for the child to imitate the behavior. Children are more likely to imitate a model that is similar to them not only in physical characteristics such as race, gender, and age, but also in ability, with children more likely to imitate someone who was just beyond their current level of functioning.

Self-efficacy. Self-efficacy is another aspect of Bandura's social learning theory that is important in relation to success of video modeling. Self-efficacy is defined by Bandura (1994) as an individual's beliefs about their own levels of competence or their ability to succeed in a particular circumstance. By showing the either the individual or another person performing at a high level with minimal errors, video modeling interventions aim to build the individual's self-efficacy and instill in the individual's mind a positive model to follow. Videos featuring the individual him or herself may be particularly effective in improving self-efficacy if only positive behaviors or successful skill attempts were shown in the video model.

Self-efficacy is developed in relation to four main areas of influence: mastery experiences, witnessing someone similar to oneself succeed, social persuasion, and internal stress reduction

(Bandura, 1994). Peer modeling allows the individual to see a similar peer performing a skill slightly beyond their present level of functioning. This may be interpreted as seeing someone similar to them succeed, and also lower the stress of learning a new skill. Both types of video-based interventions may challenge the individual's negative thought patterns and show the individual that he or she is not only capable of change, but also what he or she must do to make that positive behavioral, social, or communicative change.

Zone of Proximal Development. Vygotsky's (1978) zone of proximal development is also an important concept for video self-modeling. Vygotsky (1978) defined the zone of proximal development as the "distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers" (pg. 131). Thus, it is important that a video model be within the zone of proximal development for it to be successful.

Types of Video-based Interventions

Rayner, et al. (2009) defines the types of video-based interventions summarized in Figure 1. Videos can either be filmed in the third-person or first-person perspective. Third-person perspective videos are filmed from an outside perspective allowing the child to see the entire person or persons modeling the video. First-person perspective videos are filmed from the point of view of the person performing the task and typically only show the arms and hands of the person modeling the task if the person is shown at all.

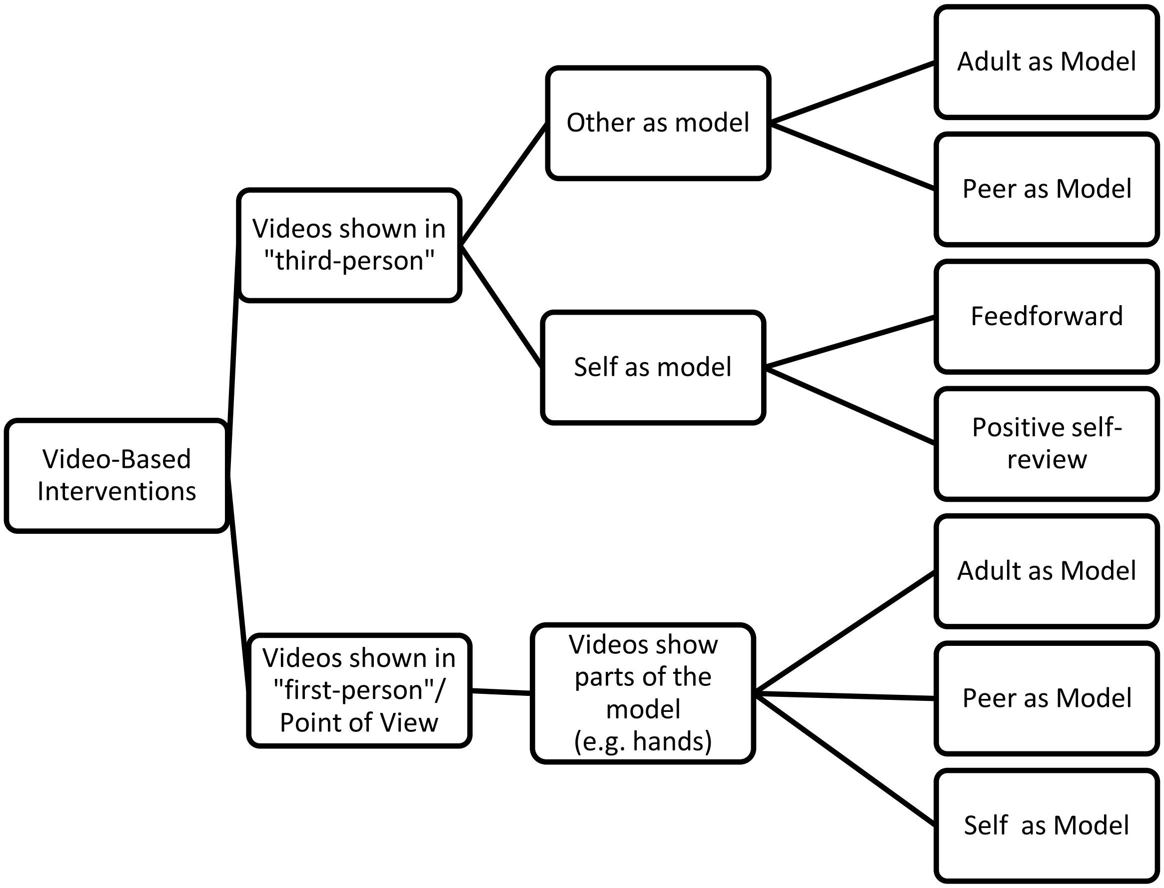

Figure 1. Types of Video Modeling Interventions. Adapted from Rayner, Denholm, and Sigafoos (2009).

Third-Person Perspective. Third-person perspective videos are subdivided into “other” and “self” modeling categories (Rayner,et al. , 2009). The “other” modeling category describes videos that use adults, peers, or siblings to model the target behavior. The “self” modeling category describes videos that use the target individual as the model (Bellini & Akullian, 2007; Dowrick, 1999; Rayner, et al., 2009). Dowrick (1999) described the following two types of video self-modeling interventions: positive self-review and feedforward. Positive self-review features a video of the best behaviors an individual has been able to produce with all negative behaviors removed (Dowrick, 1999). Feedforward, in contrast, depicts a skill that the individual has not yet acquired. Editing the videos can remove negative behavior and prompts or change the order of individual clips to show the individual performing at an advanced level (Buggey, 2005; Dowrick, 1999).

First-Person Perspective. Video models which are filmed from the eye-level of the individual modeling the behavior and typically feature only the arms and hands of the person modeling the behavior is classified as a point of view video model (Hine & Wolery, 2006; Rayner, et al., 2009). Just as with other video modeling interventions, the behavior can be modeled either by an adult, peer, sibling, or the individual him or herself (Rayner, et al., 2009). Rayner, et al. (2009) also include Video priming or video instruction does not feature a person modeling a behavior in any way, and typically uses a computer to interactively teach a skill using video, text, and other multimedia without using an individual to model a skill or behavior (Rayner, Denholm, & Sigafoos, 2009).

Comparisons of Types of Video-based Interventions

Live (In-vivo) model vs. video model. Charlop-Christy, et al. (2000) compared in-vivo modeling with adult models with video modeling featuring the same adult models for teaching five children between the ages of seven and eleven with autism. They found that children learned faster and generalized what they learned more successfully when they viewed a video model (Charlop-Christy, et al., 2000). Both the in vivo and video modeling conditions featured the same adults modeling the task, which suggests that the video condition was particularly effective.

