1-19-2015

# The Use of a Video Self-Modeling Intervention to Decrease Disruptive Behaviors in Students with Intellectual Disability

David M. Sax
*University of Connecticut - Storrs*, david.sax@uconn.edu

The Use of a Video Self-Modeling Intervention to Decrease Disruptive Behaviors in Students with Intellectual Disability

David Matthew Sax, Ph.D.

University of Connecticut, 2015

The study utilized a multiple baseline design across participants to examine the effects of a video self-modeling intervention (VSM) on three middle school students showing high rates of disruptive classroom behaviors. All three students were receiving special education services through the classification of either intellectual disability or autism, and all had documented intellectual and adaptive functioning that met the criteria for an intellectual disability. The purpose of the study was to see whether VSM could reduce disruptive behaviors and if changes could be maintained after the end of treatment. Intervention procedure consisted of students watching videos exclusively showing themselves displaying appropriate classroom behaviors. Changes to these behaviors were compared from baseline to treatment and then from baseline to the one-month follow-up. Changes were seen in two of three students, which were maintained at follow-up. The intervention was effective in reducing disruptive behaviors that appeared to be socially mediated. It is difficult to discern the effect of treatment on the third student due to study limitations, although it appeared to have little or no effect in reducing stereotyped or self-stimulatory behaviors. Reasons for this are likely attributable to the study's limitations as well as unique characteristics of the student's behavior.

# The Use of a Video Self-Modeling Intervention to Decrease Disruptive Behaviors in Students with Intellectual Disability

David Matthew Sax

B.A., University of Missouri, 2008

M.A., University of Connecticut, 2011

A Dissertation

Submitted in Partial Fulfillment of the

Requirements for the Degree of

Doctor of Philosophy

at the

University of Connecticut

2015

APPROVAL PAGE

Doctor of Philosophy Dissertation

The Use of a Video Self-Modeling Intervention to Decrease Disruptive Behaviors in Students with Intellectual Disability

Presented by

David Matthew Sax, B.A., M.A.

Major Advisor

__________________________________________________________

Thomas J. Kehle

Associate Advisor

__________________________________________________________

Melissa A. Bray

Associate Advisor

__________________________________________________________

Shamim S. Patwa

University of Connecticut
2015

## ACKNOWLEDGEMENTS

I want to acknowledge some of the people who helped me along the way and, without whom, I would not have been able to get to this point. First and foremost, I would like to thank Joanne Roberge, administrative assistant in the Department of Educational Psychology, for all of her organizational help, her guidance in helping me navigate all the forms and paperwork to proceed through the school psychology program, for sending me to a knowledgeable counterpart when she herself could not help, and in all other ways coming to my aid when I needed assistance with something. Without her I would likely have been removed from the graduate student rolls by clerical error.

To my advisors Thomas Kehle, Melissa Bray, and Shamim Patwa, I would like to thank them for all their helpful comments, questions, and edits regarding my dissertation study. Since first stepping onto campus, Tom and Melissa in particular have always been incredibly kind and encouraging to me, as well as inexplicably generous with their time.

Lastly, I would like to thank my readers, Orville Karan and Mary Yakimowski for their help as well. Orv shared some much-appreciated words of wisdom and provided pointed yet fair criticism at my defense. I want to thank Mary for her very keen eyes in reading over drafts of my dissertation. Having worked for her as a graduate assistant for a few years, I have learned to expect nothing less.

TABLE OF CONTENTS

# CHAPTER 1: STATEMENT OF THE PROBLEM

Intellectual disability (ID) is a condition marked by impairments in both intellectual and adaptive functioning, exhibited in an individual before the age of 18 (Schalock et al., 2010). Students with ID can pose a number of challenges to educators due to their academic and, for some, behavioral needs (Condillac, 2007). Students with ID and behavioral problems have been found to require some of the most intensive supports of any students in schools (McLeod & McKinnon, 2010). For these individuals, problem behaviors exhibited can range from passive off-task behaviors to non-compliance, stereotypy, inappropriate vocalizations, and, in severe cases, aggression (Ferro, Foster-Johnson, & Dunlap, 1996). In the classroom, these behaviors are disruptive and can result in a loss of instruction for the individual and class (Carr, Taylor, & Robinson, 1991; Scott, Alter, & Hirn, 2011). For educators, student behavior problems can be a significant source of stress (McCarthy, Lambert, & Reiser, 2014) and have been linked to teacher turnover (Ingersoll, 2001) and attrition from the profession (Gonzalez, Brown & Slate, 2008). Without intervention, student behavioral problems tend to persist (Horner, Carr, Strain, Todd, Reed, 2002).

Video self-modeling (VSM) is an intervention that has promise in changing such problem behaviors. Dowrick (1999) defined VSM as an "intervention procedure using the observation of images of oneself engaged in adaptive behavior" (p. 23). Videos are edited to exclusively show exemplary instances of individuals performing the targeted behaviors (Dowrick, 1999). Repeated viewings of these videos have been shown in some cases to induce changes in behavior that generalized to different settings and have been maintained after viewings have ceased (Buggey & Ogle, 2012; Delano, 2007). VSM has been applied to a wide range of problems such as increasing social interactions in children with autism (Bellini, Akullian, & Hopf, 2007; Shukla-

Mehta, Miller, & Callahan, 2010; Victor, Little, Akin-Little, 2011), decreasing stuttering (Bray & Kehle, 1996; Bray & Kehle, 2001), increasing speech in students with selective mutism (Kehle, Madaus, Baratta, & Bray, 1998), increasing reading fluency (Decker & Buggey, 2014), reducing fear of public speaking (Rickards-Schlichting, Kehle, & Bray, 2004), increasing compliance for children in a psychiatric hospital (Axelrod, Bellini, & Markoff, 2014) and increasing on-task behavior (Clare, Jenson, Kehle & Bray, 2000; Coyle & Cole, 2004), among others.

Specifically within the ID population, VSM has been used to reduce inappropriate sexual behaviors (Dowrick & Ward, 1997), to teach job skills (Goh & Bambara, 2013), first-aid (Ozkan, 2013), and English prepositions (Mechling & Hunnicutt, 2011). Other studies have investigated the use of VSM to reduce disruptive classroom behaviors within non-ID populations, for example, with students receiving special education services under the category of emotional disturbance (Kehle, Clark, Jenson, & Wampold, 1986; Possell, Kehle, Mcloughlin, & Bray, 1999). Very few studies, however, have used this intervention to reduce disruptive classroom behaviors in students with ID. One study by Brown and Middleton (1998) used VSM to successfully reduce a type of disruptive, stereotyped behavior in a six-year-old child with ID. In another study, Bilias-Lolis, Chafouleas, Kehle, and Bray (2012), used VSM to effectively reduce disruptive behaviors in three high school students with ID. These two studies showed promise in reducing disruptive behaviors in students with ID. However, given the small number participants involved, and the range of ages and behavioral problems exhibited, further investigation is needed to see if these findings generalize (Bilias-Lolis et al., 2012).

# CHAPTER 2: REVIEW OF THE LITERATURE

## Definition of Intellectual Disability

The most recent manual on intellectual disability published by the American Association of Intellectual and Developmental Disabilities (AAIDD, formerly the American Association on Mental Retardation) provides the following definition: “Intellectual disability is characterized by significant limitations both in intellectual functioning and in adaptive behavior as expressed in conceptual, social and practical adaptive skills. This disability originates before age 18.” (Schalock et al., 2010, p. 1). The three main criteria of the definition, limitations in intellectual and adaptive functioning, and age of onset before age 18, are shared by the Connecticut State *Guidelines for Identifying Children with Intellectual Disability* (2007) used to identify students with ID for special education in Connecticut public schools.

## Identifying Students with Intellectual Disability for Special Education in Connecticut

For a student to qualify for special education services under the distinction of intellectual disability, a comprehensive evaluation is conducted, with primary components being the assessment of intellectual and adaptive functioning. While there is no consensus on how to define intelligence (Legg & Hutter, 2007), the assessment of intellectual functioning via the use of standardized intelligence (or IQ) tests has a long history in psychology (Benjamin, 2009). Commonly used assessments include the Wechsler Intelligence Scale for Children or Woodcock-Johnson Tests of Cognitive Abilities, although many others exist. Intellectual assessments generally yield standardized scores with a mean of 100 and a standard deviation of 15 (Willis, Dumont, & Kaufman, 2013). A limitation in intellectual functioning is commonly defined as a score two standard deviations below the mean on an IQ test (Connecticut State Department of

Education, 2007). There is no distinct cut-off score that delineates intellectually disabled from non-intellectually disabled, which emphasizes the importance of clinical judgment and use of standard error of measurement when eligibility is considered (Schalock et al., 2010). Accordingly, IQ scores of 75 and below are considered to meet this standard (Wasserman, 2013). In addition, the limitation in intellectual functioning must have been present between birth and 18 years of age and must have an impact on an individual’s educational performance, thus requiring special education services (Connecticut State Department of Education, 2007).

In contrast to intellectual functioning, adaptive functioning is not assessed via standardized tests, but through observations and rating scales completed by teachers and caregivers (Connecticut State Department of Education, 2007). Adaptive behavior is conceptualized as the learned, practical behaviors needed for everyday living (Schalock et al., 2010). Commonly used assessments provide overall as well as composite scores across three domains: conceptual, social, and practical (e.g., Adaptive Behavior Assessment System, Vineland Adaptive Behavior Scales). A three-factor model of adaptive behavior was the result of factor analysis and its technical properties generally been found to be reliable (Arias, Verdugo, Navas, & Gomez 2013). Adaptive behavior assessments ask a caregiver or teacher to rate their observations of an individual’s typical performance of specific behaviors or skills without assistance. These commonly include basic reading and writing, counting, telling time, asking for information, getting along with others, following social rules, job skills, and performing activities of daily living such as eating, attending to personal hygiene and safety, and using transportation (Schalock et al., 2010). The Connecticut guidelines state that a limitation in adaptive functioning is evidenced by a caregiver rating of at least 1.5 standard deviations below the mean in at least one domain (Connecticut State Department of Education, 2007).

## Prevalence of Intellectual Disability

Determining the prevalence of ID within the U.S. population is a difficult task and varies based on definition, methodology, and sample studied. Prevalence rates are generally between 1-3% (Reschly, Myers, & Hartel, 2002), although lower rates have been found. The National Health Interview Survey, a survey conducted by the Centers for Disease Control (CDC), was used annually to ask families whether one of their children has been diagnosed with various developmental disabilities (e.g., ADHD, autism, ID, blindness). Using the survey data from 1997-2008, Boyle et al. (2011) estimated that 0.71% of children in the U.S. has been identified as ID, a figure which represents a 50% decrease in the prevalence of ID compared to a prevalence study by Bhasin, Brocksen, Avchen, and Braun (2006) which examined data from 1996 and 2000. Comparatively, 6.69% of children were estimated to be identified with ADHD, 7.04% with a learning disability, and 0.47% with autism during the same period. According to Boyle et al. (2011), reasons for the decrease in ID could be attributed to parents not knowing their child's disability classification for special education, and others indicating "other developmental delay" due to some states expanding the age-limit of the classification "developmental delay" in special education.

