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An Evaluation of Behavioral Skills Training On the Implementation of Peer-Mediated Discrete Trial Training

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AN EVALUATION OF BEHAVIORAL SKILLS TRAINING ON THE IMPLEMENTATION OF PEER-MEDIATED DISCRETE TRIAL TRAINING

By

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ABSTRACT

AN EVALUATION OF BEHAVIORAL SKILLS TRAINING ON THE IMPLEMENTATION OF PEER-MEDIATED DISCRETE TRIAL TRAINING

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The purpose of this study was to evaluate the effects of behavioral skills training on the implementation of an evidence-based teaching method by student interventionists for children with autism spectrum disorder (ASD). Three elementary school students were trained to use an applied behavior analysis (ABA) based instructional method, known as discrete trial training (DTT), to teach academic skills to children with ASD. A multiple baseline across individuals was used to demonstrate the effectiveness of the behavioral skills training and peer-mediated DTT procedures. Generalization of the interventionist's ability to teach new, previously untrained target behaviors was assessed by conducting generalization probes throughout the study. The results of this study replicated the results of previous studies that have demonstrated the utility of BST to train others to implement DTT in school settings. And, similar to previous research, peer-mediated DTT resulted in an improvement in the acquisition of targeted academic skills. Furthermore, this study provided preliminary evidence that the elementary students may generalize DTT procedures across a variety of target skills. Additional research is needed to determine the long-term effectiveness of peer-mediated DTT in school settings.

Keywords: discrete trial training, peer-mediated intervention, ASD

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DEDICATION

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CHAPTER I - INTRODUCTION

According to the Centers for Disease Control Autism and Developmental Disabilities Monitoring Network (2014), it is estimated 1 in 68 children have been identified with an autism spectrum disorder (ASD). Further, the U.S. Department of Education reports 7 percent of children between the ages of 6 and 21 receiving special education services in public schools under the Individuals with Disabilities Education Act (IDEA) fall into the autism ruling category, and only 56 percent of children with ASD finish high school (Wagner, 2006). Children with ASD present some of the most difficult of all instructional challenges. These children have delays in language development, deficiencies in social and play behavior, and engage in repetitive patterns of behavior (American Psychiatric Association, 2013). Additionally, these children may engage in problem behavior that prevents the acquisition of academic skills [e.g. self-injurious behavior, aggression, disruption, noncompliance, etc.] (Matson & LoVulo, 2008).

These inappropriate behaviors and skill deficits make typical small-group instruction in a special education classroom extremely difficult (Almond, Rodgers, & Krug, 1979). If small-group instruction is too difficult, individualized education programs (IEPs) may indicate instruction on a 1:1 basis so that the child can experience optimal educational growth. Teachers who provide 1:1 instruction may utilize intensive, behavioral interventions to address language and academic skill deficits in addition to addressing challenging, inappropriate classroom behavior. Thus, there has been an emphasis on Early Intensive Behavioral Interventions (EIBI) rooted in Applied Behavior Analysis (ABA), which may be referred to as the Lovaas method (Burrows, 2004), for this population.

By using EIBI programs, such as the Lovaas method, learning is maximized by intense treatment provided by the child's caregivers over approximately 40 hours per week of intervention for two to three years (Burrows, 2004); and research has demonstrated that EIBI is an important component to the success of students with ASD. Following an investigation focusing on a range of comprehensive interventions with children with ASD, it was determined that EIBI is an effective intervention when compared to no intervention controls or eclectic/ASD-specific special education interventions (e.g., TEACCH, sensory integration, and "circle time"; Howard, Sparkman, Cohen, & Green, 2005). In one of the methodologically strongest studies evaluating EIBI for children with ASD, a treatment group received 30 hours per week of discrete trial training (DTT) and a control group received minimal behavioral treatment. Children from the treatment group were found to have mean IQ scores that were approximately 30 points higher than those of the control subjects following an assessment conducted 6 years after the initial assessment had been completed (Burrows, 2004); however, in a review conducted by Howlin and colleagues (2009), the authors concluded the average effects of EIBI were favorable compared to controls but noted the great amount of variability across children in EIBI studies and could not identify any reliable predictors of outcome (primarily age or IQ at intake). In a meta-analysis of EIBI for children with ASD, Eldevik and colleagues (2009) found a large overall effect size for IQ change and a medium overall effect size for the Vineland Adaptive Behavior Composite score when EIBI was compared with no intervention controls and eclectic forms of instruction. Further, Eldevik and colleagues (2009) concluded the results support the clinical implication that EIBI should be an intervention of choice for children with ASD.

Discrete Trial Training

There is a large amount of evidence that exists for the efficacy of a behavior analytic approach to address a wide range of challenges exhibited by children with ASD, including teaching strategies designed to enhance language skills and academic skills (Smith, 1999). One such behavior analytic teaching strategy is known as discrete trial training (DTT). DTT is a method of teaching a targeted skill in simplified and structured steps in which there is a clearly defined beginning and end to each trial (Smith, 2001). By using the DTT method of instruction, a child's teaching program may be individualized and instruction can be simplified to enhance the child's learning (Smith, 2001). The primary technique used throughout the DTT method of instruction, regardless of target skill, consists of four parts: *a)* the trainer's presentation of stimuli to which a child responds, *b)* the child's response, *c)* the consequence, and *d)* a short pause prior to the next command (Anderson, Taras, & O'Malley-Cannon, 1996). DTT was first described by Thorndike in 1911, but the procedure was not applied to teaching young children until the 1950s (Lindsley, 1996). The earliest use of DTT with children with ASD in an applied setting was a study conducted by Wolf, Risley, & Mees (1964) to teach a young boy with ASD vocal-verbal behavior. This strategy became more popular as a teaching tool for this population following the work of Lovaas and colleagues (1977, 1981, 1987); and it continues to be a preferred intervention as part of EIBI for children with ASD (Smith, Donahoe, & Davis, 2000).

DTT has been used in a variety of ways to teach a multitude of skills. DTT has been used to teach language skills, such as receptive language (Lovaas, 1977), expressive language (Howlin, 1981), conversation skills (Krantz, Zalewski, Hall, Fenski, &

McClanahan, 1981), gestural communication (Buffington, Krantz, McClannahan, & Poulson,1998), basic phonological skills (Koegel, O'Dell, & Dunlap, 1988), responses to *Wh*- questions (Handleman 1979), and complex sentence structures (Krantz et al., 1981; Risley, Hart, & Doke, 1972). This strategy has also been used to teach complex language skills such as plurals (Baer, Guess, & Sherman, 1972), adjectives (Risley, Hart, & Doke, 1972), and opposites, prepositions, and pronouns (Lovaas, 1977). DTT has also been used to teach nonvocal language skills, such as sign language (Carr, Kolinsky, & Leff-Simon, 1987), and as functional communication training (FCT) responses designed to decrease problem behavior. Additionally, DTT methods of instruction have been successfully implemented by teachers, parents, paraprofessionals, and graduate and undergraduate students (Crockett et al., 2007; Devlin & Harber, 2004; Dib & Sturmey, 2007; Downs, Conley, & Rau, 2008; Downs, Downs, Johansen, & Fossum, 2007; Fazzio, Martin, Arnal, & Yu, 2009; Sarakoff & Sturmey, 2008; Severtson & Carr, 2012). In general, these interventions are useful during the initial stage of learning; then, once the student makes progress, they may begin to participate in less intensive, small group instruction (Almond et al., 1979).

Given the well-documented evidence that supports the effectiveness of DTT procedures as a teaching strategy for a variety of skills, DTT programming within an ABA program is widely considered one of the current best practices for students with ASD and meets the standard of a scientifically based practice (Simpson, 2005). Further, the National Autism Center's National Standards Report (2009), which provides comprehensive information about the level of scientific evidence that exists in support of the many educational and behavioral treatments available for individuals with ASD,

included discrete trial teaching as an established, evidence based treatment under the Behavioral Package and Comprehensive Behavioral Treatment for Young Children categories.

EIBI programs, which rely heavily on DTT procedures, can be expensive for both state institutions and families with children with ASD. A cost-benefit analysis completed in 1998 estimated a family's annual cost per child with ASD was $32,820 for EIBI services, while the median household income was $33,714 (Jacobson, Mulick, & Green, 1998) —leaving many families without the means to afford effective treatment. Although the expense of DTT and EIBI programs may be daunting, there are not only long-term benefits for the child's functioning throughout life, but also long-term financial benefits for the family and school systems. After taking other variables into account (e.g. median household income, special education cost, and community services, it has been suggested that at the rate of normal functioning achieved by 40-50% of children with an ASD who receive EIBI compared to ineffective intervention, cost savings per child with ASD was estimated to be between $208,689 to $274,709 (with inflation) until 22 years old and between $2,439,710 to $2,816,535 (with inflation) to age 55 (Jacobson et al., 1998).

Chasson, Harris, and Neely (2007) compared the costs associated with 18 years of special education to the costs associated with the implementation of an average of 3 years of DTT in an effort to minimize the need for special education and discovered the state of Texas would save $208, 500 per child across 18 years of education with EIBI. When using a conservative estimate of 10,000 children with ASD in Texas, the authors estimated the state of Texas would save a total of $2.09 billion with EIBI. However, despite these financial benefits, the high initial costs associated with DTT and EIBI for

families and school districts remain. Attempts to alleviate this issue have led researchers and practitioners to investigate means for reducing the cost of DTT and EIBI across settings. One strategy frequently investigated is through training additional individuals (e.g., parents, paraprofessionals) to implement intervention procedures.

Behavioral Skills Training

Behavioral Skill Training (BST) is a training package consisting of instructions, modeling, rehearsal, and feedback (Sarokoff & Sturmey, 2004). This training package has been repeatedly demonstrated to be a successful model for not only teaching skills to individuals with ASD (Johnson, Miltenberger, Knudson, Egemo-Helm, Kelso, Jostad, & Langley, 2006), but perhaps more importantly for training teachers, parents, and siblings to implement a variety of skills, such as DTT. A review of twenty published experiments that evaluated training procedures of teaching individuals how to implement DTT found the most common training methods included the components of BST (Stenhoff & Lignugaris/Kraft, 2007). Furthermore, behavioral skills training has resulted in better overall treatment integrity and maintenance of skills than other training methods, such as computer based training (Nosik, Williams, & Lee, 2013).

To date, there are many examples of individuals that have been trained to implement a variety of procedures. Parents and siblings of children with autism, paraprofessionals, and classroom peers have been trained to implement procedures such as guided compliance (Miles & Wilder, 2009), mand training (Nigro-Bruzzi & Sturmey, 2010), the picture exchange communication system (Rosales, Stone, & Rehfeldt, 2009), and DTT (Dart, Radley, Furlow, & Murphy, 2016; Radley, Dart, Furlow, & Ness, 2015; Sarakoff & Sturmey, 2004;). Furthermore, adults with an ASD have also been trained

through BST to implement DTT to teach academic skills to children with ASD (Lerman, Hawkins, Hoffman, & Caccavale, 2013; Lerman, Hawkins, Hillman, Shireman, & Nissen, 2015). Despite the success of BST to train individuals to teach children a variety of skills, generalization has been noted as a problem (Baker, 1989).