Conversely, Geiger, et al. (2010) found that three children between the ages of seven and nine with autism did not favor video over in-vivo models and were able to learn essentially the same amounts from both types of modeling. The researchers used a point of view video model for a drawing and craft-construction task, and an adult modeled social behavior from a third-person perspective (Geiger, et al., 2010). Two of the three participants did attend to the video modeling conditions more often than the in vivo modeling condition, but neither participant showed any difference in the number of trials necessary to achieve mastery (Geiger, et al., 2010). Gena, et al. (2005) also did not find a difference or preference for in vivo or video modeling for three preschool-aged children with autism in a social responsiveness intervention. However, their study was complicated by the fact that they used both prompting and reinforcement in addition to the in vivo and video modeling interventions and by the fact that they used adult models in the in vivo condition and peer models in the video modeling condition (Gena, Couloura, & Kymissis, 2005). Their study is further complicated by the fact that each child was exposed to 140 different social scenarios, so their null results could simply be due to practice effects from being exposed to so many trials (Gena, Couloura, & Kymissis, 2005).

The contradictory results suggest that more research needs to be done to confirm whether there is a preference for in vivo versus video modeling for individuals with autism and if there is a difference in effectiveness beyond a theoretical basis. It is interesting that all three studies used adults to model the behaviors in the in vivo condition and only one study used peers to model the behaviors on video. Based upon Bandura's (1977) social learning theory, peer modeling should be more effective but that there is no research comparing peer in vivo modeling versus peer video modeling. It appears that adult models were selected for convenience and ease rather than on a theoretical or evidence-based reason. Thus, more research needs to be completed exploring whether there is a difference for peer vs. adult models for in vivo modeling.

Peer vs. Self Model. Based upon Bandura's research, peer and self-modeling are theorized to be the most powerful modeling methods because they are the two modes most similar to the target individual. However, the effectiveness of self-modeling over peer modeling is reliant on the ability of the child to self-recognize. Rochat and Striano (2000) suggest that infants have an implicit sense of self as separate from other people and objects at birth, which is much earlier than when children begin to exhibit conceptual self-knowledge at age two. Three month old infants can discriminate between a mirror image of themselves versus a same-aged peer exhibited by the infant looking, smiling at, and cooing significantly more at themselves (Rochat & Striano, 2002). Explicit self-awareness and metarepresentation of the self, however, does not emerge until approximately 2 ½ years of age. Explicit self-awareness has been documented in typically developing children through self-referent activities, self-labeling, and emotional expression of embarrassment in the rouge test (Lewis & Ramsay, 2004). Video cameras have also been used as an informal estimate of self-recognition by turning the view finder around to the child and observing reactions (Buggey, 2007). Buggey (2012) found that children will typically "act for the camera" by smiling, turning their head, or sticking out their tongue. There is no difference in the self-recognition development of children with autism as compared to their typical peers when mental age is taken into account suggesting that self-recognition development follows the same developmental pattern as typically developing children (Dissanayake, et al., 2010; Lind & Bowler, 2009).

Both video self-modeling and video modeling with another as a model have been recognized as evidence based practices (Bellini & Akullian, 2007; Mason, et al., 2012) Research on video self-modeling has been growing in popularity over the past four decades, and has been successfully used to improve social skills, language ability, motor skills, and vocational and functional skills for individuals with autism ranging from preschool-age children to adults (Buggey & Ogle, 2012). Of the 47 studies on video self-modeling included in Buggey and Ogle's (2012) review, 44 showed positive gains and three show no change. In a meta-analysis of video modeling with other as a model across all age groups, Mason, et al. (2012) found that the effectiveness of video modeling was very effective for elementary school children (Effect size = .86), moderately effective for preschool-aged children (Effect size = .79), secondary school children (Effect size = .75), and post secondary school individuals (Effect size = .71). The overall effect size of .82 identifies video modeling with other as a model as a very effective intervention (Mason, et al., 2012).

Sherer et al. (2001) found that there was no difference in learning from a self video model and a peer video model for five children with autism between the ages of four and eleven in a conversation task. In general, they found that children who learned well from one type of video model learned just as well from the other. In contrast, Marcus and Wilder (2009) found that three children with autism spectrum disorder (ages 4, 9, and 9) achieved a mastery criterion for the video self-modeling intervention, but only one child achieved the mastery criterion for the peer video modeling intervention. Additionally, the single child that was successful in mastering a task in the peer-modeling intervention achieved the mastery criterion faster in the video self-modeling intervention suggesting that self-modeling was a more powerful intervention (Marcus & Wilder, 2009).

There have been six meta-analyses and reviews of the literature comparing self and other video modeling studies. None of the reviews found statistically significant differences between the self-modeling and peer and adult modeling studies (Ayres & Langone, 2005; Bellini & Akullian, 2007; Delano, 2007; McCoy & Hermansen, 2007; Mechling, 2005; Rayner, et al., 2009). Each determined that both self and other video modeling strategies met the standard to be considered an evidence-based practice for individuals with autism.

All six reviews suggest that more research needs to be done to determine the effectiveness of self-modeling versus other (peer and adult) modeling (Ayres & Langone, 2005; Bellini & Akullian, 2007; Delano, 2007; McCoy & Hermansen, 2007; Mechling, 2005; Rayner, et al., 2009). McCoy and Hermansen (2007) do suggest that both peer and self models seem to be effective, but without more comparative studies it is difficult to determine the effectiveness of one method over the other. Other than the studies named above, all other self-modeling, peer modeling, and adult modeling research has been conducted utilizing one method in a single subject or small-n design. Thus, the argument that self-modeling is more effective than peer modeling is, at the present time, based primarily on a theoretical construct.

Rayner, et al.(2009) discuss that video self-modeling is limited because it requires that the individual to exhibit the targeted behavior in some form in some context for a feedforward intervention to be successful. They describe that it has been very successful at encouraging the generalization of a skill already achieved in one context to another context, but it could be very difficult to capture emerging behaviors such as very rare language or social interactions with peers. If there are no significant differences in the effectiveness of self versus peer models, then the benefits of using typical peers to model behaviors will outweigh the difficulty of using self-modeling (Rayner, et al., 2009).

First-Person vs. Third-Person Video Modeling. Currently, there is no research comparing first-person and third-person perspective video modeling interventions. Point of view video modeling, which shows the arms and hands of either a peer or adult model from the visual perspective of the individual, is a relatively new video modeling strategy (Rayner, et al., 2009). Shipley-Benamou, et al. (2002) successfully taught functional living skills to three five-year-old children with autism using point of view video modeling, and Hine and Wolery (2006) successfully taught two preschoolers with autism to play with a novel toy. Tetreault and Lerman (2010) were able to successfully teach two children with autism (ages 5 and 8) using point of view video modeling alone to initiate and maintain a conversation, and a third individual (age 4) was successful only after receiving limited vocal prompts in addition to the point of view video model. This research suggests that point of view video modeling might also be an effective intervention, but more research needs to be done to determine the value of the point of view visual perspective as opposed to the third-person perspective.

The Value of Video Modeling Interventions

Lord and Bishop (2010) proposed that the value of an intervention should be measured by how long it takes for the intervention to be effective, how much money and labor went into its accomplishment, how much the new skill or behavior contributes to the individual and family's well-being, and how much the new skill or behavior allows for the acquisition of new skills and adaptive behaviors. Video-based modeling interventions meet these criteria because if effective, results tend to be apparent quickly (Bellini & Akullian, 2007; Charlop-Christy, et al.,2000), and video modeling has been shown to promote generalization both to other skills and behaviors and other environments better than in vivo (live) modeling (Charlop-Christy, et al., 2000).

The cost and labor of video modeling is also typically less than other interventions such as applied behavior analysis (ABA) in that video modeling typically shows results very quickly and is not as time and labor intensive as ABA (Lord & Bishop, 2010). Video modeling is also less time intensive than in vivo (live) modeling for therapists because they do not have to be trained to model a behavior repeatedly for their client (Charlop-Christy, et al., 2000; Lord & Bishop, 2010). The primary cost of a video modeling intervention would simply be for the video camera itself as most computers now come equipped with free software for video editing that is user-friendly.