Similar issues exist in determining the prevalence of students with ID in special education. According to the 35th Annual Report to Congress on the Implementation of IDEA (2013), 7.4% of students age 6-21 were being served under the category of intellectual disability (p. 39). In comparison, over 40% of students were identified with a specific learning disability, 7% with autism, and 6.4% with emotional disturbance (U.S. Department of Education, 2013, p. 39). Interestingly, since the 1970s, there has been a decrease of about 40% in students labeled with intellectual disability, and over 200% increase in students with learning disabilities in

special education (MacMillan, Gresham, Siperstein, & Bocian, 1996; Reschly, Myers, & Hartel, 2002). Some of the reasons for this can be found in the challenge of defining and identifying learning disabilities (Scruggs & Mastropieri, 2002). However, MacMillan et al. (1996) found that, for students who could be described as mildly intellectually disabled, school teams were hesitant to classify them as intellectually disabled. As learning disability can be perceived as less stigmatizing to the individual than intellectual disability, or, as it was known until recently, mental retardation, teams may be more comfortable identifying students as having a learning disability (Connecticut State Department of Education, 2007). Thus, examining classification data may provide a rough estimate of the prevalence of students with ID in schools.

## Intellectual Disability and Behavior Problems

For some individuals with ID, limitations in intellectual and adaptive functioning are accompanied by behavior problems (Kurtz & Lind, 2013). Much of the literature on the prevalence of behavior problems in individuals with ID comes from populations living in institutions, community placements or those attending special schools (Emerson et al., 2001). In these studies, what constitutes a behavior problem varies, but is often described as behaviors that interfere with or limit access to the general environment (Emerson, 2006) or which pose serious management problems (Emerson et al., 2001; Lundqvist, 2013). Behaviors frequently measured in prevalence studies are generally consistent and include verbally and physically aggressive acts, stereotypy, self-injury, and non-compliance (Crocker et al., 2006; Matson & Rivet, 2008; Oliver, Petty, Ruddick, & Bacarese-Hamilton, 2012). Prevalence rates vary depending on definitions and sampling procedures used (Gardner & Moffatt, 1990), but population studies find that problem behaviors are seen in approximately 10-15% of individuals with ID (Didden et al., 2012; Emerson et al., 2001; Lundqvist, 2013).

Furthermore, problem behaviors have been found to be more severe with the presence of other factors such as severe ID and co-morbid autism diagnosis. In a meta-analysis of risk-markers for problem behaviors in individuals with ID, McClintock, Hall, and Oliver (2003) found that those with the presence of severe ID (i.e., lower IQ scores), a diagnosis of autism, and deficits in verbal skills were more likely to exhibit self-injurious, aggressive, stereotyped, or destructive behaviors. Other studies have reported similar findings. McCarthy et al. (2010) found that behavior problems were four times more likely in individuals with co-morbid ID and autism than in individuals with ID alone. Autism and ID are known to co-occur at high rates, with Fombonne (1999) estimating that about 80% of individuals with autism also meet criteria for ID. Moreover, for these individuals with co-morbid conditions, they were more likely to have severe forms of ID. Cooper et al. (2009) found the prevalence of self-injurious behaviors higher in those with more severe forms of ID, autism, and verbal deficits. However, given the relationship between intellectual functioning (assessments of which, frequently measure an individual's verbal skills to some degree; Cassidy, Roche, & O'Hora, 2010), autism, and verbal deficits, these may not be independent factors (Cooper et al., 2009).

For those with severe ID and/or autism who may lack appropriate verbal skills, problem behaviors may serve an instrumental role (Hutchins & Prelock, 2014). Medeiros, Rojahn, Moore, and van Ingen (2014), for example, found that self-injurious behaviors (e.g., head banging, self-scratching, self-biting), more common in those with severe disabilities, often functioned as an escape from social demands and as an access to tangibles. Studies on the effects of functional communication training further support this, showing that problem behaviors tend to decrease as verbal skills increase (Carr & Durand, 1985; Chezan, Drasgow, Martin, 2014; Hutchins & Prelock, 2014; Reeve & Carr, 2000). Lacking the appropriate means to have their needs met,

engaging in problem behaviors may serve a useful function for those with severe disabilities, which may partially explain the higher rates.

## Behavioral Problems in Schools

While a sizable literature base exists regarding individuals with ID and behavior problems, surprisingly little is known regarding the frequency to which these behaviors occur in classroom settings or how they compare to students without disabilities. Studies utilizing direct observation of classroom behaviors exist but many do not provide meaningful data for the purposes of the present investigation, either because problem behaviors were not the focus (Forness, Guthrie & MacMillan, 1981; Forness, Guthrie, & MacMillan, 1982; Forness & Kavale, 1985; Hollowood, Salisbury, Rainforth & Palombaro, 1994) or because students with behavior problems were specifically excluded (Logan & Keefe, 1997; Logan & Malone 1998a; Logan & Malone, 1998b).

Two studies in particular measured similar behaviors and included students with behavior problems and thus bear on the present investigation. McDonnel, Thorson, McQuivey, and Kiefer-O'Donnell (1997) observed eighteen elementary students, six students with low-incidence disabilities (at least five of whom would likely qualify as ID based on student data), six students without disabilities in the same classroom, and six students without disabilities in a different classroom. "Academic engaged time" and "competing behaviors" were measured (p. 21-22). Academic responses included behaviors appropriate to the classroom task such as reading, talking about the subject matter, raising hand, answering a question, and looking at teacher or peer. Competing behaviors consisted of aggression towards others, disrupting the academic task, talking without permission, passive off-task behavior, non-compliance, self-stimulatory behavior, and self-harm; all of which would be counted as disruptive behaviors in the present

study. Students were observed between 15-22 times over five months; each observation was at least 20 minutes long and behaviors were coded using a 20-second momentary time-sampling procedure.

Results showed that the students with disabilities engaged in similar but lower rates of engaged or on-task behavior compared to their non-disabled peers (students with disabilities mean of 78%, students without disabilities - same class mean of 84%, students without disabilities - different class mean of 87%). Similarly, rates of competing or disruptive behaviors were higher for those with disabilities with a mean of 21%, compared to 15% for students without disabilities in the same class and 12% for students without disabilities in a different class; a difference that was found to be statistically significant, although whether this represented a meaningful difference was questioned**.** Individual student data were not provided, but two of the six students with disabilities were said to have been responsible for over 50% of disruptive behaviors for the entire group (McDonnel et al., 1997).

Ferro, Foster-Johnson, and Dunlap (1996) observed students with ID in self-contained classrooms to examine the relationship between academic tasks and disruptive behaviors. Although they were not in classrooms with non-disabled peers, participants included both students with and without behavior problems. The number of students was much larger than the study by McDonnel et al. (1997), with 288 participants in 64 different classrooms (3 pre-elementary, 16 elementary, 45 secondary). No comparison was made to non-disabled peers. All classrooms were observed for at least one, 2-hour session, using 10-second partial interval sampling. The study measured appropriate behaviors made up of task-completion, appropriate vocalizations and following directions. Problem behaviors included inappropriate vocalizations, off-task, stereotypy, inappropriate use of materials, non-compliance, aggression, and out-of-seat

without permission; all of which would be classified as disruptive behaviors in the present study. Across all classrooms, the average level of disruptive behaviors was 15% of intervals observed (M=14.9, SD 14.6, range of 0-63%). No additional data were provided regarding the contributions of individual student behavior (Ferro et al., 1996).

Overall, the studies by McDonnel et al. (1997) and Ferro et al. (1996) provide some information about average rates of disruptive behaviors during classroom instruction exhibited by individuals with ID. However, for the much larger study by Ferro et al. (1996), a question left unanswered is the extent to which behavior problems reported at the group level were attributable to a small number of individuals, as was the case in McDonnel et al. (1997). Knowing this information would be interesting as population studies of individuals with ID (Didden et al., 2012; Emerson et al., 2001; Lundqvist, 2013) as well as school populations in general (Algozzine, Christian, Marr, McClanahan, & White, 2008) conclude that a relatively small number of individuals constitute a large proportion of overall behavior problems.

## Video-Based Modeling

VSM is one type of video-based modeling (VBM), a name for any intervention procedure that "induces simulation of observed skills or behaviors by exposing the target individual to a model correctly demonstrating the target skill or behaviors via a video-recording" (Mason et al., 2013, p. 120). Other types of VBM can include peers or adults as models. VSM represents a unique type of modeling since the one whose behavior serves as model and the one whose behavior is targeted for intervention, are the same person (Dowrick, 2012). Within the category of VSM, Dowrick (1999) provides a distinction between *feedforward* and *positive self-review* procedures. A feedforward procedure is utilized in situations when an individual does not currently have the skill within their behavioral repertoire, cannot perform it fluently, or has not

demonstrated it within a certain context (Collier-Meek, Fallon, Johnson, Sanetti, & del Campo, 2012). Verbal instructions, physical guidance, reinforcement or corrective feedback are provided to the individual so that one can perform the targeted behaviors, supports that are edited out of the finished video. The result is that the individual is then able to watch a video of themselves perform the behaviors successfully and without assistance. In contrast, positive self-review is used in situations where the individual has previously acquired the necessary skills or behaviors, but exhibits them infrequently (Bellini & McConnell, 2010). Using this procedure, individuals are recorded without receiving any instruction or guidance. During editing, all inappropriate or unsuccessful performances are removed so that the individual views only appropriate, exemplary instances of themselves performing a targeted behavior (Bray & Kehle, 2012; Dowrick, 1999).

In that the behaviors induced by the addition of the video are later occasioned by existing environmental conditions, presentation of a modeling video can be conceptualized as a type of response prompt (Cooper et al., 2007; MacDonald, Sacramone, Mansfield, Wiltz, & Ahearn, 2009). Modeling and other types of prompts serve as an efficient means to bring out behaviors that would otherwise require more time intensive strategies such as shaping through successive approximation or by waiting for them to occur so that they can then be reinforced (Lerman, Iwata, & Hanley, 2013). Indeed, one of the noted strengths of VSM is the rapidity at which it brings out targeted behaviors (Dowrick, 2012). Once these induced behaviors occur in a given setting, it is the consequences within this setting, for example, teacher praise, successful completion of a task, or social interaction with a peer, that will later maintain it. When modeling interventions are successful, eventually the individual's environment will come to occasion the target behaviors without the addition of a modeling video.

There is some question over what type of model is best to use for VBM (e.g., self, peer, adult) and evidence is currently mixed. Ozkan (2013) found that self and peer modeling were equally effective at teaching first aid skills to individuals with intellectual disability. Likewise, Schunk and Hanson (1989) found both types of models were effective in teaching math skills to regular education students achieving below grade-level in math. Decker and Buggey (2014), however, found that in comparing self and peer modeling for improving oral reading fluency in children with learning disabilities, the largest gains were seen in two students who viewed self-modeling videos, although both types were effective. Also, Marcus and Wilder (2009) found self-modeling superior to peer modeling in teaching children with autism to identify novel letters.

Meta-analyses by Bellini and Akulian (2007), Delano (2007), and Rayner, Denholm, and Sigafoos (2009) which compared self and peer modeling for individuals with autism, found that both were equally effective. Interestingly, a meta-analysis by Mason et al. (2013) found that while all types of VBM were effective, when disaggregated by model (e.g., self, peer, and adult), adult models showed the largest effect. However, the studies included in the meta-analysis that examined peers and adults as models were conducted primarily on individuals with autism and, to a lesser extent, intellectual disability. Fewer studies were included which investigated self as models and those that did were conducted on a wider range of individuals, such as those with learning disabilities and emotional disturbance, as well as autism and intellectual disability.