Generalization has been defined as "the occurrence of relevant behavior under different nontraining conditions" (Stokes & Baer, 1977). Although Bolton and Mayer (2008) identified ways to promote the generalization of paraprofessional discrete trial teaching skills by incorporating common stimuli, fewer studies have examined the effects of BST on the implementation of treatment strategies, its effects on child responding, and the generalization of targeted intervention skills. Lafasakis and Sturmey (2007) assessed the acquisition and generalization of DTT skills with three parents of children with autism and if changes in parent teaching were accompanied by increases in children's correct responding across motor imitation skills. A multiple baseline across parents design was used to evaluate the effects of BST on parent's skills. Results indicated that BST was highly effective and efficient in teaching DTT skills to parents. Furthermore, results demonstrated improving correct implementation of DTT may result in the generalization of correct parent teaching to untrained teaching programs and that their children emitted more correct responses after the parents learned to teach more effectively. Ward-Horner and Sturmey (2008) examined the effects of behavioral skills training on the generalization of parents' use of discrete trial teaching, child correct responses, and maladaptive behavior. There were three parent-child dyads that participated in this study, and the effects of BST were evaluated using a multiple-baseline-across-participants-experimental design. The first author chose three exemplars

from each of the receptive programs for three children with parents receiving training on only one exemplar. Similar to previous studies, BST was an effective treatment package to increase parents' correct use of DTT. Furthermore, the selection of child programs to include during parent training was effective at producing the generalization of DTT to generalization exemplars. However, there weren't any positive effects in child responses, despite the effectiveness of the behavioral skills training.

Crockett, Fleming, Doepke, and Stevens (2007) assessed the acquisition and generalization of DTT skills with parents of children with autism. Experimenters used BST to train two mothers of children with ASD to implement DTT procedures to teach their 4-year-old children language/communication skills and motor skills. To evaluate the effectiveness of the parent's implementation of DTT procedures, a multiple baseline across child skills was utilized. Both parents improved their teaching across child skills before receiving training on the DTT procedures for all of the child skills, suggesting training in one exemplar was sufficient to improve performance. For one of the children with ASD, Jason, targeted skills included attending, writing, counting, and indicating preference. After the parent implemented DTT procedures, Jason's attending improved from a baseline mean of 44% correct to a post-training mean of 57% correct, and his writing skills improved from a baseline mean of 12% correct to a post-training mean of 61% correct. Although there were not any improvements observed in the remaining two target skills, data were only collected for five sessions. For the other child with ASD, Nevin, target skills included attending, labeling, playing with a ball, and verbal imitation. Similar to the first participant, Nevin demonstrated improvement in two of the four target behaviors: attending improved from a baseline mean of 8% correct to a post-training

mean of 34% correct and an improvement in playing with a ball from a baseline mean of 20% to a post-training mean of 40%. These results demonstrated two parents were able to acquire the skills necessary to teach their children using DTT procedures following training, and these procedures resulted in improvements for two of the four targeted skills for both children. Perhaps more importantly, both of the parents who participated in the study improved their teaching across the skills they taught their child before receiving specific training, which indicated generalization had occurred. Surprisingly, the generalization of parent behaviors across similar and dissimilar child skills occurred within 2-4 training sessions. Despite these results with parent implementation of DTT, few studies have sought to examine not only the effects of BST on peer implementation but also the generalization of DTT procedures to teach untrained skills programs in a school setting.

DTT in School Settings

Few studies exist which have evaluated intensive ABA interventions such as DTT in specialized school settings for children with ASD using standardized test outcomes (McGarrell, Healy, Leader, O' Connor, & Kenny, 2009; Waddington & Reed, 2009). Even fewer studies exist which investigate the effects of ABA-based interventions in mainstream inclusion settings despite the fact researchers recommend that children with ASD should be educated in the same setting as their peers (Mesibov & Shea, 1996). Although few, the results of studies conducted in mainstream inclusion settings have been promising. Grindle and colleagues (2012) discovered moderate to large effects for standardized outcomes (i.e. IQ, ABLLS, and VABS) scores for eleven children with an ASD diagnosis who received DTT interventions in an ABA class at a mainstream state-

funded elementary school. Thus, there is preliminary evidence an ABA educational model for children with ASD can be delivered effectively in a mainstream school setting.

Despite promising support for DTT and EIBI within school settings, school-based personnel may not utilize evidence-based practices for training skills in individuals with ASD due to issues of perceived feasibility, availability of required resources, time constraints, or availability of requisite technology (Bellini & McConnell, 2010; Collier-Meek, Fallon, Johnson, Sanetti, & Delcampo, 2012; Dingfelder & Mandell, 2011). For example, Hess and colleagues (2008) found only 5.95% of public school special education classrooms in Georgia utilize DTT to teach children with ASD, and in a follow-up study, Morrier, Hess, and Heflin (2010) reported even fewer teachers (4.89%) reported using best practices for students with ASD in their classrooms. Further, the results of Hess and colleagues' (2008) study suggested that more than 90% of the strategies used with students with ASD in Georgia Public Schools were not scientifically-based practices. The practices utilized by teachers which were not scientifically-based practices fell into categories such as promising practice (e.g. cognitive behavioral modification, social stories, incidental teaching), practices with limited support (e.g. gentle teaching, floor time, music therapy, pet/animal therapy, and auditory integration training), and practices which are not recommended (e.g., holding therapy and facilitated communication). An additional, important finding of this study was that almost 40% of the strategies reported as being used by teachers were not even mentioned in similar, previously published research. Hess and colleagues (2008) suggested this may be the result of a sudden, rapid increase in the number of available strategies that has exceeded

the opportunity for accurate recording in published literature as well as a willingness for educators to institute treatments before they have had an opportunity to be validated.

Although DTT is an accepted, scientifically based practice and may be effective for promoting learning in children with ASD within school settings, school-based implementation is not without disadvantages. For example, Skokut and colleagues (2008) caution against utilizing this strategy in the classroom since its one-to-one format limits treatment implementation in environments such as inclusive classrooms with typical peers. Additionally, Steege and colleagues (2007) caution against using a school-based DTT program for students with ASD as there may not be enough time available for the intervention to be successful. Steege and colleagues (2007) describe an observation of a third grader with ASD placed in a self-contained special education classroom described as an "ABA classroom" which comprised of six students with ASD, one special education teacher, and four educational technicians. In this classroom, each child received intensive, systematic instruction for approximately 1.5 hours per day (approximately 7.5. hours per week), which falls short of the recommended 25 to 40 hours of instructional services (Howard, Sparkman, Cohen, Green, & Stanislaw, 2005; National Research Council, 2001) School personnel may also find it challenging to deliver purely behavioral treatment programs (e.g., Eikeseth, Smith, Jahr, & Eldevik, 2002; Howard et al., 2005), as many schools implement eclectic intervention approaches (Hess et al., 2008)—previously found to be less effective in promoting desired outcomes (Eikeseth et al., 2002). Finally, insufficient training and supervision is likely to limit the efficacy of teachers in implementing DTT within school settings. Because of these issues,

research should evaluate how evidence-based, behavioral strategies may be effectively implemented in school settings.

Other disadvantages to implementing DTT in schools include that it is time consuming for teachers to implement; and for many children who are more severely affected by the symptoms of ASD, they may require more one-to-one instruction than is feasible for a teacher to implement on his or her own. For instance, some children may require up to 30 to 40 hours of intensive one-to-one instruction per week over the course of two years before any differences in IQ, language development, and academic skills are observed (Lovaas, 1987; McEachin, Smith, & Lovaas, 1993; Smith, Groen, & Wynn, 2000). Another disadvantage to implementing DTT focused instructional programs is that they require the target student to spend additional time in a one-to-one instruction setting and is therefore separated from their similarly aged peers during this form of instruction. This can be problematic as the beneficial effects of interacting with a typically developing peer model, which may facilitate learning in a child with ASD, are diminished.

Using a peer-mediated DTT protocol may address these issues of school-based DTT. By using peers as change agents, teachers may be able to focus on group instruction while the target students are working towards academic goals. Perhaps more importantly, the target students may be able to learn life skills (e.g. ways to request preferred items and activities, receptive language skills, expressive language skills, etc.) as a result of peer-mediated intervention, decreased exclusion from typically developing peers, and additional one-to-one instruction. Radley, Dart, Furlow, and Ness (2015) evaluated the feasibility and effects of a peer-mediated, school-based, DTT protocol for

students with autism spectrum disorder. Six typically developing elementary-age peers were trained using BST to implement a basic DTT protocol for two students with ASD. A multiple baseline across participants design was used to evaluate intervention integrity and correct/independent responding. Overall, a large effect was demonstrated between training of DTT procedures and each student interventionist's implementation of DTT procedures. In addition, a large effect was demonstrated between the student interventionist's treatment integrity and skill acquisition by students with ASD. This study provided preliminary evidence for the effectiveness of peer-mediated DTT in a school based setting.

Peer-mediated Interventions

Peer-mediated interventions have been defined as those in which peers serve as behavior change agents (Kalfus, 1984; Odom & Strain, 1984; Strain & Odom, 1986). Research has shown the effectiveness of student interventionists for academic-related tasks (DuPaul, Ervin, Hook, & McGoey, 1998; Harris & Sherman, 1973; Hofstadter-Duke & Daly, 2011; Kamps, Barbetta, Leonard, & Delquadri, 1994; Mayfield & Vollmer, 2007; Thiemann-Bourque, Brady, McGuff, Stump, & Naylor, 2016;) as well as for agents of behavior change (e.g., on-task behavior, social skills; DuPaul et al., 1998; Kamps et al., 1994;). Peer-mediated intervention is an attractive approach to addressing a variety of behavior problems in schools for many reasons. In addition to the academic and collateral benefits to the student interventionist and being a resource-efficient solution to constraints on instructional time and school funds, peer-mediated interventions have been demonstrated to be as effective as interventions provided by adults. For example, peers who have participated in classwide peer tutoring interventions

have produced superior weekly achievement effects for inner-city students, demonstrating that peer-tutoring interventions may be superior to procedures typically developed by teachers in some populations (Greenwood, Dinwiddie, Terry, Wade, Stanley, Thibadeau, & Delquadri, 1984). The effectiveness of peers as change agents is documented in the classwide peer tutoring literature for increased positive outcomes. In a 12-year longitudinal study, results indicated that class-wide peer tutoring resulted in increased student engagement during instruction for individuals in grades 1 to 3, increased growth in student achievement in grades 2, 3, 4, and 6, a reduction in the number of classwide peer tutoring students requiring special education services by the 7th grade, and a reduction in the number of dropouts by 12th grade (Greenwood & Delquadri, 1995; Greenwood, Delquadri, & Hall, 1989). These interventions have been shown to capitalize on the natural processes of peer influence for facilitating the acquisition of skills (Odom & Strain, 1984).

Peer mediated interventions have been used effectively with a variety of populations, such as individuals with ASD, emotional and behavioral disorders (EBD), individuals with specific learning disabilities (LD), and typically developing students, in order to address a variety of academic, social, and behavioral concerns (Dufrene, Reisener, Olmi, Zoder-Martell, McNutt, & Horn, 2010; Hughes, Harvey, Cosgriff, Reilly, Heihngoetter, Brigham, Kaplan, & Bernsten, 2013; Scruggs, Mastropieri, & Richter, 2012; Sperry, Neitzel, & Englehardt-Wells, 2010; Trembath, Balandin, Togher, & Stancliffe, 2009). Some of the interventions that have been previously used with students as intervention agents have addressed a variety of issues such as improving reading fluency (Dufrene et al., 2010), teaching social studies (Scruggs, Mastropieri, & Marshak,

2012), improving social skills and prosocial behaviors (Harjusola-Webb, Hubbell, & Bedesem, 2012; Hughes et al., 2013), and using alternative and augmentative communication (Trembath et al., 2009). These results have been achieved within both special education and general education for students in elementary school, middle school, and high school (Hughes et al., 2013; Lindauer & Petrie, 1997; Maheady, 2001; Mathes & Fuchs, 1994; and Utley & Mortweet, 1997).

Previous research has demonstrated that typically developing peers, such as siblings of children with ASD, can serve important roles in supporting other children in achieving communication and social skills as they interact with each other (Baker, 2000; James & Egel, 1986). Schriebman, O'Neill, and Koegel (1983) demonstrated typically developing peers (i.e., siblings) can become proficient in behavioral teaching skills such as the use of discriminative stimuli, use of prompts, use of shaping, use of consequences (i.e. reinforcement and extinction), and the use of discrete trials. Proficiency in these skills enabled the siblings to produce improvement in the child with ASD's correct responding. Perhaps more importantly, the siblings in this study used their skills in a different environment and in a much less structured type of interaction than what occurred during the training sessions, suggesting the siblings may have generalized their skills across environments.