Video-based interventions are also valuable for individuals with autism because videos can be adapted to the needs of the individual. In a 2009 review, Rayner, et al., summarized the current studies on video-based interventions for individuals with autism into five main categories based upon what type of behavior or skill was targeted. Video based interventions have been successfully used to improve and increase social interactions, improve and increase the use of language/ communication skills, teach functional skills, increase the consistency of compliant/ appropriate behavior and reduce problem behavior, and improve and increase academic skills (Rayner, et al., 2009). Video self-modeling alone has been used to increase social engagement (Bellini, et al., 2007), train responding behavior (Buggey et al.,1999), train spontaneous requesting (Yingling & Neisworth, 2003), enhance conversation skills (Scattone, 2008), teach vocational skills (Allen, Wallace, & Renes, 2010), teach appropriate circle time and center time behavior (Crandell & Johnson, 2009), increase sharing (Crandell & Johnson, 2009), reduce tantrums (Buggey, 2005), reduce pushing (Buggey, 2005), increase language production (Buggey, 2005), increase social initiations (Buggey, 2005), and many other applications within autism population. The successful application of video-based interventions illustrates the adaptability of video-based interventions in that it can be used for a variety of reasons to change or improve behavior.

Creating and Editing Video Models

Buggey (2005) describes the process of creating video modeling tapes or DVD's for children with autism using computer video editing software. Programs such as iMovie© for Apple operating systems and MovieMaker© for Windows operating systems are free programs offered by Apple and Windows that are both user-friendly and allow for more complex video editing than can be accomplished using the VCR method (Buggey, 2005). Either program allows the videographer to simply download the movie to the computer and cut and paste the desired behaviors into a single video. Through creative editing, it is possible to show a child performing a skill that they are not presently able to accomplish. For example, in a 2005 study of expressive language, Buggey extracted individual words of a child speaking to make a sentence. This intervention allowed the child to see himself speaking in multi-word sentences when he had previously only been able to speak in single-word utterances (Buggey, 2005).

Purpose of Study

The purpose of this study is to determine the difference between two types of video modeling for use as behavioral interventions for children with autism spectrum disorder. Video self-modeling is a type of video model that portrays the target individual performing a specific skill from an outside perspective. Point of view video modeling portrays a skill from the individual's visual point of view as he or she would view the task. Both types of video modeling have been found to be effective interventions, but no study as of yet has compared the effectiveness of the two types in direct comparison to one another. An identical novel task will be used to assess the differences in effectiveness for two groups of children randomly assigned to either a self-modeling video or a point of view video model. Because of video self-modeling's ability to increase self-efficacy, it is expected to be more effective in teaching a novel skill.

CHAPTER 3

METHODS

Participants

Four, 3 and 4 year-old children with a primary diagnosis of autism who attend an urban, inclusive private preschool were selected to participate in the study. All interactions with the participants took place in their classrooms with a teacher present. Participants were recruited first by talking to the therapists and researchers at the school about the participant qualifications needed for the study. The qualifications requested were children between the ages of 3 and 5 years-old with a primary diagnosis of autism. A team of therapists and researchers then selected four children with the most similar ability levels with a primary diagnosis of autism between the ages of 3 and 4 that were appropriate for the study. The classroom teachers were then contacted and asked for permission to include the children in the study. Once the teachers gave permission, informed consent forms were sent home with the children for a parent or legal guardian to sign and return. Once the permission forms were signed and returned, the children were matched into research conditions based upon their age, severity of autism, cognitive ability, verbal ability, and motor ability based upon assessments completed by the school as part of their individualized education plan. Logan and Oliver were shown video self-models and Jeremy and Darin were shown point of view video models. The names of the participants have been changed to protect their identities.

Oliver was a 4 year 3 month-old male with a primary diagnosis of autism at the time he was tested. He was scored as very likely to have autism with an index score of 85 on the *Gilliam Autism*

Rating Scale – 2, and scored in the 9th percentile with a scale score of 6 for stereotypical behavior, 25th percentile with a scale score of 8 for communication, and 37th percentile with a scale score of 9 for social interaction. Oliver's cognitive ability was assessed using the *Wechsler Preschool and Primary Scale of Intelligence – 3.* He had a verbal IQ of 116 (86th percentile), performance IQ of 93 (32nd percentile), and full scale IQ of 105 (63rd percentile) which places him slightly above average as compared to his same-age peers. His receptive verbal ability was average (94, 34th percentile) as assessed using the *Peabody Picture Vocabulary Test-4,* and his expressive vocabulary was also average (99, 47th percentile) as assessed using the *Expressive Vocabulary Test*. Oliver's motor ability was below average in fine motor ability (33, 4th percentile) and low average in gross motor ability (43, 21st percentile). Oliver potentially meets the qualifications for Asperger's Disorder, otherwise known as high functioning autism, as his cognitive ability and verbal ability is unimpaired (DSM-IV-TR, 2009, 84).

Logan was a 3 year 7 month-old male with a primary diagnosis of autism at the time he was tested. He scored in the severe category of autism with a t-score of 62 in the *Childhood Autism Rating Scale – 2*. Logan's cognitive ability was estimated to be at the 19 month-old level (5%) and was below average for his age group according to the *Bayley Scales of Infant and Toddler Development – 3.* His verbal ability was assessed using the *Test of Early Language Development* – 3, and he scored a standard score of 74 (4th percentile) in receptive language, 77 (6%ile) in expressive language, and 71 (3rd percentile) for total verbal ability. However, his teachers reported that he could recognize and correctly label letters and their sounds and some written words which may indicate possible hyperlexia, or the ability to decode written words prior to comprehending what the word actually means (DSM-IV-TR, 2009, 72). His motor ability was assessed using the *Learning Accomplishment Profile – Diagnostic Edition*, and he had a score of 27 (1st percentile) for fine motor ability and 35 (7th percentile) for gross motor ability.

Jeremy was a 3 year 7 month-old male with a primary diagnosis of autism at the time he was tested. He was rated as very likely to have autism with an index score of 112 on the *Gilliam Autism Rating Scale -2*, and was rated as severely autistic with a t-score of 43.5 on the *Childhood Autism Rating Scale -2*. His cognitive ability was estimated to be at the 12m level (56, 1st percentile) as assessed using the *Mullen Scales of Early Learning*. He was also administered the *Bayley Scales of Infant and Toddler Development – 3*, and scored in the low average range with a standard score of 80 (9th percentile). Jeremy's verbal ability was assessed as significantly below average (63, 1st percentile) using the *Test of Early Language Development – 3,* and he obtained a score of 68 (2nd percentile) on the receptive language subscale and 71 (3rd percentile) on the expressive language subscale. He was also assessed as being significantly below average (50, 1st percentile) using the *Preschool Language Scale – 4*, and he obtained a score of 50 (1st percentile) on the auditory comprehension subscale and 50 (1st percentile) on the expressive language subscale. Jeremy's fine motor ability was significantly below average (27, 1st percentile), but his gross motor was low average (39, 14th percentile).