More evidence needs to be gathered to parse these issues out. All types of modeling appear to be effective at reaching behavioral goals. The effectiveness of any specific modeling intervention may well depend on many factors, such as the complexity of the specific behavior or task being modeled, the individual’s own history of performing the behavior or task, current

context and setting where the behavior is needed, and characteristics of the model, among others. Dowrick (2012) asserts that the success of modeling depends on the component behaviors being modeled and whether the one observing has these components within their behavioral repertoire. A potential benefit of self-modeling could be that, in this sense, there is no doubt as to whether the observer and model can perform the modeled behavior.

## VSM to Reduce Disruptive Classroom Behaviors

A small number of studies have used VSM to reduce disruptive classroom behaviors in students with emotional disturbance. Kehle et al. (1986) used a positive self-review procedure with four male students, age 10-13, who were the most disruptive and inattentive students in a self-contained classroom according to teacher reports. All four students showed reductions in disruptive behaviors compared to their baselines, which were maintained at a six-week follow-up. However, the study was conducted using an A-B-A design and disruptive behaviors did not return to baseline levels upon removal of the intervention, which limits the study's internal validity.

Possell et al. (1999) also used positive self-review with four students with emotional disturbance, although they were younger, at 5-8 years of age. The effect of the intervention was tested using a multiple baseline design across participants. Behavioral concerns for the students included arguing, non-compliance, and off-task behaviors, and occasionally more severe problems such as verbal and physical fighting and destruction of property. After receiving the VSM intervention, two of the four students showed sizable reductions in disruptive classroom behaviors, which were maintained at a six-week follow-up. The other two students, who were younger in age, showed modest reductions.

Few studies have investigated the use of VSM on individuals with ID (Goh & Bambara, 2013) and even fewer have applied it to reduce problem behaviors in this population. The studies that have, however, have shown promising results. A study by Dowrick and Ward (1997) used a feedforward procedure to reduce inappropriate sexual behaviors in an adult male with ID. In this case, a multiple baseline design across three different situations was employed to increase appropriate alternative behaviors. A video was created which showed three different situations in which the participant responded appropriately to a potentially compromising situation involving children (e.g., using a different route when taking out the garbage after seeing children between himself and the dumpster; turning the stereo up after children are heard playing in the hallway outside his apartment). No instances of the appropriate behaviors were displayed during baseline. However, after implementation of the VSM intervention, the participant showed appropriate behaviors in all but one observation, which were tested in a creative set of contrived situations set-up by the researchers and support staff. Furthermore, changes from the intervention were maintained at a 9-month follow-up (Dowrick & Ward, 1997). This study demonstrated that VSM could be beneficial to those with ID despite the deficits that have hindered the use of some other types of intervention (e.g., cognitive) within this population (Sturmey, 2004). The fact that VSM is not reliant upon verbal skills may be a serious advantage to using the intervention with those with ID (Dowrick & Ward, 1997).

Brown and Middleton (1998) appear to have been the first to use VSM to reduce a type of disruptive behavior in a student with ID in a classroom setting. The participant was a six year-old student who received a full-scale IQ score of 51 on the Wechsler Preschool and Primary Scale of Intelligence. He was described as appearing non-disabled except for a persistent hand flapping, a type of stereotyped behavior which occurred across all settings and activities. This

behavior posed a barrier to both learning tasks and social interactions with other students. The researchers implemented an overcorrection technique in comparison to VSM in an A-B-A-C-A-C reversal design. The overcorrection technique consisted of a verbal reprimand after the occurrence of hand flapping ("no flapping") followed by an exercise in which the student had to hold arm positions for 15 seconds at a time for a total of 45 seconds. After high levels of the disruptive behavior during initial baseline phase, both interventions were found to reduce it to almost zero. Self-modeling was thought to be superior to overcorrection, though, since the intervention did not use a punishment procedure. In addition, the VSM intervention was noted for its strength in maintenance, generalization to other settings, and minimal time needed for implementation (Brown & Middleton, 1998).

Bilias-Lolis et al. (2012) provided further evidence of the utility of VSM for reducing disruptive behaviors in students with ID. This study involved three participants ages 15 and 16 with deficits in both intellectual and adaptive functioning. Two participants obtained full-scale IQ scores on the Wechsler Intelligence Scale for Children-III of 68 and 47, respectively. A full-scale score was not provided for the third participant, composite scores provided ranged from 51-62 on the Kaufman Assessment Battery for Children. All were receiving special education services under the classification of multiple disabilities or for ID and all had demonstrated behavioral difficulties such as screaming, using lewd speech, off-task and attention-seeking behaviors that had precluded them from mainstream classrooms. This study employed a multiple baseline design across participants. After implementing the VSM intervention, all three participants showed a decreased level of disruptive behaviors. Variability in the data also decreased from the baseline phase to intervention. Most notably though, was the finding that at

the one-month follow-up, disruptive behaviors was actually lower than during the intervention phase.

The studies by Brown & Middleton (1998) and Bilias-Lolis et al. (2012) were notable in that they used VSM to reduce disruptive classroom behaviors of students with ID in a classroom setting. As Goh and Bambara (2013) pointed out, few studies have used VSM with individuals with ID, and among these, even fewer have used VSM to reduce problem behaviors. So while the investigations by Brown and Middleton (1998) and Bilias-Lolis et al. (2012) were promising in this regard, further investigation is needed to see if these findings generalize (Bilias-Lolis et al., 2012; Kratochwill, Stoiber, Gutkin, 2000).

The purpose of the present study was to determine whether VSM can be used to reduce disruptive behaviors in students with ID in a middle school setting. Any positive results will thus boost the external validity for VSM in reducing these behaviors for students with ID. Accordingly, the investigation had two research questions:

## Research Questions

1. Will VSM reduce disruptive behaviors in middle school students with ID?

   Hypothesis: It was hypothesized that VSM would reduce disruptive behaviors.

2. Will treatment effects be maintained at a one-month follow-up?

   Hypothesis: It was hypothesized that reductions in disruptive behaviors would be maintained at follow-up.

# CHAPTER 3: METHODS

## Participants and Setting

Three students from a public suburban middle school in Connecticut were recruited to participate in this study. According to the most recent data from the Strategic School Profile Report, the student population at this school was primarily “white”, and the percentage of students eligible for free and reduced-priced meals was less than 10% (Connecticut State Department of Education, n.d.).

All students were recruited from the school’s Life Skills program, which included classes for students with varying developmental disabilities that focused on the acquisition of functional or practical skills. Students, for example, learned how to make purchases, basic cooking skills, and completed jobs around the school. Classroom supports included one special education teacher and two paraprofessionals. Students in the program spent a portion of their day in the Life Skills classroom and a portion in mainstream classes.

Inclusion criteria for the study included the following: a) receiving special education services under the category of ID as noted on the student’s Individual Education Plan (IEP), or, if the student was receiving services under another category, documented standard scores of approximately 70 or below on tests of intellectual and adaptive functioning; b) nomination from the Life Skills teacher that student often displayed disruptive behaviors during class; c) presence of disruptive behaviors during at least 20% of intervals observed during a direct 20-minute observation to confirm teacher nomination.

Student 1 was a male, 14 year-old eighth grade student who received special education services under the category of ID. A review of school records indicated that on his most recent psycho-educational evaluation, his overall performance fell within the extremely low range on

the Wechsler Intelligence Scale for Children-Fourth Edition (2012 WISC-IV: FSIQ=58). Assessment of his adaptive functioning using the Adaptive Behavior Assessment System-II (ABAS-II), which examines the acquisition of behaviors needed for everyday life indicated standard score ratings in the extremely low to low range (≤ 69 – 79). Behaviors of concern for Student 1 included yelling, pounding on the desk, teasing and laughing at others, and non-compliance with teacher directions. A direct observation conducted prior to the start of the study showed the presence of disruptive behaviors during 23.3% of intervals observed.

Student 2 was also a male, 14-year-old eighth grade student receiving services under the category of ID. The most recent psycho-educational evaluation showed that his overall performance on cognitive testing was in the extremely low range (2014 WISC-IV: FSIQ=40). As for adaptive functioning, parents and teacher indicated consistent scores in the extremely low range (≤ 69) on the ABAS-II. Behavioral concerns were noted with arguing, speaking without permission, singing during class, interrupting others, non-compliance, moving around the room without permission, playing or manipulating non-work materials and off-task passive behaviors (e.g., looking idly around, resting on desk). A direct observation completed before the study showed Student 2 engaging in disruptive behaviors across 53.3% of intervals observed.

Student 3 was a male, 11-year old sixth grade student receiving services under the category of autism. Although he did not receive services under ID like the other two students, scores on assessments of intellectual and adaptive functioning made him eligible for the study. A review of records showed that his overall intellectual functioning was also within the extremely low range (2014 WISC-IV: FSIQ: 50). Likewise, adaptive functioning using the ABAS-II showed standard scores across raters ranging from the extremely low to low range (≤ 69 – 79). Student 3 required the most intensive supports compared to the other students in the study, and

behavioral concerns included frequent stereotyped vocalizations, yelling, non-compliance, work refusal, playing with non-work materials, objects, or his own hands, and off-task passive behaviors such as lying on the desk. A direct observation completed prior to study showed that Student 3 engaged in disruptive behaviors across 81.6% of intervals observed.

## Design

This study employed a multiple baseline design across participants. In this type of single-case design, baseline data are collected and, once stable, an intervention is introduced to individuals in a staggered fashion (Kazdin, 2011). All individuals receive the intervention and it was not withdrawn and re-introduced systematically after implementation as in some other types of single-case designs. A treatment effect is demonstrated when there is an observed change to the individual receiving the intervention only while all others remain at baseline. Standard convention is that at least three demonstrations of treatment effect are needed for experimental control; that is, to satisfactorily reduce threats to internal validity (Horner, Swaminathan, Sugai, & Smolkowski, 2012; Kratochwill et al., 2010).

## Dependent Measure

The dependent variable for this investigation was disruptive behaviors, which, as used by Musser, Bray, Kehle, and Jenson (2001), was defined as when a student a) fails to comply with a teacher or paraprofessional request after five seconds; b) speaks or makes noise without teacher or paraprofessional's permission; c) is out of their seat without permission; d) plays or manipulates non-work related materials or objects; e) is verbally aggressive such as using profanity, name-calling; f) is physically aggressive such as slapping, kicking, punching, or forcefully taking something from another student; and, g) is engaging in off-task passive

behavior such as orienting away from the teacher or paraprofessional during instruction or away from relevant work materials during class room activities.

**Direct Observations**

The primary method of data collection was accomplished via direct observation. During an observational session, disruptive behaviors were measured using a momentary time-sampling technique. Every 10 seconds, whether a student displayed disruptive behaviors at the end of the interval was checked and recorded. This time-sampling measure yields an estimate of the amount of time a student spent in a given activity. Momentary time-sampling was used as it is often more accurate than whole or partial interval techniques, which systematically over or underestimate instances of behavior (Merrell, 2008).