Chung and colleagues (2007) investigated the effectiveness of a peer-mediated intervention to teach social skills to four children with ASD. Peer training was conducted at baseline and immediately before each intervention session (video feedback) to orient the peers to the target skill of the day, demonstrate how to prompt the target children to use the skill of the day, how to encourage target children to ask questions, and provide

reinforcement in the form of social praise for "working hard." After only 11 weeks of intervention consisting of five-minute daily sessions, three of the four children with ASD demonstrated improvements in both the reduction of inappropriate talking, increases in appropriate talking, and increases in initiating comments. More specifically, Participant 1 demonstrated an increase in appropriate talking from 17.8% of intervals at baseline to 24.1% of intervals following intervention, his inappropriate talking decreased slightly from 7.5% of intervals to 5.3% of intervals, and initiating comments increased from 36.3% of intervals during baseline to 70.0% of intervals. Participant 2 demonstrated an increase in appropriate talking from 9.0% of intervals at baseline to 16.9% of intervals following intervention, his inappropriate talking decreased from 11.8% of intervals to 4.6% of intervals, and initiating comments increased from 0% of intervals during baseline to 23.7% of intervals. Participant 3 demonstrated an increase in appropriate talking from 16.4% of intervals at baseline to 25.4% of intervals following intervention, his inappropriate talking decreased slightly from 7.5% of intervals to 1.5% of intervals, and initiating comments increased from 18.5% of intervals during baseline to 44.5% of intervals. Although there were minimal improvements in appropriate talking, and decreases in inappropriate talking for Participant 4, there was an increase with initiating comments increased from 27.5% of intervals during baseline to 52.9% of intervals. These improvements across each of the four participants demonstrate peer-mediated skills training is an effective mode of intervention for children with ASD. Although this serves as evidence to support peer-mediated interventions for children with ASD, there have been few studies in which peers implement DTT procedures to teach academic skills to children with ASD.

Kim and Horn (2009) reported a large body of research that exists on the effectiveness of peer-implemented interventions for promoting not only communication skills of children with disabilities, and in particular children with ASD, but also academic skills. One study included in their review conducted by Colletti and Harris (1977) required siblings of children with ASD to present an academic skill, which were single-digit addition problems on flash cards for one sibling and printing letters on paper with a crayon for the other, in a discrete trial format. During baseline conditions, the siblings were allowed to use praise and reprimands for correct and incorrect responses, then they were allowed to provide edible reinforcers (i.e., candy) for correct responses during the intervention phases. For the first sibling dyad, the frequency of correct responding to addition problems increased to a mean of 41 during the first intervention phase from a baseline mean of 22. During the return to baseline conditions, the mean of correct addition problems decreased to 27.20 followed by an increase of the mean of correct responses to 42.14 once intervention was reintroduced. Results were similar with the second sibling dyad where the mean initial baseline frequency of correct responding was 29, followed by an increase to a mean frequency of 43 correct responses per session. Then the mean frequency of correct responses declined to 30.75 during the return to baseline, which was followed by an increase in the mean of correct responses to 54 during the final intervention phase. The results of this study showed typically developing peers, such as siblings, can modify the behavior of children with disabilities using a DTT intervention in the home setting.

In addition to positive effects for children with disabilities, studies involving student interventionists have also demonstrated that peer-mediated interventions are

beneficial for the student interventionist (Delquadri, Greenwood, Stretton, & Hall, 1983; Gable & Kerr, 1980; Gerber & Kauffman, 1981; Greer & Polirstok, 1982; Scruggs et al., 1985; Scruggs & Richter, 1985). One benefit for the student interventionist is the development and enhancement of the tutor's own academic skill and understanding (Chiang, Thorpe, & Darch, 1980; Cohen, Kulik, & Kulik, 1982; Gerber & Kauffman, 1981; Maheady & Harper, 1987; Maher, 1984; Polirstok & Greer, 1986). Besides notable increases in academic skills, there have been increases in collateral effects of peer-tutoring, namely increases in positive social interactions and decreases in negative social interactions between student interventionist-target student dyads (Franca, Kerr, Reitz, & Lambert, 1990). Also, Franca et al. (1990) found student interventionists were more often nominated by their classmates as preferable peers to work with or to play with after they had performed the role of peer-tutor for one tutee, and therefore, tutors appeared to receive more prestige and respect from their classmates following the peer-tutoring intervention.

Although there are many reasons to utilize peer-mediated interventions, there are also some concerns with their implementation as well. In particular, student interventionists may lose instructional time or opportunities to socialize with age-appropriate, typically developing peers. Additionally, there are concerns with peer-mediated interventions in terms of peer competence, informed consent, various negative side effects, and peer accountability (Greenwood, Carta, & Hall; 1988). A reasonable concern with utilizing typically developing peers to implement interventions with intellectual disabilities (ID) is that the procedures may inadvertently highlight the disability of the individual, potentially leading to the target students becoming

stigmatized and excluded from social groups (Chan, Lang, Rispoli,O'Reilly, Sigafoos, & Cole, 2009). To the contrary, Sasso and Rude (1987) discovered not only did socially popular peers who worked with participants with ID interact positively with the participants, but peers who did not receive training also began to have more frequent, positive interactions with the participants as well. Although the results of this study are promising, there remains the possibility student interventionists may tease and stigmatize students with ASD. A major concern for individuals designing peer mediated interventions is that peers may not regularly implement an intervention with sufficient integrity. Greenwood, Terry, Arreaga-Mayer, and Finney (1992) examined a variety of implementation factors that moderate student achievement, specifically in spelling accuracy. Variations in student outcomes were associated with reductions in the strength of treatment (e.g., opportunity to participate in peer tutoring and student participation), low program fidelity (i.e., unchallenging target skills), and low point earnings during tutoring (i.e., low rates of reinforcement). Despite these issues, results indicated that students in each class made educationally important gains in spelling accuracy. In general, peer-mediated interventions have been successfully implemented with children with ASD and continue to be supported by a solid literature base (Chan et al., 2009).

Peer-mediated DTT

There are few studies that have examined the effects of peer-mediated DTT in school settings. In addition to the preliminary evidence provided by Radley et al. (2015), Dart, Radley, Furlow, and Murphy (2016) expanded upon this study by examining what training conditions are necessary and sufficient to achieve adequate implementation of a peer-mediated DTT protocol for students with autism. Four typically developing high

school seniors were trained to implement a forward chaining procedure to four students with autism. A multiple baseline across participants design was used to evaluate the effects of didactic training and BST on student interventionist treatment integrity. Results demonstrated that BST was a more effective training procedure for promoting accurate implementation of DTT than didactic training alone. In addition, results showed that improvements in accurate implementation of each component of the DTT protocol were observed, but only one participant demonstrated treatment fidelity levels of 100% across all components.

A recently published study by Young and colleagues (2016) used BST to train six typically developing peers to implement DTT with three students with clinical diagnoses of ASD. The results of the first part of the study demonstrated that peers may be trained to implement DTT with high levels of integrity, and the maintenance of these results were observed as many as 33 school days following termination of training and performance feedback. Five of the peers from the first study participated in the second part of the study, which investigated the generalization of the DTT procedures from the first study to novel target skills. The results demonstrated that the peers effectively generalized the DTT protocol initially trained during BST to novel skills. Furthermore, the children with ASD made improvements in academic functioning that were not otherwise being targeted within the classroom due to limited resources. Interestingly, anecdotal reports from teachers of student interventionists indicated the students spontaneously requested to eat lunch, walk to the bus, and go to recess with the children with ASD following participating in the study. Thus, participating in peer-mediated DTT

may benefit the student interventionists by fostering positive attitudes regarding individuals with ASD.

Purpose of the Present Study

Although peer-mediated interventions and the procedures of DTT are well established in the literature, and previous studies have demonstrated peers can be trained to implement DTT procedures for children with ASD (Schriebman et al., 1983; Radley et al., 2015), there have been few studies which examine the effects of behavioral skills training for elementary school students as student interventionists utilizing DTT methods and the effects of these student interventionists on the acquisition of academic skills for a child with ASD in a school setting. Specifically, previous studies that have focused on peers as interventionists have been limited by insufficient treatment fidelity data and insufficient information on generalization and maintenance effects to ensure tutors use the skills over time and across different contexts (Kim & Horn, 2009). There are a variety of potential advantages of peer-mediated DTT in school settings for all stakeholders involved including: a reduced strain on valuable classroom resources; an increase in academic skills, an increase in positive social interactions with students with disabilities, an increase in prestige and respect for the student interventionist; and an increase in academic skills and social skills for the student with ASD. Therefore, the purpose of the study is to examine the effects of a behavioral skills training packing for teaching elementary school students to use discrete trial training methods.

Research Questions

1. What is the effect of behavioral skills training on an elementary school student's treatment integrity for DTT procedures?

2. Is the generalization of DTT procedures observed across target skills once student interventionists successfully complete the behavioral skills training on DTT procedures?
3. What is the effect of elementary school students as student interventionists implementing DTT procedures on the acquisition of academic skills for students with ASD in a school setting?
4. What is the treatment acceptability of the peer mediated DTT intervention for student interventionists?

CHAPTER II - METHOD

Participants and Setting

Participants included in this study were one child with ASD and three typically developing student interventionists. The study took place at an elementary school in a rural public school district in the Southeastern United States. Students with ASD who engaged in potentially dangerous problem behaviors, such as aggression, elopement (i.e. running out of the classroom), physically disruptive behavior (e.g. throwing, swiping materials, knocking over chairs), or self-injurious behavior, were excluded from the study. However, students with ASD who were nonvocal or vocal were allowed to participate in the study. The student with ASD, Tom, was a six-year-old male that was identified by his teacher as requiring additional teaching opportunities. At the time of this study, Tom had limited vocal language and was learning pre-academic skills in a self-contained classroom with 12 other students, one special education teacher, and two classroom aides. Tom primarily requested his wants and needs through pointing, leading others by the hand, or bringing items to adults; but he occasionally emitted approximations of words to request preferred items. According to Tom's teacher, he required the most assistance with matching and identifying shapes, matching and identifying letters, matching and identifying numbers, and sorting common objects that served as examples of basic shapes.

The three student interventionists were elementary school students in the sixth grade and attended the same school as the target child with ASD. Sixth grade teachers were asked to nominate high-achieving, responsible, trustworthy students who they believed could handle the responsibility of implementing a teaching strategy with a

younger student briefly each day. The first three student interventionists identified by their teachers as possessing the previously mentioned characteristics whose parents provided consent for participation were included in the study. There were two 11-year-old female students, Gwen and Adrianne, and one 11-year-old male student, Tony, who served as student interventionists. Once the student interventionists were identified, they were randomly assigned a target academic skill to teach by choosing an academic skill from a bag.

The University of Southern Mississippi Institutional Review Board approved this study before participant recruitment took place. Also, permission to conduct the study was obtained from the superintendent's office and school administration. Parental consent as well as assent to participate in the study for student interventionists and parental consent for target students was attained before the study began (see Appendix A, B, & C). Assent was not obtained for Tom due to his extremely limited language skills.

DTT sessions took place in a private classroom in order to limit distractions and were approximately 15 minutes in duration for each student interventionist. The private classroom had a table large enough for both participants to be seated within arm's reach of each other and enough chairs for participants and observers to be seated at the table. Potential reinforcers were placed within arm's reach of the peer-tutor, any stimuli required to teach the targeted skill were placed on the table in front of the target student, and data collection materials were placed on a clipboard for the student interventionist.