Darin was a 3 year 11 month-old male with a primary diagnosis of autism at the time he was tested. He was rated as very likely to have autism with an index score of 100 on the *Gilliam Autism Rating Scale – 2*, and had subscale scores of 9 (37th percentile) for stereotypical behavior and 11(63rd percentile) for social interaction. Darin's cognitive ability was assessed as low average (80, 9th percentile) by the *Bayley Scales of Infant and Toddler Development – 3.* His verbal ability was significantly below average (50, 1st percentile) according to the *Preschool Language Scale -4,* and had subscale scores of 50 (1st percentile) for auditory comprehension and 50 (1%ile) for expressive language. Darin's motor ability was significantly below average with a fine motor score of 27 (1st percentile) and a gross motor score of 27 (1st percentile) according to the *Learning Accomplishment Profile – Diagnostic Edition.*

Tasks and Materials

A single novel task unfamiliar to all participants was used to assess the differences between the types of video modeling interventions. An object retrieval task similar to one used by Esseily, et al. (2010) was used. A small Velcro-covered ball was placed in a half-gallon clear plastic bottleneck pitcher, and the child was given a wooden dowel with an opposing Velcro tip that allowed the child to retrieve the block inside. The ball was large enough not to easily fall out of the bottle, but small enough that it was easily removed from the bottle with the dowel. The bottleneck of the pitcher prevented the child from reaching into the pitcher to remove the ball. The task was judged by Esseily, et al. (2010) as being appropriate for children at a developmental age of 18-24 months; children this age do not naturally use a tool to retrieve an object, but upon witnessing a model of how to use a tool can imitate the model and retrieve the object.

To avoid the potential confounding variable of practice effects, children in the self-modeling condition did not actually complete the task. The participants were filmed with the objects in hand as if they were going to start the task and then a video from an outside perspective of the researcher completing the task was inserted, followed by a clip of the child pulling the Velcro ball off of the stick appearing to have successfully completed the task. The task was filmed from the point of view of the child completing the task for the point of view video modeling condition with the lead researcher modeling the task. The same point of view video model was used for the children in the point of view video modeling condition. All participants were shown identical models twice, resulting in films that were between 30 and 45 seconds long. Identical verbal comments of “Let’s get the ball!” at the beginning of the movie, “You got it! One more time!”, between the models, and “Great job! You got it!” were used for both the point of view video models and video self-models with the exception of the first video for one participant. Logan’s first video had no verbal comments because it was not considered an important factor for the video model, but after consulting with Dr. Tom Buggey, the decision was made add in the verbal comments for his second video at follow up and for every participant thereafter.

Dependent Measures

The dependent measure was correct imitation. Adapted from Esseily, et al. (2010, p. 697) scoring method, each child was scored using the following scale: 0 – Plays with bottle or stick for its own sake, 1 – Turns bottle upside down, 2 – Tries to insert hand into the bottle, 3 – Inserts the stick into the bottle but fails to retrieve the ball, 4 – Successfully completes the target action and retrieves the ball using the stick. To better reflect all possible actions the children demonstrated with the task objects, the additional option of turning the bottle upside down was added to the scale as it demonstrated a strategy for getting the ball out of the bottle that was not accounted for by Esseily, et al. (2010) study.

Procedure

Baseline. Baseline functioning was assessed by observing the participants with the materials to see if they naturally used the stick to get the ball without a model or prompts. Baseline data were collected in the morning between 9:30am and 10:30am in each child's classroom while his class was outside on the playground. Data were collected until the child disengaged from the materials. None of the participants successfully retrieved the ball using the stick at baseline. The child's teacher was present during baseline and aided in redirecting the child's attention as needed.

Following Buggey's (2012) method of judging self-recognition, the video camera's view finder was turned around so that the participants' in the video self-modeling condition could see themselves in the screen and their reaction to seeing themselves was recorded. Buggey (2012) has noted that children often "act for the camera" by maintaining eye contact with their image in the view finder, making faces, smiling, tilting their head, or sticking out their tongue. Video self-models were then created for each child assigned to the video self-modeling condition by filming them picking up the Velcro stick and moving it toward the bottle, and then filming them pulling the ball off of the stick. The children in the self-modeling condition did not complete the task during baseline, nor was it modeled for them.

Intervention. Each participant was shown a video model in his class at a child-sized table during the child's free play period outside in the morning between 9:30am and 10:30am. The child's teacher was present during the intervention and aided in redirecting the child's attention as needed. Each participant viewed the video model on a lap top screen, and then was given the opportunity to immediately imitate the modeled behavior with identical materials from the video (a wood dowel with a Velcro tip and a clear plastic half-gallon bottleneck pitcher with a small Velcro ball). Data were recorded until the child disengaged with the materials. If the child did not complete the task successfully after watching the video once, the video was shown again and the child was given a second opportunity to imitate the task. This procedure was repeated until the child successfully completed the task.

Logan was the only participant that did not imitate the video model correctly on the first day. Because Logan's initial video did not contain verbal comments and he was unsuccessful after watching the video seven times over two days, a follow-up session in which verbal comments were inserted into the video was conducted. The same procedure was followed during the follow up study. As he was the first participant in the study, all videos for the other three participants also contained the same verbal comments used in Logan's second video.

Data Analysis

A multiple baseline design across participants was used in the present study. Data were recorded and coded from analyzing the video recordings of the baseline and intervention sessions. The effectiveness of the two video models was determined through visual inspection of the graphical representation of data and by calculating the percentage of non-overlapping data points (Wolery, et al., 2008). Percentage of non overlapping data is calculated by determining the percent of intervention data points that do not overlap with the highest baseline data point (Worley, et al., 2008). Percentage of non overlapping data results from 90%-100% are classified as very effective treatments, 70% - 89% as effective treatments, and under 70% as either questionable or not effective (Wolery, et. al., 2008). Percentage of non overlapping data, however, is highly contested because of high error rates due to not taking into account all of the data or data trends (Wolery, et al., 2008). Therefore, visual trends were also examined in the data (Kennedy, 2005).

CHAPTER 4

RESULTS

Point of View Video Modeling Condition

Both Jeremy and Darin were successful in imitating the point of view video model, and their data are summarized in Figure 2. Jeremy was successful in immediately mastering the task after watching the point of view video model just one time making his percentage of non overlapping data 100 percent. Darin mastered the task after watching the point of view video model twice and two unsuccessful attempts. His percentage of non overlapping data was complicated by the fact that he was self-stimulating (spinning the ball inside the bottle) with the materials and thus returned to a 0-score after successfully mastering the task. If the two 0-data points are included, his percentage of non overlapping data is 57%, but if they are excluded his percentage of non overlapping data increases to 80%. Thus the point of view video model was very effective for Jeremy and effective for Darin in teaching them a novel play skill. Additional description and discussion of Jeremy and Darin's performance is below.