All observations took place in the Life Skills classroom during the afternoon mathematics period. This was in an effort to control for the effects that different classroom environments might have on the students' behavior. The goal was to have the teacher, subject, and types of activities remain constant to the extent possible. At the beginning of the period, the investigator sat at the back of the classroom but did not begin observations until mathematics instruction began. The time from start of the period to initial instruction was usually five to ten minutes. Routinely, observations started once the teacher asked a student to pass out workbook materials or introduced the topic. Common instructional activities included hands-on functional lessons (e.g., buying items from a hypothetical store), whole-class instruction such as solving problems together on the board and independent seatwork such as completing problems in workbooks. Observational sessions lasted between 25 and 32 minutes (M=30 minutes). Sessions were conducted three to four times per week during baseline and intervention phases and three times per week during follow-up. (The baseline and intervention lasted five weeks, with 3.2

observations per week; the follow-up was for two weeks, three observations per week). Whether an observation took place on a given day was dictated by the school schedule and the availability of both the students and teacher.

## Data Analysis

Visual inspection was the primary method for analyzing the data in this study. This analysis begins with an examination of baseline trend, level, and variability for each participant. A consistent behavioral pattern is needed so that a prediction can be made of what the data would look like had no intervention been implemented (Cooper et al., 2007). Once the intervention is introduced, between-phase data are inspected for signs of treatment effect such as changes in trend, level, and variability, as well as immediacy of effect and degree of overlap. Essential to the multiple baseline design, between-individual data are then compared to see whether the introduction of the independent variable brought a change to the dependent variable in the student receiving the intervention only, while all others remained consistent with their baseline patterns. Lastly, the data are examined to check for consistency across similar phases and reliability of treatment effects (Kazdin, 2011).

To complement the findings from visual inspection, a percentage of non-overlapping data points (PND) effect size was calculated. This nonparametric measure was determined by counting the number of data points in treatment that fell below (in this case, as the hope was to see a decrease in the dependent variable) the lowest point during the individual's baseline, divided by the number of data points in the treatment phase. A PND of 90% or greater is considered to be a very effective treatment, 70-89% is effective, and less than 70% constitutes a questionable or not an effective treatment treatment effect (Scruggs & Mastropieri, 1998). A PND effect size comparing follow-up data to baseline was also calculated.

To further examine any observed changes, statistical analysis was used to quantify the size of the observed change in data (Horner et al., 2012). A standardized mean difference method for calculating effect size developed by Busk and Serlin (1992) was utilized. Applying this method, the mean of an individual's treatment phase was subtracted from their baseline phase, which was then divided by the standard deviation from their baseline. This method was used to calculate changes from baseline to follow-up phase. Cohen (1988) described 0.20 as a small effect size, 0.50 as medium, and 0.80 as large. However, this guideline may be inappropriate for single-case research, which can often find effect sizes in excess of 2.00 (Maggin et al., 2011; Riley-Tillman & Burns, 2009). Currently, a better method for interpreting the magnitude of an effect is to compare the effect sizes from the current investigation to similar single-case design studies (Beeson & Robey, 2006).

## Inter-observer Agreement

Inter-observer agreement data were obtained by having a second observer simultaneously conduct observations periodically through the course of study. A graduate student experienced in performing direct observations aided in data collection.

The reliability of inter-observer data was analyzed using Cohen's kappa as described by Kazdin (2011) and Watkins and Pacheco (2000). To account for chance agreement between observers, kappa is calculated by taking the proportion of agreements (both occurrences and non-occurrences between observers) minus the proportion expected by chance, divided by one minus the proportion of agreement expected by chance. Scores range from -1 (complete disagreement) to zero (chance agreement) to 1 (perfect agreement) (Kazdin, 2011; Watkins & Pacheco, 2000). A kappa coefficient of 0.60 or 0.70 and above is considered to meet acceptable levels of inter-observer agreement (Hartmann, Barrios, & Wood, 2004; Kazdin, 2011; Kratochwill et al., 2010).

## Treatment Acceptance

The Usage Rating Profile – Intervention Revised (URP-IR) measure was administered to the teacher after the follow-up phase to assess the acceptability of the VSM intervention (Chafouleas, Briesch, Neugebauer, & Riley-Tillman, 2011). This measure contains 29-items and produces six subscale scores: *Acceptability, Understanding, Feasibility, Family-School Collaboration, System Climate*, and *System Support*. Responses are given on a 1-6 scale (1=Strongly Disagree, 6=Strongly Agree) and subscale scores are given in means. The questions composing the *Acceptability* subscale assess whether the intervention is perceived as being able to resolve a student's behavior problems. The *Understanding* subscale assesses how well the teacher understands the intervention and how to implement it. The questions making up the *Feasibility* subscale ask how convenient (in terms of time and materials needed) the intervention would be to implement. The *Family-School Collaboration* subscale assesses the degree to which the teacher would have to work with the student's caregiver to introduce the intervention. The *System Climate* subscale probes whether the intervention aligns with the school's goals or culture. Lastly, the *System Support* subscale gauges how much support or consultation the teacher would need to utilize the intervention.

## Consumer Satisfaction

In an effort to assess the student's satisfaction with the intervention, a questionnaire adapted from a colleague's unfinished dissertation study (B. Andrade, personal communication, April 4, 2013), which itself was adapted from Bray and Kehle (1996), was administered to each student after the follow-up phase of study. The researcher read the questions aloud, in addition to having the students read themselves. The questionnaire consisted of three items that asked whether the student liked the process of constructing their videos, whether they enjoyed viewing

their videos, and whether they would like to watch more videos of themselves in the future. Items were scored on a three-point scale (happy face, neutral face, sad face).

**Procedure**

Before the start of study, the researcher sat in the classroom with an iPad for a week during the mathematics period so that students would acclimate to his presence. The intervention videos were made over the following week. It had initially been planned for the researcher to begin collection of baseline data during the same week that the intervention videos were constructed; however, collecting baseline data and video required more time than what was available and precluded both activities from being completed in the same week.

During video construction, the researcher sat off to the side of the classroom and recorded participants using an iPad in an attempt to be as unobtrusive as possible to the classroom environment. Furthermore, the researcher did not ask the classroom teacher or paraprofessionals to alter their routine, activity, or instruction in any way. Unedited footage was gathered for Students 1 and 2 with relative ease over the course of two periods; Student 3, however, required three additional periods to acquire enough useable video (i.e., video displaying appropriate behaviors). After filming, raw videos were edited using Apple's iMovie program to remove instances of disruptive behavior. Finished videos contained only displays of appropriate, classroom behaviors (e.g., raising hand, working quietly). Two self-modeling videos were made per student, each lasting between two and three and a half minutes (Student 1: 2:00, 3:00; Student 2: 2:18, 3:30; Student 3: 2:00, 3:07). Keeping the videos at this length was done to maintain interest in viewing (Shukla-Mehta et al., 2010).

Before start of treatment phase, the order in which students were to receive the intervention was decided randomly using an online list generator to reduce threats to external

validity by selection (Kratochwill et al., 2010). During treatment phase, students viewed their self-modeling videos on a laptop computer in a private room adjacent to their classroom immediately prior to the mathematics period. No other individuals were present during viewings other than the researcher and student. Each student was called to the researcher's room and asked to sit down in front of the computer. Before the first viewing, each student was reminded that they would be watching a video of themselves. Upon subsequent viewings, the student was prompted to watch the video without any other additional information. All students were able to attend to the video without difficulty. Such skills are considered a prerequisite for benefiting from VSM (Buggey, 2005; Shukla-Mehta et al., 2010). After viewing the video, the student was instructed to go to the mathematics class. The time between viewing and opportunity to perform appropriate behaviors in the Life Skills classroom ranged from less than one to five minutes.

Each student viewed their self-modeling videos before every other observational session, which amounted to twice per week during the treatment phase (Bellini & McConnell, 2010; Dempster, 1988); accordingly, students viewed their videos four, three, and two times, respectively, for Students 1, 2, and 3. On one occasion, Students 2 and 3 viewed their videos on a day without an observational session. This was because one observational session was cancelled due to a school event after the two students had viewed their videos.

The follow-up phase was conducted four weeks after the end of the treatment phase. At this time, additional observations were conducted to assess maintenance of treatment effects. Students did not view their self-modeling videos during this phase of study. Upon concluding the follow-up phase, assessments of treatment acceptance and consumer satisfaction were administered to teacher and students, respectively.

# CHAPTER 4: RESULTS

## Direct Observations

Figure 1 shows the percentage of intervals observed in which the students showed disruptive behaviors over observational sessions. Dashed lines indicate a phase-change and line-breaks between data points represent student absence for a particular session. Examining the data visually, the baseline for Student 1 had the lowest levels of disruptive behaviors overall with a mean percentage during baseline of 23.2%. His behaviors evidenced a decreasing trend with higher levels of disruptive behaviors before the absence, and lower levels after. The exception was in session 7, during which disruptive behaviors were elevated before dropping precipitously during session 8. There was a high degree of variability, with percentages ranging from 3 to 41.9%. His behaviors, however, stabilized before implementation of the intervention.

Although Student 1's baseline level of disruptive behaviors was relatively low prior to treatment, there was an immediate effect upon introducing the intervention, and changes in level, variability, and trend were seen throughout treatment phase. The most significant difference was the change in variability. On the first treatment session, disruptive behaviors decreased to almost zero. Percentages remained very low or at zero throughout the treatment phase (Student 1 treatment: M=0.8%) with very little variability. This was a noticeable difference compared to baseline. During the follow-up phase conducted one-month after the end of treatment, this flattened pattern persisted, and observations of disruptive behaviors were eliminated almost entirely (Student 1 follow-up: M=0.6%).