Materials

DTT Training Protocol

The training protocol (see Appendix D), which outlines each component of the DTT intervention, was provided to each student interventionist to review during training. The primary investigator and graduate students completing data collection retained copies of this protocol in the event a student interventionist required additional training.

Behavior Intervention Rating Scale (BIRS)

The Behavior Intervention Rating Scale (BIRS; See Appendix H; Von Brock & Elliott, 1987) was administered at the conclusion of the study to assess the student interventionists' perceptions of acceptability and utility of the intervention. The BIRS consists of 24 items, which are rated on a 6-point Likert scale. The rankings range from strongly disagree (1) to strongly agree (6). The BIRS includes the same 15 items from the IRP-15, but includes an additional 9 items that allow it to measure across three factors: Acceptability, Effectiveness, and Time (Von Brock & Elliott, 1987). High scores on the BIRS indicate high levels of satisfaction of the intervention. Technical evaluations of the BIRS have found a high internal consistency ($\alpha = .97$), as well as good content and construct validity (Elliott & Treuting, 1991). Modifications were made to the BIRS to include past tense wording and substituting the word "intervention" with "tutoring." Making modifications to the tense and wording of items have been reported to not significantly alter the psychometric properties of the IRP-15 (Freer & Watson, 1999), nor the BIRS (Sheridan, Eagle, Cowan, & Mickelson, 2001; Sheridan & Steck, 1995).

Acceptance Scale for Kindergartners (ASK)

The Acceptance Scale for Kindergarteners (ASK; See Appendix I; Favazza & Odom, 1996) was administered prior to behavioral skills training for the student interventionists and at the conclusion of the study to examine changes in the

interventionist's perception of individuals with a disability. The Acceptance Scale for Kindergartners is an 18-item, group administered scale adaptation of the Acceptance Scale, Lower Elementary Version (Voeltz, 1980). The scale developed for use with children in Kindergarten differs from the original Acceptance Scale in that the words mental, retarded, special education kids, and dummy are omitted. The Acceptance Scale for Kindergarteners uses visual representations (i.e. symbols representing a happy face for a yes response, a frowning face for a no response, and a confused face with a question mark above it for maybe response) of the words yes, no, and maybe to serve as anchors for each rating point with an item. However, these visual representations were removed in order to be developmentally appropriate (i.e. student interventionist's will respond with only a yes, no, or maybe). To compute a student interventionist's total ASK score, a zero will be assigned to a negative or nonaccepting response, a one will be assigned to a maybe response, and a two will be assigned to a positive or accepting response. The scores will range from 0-36 with high scores reflecting accepting attitudes and low scores reflecting nonaccepting attitudes. A technical evaluation of the ASK has found a significant Cronbach's alpha ($\alpha = .79$) and a split-half reliability coefficient (Spearman-Brown) of .76, which indicates acceptable internal consistency (Favazza & Odom, 1996).

Dependent Measures

Intervention Integrity

Intervention integrity was collected as the primary dependent variable in the current study. Graduate students in the school psychology program or undergraduate students who have been trained in direct observation data collection by the primary investigator assessed intervention integrity for each session. This was accomplished by

directly observing student interventionists implement the DTT procedures with the target student with ASD. Observers were within reaching distance of the target student with ASD so they were able to observe each of the responses provided by the student as well as address any problem behaviors if they occurred. Observers coded a "+/-" for each component of the procedure on each trial completed in a session on the Discrete Trails Teaching Evaluation Form (Babel, Martin, Fazzio, Arnal, & Thompson, 2008; see Appendix F. A "+" will indicate the student performed the component and a "–" if the student does not complete the component of the procedure. Following the session, the graduate student added the number of components completed and divide by the total number of steps that could be completed by the student interventionist (i.e., the number of components completed correctly divided by opportunities for completing components correctly).

Correct/Independent Responding

As a secondary dependent variable, the graduate student observers and the student interventionists collected skill acquisition data based on the responses of the target student with ASD. Skill acquisition responses were coded as correct, incorrect, or prompted. Correct responses to targeted academic skills were determined through collaboration with the target student with ASD's teacher, and ach task was presented on top of a table in an straight line array of three 3 x 5 cards. For the match-to-sample task, a correct response was defined as independently placing a 3 x 5 card with the uppercase letter "R" on top of the 3 x 5 card with the lowercase letter "r." A correct response to the receptive identification task was defined as pointing to, touching, or handing the student interventionist the 3 x 5 card with the shape of an octagon; a correct response for the

sorting task was defined as placing 3 x 5 cards of objects that served as multiple exemplars of shapes on top of a 3 x 5 card that served as a sample shape. A prompted response was defined as any instance in which the student interventionist used physical guidance to increase the likelihood the student would engage in a correct response, or if the student interventionist pointed to or gestured to the correct response, modeled the correct response, stated the correct response, or arranged the stimuli such that the correct stimulus was closer to the student with ASD.

Interobserver Agreement (IOA)

Data were collected by graduate students trained in the DTT procedures. Interobserver agreement (IOA) was assessed by having a second observer collect data simultaneously, and IOA data were collected for both student interventionist treatment fidelity and target student responses. An agreement was scored when both observers scored the same code for each targeted step of the DTT procedure. For example, if on trial one, both observers scored the student as correctly presenting the discriminative stimulus, an agreement was scored. If one observer scored a presentation as being correct and another observer scored a presentation as incorrect, a disagreement was scored. If both observers scored the presentation as being incorrect, an agreement was also scored. The total number of agreements was divided by the total number of agreements plus disagreements, and multiplied by 100, thus yielding a percent agreement score. IOA data were collected for a minimum of 30% sessions for each student interventionist. In addition to simple IOA, kappa was calculated to determine the agreement between observers for skill acquisition data and student interventionist treatment fidelity. As kappa accounts for both occurrences and non-occurrences of behaviors (Sattler & Hoge,

2006), it provides a better estimate of actual agreement than simple IOA. Kappa was calculated using the formula provided by Uebersax (1982). Kappa is interpreted on a scale from -1.0 to 1.0 where less than zero is interpreted as less than chance agreement, 0.01 to 0.20 as slight agreement, 0.21 to 0.40 as fair agreement, 0.41 to 0.60 as moderate agreement, 0.61 to 0.80 as substantial agreement, and 0.81 to 0.99 as almost perfect agreement (Viera and Garrett, 2005).

Procedural Integrity

Prior to the intervention phase, the student interventionists were trained to implement DTT by the primary investigator. Specifically, the student interventionists were taught to: (a) place reinforcers out of the student's reach, (b) place task specific teaching materials in front of the student, (c) get the student's attention, (d) present a discriminative stimulus for each trial, (e) use prompts to elicit a response from the target student, (f) use appropriate consequences immediately following a response (reinforcement for correct responding, withhold reinforcement for errors, regain student's attention when inattentive), (g) pause at least 3 seconds at the end of each trial, and (h) record data on student interventionist data sheet (Appendix F). All student interventionists were trained by the primary investigator using a behavioral skills training package. The training was similar to procedures used by Fetherston and Sturmey (2014) in that it consisted of written instructions, review and discussion of the procedures, modeling each step of the discrete trial teaching protocol, a role playing scenario (i.e., skill rehearsal) supervised by the primary investigator, and corrective feedback provided as necessary. This continued until participants demonstrate 100% accuracy as demonstrated on the student interventionist training procedural integrity data sheet (See

Appendix E). IOA for procedural integrity was assessed by having a second observer collect data simultaneously for each student interventionist for each training session. Procedural integrity for behavioral skills training was 100% and interobserver agreement was 100%.

Experimental Design

A multiple baseline design across participants (Cooper, Heron, & Heward, 2006) was used to evaluate the effectiveness of the peer-mediated DTT method of instruction. The rationale behind utilizing this design and the reason it is an appropriate method for evaluating the effects of the peer mediated DTT intervention is that it is not likely the acquisition of academic skills is reversible. This is one of the strengths of the multiple baseline design in that it does not require withdrawing treatment to demonstrate experimental control. An additional strength of utilizing the multiple baseline design is that it will evaluate the development of multiple behavior changes. Three student interventionists were assigned to one student with ASD; and since each student interventionist was assigned a different academic skill to teach their target student, there were multiple behavior changes (i.e., academic skills) occurring throughout the course of the study for the student with an ASD. According to Cooper, Heron, & Heward (2006), the multiple baseline design is ideally suited to the evaluation of the progressive, multiple behavior changes that teachers and practitioners seek in an applied setting such as an elementary school.

Multiple Stimulus Without Replacement (MSWO)

The primary investigator conducted an MSWO preference assessment for the target student with ASD prior to baseline sessions. The procedure for the MSWO

assessment was completed following similar procedures described by Deleon and Iwata (1996). Prior to the MSWO, the primary experimenter asked the participant's parents to list seven items their child may prefer which will be presented during the assessment. For each assessment, a selection response was recorded when the participant made physical contact with one of the presented items, and the participants had 30 s to select an item. When a selection is made, the trial ended after the participant received 30 s access to the item (non-edible stimuli) or the item had been completed consumed (edible stimuli). If the child did not make a selection, the trial ended.

Prior to beginning the assessment, participants were given a sample of any edible items and 30 s access to any other items included in the assessment. Then, the items were presented on a tray on top of a table in random order, in a straight line array, and approximately 5 cm apart. The primary investigator instructed the participant, "Pick one." Once a selection is made, the item was either removed from the immediate area or will not be replaced (edible items). Prior to the next trial, the sequencing of the items in the array were rotated by taking the item at the left end of the line and moving it to the right end, and the items were adjusted such that they were equidistant from each other. This continued until all items were selected or the participant did not make a selection within 30 s from the beginning of a trial. Any items that were remaining were recorded as not selected. Once each target student completed 5 sessions in this manner, data were summarized by giving each item a ratio based on the number of times that it was available. The ratios were summed and converted into a percentage. Once the final percentage score was calculated for each item, the items were ranked from high to low to indicate which items were predicted to be the most effective reinforcers.

Baseline

Prior to collecting baseline data, experimenters selected potential academic skills from the target student's annual goals in the Individualized Education Plan (IEP) developed by the student's interdisciplinary team. After further collaboration with the student's teacher, probes for target skills were conducted to identify skills that were not currently in the target student's repertoire. Target skills were chosen if the student with ASD did not provide any independent, correct responses. The student interventionists were randomly assigned to teach the target student with ASD. During baseline, the student interventionist was provided with a DTT data sheet, any materials required to teach the assigned academic skill, and any potential reinforcers identified by the MSWO preference assessment. A graduate student observer read the following script to the student interventionist prior to each session: "(Student interventionist's name), you will be teaching Tom to (target skill). Here are all of the materials you will need to teach, as well as some popcorn that Tom likes. I will be seated at the table taking notes. You should teach Tom the best you can, and if at any point you would like to stop, please let me know and you can return to class." The target students received training on DTT procedures once the percent correct for both treatment integrity and the targeted academic skill were stable in trend and level. In other words, percent correct for treatment integrity and targeted academic skill either remained consistently low or showed a consistent decreasing trend across multiple sessions. Student interventionists who were trained were instructed not to share components of the DTT training with student interventionists who remained in the baseline condition. Baseline sessions were no longer than 15 minutes in duration, allowing the student interventionist over a minute per trial. The target student

was allowed 5 seconds to respond to the student interventionist's instruction before the instruction was repeated. The target student was considered withdrawn from the session and the session was terminated if the target student did not respond to three consecutive instructions. If a major distraction occurred, such as a fire drill, the session was terminated.

Intervention

Sessions during the DTT phase were identical to baseline sessions, except correct responses by the target student with ASD was reinforced with the top ranked item identified from the student's MSWO preference assessment. In addition, the student interventionist received corrective feedback following each session based upon their implementation of the DTT procedures. The primary investigator monitored each student interventionist's performance on a session-by-session basis and repeated the training if the student interventionist's treatment integrity score fell below 80% for three consecutive sessions. Mastery criterion for this phase was 80-100% correct for both student interventionist treatment fidelity and acquisition of the target skill across 3 consecutive sessions. The rationale for this mastery criterion was this criterion is typically used in IEPs for special education classrooms.