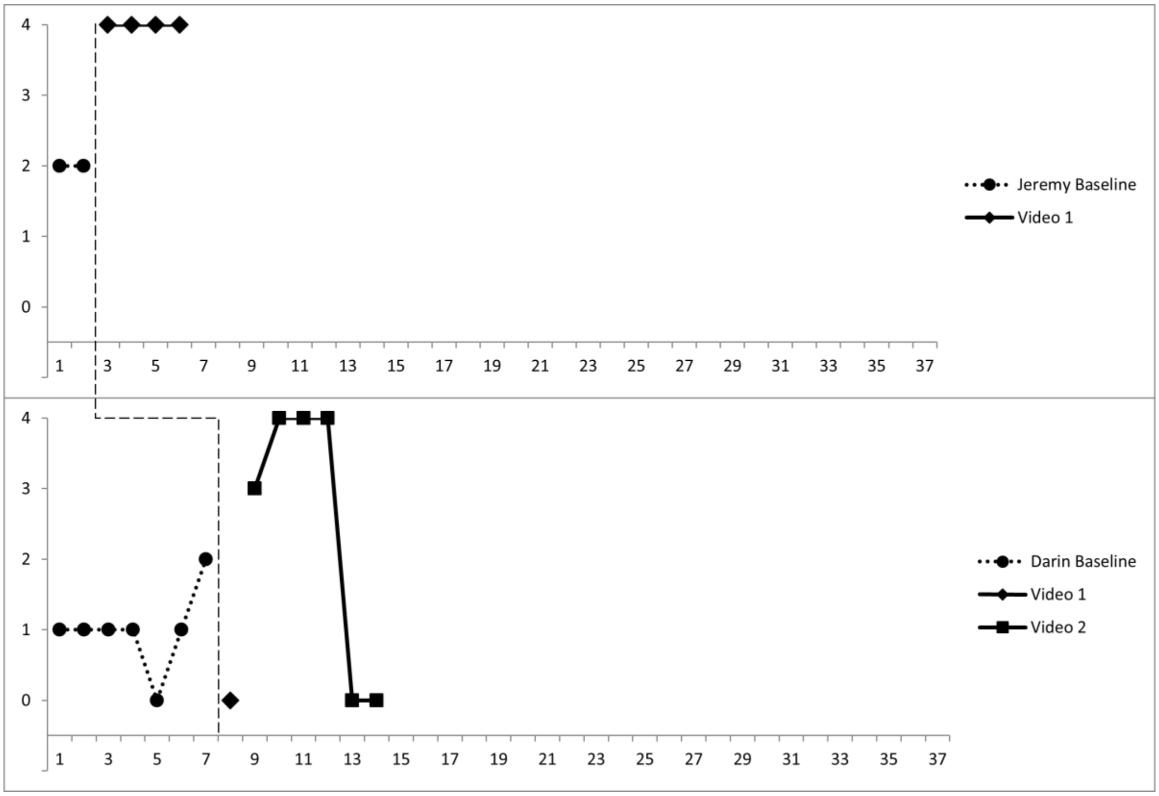

Figure 2 Point of View Video Modeling Condition. The dotted line indicates when the baseline data ended and the intervention began. The connected lines and/or unconnected individual data points identify attempts to get the ball made after watching the video model one time. Subsequent viewings of the video model are represented by breaks in the line graph and an alternating data-point marker pattern. The total number of times each participant viewed the video is summarized in the legend.

Jeremy. At baseline, Jeremy was attempting to put his hand into the bottle to get the ball. He did put the stick into the bottle once at baseline, but it was not coded because he did not seem to display any intent to get the ball. He appeared to put the stick in the bottle so that he could go play with farm animal figurines. During the intervention phase the following day, Jeremy paid very close attention to the video, and after watching the video just once, he was immediately successful in using the stick to get the ball. Jeremy's percentage of non overlapping data was 100% which is in the very effective range. Jeremy's data displayed no linear trend over time.

Darin. At baseline, Darin first attempted to turn the bottle upside down to get the ball to fall out, and when that did not work he attempted to stick his hand into the bottle to get the ball before disengaging from the activity. He was very active and distractible both at baseline and the intervention phase. In between disengaging from the materials and watching his video a second time during the intervention, he left the table to go to a more preferred activity in his classroom, and his teacher helped refocus his attention on the video by first bringing the cars he was playing with to the table, then pointing at the screen to get him to attend and removing the toy car when the video started. He did appear to be appropriately motivated to get the ball from the bottle in most trials, but also displayed possible sensory-based stimming behavior with the materials by spinning the ball inside the bottle which could be attributed to the restricted and repetitive behaviors characteristic of his diagnosis of severe autism.

The first time Darin watched his point of view video model, he was distracted because some of his classmates had come into the classroom as he was watching the video. When given the chance to imitate, he repeatedly spun the ball inside the bottle and did not attempt to get the ball out of the bottle in any way. After his classmates left the room, he watched the video for a second time and was much more focused. After watching, he first attempted to use the stick to get the ball and was unsuccessful at getting the ball to stick to the Velcro. However, he tried again and was successful in getting the ball using the stick three times before appearing to become bored with activity and return to spinning the ball inside the bottle. Including all data points, Darin's percentage of non overlapping data is 57%; however, this percentage could arguably be an incorrect representation of his ability because of his stimming behavior of spinning the ball inside the bottle after mastering the task. If the last two 0-point data points that represent his stimming behavior were excluded from the percentage of non overlapping data calculation, then he would have a percentage of non overlapping data score of 80%

which is in the effective treatment range. Darin's data also display a positive linear trend over time indicating he may have been learning on his own through trial and error how to get the ball.

Video Self-Modeling Condition

Both Oliver and Logan were eventually successful in completing the task, and their data are summarized in Figure 3. Oliver was successful in mastering the task after watching his video self-model a total of three times and four unsuccessful attempts during his intervention. Logan was shown two different versions of his video self-model in which the first had no verbal comments and the second did contain verbal comments. After watching his first video without verbal comments seven times over two days, Logan was unsuccessful in mastering the task. When verbal comments were added in his second video self-model, he was successful in mastering the task after watching the second version of the video three times and four unsuccessful attempts.

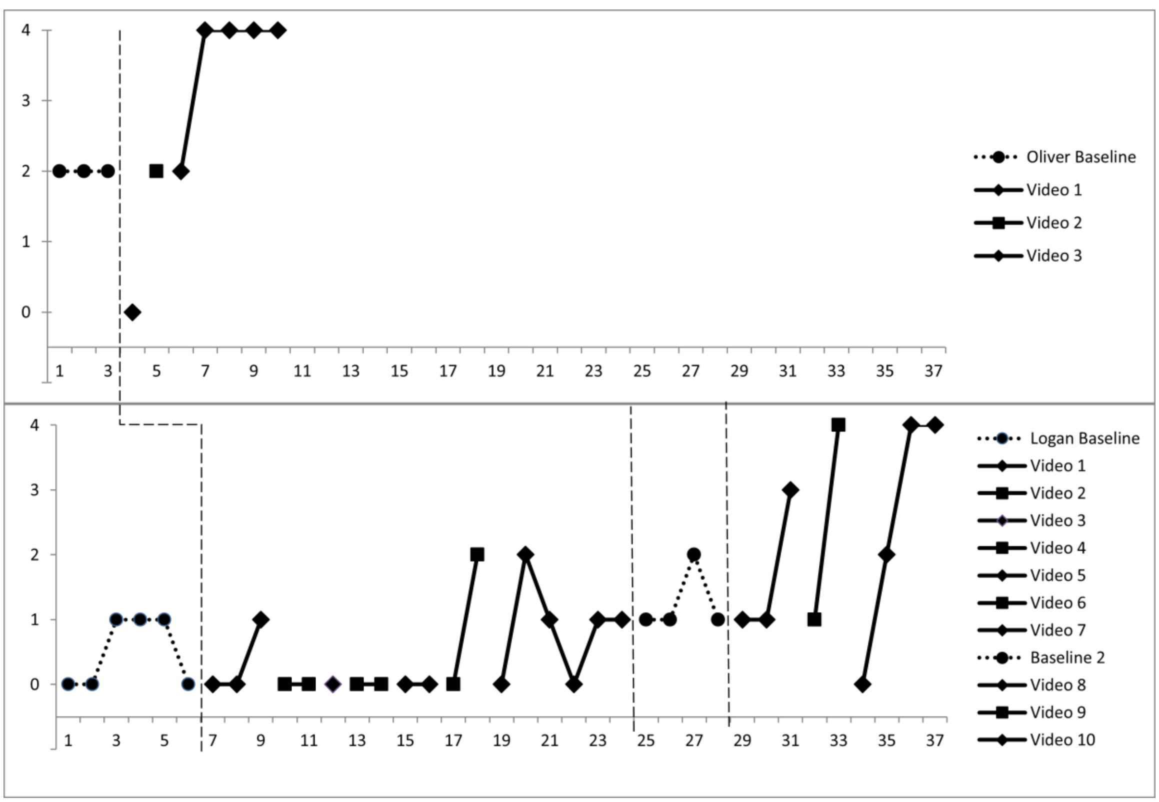

Figure 3 Video Self-Modeling Condition. The dotted line indicates when the baseline data ended and the intervention began. The connected lines and/or unconnected individual data points identify attempts to get the ball made after watching the video model one time. Subsequent viewings of the video model are represented by breaks in the line graph and an alternating data-point marker pattern. The total number of times each participant viewed the video is summarized in the legend.