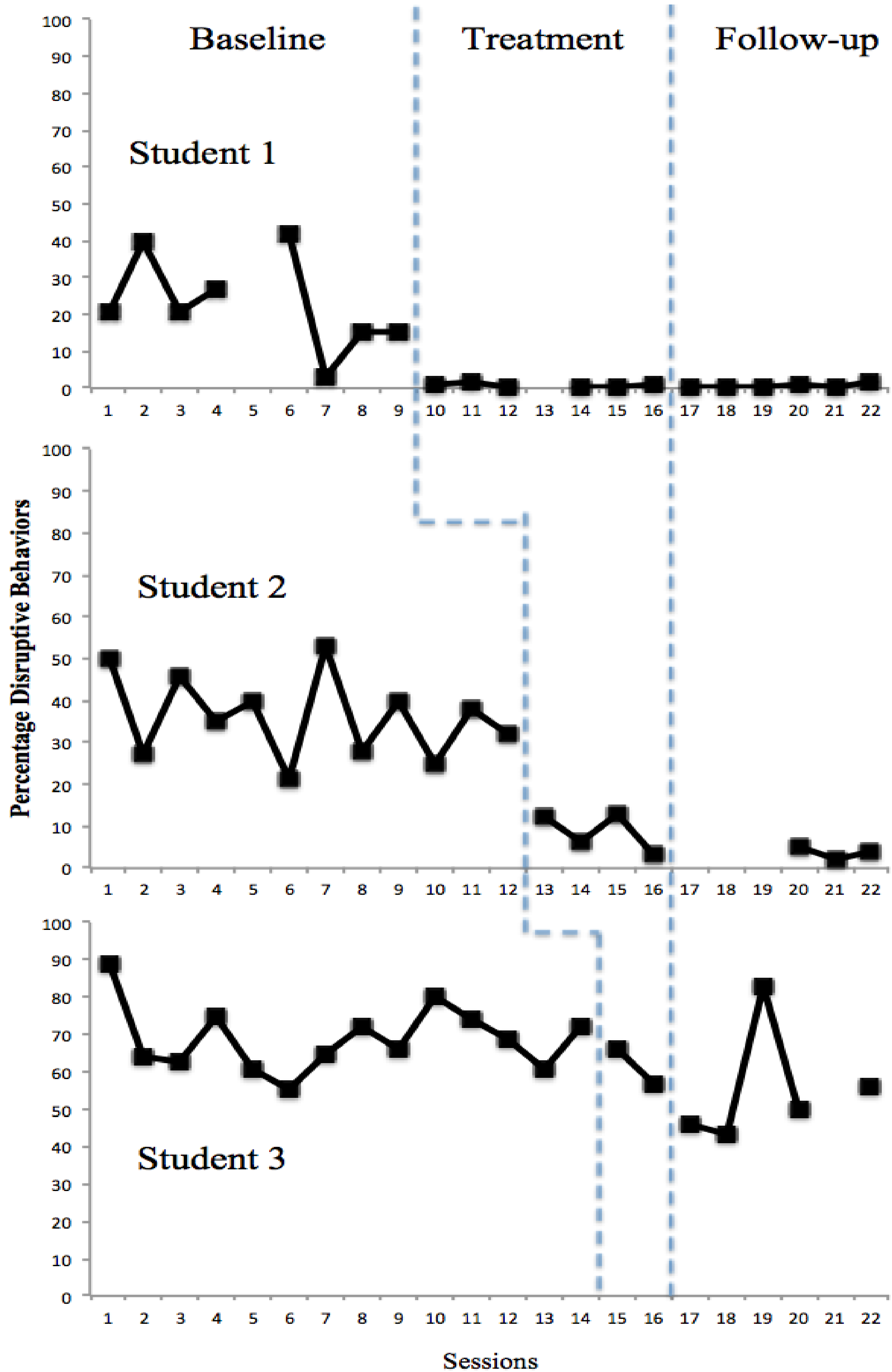


*Figure 1*. Percentage of intervals observed for each student with disruptive behaviors by session.

Table 1

*Percentage of non-overlapping data and standardized mean difference effect size by student and phase comparison*

| Student | Phase comparison | PND | d |
|---|---|---|---|
| 1 | Baseline-Treatment | 100% | 1.72 |
| | Baseline-Follow-up | 100% | 1.74 |
| 2 | Baseline-Treatment | 100% | 2.71 |
| | Baseline-Follow-up | 100% | 3.20 |
| 3 | Baseline-Treatment | 0% | 1.00 |
| | Baseline-Follow-up | 60% | 1.76 |

Calculating the effect sizes reinforces the findings from a visual analysis. As can be found in Table 1, the PND for the data from Student 1 was 100% for both intervention and follow-up phases, indicating the intervention was very effective. Once the intervention was implemented, the data changed in the desired direction with no overlap relative to the baseline phase. The standardized mean difference effect size from baseline to treatment for Student 1 was 1.72, and was approximately equal from baseline to follow-up at 1.74. These represent an effect somewhat smaller than the ones found in a similar study by Bilias-Lolis et al. (2012), where the average effect size across three participants was 2.09 from baseline to treatment, and 2.51 from baseline to follow-up.

Visual inspection of the data from Student 2 showed a small decreasing trend during baseline. The level of disruptive behaviors during baseline was 36.3%. The amount of variability was high, with a range of 21.5 to 53.1%, although the size of the shifts was reduced in the observations leading up to the treatment phase.

Once the intervention was introduced, an immediate effect was seen in that disruptive behaviors lowered by more than 20 percentage points. The level of disruptive behaviors decreased considerably during treatment, although they did not reduce to the level seen in Student 1 (Student 2 treatment: M=8.6%). The amount of variability decreased as well, with percentages ranging from 3 to 13%.

Due to a prolonged absence, fewer follow-up observations were conducted for Student 2. However, follow-up data clearly indicated that disruptive behaviors diminished compared to baseline levels (Student 2 follow-up: M=3.6%). As with Student 1, PND for Student 2 was 100% for both treatment and follow-up phases indicating that the intervention was very effective in reducing disruptive behaviors. The effect size from baseline to treatment was 2.71 and increased

to 3.20 from baseline to follow-up. This result was the largest found in the current study and the effect from baseline to follow-up was larger than what was reported by Bilias-Lolis (2012).

Lastly, baseline data for Student 3 revealed a slight decreasing trend and the highest level of disruptive behaviors compared to the other participants (Student 3 baseline: M=69.8%). As with the other two students, variability was high, with percentages of intervals observed showing disruptive behaviors ranging from 60.8 to 89.2 percent. A difference, however, was that there were fewer large shifts between observations compared to Student 1 and 2.

Determining the effect of treatment on Student 3 is not possible due to a very limited number of data points. Ideally, the treatment phase would have continued but this was not possible due to student absences, school events, and school vacation. For these reasons, the treatment phase for Student 3 consisted of only two observational sessions. So, the data do not permit an unambiguous statement of the treatment's effect, or lack thereof, on Student 3's disruptive behaviors. There is not enough data to note a trend and the level is within the range of the baseline phase. In contrast to Student 1 and 2, there was not an immediate effect of the intervention for Student 3.

Examining the data from the follow-up phase for Student 3, there was an overall decrease in level compared to baseline; however, given that a treatment effect was never established, it would be dubious to claim this change at follow-up as an effect of treatment. The level of disruptive behaviors was high compared to the other two students, with over half of all intervals observed still showing these behaviors (Student 3 follow-up: M=55.8%). A high degree of variability remained as well, with one observation (Session 19) showing one of the highest percentages of disruptive behaviors in the investigation. Lastly, follow-up data showed an increasing trend, with the last observational session back into baseline levels (Session 22).

The PND from baseline to treatment was 0%, indicating complete overlap with baseline data and no effect of the intervention. The PND from baseline to follow-up was 60%, meaning there was some change from baseline, although this cannot be confidently cited as a result of treatment. A standardized mean effect size from baseline to treatment was 1.00, and was 1.76 from baseline to follow-up. However, given the few number of observations during treatment and lack of a documented treatment effect, the figures are not meaningful.

Overall, despite high variability within each student's baseline data, treatment effects were demonstrated in two of the three students. This was evidenced by reductions in level and variability of the dependent variable during treatment phases for Student 1 and 2. Treatment effects were seen immediately upon implementation of the intervention and persisted across treatment phase. Importantly, once the treatment was introduced to Student 1, the data for Students 2 and 3 continued within their baseline patterns. Student 2's baseline did decrease at the same time Student 1 received the intervention (Session 10), which could have undermined claim of a treatment effect for Student 1; however, the data for Student 2 increased during the next observation (Session 11) and continued within his baseline pattern (Session 12); this reduced the threat that the effect was attributable to an extraneous variable common to both students as well or that the introduction of the intervention to Student 1 had an indirect effect on Student 2. Likewise, when the intervention was introduced to Student 2, Student 3's baseline continued independently within its pattern. Despite the two documented treatment effects (Students 1 and 2), experimental control cannot be claimed given the lack of a clear, third treatment effect (Student 3). Standard convention states that there must be a minimum of three demonstrations of a treatment effect to satisfactorily reduce threats to internal validity (Horner, Swaminathan, Sugai, & Smolkowski, 2012; Kratochwill et al., 2010); that is, to say the intervention brought

about the observed changes to behavior. So, although Students 1 and 2 evidenced behavior change after receiving the intervention, there is less confidence to state the change occurred as a result of the VSM intervention had a treatment effect been demonstrated in Student 3.

**Inter-observer Agreement**

The level of inter-observer agreement was calculated using Cohen's kappa. Observations with the researcher and graduate student were conducted three times, once during baseline, intervention, and follow-up phases for each participant. The level of inter-observer agreement ranged from a kappa score of .78 to .92 across inter-observer sessions with a mean of .86, which exceeds acceptable levels of agreement (Kratochwill, et al., 2010). Although levels of inter-observer agreement signify reliable observations, the number of sessions in which inter-observer data was gathered fell below the criteria of 20% of sessions in each phase for each participant (Kratochwill, et al., 2010). Specifically, treatment and follow-up phases for Student 2 and 3 met the criteria; however, none of the baseline phases did, nor did treatment and follow-up phases for Student 1.

**Treatment Acceptance**

The URP-IR was completed by the Life Skills teacher to assess what aspects of the intervention would impede or promote its use in the future. Scores for each subscale can be seen in Table 2. The strengths of the intervention were that it is perceived as being a way to deal with problem behaviors (*Acceptability*=4.67) and that the teacher understood how to implement it without much or any outside consultation (*Understanding*=4.33; *System Support*=2.67). It is also viewed as somewhat feasible, although the time and materials needed for implementation may be a hurdle (*Feasibility*=4). Other benefits of the intervention is that little collaboration between home and school was needed (*Home-School Collaboration*=3.67), and its use aligns with overall

school goals (*School Climate*=4). Overall, the intervention was viewed favorably by the teacher and is likely to be used again, particularly with behaviors found difficult to ameliorate through other means.

Table 2

*Mean Usage Rating Profile- Intervention Revised[1] scores for teacher*

| Subscale | Mean | SD |
|---|---|---|
| Acceptability | 4.67 | 0.50 |
| Understanding | 4.33 | 0.58 |
| Home-School Collaboration | 3.67 | 0.58 |
| Feasibility | 4 | 0.63 |
| System Climate | 4 | 0.70 |
| System Support | 2.67 | 0.58 |

*Note*. [1]Chafouleas, Briesch, Neugebauer, and Riley-Tillman (2011)

## Consumer Satisfaction

Data obtained during the follow-up phase of the intervention revealed that two of the three students enjoyed the process of being recorded for their video; the other student was neutral. All three students indicated that they enjoyed watching their videos and would enjoy viewing more videos of themselves in the future.

# CHAPTER 5: DISCUSSION

The purpose of this study was twofold: to examine the effectiveness of a VSM intervention to reduce disruptive behaviors in students with ID and to assess whether treatment effects would be maintained at a one-month follow-up. Moreover, as VSM has been used before with this population, positive results would thus support its external validity for reducing disruptive classroom behaviors. Specific hypotheses were: a) the intervention would reduce disruptive behaviors, and b) effects would be maintained at follow-up. Results showed that meaningful changes were seen in two of the three students after viewing their videos. Specifically, Student 1 and 2 showed decreases in disruptive behaviors during treatment, with the most notable changes for Student 2. His behaviors evidenced a substantial level change, from 35% during baseline to 7.8% during treatment. Changes for Student 1 were less dramatic, as a reduction during the baseline phase dampened the potential effect of the intervention. Even so, the intervention did bring a clear pattern change as disruptive behaviors decreased to very low levels with little variability. Follow-up observations conducted one-month after the end of treatment demonstrated maintenance of treatment effects for these two students. For Student 2, disruptive behaviors were actually reduced further at follow-up (Student 2 disruptive behaviors at follow-up: M=3.6%). Given the brevity of the videos and treatment phase, this finding is quite remarkable.