Generalization Probes

Generalization was assessed by requiring student interventionists to teach a different student interventionist's academic skill using the DTT procedures. Each student interventionist was assigned to teach one of the different target academic skills for each generalization probe. For example, since Gwen was teaching the matching to sample task, she was asked to teach the receptive identification task for her first generalization

probe, and the sorting task for the second generalization probe. Then, Adrianne taught the sorting task for her first generalization probe and the matching to sample task for the second generalization probe. This process continued for each generalization probe for each student interventionist for the remainder of the study. Each student interventionist completed at least two generalization probes during the baseline and intervention phases.

Data Analysis

Results were analyzed by using visual inspection of the trend, level, and variability of the data collected for each session. It was hypothesized as student interventionist treatment integrity improved from baseline, the target student's acquisition of academic skills would improve during the DTT phase. Furthermore, it was also hypothesized once the student interventionist was trained to implement DTT procedures and met mastery criterion for the DTT phase, generalization of the procedures would be observed when the student interventionists were asked to teach the target students additional, topographically similar academic skills. In other words, the student interventionists were teaching skills that had shared stimulus properties. Tau-U (Parker, Vannest, Davis, & Sauber, 2011) effect sizes were calculated across baseline and intervention phases for each student interventionist, each target skill, across all student interventionists, and across all target skills. Tau-U is a method for measuring data non-overlap between two phases (A and B) and can address data trend, yielding a more conservative estimate of effect. Tau-U, which includes four indices that are based on Kendall's Rank Correlation and Mann-Whitney *U*, is more conservative than NAP because it allows for the control of trends in the baseline and intervention phases (Parker et al., 2011). Tau-U scores range between 0 and 1 and represent the percentage of data

that improved between baseline and treatment. Tau-U scores were interpreted using the aforementioned guidelines proposed by Vannest and Ninci (2015), thus a score of 0.20 or less was considered a small change, 0.21 to 0.60 a moderate change, 0.61 to 0.80 a large change, and above 0.81 a large to very large change.

CHAPTER III - RESULTS

Effects of behavioral skills training on intervention integrity

The primary research question addressed the functional relationship between behavioral skills training and treatment integrity. It was hypothesized the student interventionists would implement the DTT procedures with integrity above the levels of integrity observed during baseline sessions. In general, visual analysis indicated the behavioral skills training had a large effect on treatment integrity for not only the trained target skill, but also for target skills that student interventionists were not directly trained to teach. Each student interventionist implemented the DTT protocol with low levels of treatment integrity during baseline sessions and reached mastery criteria during treatment sessions. Furthermore, no overlapping data were observed from baseline to intervention for each student interventionist. The overall effect size of the training procedures on treatment integrity across each of the student interventionists indicated a very large effect (Tau-*U* = 1.00, 95% CI = 0.72 – 1.00). In addition, the effect size for treatment integrity generalization probes across each of the student interventionists also indicated a very large effect (Tau-*U* = 1.00, 95% CI = 0.50 – 1.00). Interobserver agreement was collected across an average of 32.02% of observations (28.57% of sessions for Gwen, 37.5% of sessions for Adrianne, and 30% of sessions for Tony), and total IOA for intervention integrity averaged 92.99% across the student interventionists. Individually, IOA averaged 93.13% for Gwen (range: 89.71 – 100%), 91.61% for Adrianne (range: 89.03 – 100%), and 94.22% for Tony (range: 83.33 – 100%). Kappa for all sessions in which IOA was collected was 0.892 (SE = 0.009, 95% CI = 0.875 – 0.909), which is interpreted as almost perfect agreement. Data for each student interventionist is presented below.

Intervention Integrity, Gwen

The top panel of Figure 1 includes Gwen's intervention integrity data. Visual analysis of Gwen's intervention integrity shows a low, stable baseline. Following BST, a large and immediate increase in intervention integrity above baseline levels was observed. A high, stable trend in integrity continued through the intervention phase. The effect size of BST training on Gwen's intervention integrity was very large (Tau-*U* = 1.00, 90% CI = 0.37 – 1.00). Gwen completed two generalization probes during baseline with low levels of integrity, then completed two generalization probes during intervention with consistently high levels of integrity. Although, the effect size of BST training on Gwen's intervention integrity for untrained target skills was very large (Tau-*U* = 1.00, 90% CI = 0.00 – 1.00).

Intervention Integrity, Adrianne

The middle panel of Figure 1 includes Adrianne's intervention integrity data. Visual analysis of Adrianne's intervention integrity shows a low, relatively stable baseline. Following BST, a large and immediate increase in intervention integrity above baseline levels was observed. A high, relatively stable trend in integrity continued through the intervention phase. The effect size of BST training on Adrianne's intervention integrity was very large (Tau-*U* = 1.00, 90% CI = 0.42 – 1.00). Similar to Gwen, Adrianne completed two generalization probes during baseline with relatively low levels of integrity similar to baseline levels observed for the target skill. Levels of intervention integrity during two generalization probes that were completed during intervention were high and stable. Similar to Gwen's results, the effect size of BST

training on Adrianne's intervention integrity for untrained target skills was very large (Tau-*U* = 1.00, 90% CI = 0.00 – 1.00).

Intervention Integrity, Tony

The bottom panel of Figure 1 includes Tony's intervention integrity data. Visual analysis of Tony's intervention integrity shows a low, relatively stable baseline. Following BST, a steady increasing trend in intervention integrity above baseline levels was observed. A high, relatively stable trend in integrity continued through the intervention phase. The effect size of BST training on Tony's intervention integrity was very large (Tau-*U* = 1.00, 90% CI = 0.46 – 1.00). Tony completed three generalization probes during baseline with relatively low levels of integrity similar to baseline levels observed for the target skill. Levels of intervention integrity during two generalization probes that were completed during intervention were high and stable. The effect size of BST training on Tony's intervention integrity for untrained target skills was very large (Tau-*U* = 1.00, 90% CI = 0.05 – 1.00).

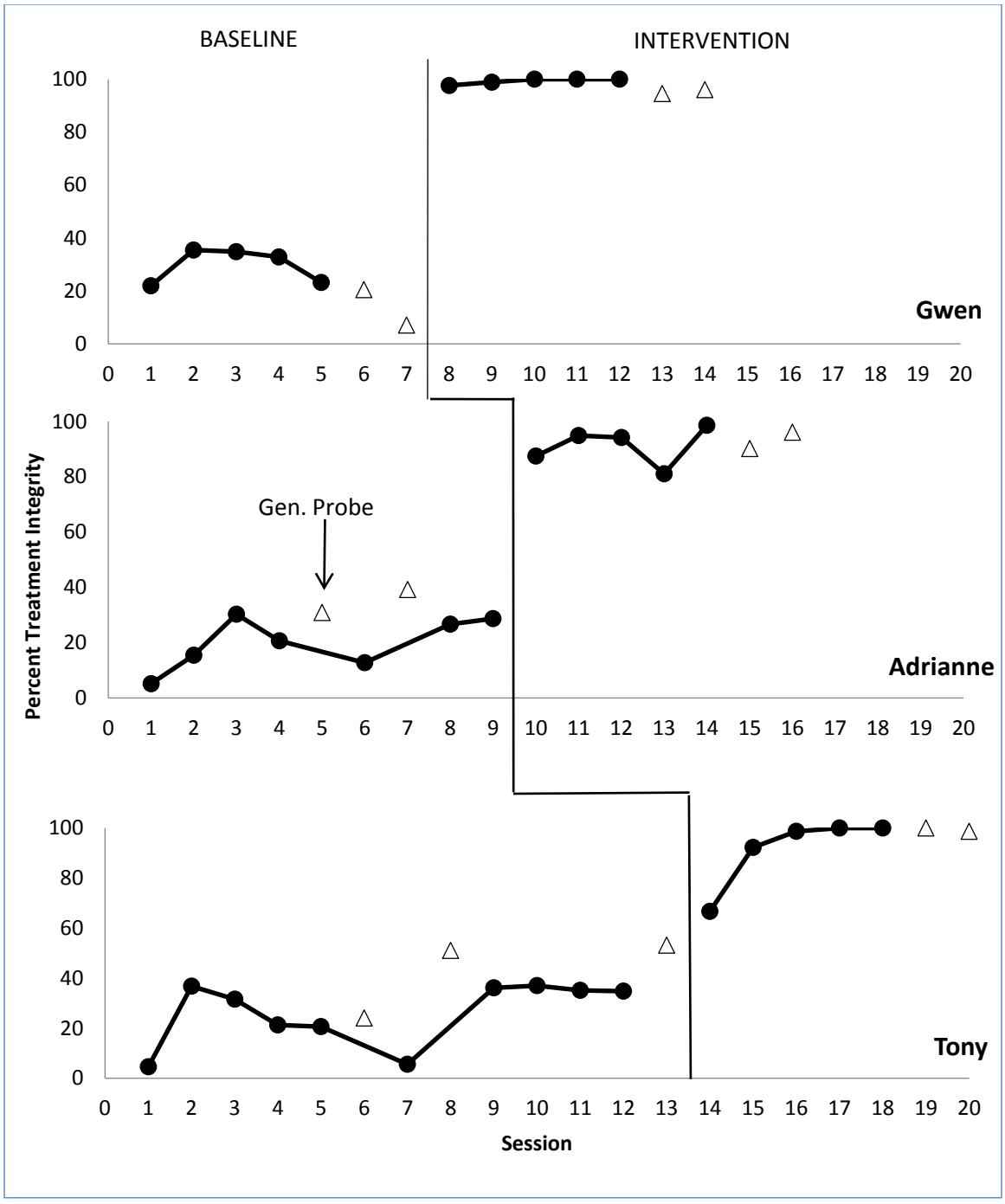

Figure 1. Percent treatment integrity for each student interventionist.

Effects of peer-mediated DTT on correct/independent responding

The third research question sought to address the functional relationship between the peer-mediated procedure and the acquisition of the targeted skills for the participant with ASD. It was hypothesized that the implementation of peer-mediated DTT would result in an increase in the accuracy of the participant's responding above baseline levels. Overall, visual analysis indicates the implementation of peer-mediated DTT had a large effect on correct, independent responses for each of the target skills. The target student with ASD responded with relatively low levels of accuracy during baseline sessions and reached mastery criteria during intervention sessions. There were no overlapping data observed from baseline to intervention for two of the three targeted skills. The overall effect size of the training procedures on treatment integrity across each of the student interventionists indicated a very large effect (Tau-*U* = 1.00, 95% CI = 0.50 – 1.00). In addition, the effect size for treatment integrity generalization probes across each of the student interventionists also indicated a large effect (Tau-*U* = 0.65, 95% CI = 0.12 – 1.00). Total IOA for skill acquisition observations averaged 87.78% across each academic skill. Individually, IOA averaged 83.33% for the match to sample task (range: 70 – 100%), 86.67% for the receptive identification task (range: 60 – 100%), and 93.33% for the sorting task (range: 80 – 100%). Data for each targeted skill is presented below.

Correct/independent responding, Tom

Figure 2 presents Tom's correct, independent responding across each of the targeted skills using the peer-mediated DTT procedure. Across the targeted skills, peer-mediated DTT was associated with a very large overall effect size for correct, independent responding (Tau-*U* = 0.90, 95% CI = 0.61 – 1.00). Furthermore, Tom's

correct, independent responding remained high for each of the target skills across each of the student interventionists. Data from each target skills are presented individually below.