Oliver. At baseline, Oliver was using his hand to attempt to get the ball out of the bottle. During baseline and the intervention, he was very distractible and had trouble focusing. He was particularly distracted by the video camera once he realized that he could see himself in the view finder. He exhibited the behavioral signs of self-recognition by smiling, tilting his head back and forth, and sticking his tongue out. He did appear to be appropriately motivated to get the ball from the bottle in most trials, but also displayed some stimming behavior during the intervention phase with the materials by becoming preoccupied with feeling the Velcro on the tips of the stick used to get the ball which could be attributed to the preoccupations with parts of objects and possible sensory sensitivity characteristic of his diagnosis of severe autism.

The first time he had the opportunity to watch his video, he was very distracted by the camera and fascinated with seeing himself in the view finder. When given the opportunity to imitate the video, he just felt the Velcro on the ends of the stick and made no attempt to get the ball. The second time he watched the video, he watched the first example of the model intently, but became distracted with the camera again during the second part. However, while he was watching the camera during the second part of the video, he verbally imitated “let’s get the ball” meaning that he had at least listened to the video enough to imitate what was said. However, this could be attributed to echolalia which is common in children with severe autism. After watching the second video, he attempted to get the ball by putting his hand in the bottle, and when he was unsuccessful he disengaged from the activity. The third time he watched the video he was much more focused, but after watching he again attempted to use his hand to get the ball. However, he then picked up the stick and successfully used it to get the ball four times before disengaging from the activity. His percentage of non overlapping data was 57%. He appeared to be very proud of himself for mastering the task and enjoyed the verbal praise he received when he mastered the task. Oliver's data did not display a linear trend at baseline, but did show a slight linear trend during the intervention phase indicating that he may have learned how to get the ball through trial and error and not just by watching the video.

Logan. Logan failed to exhibit some of the behavioral signs of self-recognition of smiling, tilting his head back and forth, and sticking his tongue out, but he did look briefly at the view finder through his peripheral vision. He was not consistently motivated to get the ball from the bottle, and displayed stimming behavior throughout baseline and intervention phases. Stimming behavior can be attributed to the repetitive and stereotyped behaviors and possible sensory sensitivity characteristic of his diagnosis of severe autism. Logan was the first participant in the study, and his first video self-model had no verbal comments in it for the first seven times he viewed the video because their inclusion was not thought to be an important factor for a single-step imitation task at that time. After he was unsuccessful in mastering the task, and consulting with Dr. Tom Buggey (2012), a follow up study in which verbal comments that identified the target behavior were inserted into the video. A video identical to the original visually, with the verbal comments of "Let's get the ball!" at the beginning, "You got it! One more time." in between the two models, and "Great job! You got it!" inserted was created. The only comment that was slightly directive was the first that identified the model, but at no point was the procedure expressed verbally to any participant. The comments were then used in both the point of view video model and the other video self-model. Logan's follow up study was conducted two months from when he originally participated in the study. Secondary baseline data was collected prior to collecting follow up data to account for potential changes in ability.

Initial Attempts. At Logan's first baseline, he was first very interested in playing with the materials themselves and particularly enjoyed spinning the ball inside the bottle which could be labeled as a stimming behavior characteristic of his severe autism diagnosis. . When he attempted to get the ball out of the bottle, he turned the bottle upside down in an attempt to get the ball to fall out. When it did not fall out, he hit it upside down against the floor to make it come out and was successful in getting the ball this way during baseline. Because of this, another layer of Velcro was added to the ball to prevent it from falling out of the bottle. Like Jeremy, however, he did put the stick in the bottle at baseline without displaying any intent to get the ball so that he could move on to a more preferred activity of playing with a doll house.

Logan was unsuccessful in mastering the task after watching his video four times the first day. He was very distracted and unfocused, and after watching the video simply wanted to stim with the materials. During the first trial he again tried to get the ball out of the bottle by turning it upside down, but when he was unsuccessful, he stimmed with the materials primarily by spinning the ball inside the bottle and made no attempt to get the ball during trials two, three, or four. The next day, he was more attentive while watching the video. During trial five, he again made no attempt to get the ball and just played with the materials. During trial six, he attempted to get the ball by putting his hand inside the bottle before becoming disengaged. During trial seven, he first played with the materials, and then put his hand in the bottle. When that was unsuccessful he went back to turning the bottle upside down to try to get the ball to fall out. Logan's PERCENTAGE OF NON OVERLAPPING DATA for the first seven trials was 11.1%. Logan's data at baseline revealed a slightly positive linear trend in that he went from simply playing with the materials to trying to get the ball out of the bottle. His intervention data also showed a slightly positive linear trend in that he progressed to using his hand to get the ball out of the bottle. Logan's percentage of non overlapping data for study one is 11 percent as only two data points exceeded his baseline functioning.

Follow-Up Session. At the second baseline, Logan first attempted to turn the bottle upside down, then stuck his hand inside the bottle, and finally turned the bottle upside down again in an attempt to get the ball before becoming disengaged with the activity. After watching the video self-model with verbal comments, he again turned the bottle upside down twice in an attempt to get the ball before unsuccessfully using the stick in an attempt to get the ball. He watched the video a second time and again turned the bottle upside down before using the stick to correctly complete the task using the stick to get the ball out of the bottle. He watched the video for a third and final time after pushing the button to start the video on his own, and proceeded to play with the stick, then tried to get the ball out with his hand, before finally completing the task successfully by using the stick twice before disengaging from the activity. His percentage of non overlapping data for the follow-up study data alone was 44%.

The overall percentage of non overlapping data across both the original study and the follow up study was 22%. Logan's first baseline and intervention data showed a slight linear trend over time in that he progressed from turning the bottle over to attempting to stick his hand in the bottle. His second baseline and intervention show a more significant linear trend indicative of trial and error learning. Overall, his data showed a considerable linear trend over the ten trials, which indicates he could have learned how to do the task through trial and error alone and not by watching the video model.

CHAPTER 5

DISCUSSION

Summary

This study evaluated the effectiveness of point of view video modeling as compared to video self-modeling, and it appears that point of view video modeling was more effective in teaching the object retrieval task in four preschool-age children with autism. This result refutes the hypothesis that video self-modeling would be more effective because of its ability to also improve self-efficacy. Children in the point of view video modeling condition watched the video model either once or twice to achieve the mastery criterion. The point of view video modeling condition had percentage of non overlapping data scores that were between 80% (excluding Darin's post-mastery data points) and 100% indicating that the intervention was effective in teaching the object retrieval task. The two children in the video self-modeling condition took considerably longer to learn the task when compared to the two children in the point of view video modeling condition. Despite being the oldest and most cognitively advanced child in the study, Oliver still had to watch his video self-model three times to correctly complete the task and Logan had to watch ten times. The percentage of non overlapping data scores for the video self-modeling condition were between 22% (across both of Logan's sessions) and 57% indicating that video self-modeling fell within the questionable to ineffective range in teaching the object retrieval task. While the study is limited in many ways, it does provide support for the effectiveness of point of view video modeling in young children with autism spectrum disorder.

Possible Explanations

One possible explanation for why point of view video modeling was more effective is that it showed a clearer model. Because the point of view video model was filmed over the shoulder of the researcher modeling the task, the child viewing the video had a clear uninterrupted view of the task from his perspective. Because the children in the self-modeling condition could not actually complete the task at baseline, their videos were much less smooth when compared to the point of view video models which were filmed in one continuous session without any editing. The video self-models had two major edit points before and after the video clip of the researcher modeling the task. Though every effort was made to have the videos be as seamless as possible, there was still a considerable amount of jumpiness in the videos around these edits that may have distracted the children viewing the video.