As for Student 3, there was a change in level at follow-up, but this cannot be unambiguously shown to be the effect of the intervention; furthermore, the change was small and especially unimpressive in light of the still high amount of disruptive behaviors present. Thus, an overall evaluation of the effect of the intervention is muddied due to the inadequate treatment phase for Student 3.

Regarding Students 1 and 2, maintenance of treatment effects is conceivably due to transfer of stimulus control. Although environmental variables were not measured, it is possible that appropriate behaviors initially induced through watching the videos were later maintained after coming in contact with teacher praise and attention, for example. A transfer to natural reinforcers makes the changes much more likely to remain as time goes on (Cooper, Heron, & Heward, 2007).

Recognizing the shortcomings in the data for Student 3 and the speculative nature of any conclusions drawn from it, it is still reasonable to state that the introduction of the intervention did not bring the type of response seen in Student 1 and 2. The behavior of Student 3 appeared unchanged from baseline. There are likely many contributing factors as to why more significant changes were not seen, but the simplest one is that the VSM intervention was not implemented long enough to have the desired effect.

The treatment phase for Student 3 lasted for only two observational sessions. It could be that more significant changes would have been seen had treatment continued. Although the necessary length of treatment needed for VSM to work has not been evaluated, researchers have recommended that students watch their modeling videos multiple times (Shukla-Mehta et al., 2010) over the course of several weeks for optimal results (Bellini & McConnell, 2010; Kehle & Bray, 2009).

Another potential factor for the lack of response was the behaviors presented in Student 3's videos. Unlike Student 1 and 2, Student 3's final videos consisted almost entirely of him engaged in quiet, independent seatwork. There was little variety in the displayed behaviors. The behaviors depicted, although appropriate for certain kinds of tasks (e.g., completing problems in a workbook), were inappropriate for others (e.g., listening to instruction, engaging in a group

activity, giving an answer to a problem). A problem may have been that there were relatively few opportunities to engage in the behaviors depicted in the videos. Quiet, on-task activities were the predominant behaviors shown because the student only rarely engaged in appropriate, participatory behaviors. It could have been beneficial, although more intrusive to the classroom environment as well as incongruent with the study protocol, to have had the teacher prompt the student for appropriate responses during filming to increase the variety of behaviors captured on video. In this way, the depicted behaviors would be better suited for the range of activities present in the classroom environment.

Student 3's unique behavioral problems likely also contributed significantly for the lack of response to intervention. While all the behaviors targeted by intervention were disruptive to classroom instruction, Student 3's behaviors appeared to have a unique function compared to the other students. Although a formal functional behavioral assessment was not conducted, observations would suggest that the function of many of Student 3's behaviors was as a direct access to immediate sensory stimuli (Cipani & Schock, 2010), meaning that reinforcement was produced by the behavior itself or was automatic (Vaughn & Michael, 1982). This direct function differed from Student 1 and 2's behaviors, which were likely socially mediated through access to attention (peer or adult) or escape from tasks. In this way, Student 1 and 2's behaviors were similar to the descriptions of the target behaviors successfully reduced in the study by Bilias-Lolis et al. (2012). The students in that study were said to display "disruptive social behavior" which was reduced by VSM (Bilias-Lolis et al., p. 88). None of the students showed stereotyped disruptive behavior to the degree shown by Student 3 in the present investigation. Student 3 engaged in frequent stereotyped vocalizations and hand-play in front of his face, with or without an audience present. Such behaviors have been known to be especially difficult to

ameliorate, since the individual has unmediated access to the reinforcer (Piazza et al., 2000) and because physically preventing the individual from engaging in the behavior can be difficult or impossible in practice (Ahearn et al., 2007), in addition to causing side effects such as aggressive behavior (Colon et al., 2012). These behaviors can also interfere with acquiring appropriate modeled responses (Young, Krantz, McClannahan, & Poulson, 1994).

In some reports, behavioral strategies in addition to video-modeling have been more successful than using video-modeling alone (Mason et al., 2013; Shukla-Mehta et al., 2010). To compete with such reliable means of stimulation produced by these behaviors, additional strategies relevant to treating stereotypy, for example, response blocking (Ahearn et al., 2007), identification of competing reinforcers (Ahearn et al., 2005; Roberts-Gwinn, 2001), or manipulation of motivating conditions (Lang et al., 2010) might be needed in conjunction with video-modeling to reduce these behaviors.

With the different treatment effects as well as student characteristics, it is reasonable to ask whether there is a way to predict who will benefit from this intervention. Student 3, for instance, differed from the other two students in age, comorbid disability, type, and severity of disruptive behavior. While it is perhaps intuitive to hypothesize that these factors could predict response to treatment, there is no definitive evidence to support this. In a review of the literature on video-based modeling (i.e., inclusive of both self and others as models), Rayner, Denholm, and Sigafoos (2009) found that there were currently no empirically-evaluated methods for predicting who will benefit from these interventions. Although certain prerequisite skills are frequently reported (e.g., ability to attend to, and imitate depicted behaviors) and may indeed be essential, the authors noted that a reliable measure that could be used across implementers to

predict a response to intervention has not yet been developed (Rayner et al., 2009). Whether a measure could be used to predict response to treatment is thus still an open question.

In conclusion, the present investigation lends support for using VSM to decrease disruptive classroom behaviors in middle school students with disruptive behaviors despite lack of a third demonstrated treatment effect. The treatment was effective in reducing socially-mediated disruptive behaviors in two of three students. The treatment had little to no effect in reducing stereotyped or self-stimulatory disruptive behaviors in a third student, likely attributable to limitations of the investigation as well as unique characteristics of the student's behaviors. Strengths of the video self-modeling intervention were that it is relatively brief, unintrusive to the classroom, simple to create due to the ubiquitousness of video recording and editing software, and well-received by students and teacher.

## Limitations

As with every study, this investigation has its limitations. First, an insufficient amount of inter-observer data was taken. Given this, there is less confidence in the reliability of the data had more inter-observer data been collected.

Another limitation was the brief treatment phase for Student 3. Such limited exposure to the intervention limits the claims that can be made about the effect of the intervention on this student's behavior. Preferably, the treatment phase would have extended further but events outside the researcher's control prevented this from happening.

An additional limitation was the amount of variability in the baseline for Student 1 when the intervention was implemented. There was a large fluctuation in disruptive behaviors between Sessions 6 and 7, which then stayed consistent over the next two baseline observations. While his baseline appeared to stabilize here, it would have been more ideal to continue his baseline

phase for at least another observational session. Unfortunately, the practical realities of conducting research in a school setting required that the treatment phase begin for this student in order to complete the study in the available time frame.

Also, there was the threat of participant reaction to the presence of the researcher (Kazdin, 2011); that is, that participants may have behaved differently after being told about the filming and while the researcher was present in the classroom. Steps were taken to limit this by having the researcher sit in the classroom for a week prior to recording for students to acclimate to his presence. Also, the researcher used a small tablet device to record videos, which has the benefit of being less conspicuous than a video camera. Although students were made aware that they were to be filmed before the start of study, during the recording process, the researcher could have easily appeared to be writing an email or reading an article as recording a video.

Another threat was the lack of control over certain environmental variables. The first was the variety of classroom activities that took place during mathematics instruction. For example, some lessons contained group games, which tended to be much more active and engaging, while other lessons consisted primarily of quiet, independent seatwork. This is simply the reality of any classroom. Fortunately, most class periods were composed of the same two activities (e.g., group problem-solving and independent seatwork), which provided some consistency in instruction.

The second was the ongoing strategies being used by the teacher and paraprofessionals to manage the students' behavior. No effort was made to control how support staff interacted with the students (e.g., instructions to provide more or less prompts, correction, praise) or to change individual or class-wide contingency plans. The intervention was inserted into the classroom with all the usual supports in place. Ongoing supports and strategies could have had an additive effect to the implemented intervention.

It should be noted while there are always threats to internal validity, the nature of the multiple-baseline design—as in any good research design—reduces them to an extent. So despite threats to internal validity, there is some degree of confidence that the dependent variable changed as result of implementation of the intervention as opposed to other extraneous variables.

It is common in single-case research for authors to make a disclaimer about their study's potential lack of external validity or generalizability. Yes, while it is true that the specific findings herein are a function of these three particular students, in a particular classroom, in one particular middle school, questions regarding generalizability are not unique to single-case design. Replication is the only way to determine reliability and generalizability of findings (Branch & Pennypacker, 2013). This is true not only of single-case research designs, but group designs as well (Smith, 2013).

Lastly, there is a practical limitation to this study. Although the equipment and programs needed to record and edit video have become cheaper, more ubiquitous, and easier to use, the amount of time needed to record the videos could pose a hurdle for the typical school practitioner. One student in particular required multiple class periods to gather enough usable video. In typical practice, this would likely bar its use, and a teacher would more likely utilize different techniques (e.g., utilize feedforward VSM, another peer as model) if recording required too much time.

## Future Research

Future research could improve and extend the current study in a number of ways. First, another researcher could replicate the present study, improving on some of its limitations. Another could extend our knowledge of how treatment effects are maintained by assessing maintaining variables. The present study assumed that variables present in the classroom

environment (e.g., teacher praise, attention, additional free time as a result of work completion) later maintained the appropriate behaviors prompted by the VSM intervention. It would be interesting to examine this, to see whether appropriate behaviors are met with an increase in teacher praise or attention through a descriptive study or by systematically manipulating these variables using an experimental design.

Future research could also examine problem behaviors more specifically to tease out different effects, instead of grouping a number of behaviors into one category. Another study could test whether VSM is more effective at reducing certain functional classes of behaviors compared to others. Breaking down behaviors more specifically could allow a finer-grained analysis of this kind.

# REFERENCES

Ahearn, W. H., Clark, K. M., DeBar, R., & Florentino, C. (2005). On the role of preference in response competition. *Journal of Applied Behavior Analysis, 38*, 247-250.

Ahearn, W. H., Clark, K. M., & MacDonald, R. P. F. (2007). Assessing and treating vocal stereotypy in children with autism. *Journal of Applied Behavior Analysis, 40*, 263-275.

Algozzine, K., Christian, C., Marr, M. B., McClanahan, T., & White, R. (2008). Demography of problem behavior in elementary schools. *Exceptionality, 16*, 93-104.

Arias, B., Verdugo, M. A., Navas, P., & Gomez, L. E. (2013). Factor structure of the construct of adaptive behavior in children with and without intellectual disability. *International Journal of Clinical and Health Psychology, 13*, 155-166.

Axelrod, M. I., Bellini, S. & Markoff, K. (2014). Video self-modeling: A promising strategy for noncompliant children. *Behavior Modification, 38*, 567-586.

Beeson, P. M., & Robey, R. R. (2006). Evaluating single-subject treatment research: Lessons learned from the aphasia literature. *Neuropsychology Review, 16*, 161-169.

Bellini, S., Akullian, J., & Hopf, A. (2007). Increasing social engagement in young children with autism spectrum disorders using video self-modeling. *School Psychology Review, 16*, 80-90.

Bellini, S., & McConnell, L. L. (2010). Strength-based educational programming for students with autism spectrum disorders: A case for video self-modeling. *Preventing School Failure, 54*, 220-227.

Benjamin, L. T. (2009). A history of psychology (3rd ed.). Malden, MA: Blackwell.