Visual analysis of the top panel of Figure 2 shows a slightly variable baseline phase for the match-to-sample task. After the student interventionists were trained on the DTT protocol, a steady increase in accurate responding was observed during the intervention phase. Tom reached mastery for this skill after responding with 80% accuracy. In addition, Tom responded accurately across each of the student interventionists for three of four generalization probes conducted during the intervention phase. The effect size of the peer-mediated DTT procedure on Tom's accurate responding for matching-to-sample is large (Tau-*U* = 0.71 90% CI = 0.21 – 1.00).

As shown in the middle panel of Figure 2, visual analysis shows a low, relatively stable baseline phase for the receptive identification task. It should be noted Tom reached 90% accuracy on the second generalization probe with Gwen as the student interventionist. After the student interventionists were trained on the DTT protocol, a steady increase in accurate responding was observed during the intervention phase. Tom reached mastery for this skill after responding with 80% accuracy. Tom responded more accurately with Gwen as the student interventionist when compared to Tony (i.e., second generalization probe in the baseline phase and intervention phase). The effect size of the peer-mediated DTT procedure on Tom's accurate responding for the receptive identification task is very large (Tau-*U* = 0.83, 90% CI = 0.33 – 1.00).

Visual analysis of the bottom panel of Figure 2 shows a low, stable trend in the baseline phase for the sorting task. After the student interventionists were trained on the DTT protocol, a large increase in accurate responding was observed during the

intervention phase. Furthermore, Tom's accurate responding increased from zero levels during the baseline phase to mastery by the second generalization probe during the intervention phase. The effect size of the peer-mediated DTT procedure on Tom's accurate responding for the sorting task is very large (Tau-*U* = 1.00, 90% CI = 0.56 – 1.00).

As shown in the middle panel of Figure 2, visual analysis shows a low, relatively stable baseline phase for the receptive identification task. It should be noted Tom reached 90% accuracy on the second generalization probe with Gwen as the student interventionist. After the student interventionists were trained on the DTT protocol, a steady increase in accurate responding was observed during the intervention phase. Tom reached mastery for this skill after responding with 80% accuracy. Tom responded more accurately with Gwen as the student interventionist when compared to Tony (i.e., second generalization probe in the baseline phase and intervention phase). The effect size of the peer-mediated DTT procedure on Tom's accurate responding for the receptive identification task is very large (Tau-*U* = 0.83, 90% CI = 0.33 – 1.00).

Visual analysis of the bottom panel of Figure 2 shows a low, stable trend in the baseline phase for the sorting task. After the student interventionists were trained on the DTT protocol, a large increase in accurate responding was observed during the intervention phase. Furthermore, Tom's accurate responding increased from zero levels during the baseline phase to mastery by the second generalization probe during the intervention phase. The effect size of the peer-mediated DTT procedure on Tom's accurate responding for the sorting task is very large (Tau-*U* = 1.00, 90% CI = 0.56 – 1.00).

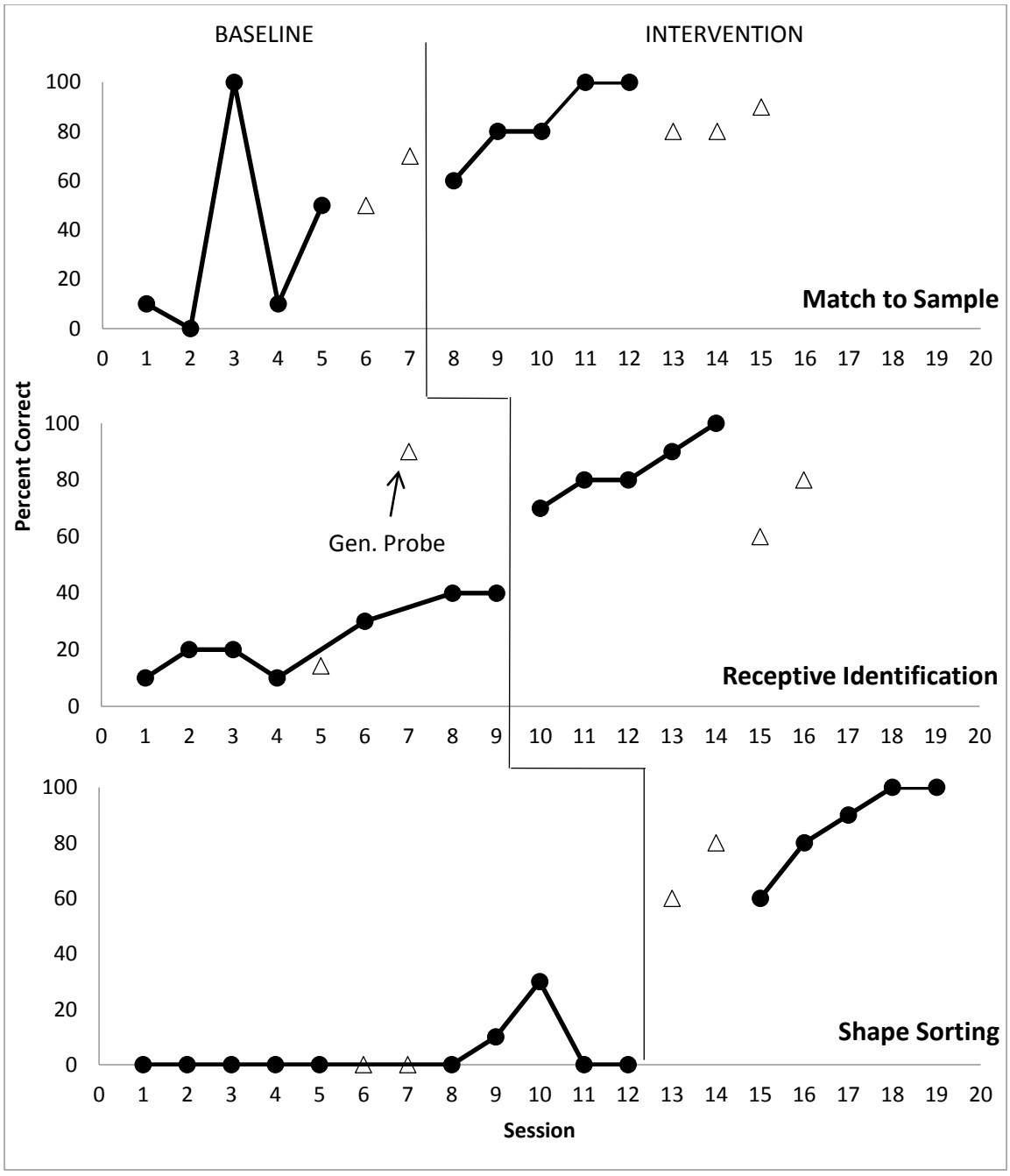

Figure 2. Percent correct/independent responding across target skills for Tom.

Treatment Acceptability

Data were collected on the acceptability of the DTT intervention from each of the student interventionists. At the conclusion of the study, each student interventionist

completed a Behavior Intervention Rating Scale (BIRS). Overall, the peer-mediated DTT procedure was rated positively by the student interventionists (M = 5.22, SD = 1.27; Agree) on the factors of acceptability (M = 5.16, SD = 1.36; Agree), effectiveness (M = 5.33, SD = 1.19; Agree), and time (M = 5.33, SD = 0.82; Agree).

Acceptance of Students with Disabilities

Data were collected on the acceptance of students with disabilities after each participant provided assent to participate in the study and at the conclusion of the study. The student interventionists completed a modified Acceptance Scale for Kindergartners (ASK). In general, each of the student interventionists provided responses indicating accepting attitudes prior to participation in the study (M = 32.67, SD = 4.16; Positive/Accepting). Although there was a slight decrease in average scores provided by the student interventionists at the conclusion of the study, their scores reflected positive accepting attitudes (M = 31.33, SD = 3.06; Positive/Accepting). Two-tailed t-tests were completed to determine the statistical significance of student interventionist's pre-post scores; the results for each student interventionist are displayed below in Table 2. The t-tests did not yield any significant results for any of the student interventionists.

Table 1

t-test Results of Acceptance Scale for Kindergartners (ASK)

	Mean	SD	t-test (p)
Gwen	35	1.41	0.33
Adrianne	31	4.24	0.14
Tony	30	2.83	0.16

CHAPTER IV – DISCUSSION

The purpose of the current study was to evaluate the effects of behavioral skill training on the implementation of peer-mediated discrete trial training by elementary school students. In addition, this study aimed to assess the generalizability of DTT procedures across target skills once student interventionists successfully completed the behavioral skills training. Functional relationships were demonstrated between behavioral skills training and student interventionist treatment integrity. The results of the current study provides additional evidence that elementary school students can be trained effectively to implement DTT, and it provides preliminary evidence that the elementary students may generalize DTT procedures across a variety of target skills.

The results of this study replicated the results of previous studies that have demonstrated the utility of BST to train others to implement DTT in school settings. Similar to the results of previous research involving peer-mediated DTT (Dart et al., 2016; Radley et al., 2015, Schriebman et al., 1983; Young, Radley, Jenson, West, & Clare, 2016), each of the student interventionists were trained to implement the DTT protocol with a high-degree of fidelity following a brief training session consisting of written and verbal instructions, modeling, rehearsal, and corrective feedback. The high-degree of fidelity may have been maintained by on-going corrective feedback that was provided throughout the remainder of the study. For Gwen and Adrianne, integrity led to an immediate increase to 100 and 87.5 percent treatment integrity following BST, yet Tony's integrity was initially 66.67% following initial training. It is also possible that the ongoing corrective feedback that was provided throughout the study may have been responsible for the maintenance of high treatment integrity for Gwen and Adrianne and

the increase in treatment integrity for Tony. The results of the present study also expand on the current literature base in that Tom acquired skills as a result of the peer-mediated DTT intervention. Despite the fact that Tom received a less intense intervention than what is typical of EIBI programs, they were sufficient to teach each of the target skills to mastery.

Response generalization was observed across different target skills for each student interventionist. Skinner (1953) conceptualized response generalization as a process in which "reinforcement of a response increases the probability of other responses that are similar" (p. 54). More recently, Mayer, Sulzer-Azaroff, and Wallace's (2011) definition of response generalization involves physical similarities between the novel response and any previously reinforced responses. In this study, the DTT teaching procedures for teaching match-to-sample, receptive identification, and sorting tasks were topographically similar responses, thus making generalization of the teaching procedures more likely. This expands upon previous literature demonstrating the effectiveness of peer-mediated DTT in that a student interventionist may teach additional skills without being directly trained. This could save school personnel supervising such a program time in that they may need to only provide behavioral skills training on DTT procedures then provide booster sessions or ongoing corrective feedback throughout the school year rather than re-training interventionists for each target skill (Dufrene, Noell, Gilbertson, & Duhon, 2005).

Constraints on time, personnel, intervention intensity, and other resources have been cited in previous research as potential barriers to the implementation of DTT in school settings (Skokut et al., 2008; Steege, Mace, Perry, & Longenecker, 2007).

Furthermore, DTT interventions within the schools are often provided by a single instructor, thereby limiting opportunities for the generalization of targeted skills (Steege et al., 2007). The findings of this study contribute to previous literature that supports a peer-mediated approach to increasing the feasibility of implementing DTT in schools. Whereas DTT sessions completed in a study by Radley et al. (2015) were not longer than 30 minutes in duration, DTT sessions for target students with ASD that were conducted during this study were not longer than 45 minutes in duration. Still, each student interventionist was removed from their classroom for no longer than 15 minutes before the next student interventionist was sent to the classroom, thereby limiting the amount of time student interventionists were away from their typical classroom activities. Since peer-mediated interventions capitalize on an abundance of potential interventionists, these students collectively provided effective 1:1 instruction to the target student for up to 45 minutes. During this time, a target student's teacher may have increased opportunities to focus on a variety of other time-intensive classroom tasks. A major barrier to conducting DTT in schools is that students may not receive this type of teaching intervention with sufficient intensity to observe progress towards academic goals. Yet, previous studies have demonstrated that students with ASD acquire academic skills following the implementation of peer-mediated DTT (Radley et al., 2015; Young et al., 2016). Although further research is warranted, the results of this study lend further support to the utility of peer-mediated DTT in schools because the target student acquired skills from his individualized education plan (IEP) that were not otherwise targeted in the classroom. In addition, the results of this study and the findings of Young et al. (2016) provide preliminary evidence that the training of multiple peers as interventionists

provide additional opportunities for the generalization of skills for students with ASD. This may not otherwise be possible if the student with ASD only receives instruction from single instructor trained to implement DTT. This can be especially problematic if instruction is only provided by adults, or more specifically, teachers or classroom assistants.