A second explanation could be that the children in the self-modeling condition were not fooled into thinking that it was them modeling the task and were confused or bewildered by a video that essentially showed them, then a close up of someone else's arms and hands, then them again. Their confusion or surprise could have distracted them from the model itself, and resulted in them having to be shown the video multiple times for them to actually notice the model.

A third explanation could be that the children in the self-modeling condition could not self-recognize. While this did not appear to be the case for one participant, the other participant in the self-modeling condition did not appear to recognize himself in the camera's view finder and showed no change in behavior. While observing a child's reaction to seeing himself on a video camera in real time is not necessarily a reliable test of self-recognition, it is possible that he did not recognize himself in the video and thus any unique effects of self-modeling over other-modeling would be negated. The participant's mental age of 19 months also provides support the absence of self-recognition in that meta-representation of self does not typically develop until approximately the age of 30 months (Lewis & Ramsey, 2007).

Individual differences associated with the participants in the study also may have made an important contribution to the differences in effectiveness. Three participants exhibited stimming behavior with the materials in varying degrees. However one participant in the video self-modeling condition exhibited significantly more of this behavior when compared to the other participants. This may have interfered with his motivation to get the ball as he received more enjoyment spinning the ball inside the bottle than getting the ball out of the bottle. Another individual difference that could have played a role in the difference in efficacy could be the ability of participants to adequately pay attention to the video model as participants varied in their ability to concentrate and attend to the video during the intervention phase. Even though the videos were less than 30 seconds each and repeated the model twice, if an individual was unable to attend to the video, he would be unable to imitate the model because he would not have seen it. Other individual differences including the mood of the participant, motivation to master the task, and unknown prior experience may have also contributed.

Limitations and Directions for Future Research

The study is limited by many characteristics. First was the methodological flaw in which one participant's video did not at first contain the same verbal instructions that other participants received. While it is unclear whether including verbal comments would impact the effectiveness of the videos, more research needs to be done to explore the impact of verbal comments in a video model. The comments used primarily just labeled the behavior to be modeled, but may have also had reinforcing characteristics as well.   One comment was vaguely directive ("Let's get the ball!"), but provided no direct instructions on how to retrieve the ball from the bottle. Additional research is needed to determine whether including spoken directions in the video will improve effectiveness. Additionally, as one of the participants had characteristics consistent with hyperlexia, written instructions may also effect whether a video modeling intervention is successful or not.

Another limitation of the study is that the participants in each condition may have not been appropriately matched. One participant in the video self-modeling condition was both older and significantly more cognitively advanced compared to the other participants. This makes him potentially not comparable to the other children in the study. However, it is interesting to note that although he had the highest ability, he still mastered the task at a slower rate than the two children in the point of view video modeling condition suggesting that his advanced age and cognitive ability did not give him an advantage of learning the model. More research need to be conducted to determine the effectiveness of video modeling interventions with individuals with autism of different cognitive abilities to determine the effect of intelligence on the ability to imitate a video model. To better determine differences in effectiveness, future research should also try to match participants on as many variables as possible to reduce the effect of potential confounding variables such as age and cognitive ability.

Another limitation was that all but one of the participants was under the age of four, and video modeling interventions have had mixed results with children under the age of four (Buggey & Ogle, 2012; Mason, et al., 2012). Future research comparing video modeling methods should try to focus on children older than four to avoid the potential lower developmental limits of the intervention itself as it is unclear at what age video modeling becomes ineffective at this time. Related, future research should be conducted to determine at what developmental level video modeling becomes ineffective.

The current study is also limited in scope and generalizability because a single motor-dependent task was used to assess differences between the two methods of video modeling. Therefore, it is unclear whether the differences in effectiveness are due to the video model itself or are task specific. Future research should repeat the study using different tasks.

Furthermore, the effectiveness of different video modeling interventions may be specific to the task itself. In an intervention such as the one used in the present study point of view video modeling appears to be more effective. However, other types of video modeling may be more effective with different types of interventions. For example, it may be more effective to use video self-modeling in interventions addressing more complex behaviors such as social skills. Therefore, even if a particular video modeling method is found to be slightly more effective than another, it does not negate the other methods because they can still be successfully used to change or teach behavior.

Future research should also be conducted on what factors may increase attention and effectiveness to video models in children with autism. It is unclear whether including verbal comments, sound effects such as cheering, or music in the videos has any effect on the effectiveness of video modeling interventions. Likewise, subtleties in video editing such as transitions between scenes, including title pages, and other editing techniques as well as the overall quality and smoothness of the video model itself has yet to be explored.

The ease of filming and editing may also affect the overall use of different types of video modeling over and above differences in effectiveness. The point of view video model was considerably easier to film and required no editing for the current study. This contrasted considerably with video self-modeling videos which were difficult to film because of the need to capture specific behaviors and required a considerable amount of editing. As the goal of research on video modeling should be to help educators and professionals choose when it is appropriate to use a specific type of video modeling, the difficulty in making the videos may be a potential limitation. Therefore, basic training in video editing and video modeling techniques is needed for educators so that video modeling interventions can be used to help more children with autism.

Conclusion

To date, this is the first study to compare point of view video modeling and video self-modeling directly. The present study does provide support for the potential of point of view video modeling to be more effective than video self-modeling in young children with autism spectrum disorder. However, more research needs to be done to determine the effectiveness of each method separately and in direct comparison with one another before a definitive conclusion can be drawn.

REFERENCES

Allen, K., Wallace, D., & Renes, D. (2010). Use of video modeling to teach vocational skills to adolescents and young adults with autism spectrum disorders. *Education and Treatment of Children, 33*:3, 339-349.

American Psychiatric Association. (2000). Diagnostic and statistical manual of mental disorders (4th ed., text rev.). Washington, DC: p. 69 - 84.

Ayres, K. & Langone, J. (2005). Intervention and instruction with video for students with autism: A review of the literature. *Education & Training in Developmental Disabilities, 40,* 183-196.

Bandura, A. (1977). *Social learning theory.* Englewood Cliffs, NJ: Prentice-Hall.

Bandura, A. (1994). Self-efficacy. In V.S. Ramachaudran (ed.). *Encyclopedia of Human Behavior,* 4, 71-81. New York: Academic Press.

Bellini, S., & Akullian, J. (2007). A meta-analysis of video modeling and video self-modeling interventions for children and adolescents with autism spectrum disorders. *Exceptional Children, 73:*3, 264-287.

Bellini, S., Akullian, J., & Hopf, A. (2007). Increasing social engagement in young children with autism spectrum disorders using video self-modeling. *School Psychology Review, 36*:1, 80-90.

Biederman, G. & Freedman, B. (2007). Modeling skills, signs and lettering for children with down syndrome, autism and other severe developmental delays by video instruction in classroom setting. *Journal of Early and Intensive Behavioral Intervention, 4:* 4, 736 - 743.

Buggey, T. (2007). A picture is worth… Video self-modeling applications at school and home. *Journal of Positive Behavior Interventions, 9*: 3, 151-158.

Buggey, T. (2012, January 16). Personal consultation.

Buggey, T. (2005). Video self-modeling applications with students with autism spectrum disorders in a small private school setting. *Focus on Autism and Other Development Disabilities, 25: 1, 52-63.*

Buggey, T. & Ogle, L. (2012). Video self-modeling. *Psychology in the Schools, 49:*1, 52-70. Doi: 10.1002/pits

Buggey, T., Toombs, K., Gardener, P., & Cervetti, M. (1999). Training responding behaviors in students with autism using videotaped self-modeling. *Journal of Positive Behavior Intervention, 1*: 4, 2005-214.