Bhasin, T. K., Brocksen, S., Avchen, R. N., Braun, K. V. N. (2006). Prevalence of four developmental disabilities among children aged 8 years: Metropolitan Atlanta

developmental disabilities surveillance program, 1996 and 2000. *Morbidity and Mortality Weekly Report, 55*, 1-9.

Bilias-Lolis, E., Chafouleas, S. M., Kehle, T. J., & Bray, M. (2012). Exploring the utility of self-modeling in decreasing disruptive behavior in students with intellectual disability. *Psychology in the Schools, 49*, 82-92.

Boyle, C. A., Boulet, S., Schieve, L. A., Cohen, R. A., Blumberg, S. J., Yeargin-Allsopp, M., Visser, S., & Kogan, M. D. (2011). Retrieved from: http://pediatrics.aappublications.org/content/early/2011/05/19/peds.2010-2989#related-urls

Branch, M. N., & Pennypacker, H. S. (2013). Generality and generalization of research findings. In G. J. Madden, W. V. Dube, T. D. Hackenburg, G. P. Hanley, & K. A. Lattal (Eds.), *APA Handbook of Behavior Analysis* (Vol. 1, pp. 151-175). Washington, DC: American Psychological Association.

Bray, M. A., & Kehle, T. J. (1996). Self-modeling as an intervention for stuttering. *School Psychology Review, 25*, 358-369.

Bray, M. A., & Kehle, T. J. (2001). Long-term follow-up of self-modeling as an intervention for stuttering. *School Psychology Review, 30*, 135-141.

Bray, M. A., & Kehle, T. J. (2012). Introduction to the special issue self-modeling: Self-modeling as a treatment for a myriad of issues. *Psychology in the Schools, 49*, 1-2.

Briesch, A. M., Chafouleas, S. M., Neugebauer, S. R., & Riley-Tillman, T. C. (2013). Assessing influences on intervention implementation: Revision of the usage rating profile – intervention. *Journal of School Psychology, 51*, 81-96.

Brown, G., & Middleton, H. (1998). Use of self-as-a-model to promote generalization and reduction of self-stimulation in a child with mental retardation. *Education and Training in Mental Retardation, 33*, 76-80.

Buggey, T. (2005). Video self-modeling applications with children with autism spectrum disorder in a small private school. *Focus on Autism and Other Developmental Disabilities, 20*, 52-63.

Buggey, T., & Ogle, L. (2012). Video self-modeling. *Psychology in the Schools, 49*, 52-70.

Busk, P. L., & Serlin, R. C. (1992). Meta-analysis for single-case research. In T. R. Kratochwill & J. R. Levin (Eds.), *Single-case research design and analysis: New directions for psychology and education* (pp. 187-212). Hillsdale, NJ: Erlbaum.

Carr, E. G., & Durand, V. M. (1985). Reducing behavior problems through functional communication training. *Journal of Applied Behavior Analysis, 18*, 111-126.

Carr, E. G., Taylor, J. C., & Robinson, S. (1991). The effects of severe problem behavior in children on the teaching behavior of adults. *Journal of Applied Behavior Analysis, 24*, 523-535.

Cassidy, S., Roche, B., & O'Hora, D. (2010). Relational frame theory and human intelligence. *European Journal of Behavior Analysis, 11*, 37-51.

Chafouleas, S M., Briesch, A. M., Neugebauer, S. R., & Riley-Tillman, T. C. (2011). *Usage Rating Profile – Intervention (Revised)*. Storrs, CT: University of Connecticut.

Chezan, L. C., Drasgow, E., & Martin, C. A. (2014). Discrete-trial functional analysis and functional communication training with three adults with intellectual disabilities and problem behavior. *Journal of Behavioral Education, 23*, 221-246.

Cipani, E., & Schock, K. M. (2010). Functional behavioral assessment, diagnosis, and treatment: A complete system for education and mental health settings (2nd ed.). New York, NY: Springer.

Clare, S. K., Jenson, W. R., Kehle, T. J., & Bray, M. A. (2000). Self-modeling as a treatment for increasing on-task behavior. *Psychology in the Schools, 37*, 517–522.

Collier-Meek, M. A., Fallon, L. M., Johnson, A. H., Sanetti, L. M. H., & del Campo, M. A. (2012). Constructing self-modeling videos: Procedures and technology. *Psychology in the Schools*, 49, 3-14.

Colon, C. L., Ahearn, W. H., Clark, K. M., & Masalsky, J. (2012). The effects of verbal operant training and response interruption and redirection on appropriate and inappropriate vocalizations. *Journal of Applied Behavior Analysis, 45*, 107-120.

Condillac, R. A. (2007). Behavioral intervention and intellectual disabilities. In I. Brown, & M. Percy (Eds.), *A comprehensive guide to intellectual and developmental disabilities* (pp. 363-372). Baltimore, MD: Brookes Publishing Company.

Connecticut State Department of Education. (2007). Guidelines for identifying children with intellectual disability. Hartford, CT: Author.

Connecticut State Department of Education. (n.d.). Strategic school profile reports. Retrieved from http://sdeportal.ct.gov/Cedar/WEB/ResearchandReports/SSPReports.aspx

Cooper, J. O., Heron, T. E., & Heward, W. E. (2007). Applied behavior analysis. Columbus, OH: Merrill Publishing.

Cooper, S. A., Smiley, E., Allan, L. M., Jackson, A., Finlayson, J., Mantry, D., & Morrison, J. (2009). Adults with intellectual disabilities: Prevalence, incidence and remission of self-injurious behaviour, and related factors. *Journal of Intellectual Disability Research, 53*,

200-216.

Coyle, C., & Cole, P. (2004). A videotaped self-modeling and self-monitoring treatment program to decrease off-task behaviour in children with autism. *Journal of Intellectual and Developmental Disability, 29*, 3-15.

Crocker, A. G., Mercier, C., Lachapelle, Y., Brunet, A., Morin, D., & Roy, M. E. (2006). Prevalence and types of aggressive behaviour among adults with intellectual disabilities. *Journal of Intellectual Disability Research, 50*, 652-661.

Decker, M. M., & Buggey, T. (2014). Using video self- and peer modeling to facilitate reading fluency in children with learning disabilities. *Journal of Learning Disabilities, 47*, 167-177.

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

Dempster, F. N. (1988). Informing classroom practice: What we know about several task characteristics and their effects on learning. *Contemporary Educational Psychology, 13,* 254–264.

Didden, R., Sturmey, P., Sigafoos, J., Lang, R., O'Reilly, M. F., & Lancioni, G. E. (2012). Nature, prevalence, and characteristics of challenging behavior. In Matson, J. L. (Ed.), *Functional assessment for challenging behaviors*, 25-44. New York, NY: Springer.

Dowrick, P. W. (1999). A review of self-modeling and related interventions. *Applied and Preventive Psychology, 8*, 23–40.

Dowrick, P. W. (2012). Self-modeling: Expanding the theories of learning. *Psychology in the Schools, 49*, 30-41.

Dowrick, P., & Ward, K. (1997). Video feedforward in the support of a man with intellectual disability and inappropriate sexual behaviour. *Journal of Intellectual & Developmental Disability, 22*, 147-160.

Emerson, E. (2006). Challenging behavior: Analysis and intervention in people with severe intellectual disabilities ($2^{nd}$ ed.). New York, NY: Cambridge University Press.

Emerson, E., Kiernan, C., Alborz, A., Reeves, D., Mason, H., Swarbrick, R., Mason, L., & Hatton, C. (2001). The prevalence of challenging behaviors: A total population study. *Research in Developmental Disabilities, 22*, 77-93.

Ferro, J., Foster-Johnson, L., & Dunlap, G. (1996). Relation between curricular activities and problem behaviors of students with mental retardation. *American Journal on Mental Retardation, 101*, 184-194.

Fombonne, E. (1999). The epidemiology of autism: A review. Psychological Medicine, 29, 769-786.

Forness, S. R., Guthrie, D., & MacMillan, D. L. (1981). Classroom behavior of mentally retarded children across different classroom settings. *Journal of Special Education, 15*, 497-509.

Forness, S. R., Guthrie, D., & MacMillan, D. L. (1982). Classroom environments as they relate to mentally retarded children's observable behavior. *American Journal of Mental Deficiency, 87*, 259-265.

Forness, S. R., & Kavale, K. A. (1985). Effects of class size on attention, communication, and disruption of mildly mentally retarded children. *American Educational Research Journal, 22*, 403-412.

Gardner, W. I., & Moffatt, C. W. (1990). Aggressive behaviour: Definition, assessment, treatment. *International Review of Psychiatry, 2*, 91-100.

Goh, A. E., & Bambara, L. M. (2013). Video self-modeling: A job skills intervention with individuals with intellectual disability in employment settings. *Education and Training in Autism and Developmental Disabilities, 48*, 103-119.

Gonzalez, L., Brown, M. S., & Slate, J. R. (2008). Teachers who left the teaching profession: A qualitative understanding. *The Quantitative Report, 13*, 1-11.

Hartmann, D. P., Barrios, B. A., & Wood, D. D. (2004). Principles of behavioral observation. In S. N. Haynes & E. M. Hieby (Eds.), *Comprehensive handbook of psychological assessment* (Vol. 3, pp. 108-127). New York, NY: John Wiley & Sons.

Hitchcock, C. H., Dowrick, P. W., & Prater, M. A. (2003). Video self-modeling intervention in school-based settings: A review. *Remedial and Special Education, 24*, 36-45.

Hollowood, T. M., Salisbury, C. L., Rainforth, B., & Palombaro, M. M. (1994). Use of instructional time in classrooms serving students with and without disabilities. *Exceptional Children, 61*, 242-253.

Horner, R. H., Swaminathan, H., Sugai, G., Smolkowski, K. (2012). Considerations for the systematic analysis and use of single-case research. *Education and Treatment of Children, 35*, 269-290. \

Horner, R. H., Carr, E. G., Strain, P. S., Todd, A. W., & Reed, H. K. (2002). Problem behavior interventions for young children with autism: A research synthesis. *Journal of Autism and Developmental Disorders, 32*, 423-446.

Hutchins, T. L., & Prelock, P. A. (2014). Using communication to reduce challenging behaviors in individuals with autism spectrum disorders and intellectual disability. *Child and Adolescent Psychiatric Clinics of North America, 23*, 41-55.

Ingersoll, R. M. (2001). Teacher turnover and teacher shortages: An organizational analysis. *American Educational Research Journal, 38*, 499-534.

Kanne, S. M., & Mazurek, M. O. (2011). Aggression in children with ASD: Prevalence and risk factors. *Journal of Autism and Developmental Disorders, 41*, 926-937.

Kehle, T. J., & Bray, M. A. (2009). Self-modeling. In A. Akin-Little, S. Little, M. Bray, & T. J. Kehle (Eds.), *Behavioral interventions in schools: Evidence-based positive strategies* (pp. 231-244). Washington, DC: American Psychological Association.

Kehle, T. J., Bray, M. A., Margiano, S. G., Theodore, L. A., & Zhou, Z. (2002). Self-modeling as an effective intervention for students with serious emotional disturbance: Are we modifying children's memories? *Psychology in the Schools, 39*, 203-207.

Kehle, T. J., Clark, E., Jenson, W. R., & Wampold, B. E. (1986). Effectiveness of self-observation with behavior disordered elementary school children. *School Psychology Review, 15*, 289-295.