It should be noted that there were not any significant changes in the accepting attitudes of individuals with disabilities based on the results from the ASK. Each student's ASK scores indicated high levels of acceptance and positive attitudes towards students with disabilities prior to beginning the study. Therefore, it is possible the results from the ASK did not change significantly due to ceiling effects. It is possible that the positive attitudes towards individuals with disabilities are a reason why the student interventionists provided assent to participate in the study in the first place. In addition, their attitudes towards students with disabilities, despite any challenges that may have arisen during implementation, did not change significantly following the study's conclusion. This may have contributed to their success as a student interventionist. Anecdotally, the student interventionists asked before the study began how soon they would get to meet the target student, if it would be possible to play with the target student with ASD following sessions, and asked if they could see the target student with ASD one last time before summer break when the student interventionists were gathered at the conclusion of the study. Furthermore, the teachers of student interventionists reported at the conclusion of the study that the students seemed to enjoy the time spent with the target student with ASD and the work they were completing with him. Since the ASK may not be sufficiently sensitive to changes in a peer's acceptance of other students with

disabilities, future research may focus on collecting social validity data in a variety of ways. In a review of strategies for assessing attitudes towards individuals with disabilities, Salend (1994) suggests using one of the most widely used instruments for assessing attitudes toward individuals with disabilities known as the Attitudes Towards Disabled Persons (ATDP) assessment. This scale may be particularly helpful for peer-mediated DTT interventions conducted in a school setting since there are four levels of the Acceptance Scale: Lower Elementary, Upper Elementary, Secondary Level-A version, and Secondary Level-B version. Besides more formal devices for measuring a student's attitudes towards individuals with disabilities, Salend (1994) recommends the direct observation of interaction patterns between students in classrooms, play areas, and social settings. Young et al. (2016) conducted probes during unstructured play periods and observed increases in positive social interactions between student interventionists and participants with autism after completing peer-mediated DTT intervention. Thus, it is possible that the implementation of peer-mediated DTT may not only promote further inclusion of individuals with ASD, but may also benefit peer tutors through fostering positive attitudes regarding individuals with ASD (Young et al., 2016).

Limitations

There were several limitations to the current study. Perhaps the most notable limitation of the study includes the increasing trend and variability in correct/independent responding during the baseline phases for Tom. It is important to note that Tom had accurately matched many of his basic shapes during the initial skills probes. It is possible that student interventionists may have reinforced Tom's responses during baseline, and he quickly acquired the match-to-sample task with octagon. It is also possible that once

Tom's accuracy with the match-to-sample task with octagon improved, his matching repertoire generalized to the sorting task and his responding, though not at mastery level, resulted in some form of reinforcement (e.g., social praise) from the student interventionists. Although the increasing trend limits conclusions that may be drawn, it must be noted that incorrect/independent responding was not a basis for phase change decisions. In addition, the results for generalization probes for Tom's independent/correct responses across student interventionists are limited. Tom only provided a correct/independent response above 80% for the second generalization probe for the receptive identification and sorting tasks. Future researchers should collect additional data to ensure students with ASD reach mastery criteria across each of the student interventionists.

Second, data collection procedures required the researchers to remain in close proximity to the student interventionists and the target student during DTT sessions. Thus, it is unknown if reactivity influenced student behavior throughout each session. Although there was little interaction between observers and the student interventionists or target student, future studies may investigate the effectiveness of an intervention such that teachers may further reduce the intensity of supervision for student interventionists. One way to reduce the intensity of supervision without sacrificing treatment integrity may be a self-monitoring intervention. For example, Belfiore, Fritts, and Herman (2008) found that video self-monitoring and self-evaluation increased the accuracy of DTT for four staff members providing at least 20 hours of intervention per week. Although student interventionists may not spend as much time implementing DTT, a self-monitoring intervention may be sufficient to maintain integrity with reduced direct supervision.

Third, although response generalization of the student interventionist's implementation of the DTT procedures was observed, insufficient data were collected to determine if stimulus generalization would have been observed for Tom. Based on data that were collected, Tom continued to respond with at least 80% accuracy across each of the student interventionists for the match to sample task. But, due to the time constraints of the school year, additional data demonstrating generalization across student interventionists for the receptive identification and sorting task were not completed. Future studies may investigate whether stimulus generalization across student interventionists is observed during peer-mediated DTT sessions by collecting additional generalization probe data. Furthermore, future research may investigate generalization for target students with ASD in different learning environments. An additional limitation to this study is the lack of maintenance probe data. Follow-up data on intervention integrity and student skill acquisition may provide information on the long-term effects of peer-mediated DTT.

Conclusion

The current study demonstrates that behavioral skills training is effective with teaching elementary school students to implement DTT, and similar to previous research, peer-mediated DTT resulted in an improvement in the acquisition of targeted academic skills. In addition, this study provides preliminary evidence on student interventionist's generalization of DTT procedures across a variety of academic skills and a target student with ASD's generalization of responses across student interventionists. Additional research is needed to determine the long-term effectiveness of peer-mediated DTT and to

determine if it is possible to decrease the intensity of the supervision of student interventionists.

APPENDIX A – PARENTAL PERMISSION DOCUMENT 1

BACKGROUND

Your child_____ is being asked to help as a peer tutor in a research study. Before you decide, it is important for you to understand why the research is being done and what it will involve. Please take the time to read the following information carefully. Ask if there is anything that is not clear or if you would like more information. Take time to decide whether you will allow your child to take part in the study.

The purpose of this research study is to evaluate the effects of peer tutoring on the behavior of children with autism spectrum disorders. Research has shown that intensive intervention services are beneficial in improving long-term outcomes in children with autism spectrum disorders, such as language and cognitive skills. Although effective, intensive services are often difficult to implement in school settings due to time constraints of teachers and other school staff. As such, research has evaluated whether peers can effectively provide supplemental tutoring.

The research will be conducted by Christopher Furlow, a graduate student in the School Psychology program at the University of Southern Mississippi, and Dr. Keith Radley, an assistant professor of school psychology at the University of Southern Mississippi.

STUDY PROCEDURE

If you allow your child to participate in this study, they will receive instruction in peer tutoring. Instruction will occur during a non-instructional period. During this period, your child will learn tutoring strategies and watch examples of successful peer

tutoring. Following didactic training, your child will role-play peer tutoring techniques with a research assistant.

Once your child has demonstrated proficiency in the peer tutoring strategies, they will serve as a peer tutor to a child with autism spectrum disorder. Peer tutoring will occur three times per week during non-instructional periods. Each peer tutoring session will be approximately 15 minutes in duration. Peer tutoring will take place under the supervision of a research assistant. Skills that your child may tutor include matching shapes, naming colors, and identifying letters.

The peer tutoring program will last approximately five weeks. At the end of the peer tutoring program, your child will complete a short survey. This survey will is short and simple, and will ask your child if they enjoyed participating as a peer tutor.

RISKS

The risks of this study are minimal. There is a risk that your child may not enjoy serving as a peer tutor and may become uncomfortable while learning or practicing peer tutoring strategies. If your child feels upset in any way as a result of their participation, you may tell Dr. Radley or Dr. Dart, who can help to alleviate any distress. If your child does not enjoy participating as a peer tutor, they may request to stop at any time. Should your child request to stop serving as a peer tutor, they will be returned to their regular class. In order to minimize risk, students will be asked regularly if they would like to continue to serve as a peer tutor.

In addition to the risks listed above, your child may experience previously unknown or unforeseen risk.

BENEFITS

We cannot promise any direct benefit to your child for taking part in this study. However, possible benefits from participation in the peer tutoring may include meeting new children and learning how to help students with exceptionalities. The results of this study may also provide useful information on how schools can better help students with autism spectrum disorders.

ALTERNATIVE PROCEDURES

If you do not want your child to participate in this study, your child will continue with his or her regularly scheduled school activities. Your child's participation will not prevent you from participating in other school or class activities.

CONFIDENTIALITY

Other than name and age, no personal information will be collected from your child. The personal information that is collected will be kept strictly confidential. Your child will be assigned a number, which will be used on study materials instead of their name. The hard copies of the study materials will be stored in a locked filing cabinet located in Dr. Radley's private office. Dr. Radley is the only person that has the key and access to the filing cabinet. Electronic data will be stored on Dr. Radley's office computer, which is password protected. Only members of the research team will have access to this information. The results of this study may be presented at professional conferences and/or published in a professional journal. If this occurs, your child's personal information will be protected.

PERSON TO CONTACT

If you have questions, complaints, or concerns about the research or related matters, or if you feel your child has been harmed as a result of participation in the study, please contact Dr. Radley or Christopher Furlow, either by phone or by e-mail.

Keith Radley

(601) 266-6748

keith.radley@usm.edu

Christopher Furlow

(504) 458-6584

christopher.furlow@eagles.usm.edu

VOLUNTARY PARTICIPATION

It is up to you to decide whether to allow your child to take part in this study. Participation is strictly voluntary. Refusal to allow your child to participate or the decision to withdraw your child from this research will involve no penalty, prejudice or loss of benefits to which your child is otherwise entitled. This will not affect the services your child is provided their school. You may choose to withdraw your child at any time without providing a reason.

COSTS AND COMPENSATION TO PARTICIPANTS

There are no costs to participate in this study.

Your child may be given small rewards for participation in the study. The rewards will be different and may vary in cost. Your child will not know what the reward is beforehand. Examples of rewards include a snack or a small toy. Any reward that you or your child is not comfortable with will not be used. Please indicate any rewards or snacks not to be used with your child on the following page.

CONSENT

By signing this consent form, I confirm I have read the information in this parental permission form and have had the opportunity to ask questions. I will be given a signed copy of this parental permission form. I voluntarily agree to allow my child to take part in this study.

_____

Child's Name

_____

Parent/Guardian's Name

_____ _____

Parent/Guardian's Signature Date

_____

Relationship to Child

The following rewards or snacks may **NOT** be used with my child:

_____

_____

_____

_____

_____

_____

Name of Researcher or Staff

_____ _____

Signature of Researcher or Staff Date

APPENDIX B – ASSENT TO PARTICIPATE IN THE STUDY

Purpose of the Research

We are asking you to take part in a research study because we are trying to learn more about how to help students learn.

Procedure/Intervention/Method

If you agree to be in this study, you will serve as a peer tutor to younger students in a different class. As a peer tutor, you may teach other students how to match shapes, name colors, or identify letters of the alphabet. Serving as a peer tutor might help you make new friends and learn how to help other students.

Before serving as a peer tutor, you will be taught techniques for helping students learn. This training will last about an hour, and will occur during a non-academic time, such as recess. During training, you will watch examples of tutoring and practice with an adult. After you have learned how to use the peer tutoring strategies, you will tutor another student. An adult will supervise you as you tutor the other student.

You will be asked to tutor another student for about five weeks. After tutoring is finished, you will be asked to take a survey. The survey is short and will ask you whether or not you liked being a peer tutor.

Risks

By participating in this group, there may be several risks. You may not like leaving class to be a peer tutor. Your teachers will try to make sure that you leave class at a time where you will miss the least amount of work and they will help you make up any work you may miss. They will also try to make sure that other children don't know that you are a peer tutor if you don't want them to know. You may feel nervous when you are

asked to practice some of the things you learn. If this happens, your teachers and other adults will try to help you feel better and find ways to make it easier for you. You may also not like completing the questionnaires. If you have any questions, you can ask for help at any time. You also can choose not to participate at any time.