Burns, M. & Ysseldyke, J. (2009). Reported prevalence of evidence-based instructional practices in special education. *Journal of Special Education, 43:*1, 3-11. Doi: 10.1177/0022466908315563

Centers for Disease Control and Prevention, Autism and Developmental Disabilities Monitoring Network. (2012). Prevalence of autism spectrum disorders. *Morbidity and Mortality Weekly Report: Surveillance Summaries:* 61: 3. Retrieved from http://www.cdc.gov/mmwr/pdf/ss/ss6103.pdf

Charlop-Christy, M., Le, L., & Freeman, K. (2000). A comparison of video modeling with in vivo modeling for teaching children with autism. *Journal of Autism and Developmental Disorders, 30:*6, 537-552.

Crandell, S., & Johnson, C. (2009). The impact of video instruction: A case study of a student with Aspergers syndrome. *Teaching Exceptional Children Plus, 5*: 6, 1-14.

Delano, M. (2007). Video modeling interventions for individuals with autism. *Remedial and Special Education, 28,* 33-42.

Dissanayake, C., Shembrey, J., & Suddendorf, T. (2010). Delayed video self-recognition in children with high functioning autism and Asperger's disorder. *Autism, 14*:5, 495-508. Doi: 10.1177/1362361310366569

Downs, R. & Downs, A. (2010). Practices in early intervention for children with autism: A comparison with the National Research Council recommended practices. *Education and Training in Autism and Developmental Disabilities, 45:*1, 150-159.

Dowrick, P. (1999). A review of self-modeling and related interventions. *Applied & Preventative Psychology, 8,* 23-39.

Esseily, R., Nadel, J., Fagard, J. (2010). Object retrieval through observational learning in 8- to 18-month-old infants. *Infant Behavior and Development, 33,* 695-699.

Geiger, K., LeBianc, L., Dillon, C., & Bates, S. (2010). An evaluation of preference for video and in vivo modeling. *Journal of Applied Behavior Analysis, 43:* 2, 279-283.

Gena, A., Couloura, S., & Kymissis, E. (2005). Modifying the affective behavior of preschoolers with autism using in-vivo or video modeling and reinforcement contingencies. *Journal of Autism and Developmental Disorders, 35:* 5, 545-556.

Grandin, T. (1996). *Thinking in pictures: My life with autism.* New York, NY: Vintage Books.

Hine, J., & Wolery, M. (2006). Using point of view video modeling to teach play to preschoolers with autism. *Topics in Early Childhood Special Education, 26:*2, 83-93.

Hume, K., Bellini, S., & Pratt, C. (2005). The usage and perceived outcomes of early intervention and early childhood programs for young children with autism spectrum disorder. *Topics in Early Childhood Special Education, 25:*4, 195-207.

Kennedy, C. (2005). *Single-Case Designs for Educational Research.* Boston, MA: Pearson Allen and Bacon.

Lewis, M. & Ramsay, D. (2004). Development of self-recognition, personal pronoun use, and pretend play during the 2nd year. *Child Development, 75:* 6, 1821-1831.

Leyfer, et al. (2006). Comorbid psychiatric disorders in children with autism: Interview development and rates of disorders. *Journal of Autism and Developmental Disorders, 36,* 849-861. DOI: 10.1007/s10803-006-0123-0

Lind, S. & Bowler, D. (2009). Delayed self-recognition in children with autism spectrum disorder. *Journal of Autism and Developmental Disorders, 39,* 643-650. Doi: 10.1007/s10803-008-0670-7

Lord, C. & Bishop, S. (2010). Autism spectrum disorders: Diagnosis, prevalence, and services for children and families. *Social Policy Report, 24:*2, 1-21.

Marcus, A. & Wilder, D. (2009). A comparison of peer video modeling and self video modeling to teach textual responses in children with autism. *Journal of Applied Behavior Analysis, 42:* 2, 335-341.

Mason, R., Ganz, J., Parker, R., Berke, M., & Camargo, S. (2012). Moderating factors of video-modeling with other as model: A meta-analysis of single-case studies. *Research in Developmental Disabilities, 33*: 4*,* 1076-1086.

Mechling, L. (2005). The effect of instructor-created video programs to teach students with disabilities: A literature review. *Journal of Special Education Technology, 20, 25-36.*

McCoy, K. & Hermansen, E. (2007). Video modeling for individuals with autism: A review of model types and effects. *Education and Treatment of Children, 30,* 183-213*.*

Rayner, C., Denholm, C., & Sigafoos, J. (2009). Video-based intervention for individuals with autism: Key questions that remain unanswered. *Research in Autism Spectrum Disorders, 3,* 291-303.

Rochat, P. & Striano, T. (2002). Who's in the mirror? Self-other discrimination in specular images by four and nine-month old infants. *Child Development, 73:* 1, 35-46.

Rogers, S. & Vismara, L. (2008). Evidence-based comprehensive treatments for early autism. *Journal of Clinical Child and Adolescent Psychology, 37:*1, 8-38. Doi: 10.1080/15374410701817808.

Seida, J., Ospira, M., Karkhaneh, M., Hartling,L., Smith, V., & Clark, B. (2008). Systematic reviews of psychosocial interventions for autism: An umbrella review. *Developmental Medicine and Child Neurology, 51,* 95-104.

Sherer, M., Pierce, K., Paredes, S., Kisacky, K., Ingersoll, B., & Schreibman, L. (2001). Enhancing conversation skills in children with autism via video technology: Which is better, “self” or “other” as a model?. *Behavior Modification, 25,* 140-158.

Shipley-Benamou, R., Lutzker, J., & Taubman, M. (2002). Teaching daily living skills to children with autism through instructional video modeling. *Journal of Positive Behavior Interventions, 4:*3, 165-176.

Smith, I. & Bryson, S. (1994). Imitation and action in autism: A critical review. *Psychological Bulletin, 116:* 2, 259-273.

Stone, W., Ousley, O., & Littleford, C. (1997). Motor imitation in young children with autism: What’s the object?. *Journal of Abnormal Child Psychology, 25:* 6, 475-485. Doi: 10.1023/A:1022685731726

Tetreault, A. & Lerman, D. (2010). Teaching social skills to children with autism using point of view video modeling. *Education and Treatment of Children, 33:* 3, 395-419.

Vygotsky, L. (1978). *Mind and Society: The Development of Higher Mental Processes.* Cambridge, MA: Harvard University Press.

Wolery, M., Busick, M., Reichow, B., & Barton, E. (2008). Comparison of overlap methods for quantitatively synthesizing single-subject data. *Journal of Special Education, 44:* 1, 18-28. Doi: 10.1177/0022466908328009

Wong, H. & Smith, R. (2006). Patterns of complementary and alternative medical therapy use in children diagnosed with autism spectrum disorders. *Journal of Autism and Developmental Disorders, 36,* 901-909. Doi: 10.1007/s10803-006-0131-0

Yingling, B. & Neiswort, J. (2003). Effect of video self-modeling on spontaneous requesting in children with autism. *Journal of Positive Behavioral Interventions, 5,* 300-305.

VITA

Lindsey Ogle was born in Winchester, TN to the parents of Chris and Melissa Ogle. She is the oldest of three children, a sister named Lauren and brother named Matthew. Her brother Matthew is autistic and mentally retarded, and is the inspiration for studying autism spectrum disorders. She attended Lincoln County High School in Fayetteville, TN where she graduated with honors in 2006. She then went on to get her bachelor's degree in psychology at the University of Tennessee at Chattanooga where she graduated Summa Cum Laude in 2010. She then continued at the University of Tennessee at Chattanooga to get her master's in psychology research in 2012. Lindsey is continuing her education by pursing a Ph.D in special education at Indiana University where she plans to research the application of video modeling in improving independent living skills and vocational skills with transition-age youth with autism spectrum disorder.