Kehle, T. J., Madaus, M. R., Baratta, V. S., & Bray, M. A. (1998). Augmented self-modeling as a treatment for children with selective mutism. *Journal of School Psychology, 36*, 247-260.

Kazdin, A. E. (2011). *Single-case research designs: Methods for clinical and applied settings* (2nd ed.). New York, NY: Oxford University Press.

Kratochwill, T. R., Hitchcock, J., Horner, R. H., Levin, J. R., Odom, S. L., Rindskopf, D. M. & Shadish, W. R. (2010). Single-case designs technical documentation. Retrieved from http://ies.ed.gov/ncee/wwc/pdf/wwc_scd.pdf.

Kratochwill, T. R., Stoiber, K. C., Gutkin, T. B. (2000). Empirically supported interventions in school psychology: The role of negative results in outcome research. *Psychology in the Schools, 37*, 399-413.

Kurtz, P. F., & Lind, M. A. (2013). Behavioral approaches to treatment of intellectual and developmental disabilities. In G. J. Madden, W. V. Dube, T. D. Hackenburg, G. P. Hanley, & K. A. Lattal (Eds.), *APA Handbook of Behavior Analysis* (Vol. 2, pp. 279-299). Washington, DC: American Psychological Association.

Lang, R., O'Reilly, M., Sigafoos, J., Machalicek, W., Rispoli, M., Lancioni, G. E., Aguilar, J., & Fragale, C. (2010). The effects of an abolishing operation intervention component on play skills, challenging behavior, and stereotypy. *Behavior Modification, 34*, 267-289.

Legg, S., & Hutter, M. (2007). Universal intelligence: A definition of machine intelligence. *Minds and Machines, 17*, 391-444.

Lerman, D. C., Iwata, B. A., & Hanley, G. P. (2013). Applied behavior analysis. In G. J. Madden, W. V. Dube, T. D. Hackenburg, G. P. Hanley, & K. A. Lattal (Eds.). *APA Handbook of Behavior Analysis* (Vol. 1, pp. 81-104). Washington, DC: American Psychological Association.

Logan, K. R., & Keefe, E. B. (1997). A comparison of instructional context, teacher behavior, and engaged behavior for students with severe disabilities in general education and self-contained elementary classrooms. *Journal of the Association for Persons with Severe Handicaps, 22*, 16-27.

Logan, K. R., & Malone, D. M. (1998a). Comparing instructional contexts of students with and without severe disabilities in general education classrooms. *Exceptional Children, 64*, 343-358.

Logan, K. R., & Malone, D. M. (1998b). Instructional contexts for students with moderate, severe, and profound intellectual disabilities in general education elementary classrooms. *Education and Training in Mental Retardation and Developmental Disabilities, 33,* 62-75.

Lundqvist, L. O. (2013). Prevalence and risk markers of behavior problems among adults with intellectual disabilities: A total population study in Orebro County, Sweden. *Research in Developmental Disabilities, 34*, 1346-1356.

MacDonald, R., Sacramone, S., Mansfield, R., Wiltz, K., & Ahearn, W. H. (2009). Using video modeling to teach reciprocal pretend play to children with autism. *Journal of Applied Behavior Analysis, 42*, 43-55.

MacMillan, D. L., Gresham, F. M., Siperstein, G. N., & Bocian, K. M. (1996). The labyrinth of IDEA: School decisions on referred students with subaverage general intelligence. *American Journal on Mental Retardation, 101*, 161-174.

Maggin, D. M., Swaminathan, H., Rogers, H. J., O'Keeffe, B. V., Sugai, G., & Horner, R. H. (2011). A generalized least squares regression approach for computing effect sizes in single-case research: Application examples. *Journal of School Psychology, 49*, 301-321.

Marcus, A., & Wilder, D. A. (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*, 335-341.

Mason, R. A., Ganz, J. B., Parker, R. I., Boles, M. B., Davis, H. S., & Rispoli, M. J. (2013). Video-based modeling: Differential effects due to treatment protocol. *Research in Autism Spectrum Disorders, 7*, 120-131.

Matson, J. L., & Rivet, T. T. (2008). Characteristics of challenging behaviours in adults with autistic disorder, PDD-NOS, and intellectual disability. *Journal of Intellectual and Developmental Disability, 33*, 323-329.

McCarthy, J., Hemmings, C., Kravariti, E., Dworzynski, K., Holt, G., Bouras, N., & Tsakanikos, E. (2010). Challenging behavior and co-morbid psychopathology in adults with intellectual disability and autism spectrum disorders. *Research in Developmental Disabilities, 31*, 362-366.

McCarthy, C. J., Lambert, R. G., & Reiser, J. (2014). Vocational concerns of elementary teachers: Stress, job satisfaction, and occupational commitment. *Journal of Employment Counseling, 51*, 59-74.

McClintock, K., Hall, S., & Oliver, C. (2003). Risk markers associated with challenging behaviours in people with intellectual disabilities: A meta-analytic study. *Journal of Intellectual Disability Research, 47*, 405-416.

McDonnel, J., Thorson, N., McQuivey, C., & Kiefer-O'Donnell, R. (1997). Academic engaged time of students with low-incidence disabilities in general education classes. *Mental Retardation, 35*, 18-26.

McLeod, S. & McKinnon, D. H. (2010). Support required for primary and secondary students with communication disorders and/or other learning needs. *Child Language Teaching and Therapy, 26,* 123-143.

Mechling, L. C., & Hunnicutt, J. R. (2011). Computer-based video self-modeling to teach receptive understanding of prepositions by students with intellectual disabilities. *Education and Training in Autism and Developmental Disabilities, 46*, 369-385.

Medeiros, K., Rojanh, J., Moore, L. L., & van Ingen, D. J. (2014). Functional properties of behaviour problems depending on level of intellectual disability. *Journal of Intellectual Disability Research, 58*, 151-161.

Merrell, K. W. (2008). *Behavioral, social, and emotional assessment of children and adolescents* (3rd ed.). New York, New York: Routledge.

Musser, E. H., Bray, M. A., & Kehle, T. J. (2001). Reducing disruptive behaviors in students with serious emotional disturbance. *School Psychology Review, 30*, 294 – 304.

Oliver, C., Petty, J., Ruddick, L., & Bacarese-Hamilton, M. (2012). The association between repetitive, self-injurious and aggressive behavior in children with severe intellectual disability. *Journal of Autism and Developmental Disorders, 42*, 910-919.

Ozkan, S. Y. (2013). Comparison of peer and self-video modeling in teaching first aid skills to children with intellectual disability. *Education and Training in Autism and Developmental Disabilities, 48*, 88-102.

Piazza, C. C., Adelinis, J. D., Hanley, G. P., Goh, H. L., & Delia M. D. (2000). An evaluation of the effects of matched stimuli on behaviors maintained by automatic reinforcement. *Journal of Applied Behavior Analysis, 33*, 13-27.

Possell, L. E., Kehle, T. J., Mcloughlin, C. S., & Bray, M. A. (1999). Self-modeling as an intervention to reduce disruptive classroom behavior. *Cognitive and Behavioral Practice, 6*, 99-105.

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.

Reeve, C. E., & Carr, E. G. (2000). Prevention of severe behavior problems in children with developmental disorders. *Journal of Positive Behavior Interventions, 2*, 144-160.

Reschly, D. J., Myers, T. G., & Hartel, C. R. (2002). *Mental retardation: Determining eligibility for social security benefits*. Retrieved from the National Academies Press website: http://www.nap.edu/download.php?record_id=10295#

Rickards-Schlichting, K. A., Kehle, T. J., & Bray, M. A. (2004). A self-modeling intervention for high school students with public speaking anxiety. *Journal of Applied School Psychology, 20*, 47-60.

Riley-Tillman, T. C., & Burns, M. K. (2009). Evaluating educational interventions: Single-case design for measuring response to intervention. New York, NY: Guilford Press.

Roberts-Gwinn, M. M., Luiten, L., Derby, K. M., Johnson, T. A., & Weber, K. (2001). Identification of competing reinforcers for behavior maintained by automatic reinforcement. *Journal of Positive Behavior Interventions, 3*, 83-87, 94.

Schalock, R. L., Borthwick-Duffy, S., Bradley, V., Buntix, W. H. E., Coulter, D. L., Craig, E. P. M., et al. (2010). Intellectual disability: Definition, classification, and systems of support ($11^{th}$ ed.). Washington, DC: American Association on Intellectual and Developmental Disabilities.

Schunk, D. H., & Hanson, A. R. (1989). Self-modeling and children’s cognitive skill learning. *Journal of Educational Psychology, 81*, 155-163.

Scott, T. M., Alter, P. J., & Hirn, R. G. (2011). An examination of typical classroom context and instruction for students with and without behavioral disorders. *Education and Treatment of Children, 34*, 619-641.

Scruggs, T. E., & Mastropieri, M. A. (1998). Synthesizing single subject studies: Issues and applications. *Behavior Modification, 22*, 221- 242.

Scruggs, T. E., & Mastropieri, M. A. (2002). On babies and bathwater: Addressing the problems of identification of learning disabilities. *Learning Disability Quarterly, 25*, 155-168.

Shukla-Mehta, S., Miller, T., & Callahan, K. J. (2010). Evaluating the effectiveness of video instruction on social and communication skills training for children with autism spectrum disorders: A review of the literature. *Focus on Autism and Other Developmental Disabilities, 25*, 23-36.

Smith, T. (2013). What is evidence-based behavior analysis? *The Behavior Analyst, 36*, 7-33.

Sturmey, P. (2004). Cognitive therapy with people with intellectual disabilities: A selective review and critique. *Clinical Psychology and Psychotherapy, 11*, 222, 232.

Victor, H., Little, S. G., & Akin-Little, A. (2011). Increasing social engaged time in children with autism spectrum disorders using video self-modeling. *Journal of Evidence-Based Practice in Schools, 12*, 105-124.

U.S. Department of Education, Office of Special Education and Rehabilitative Services, Office of Special Education Programs. (2014). The 35th annual report to congress on the implementation of the individuals with disabilities education act, 2013 (Contract No. ED-OSE-12-C-0031). Retrieved from U.S. Department of Education website: http://www.ed.gov/about/reports/annual/osep.

Vaughn, M. E., & Michael, J. L. (1982). Automatic reinforcement: An important but ignored concept. *Behaviorism, 10*, 217-228.

Wasserman, J. D. (2013). Assessment of intellectual functioning. In I. B. Wiener, J. R. Graham, & J. A. Naglieri (Eds.), *Handbook of Psychology* (2nd ed., Vol. 10, pp. 451-501). New York, NY: Wiley.

Watkins, M. W., Pacheco, M. (2000). Interobserver agreement in behavioral research: Importance and calculation. *Journal of Behavioral Education, 10*, 205-212.

Willis, J. O., Dumont, R., & Kaufman, A. S. (2013). Assessment of intellectual functioning in children. In K. F. Geisinger (Ed.), *APA Handbook of Testing and Assessment in Psychology*, (Vol. 3, pp. 39-70). Washington, DC: American Psychological Association.

Young, J. M., Krantz, P. J., McClannahan, L. E., & Poulson, C. L. (1994). Generalized Imitation and response-class formation in children with autism. *Journal of Applied Behavior Analysis, 27*, 685-697.