Benefits

Being in this study will help us to understand the best way to help kids learn. Your participation in this group may also help you make new friends.

Alternative Procedures and Voluntary Participation

If you don't want to be in this study, you don't have to be in it. Remember, being in this study is up to you and no one will be upset if you don't want to participate. You can change your mind later if you want to stop. Please talk this over with your parents before you decide whether or not to participate. We will also ask your parents to give their permission for you to take part in this study. But even if your parents say "yes" you can still decide not to do this.

Confidentiality

All of your records about this research study will be kept locked up so no one else can see them. We will not use your name when we talk about this study and only your teachers will know that you are a peer tutor.

Person to Contact

You can ask any questions that you have about the study. If you have a question later that you didn't think of now, you can call me, Dr. Radley, at (601) 266-6748.

Assent

Signing my name at the bottom means that I agree to be in this study. My parents and I will be given a copy of this form after I have signed it.

_____

Printed Name

_____ _____

Sign your name on this line Date

_____

Printed Name of Person Obtaining Assent

_____ _____

Signature of Person Obtaining Assent Date

The following should be completed by the study member conducting the assent process if the participant agrees to be in the study. Initial the appropriate selection:

_____ The participant is capable of reading the assent form and has signed above as documentation of assent to take part in this study.

_____ The participant is not capable of reading the assent form, but the information was verbally explained to him/her. The participant signed above as documentation of assent to take part in this study.

APPENDIX C – PARENTAL PERMISSION DOCUMENT 2

BACKGROUND

Your child_____ is being asked to participate in a research study. Before you decide, it is important for you to understand why the research is being done and what it will involve. Please take the time to read the following information carefully. Ask if there is anything that is not clear or if you would like more information. Take time to decide whether you will allow your child to take part in the study.

The purpose of this research study is to evaluate the effects of peer tutoring on the behavior of children with autism spectrum disorders. Research has shown that intensive intervention services are beneficial in improving long-term outcomes in children with autism spectrum disorders, such as language and cognitive skills. Although effective, intensive services are often difficult to implement in school settings due to time constraints of teachers and other school staff. As such, research has evaluated whether peers can effectively provide supplemental tutoring.

The research will be conducted by Christopher Furlow, a graduate student in the School Psychology program at the University of Southern Mississippi, and Dr. Keith Radley, an assistant professor of school psychology at the University of Southern Mississippi.

STUDY PROCEDURE

If you allow your child to participate in this study, they will receive instruction from peer tutors trained in evidence-based teaching methods. Instruction will occur during a non- instructional period. During this period, your child will receive tutoring

from an older student who has been trained to teach objectives on your child's IEP. Once your child has demonstrated proficiency in each the IEP objectives, the study will conclude. Peer tutoring will occur five times per week during non-instructional periods. Each peer tutoring session will be approximately 15 minutes in duration. Peer tutoring will take place under the supervision of a research assistant. Skills that your child may learn include basic academic skills such as matching shapes, naming colors, and identifying letters.

The peer tutoring program will last approximately five weeks.

RISKS

The risks of this study are minimal. There is a risk that your child may not enjoy being taught by a peer tutor and may become uncomfortable while learning or practicing the targeted skills. If your child feels upset in any way as a result of their participation, you may tell Dr. Radley or Christopher Furlow, who can help to alleviate any distress. If your child does not enjoy participating in peer tutoring, they may request to stop at any time. Should your child request to stop the peer tutoring session, they will be returned to their regular class. In order to minimize risk, students will be asked regularly if they would like to continue to peer tutoring.

In addition to the risks listed above, your child may experience previously unknown or unforeseen risk.

BENEFITS

We cannot promise any direct benefit to your child for taking part in this study. However, possible benefits from participation in the peer tutoring may include meeting new children and learning new academic skills that are outlined on their IEP. The results

of this study may also provide useful information on how schools can better help students with autism spectrum disorders.

ALTERNATIVE PROCEDURES

If you do not want your child to participate in this study, your child will continue with his or her regularly scheduled school activities. Your child's participation will not prevent you from participating in other school or class activities.

CONFIDENTIALITY

Other than name and age, no personal information will be collected from your child. The personal information that is collected will be kept strictly confidential. Your child will be assigned a number, which will be used on study materials instead of their name. The hard copies of the study materials will be stored in a locked filing cabinet located in Dr. Radley's private office. Dr. Radley is the only person that has the key and access to the filing cabinet. Electronic data will be stored on Dr. Radley's office computer, which is password protected. Only members of the research team will have access to this information. The results of this study may be presented at professional conferences and/or published in a professional journal. If this occurs, your child's personal information will be protected.

PERSON TO CONTACT

If you have questions, complaints, or concerns about the research or related matters, or if you feel your child has been harmed as a result of participation in the study, please contact Dr. Radley or Christopher Furlow, either by phone or by e-mail.

Keith Radley
(601) 266-6748
keith.radley@usm.edu

Christopher Furlow
(504) 458-6584
christopher.furlow@eagles.usm.edu

VOLUNTARY PARTICIPATION

It is up to you to decide whether to allow your child to take part in this study. Participation is strictly voluntary. Refusal to allow your child to participate or the decision to withdraw your child from this research will involve no penalty, prejudice or loss of benefits to which your child is otherwise entitled. This will not affect the services your child is provided their school. You may choose to withdraw your child at any time without providing a reason.

COSTS AND COMPENSATION TO PARTICIPANTS

There are no costs to participate in this study.

Your child may be given small rewards for participation in the study. The rewards will be different and may vary in cost. Your child will not know what the reward is beforehand. Examples of rewards include a snack or a small toy. Any reward that you or your child is not comfortable with will not be used. Please indicate any rewards or snacks not to be used with your child on the following page.

CONSENT

By signing this consent form, I confirm I have read the information in this parental permission form and have had the opportunity to ask questions. I will be given a signed copy of this parental permission form. I voluntarily agree to allow my child to take part in this study.

_____

Child's Name

_____

Parent/Guardian's Name

_____ _____

Parent/Guardian's Signature Date

_____

Relationship to Child

The following rewards or snacks may **NOT** be used with my child:

_____

_____

_____

_____

_____

_____

_____

Name of Researcher or Staff

_____ _____

Signature of Researcher or Staff Date

APPENDIX D – PEER TUTORING PROTOCOL

NOTE: IF THE STUDENT TRIES TO LEAVE THE TEACHING AREA, BEGINS TO ENGAGE IN PROBLEM BEHAVIOR, OR DOES NOT WANT ANY OF THE AVAILABLE TOYS OR SNACKS, STOP TEACHING.

BEFORE YOU START:

1. Place bin of toys/snacks out of the student's reach.
2. Place teaching materials in front of the student.
3. Stop the student from playing with preferred items.
4. Get the student's attention by patting your hands in your lap and say: "Get Ready!"

TEACHING:

1. Present your instruction: (Ex: "Match it," "Where's the…." "Show me…" "Give me…" "What is it?")
2. Guide the student's hand to match/touch/or give the card/object with the correct answer.
3. Praise him by saying something like: "GOOD JOB/GREAT WORK/WAY TO GO!"
4. Record **P** on data sheet and pause for 5 seconds.
5. Present your instruction: (Ex: "Match it," "Where's the…." "Show me…" "Give me…" "What is it?")
6. Point to the correct card/object.
7. If the student matches/touches the right card/object after you point to it:
    - Immediately give him the reward and praise him by saying something like: "GOOD JOB/GREAT WORK/WAY TO GO!"
    - Record **P** on data sheet and pause for 5 seconds.
    - Go to step 8

    If the student matches/touches the wrong card/object, go back and do steps 1-7.
8. Present your instruction: (Ex: "Match it," "Where's the…." "Show me…" "Give me…" "What is it?")
9. If he matches/touches the right picture/object with *NO HINTS*

- Immediately give him a reward and praise them by saying something like: "GOOD JOB/GREAT WORK/WAY TO GO!"
- Record **Y** on the data sheet and pause for 5 seconds.

If the student matches/touches the wrong card/object

- Record **N** on the data sheet and pause for 5 seconds.
- Go back and do steps 5-7

10. Repeat these steps until data sheet is completed.

IF THE STUDENT MAKES A MISTAKE:

IF THE STUDENT TOUCHES MULTIPLE CARDS ITS OKAY! FOLLOW THESE STEPS:

1. Place the student's hands in his lap and count to 2 MISSISSIPPI.
2. Present your instruction: (Ex: "Match it," "Where's the…." "Show me…" "Give me…" "What is it?")
3. Guide the student's hand to match/touch/or give the card/object with the correct picture/match.
4. Praise him by saying something like: "GOOD JOB/GREAT WORK/WAY TO GO!"
5. Record **N** on data sheet.
6. Repeat steps 5-7.

APPENDIX E – BEHAVIORAL SKILLS TRAINING PROCEDURAL INTEGRITY FORM

Adapted from Babel et al. 2008

Before Starting A Task

Components	
1. Determine teaching task	
2. Gather Materials	
3. Select effective reinforcer(s)	
4. Determine prompt fading procedure and initial fading setup	
5. Develop rapport/positive mood	

Manage Antecedents

	Trials									
Components	1	2	3	4	5	6	7	8	9	10
6. Arrange teaching materials										
7. Secure child's attention										
8. Present teaching materials										
9. Present correct instruction										
10. Present correct prompt										

Manage Consequences

Correct Response?

	Trials									
Components	1	2	3	4	5	6	7	8	9	10
11. Praise & present additional reinforcer										
12. Record Correct response										
13. Have brief intertrial interval (<5 secs.)										

Incorrect Response?

	Trials									
Components	1	2	3	4	5	6	7	8	9	10
14. Block gently, remove materials, look down (2-3 secs.)										
15. Record incorrect response										
16. Secure child's attention										
17. Re-present materials										
18. Re-present instruction & prompts to guarantee correct response										
19. Give praise only										
20. Record error correction										
21. Have brief inter-trial interval (3-5 secs.)										

Across All Trials

	Trials									
	1	2	3	4	5	6	7	8	9	10
22. Fade prompts across trials										

APPENDIX F – PEER TUTORING DATA SHEET

Student: _____ Date: _____

Peer tutor: _____

Instruction:			
Trial:			
1.	**Y**	**N**	**P**
2.	**Y**	**N**	**P**
3.	**Y**	**N**	**P**
4.	**Y**	**N**	**P**
5.	**Y**	**N**	**P**
6.	**Y**	**N**	**P**
7.	**Y**	**N**	**P**
8.	**Y**	**N**	**P**
9.	**Y**	**N**	**P**
10.	**Y**	**N**	**P**

APPENDIX G – DISCRETE TRIAL TEACHING EVALUATION RATING FORM

Adapted from Babel et al. 2008

Before Starting A Task

Components	
1. Determine teaching task	
2. Gather Materials	
3. Select effective reinforcer(s)	
4. Determine prompt fading procedure and initial fading setup	
5. Develop rapport/positive mood	

Manage Antecedents

	Trials									
Components	1	2	3	4	5	6	7	8	9	10
6. Arrange teaching materials										
7. Secure child's attention										
8. Present teaching materials										
9. Present correct instruction										
10. Present prompts										

Manage Consequences

Correct Response?

	Trials									
Components	1	2	3	4	5	6	7	8	9	10
11. Praise & present additional reinforcer										
12. Record Correct response										
13. Have brief intertrial interval (3-5 secs.)										

Incorrect Response?

	Trials									
Components	1	2	3	4	5	6	7	8	9	10
14. Block gently, remove materials, look down (2-3 secs.)										
15. Record incorrect response										
16. Secure child's attention										
17. Re-present materials										
18. Re-present instruction & prompts to guarantee correct response										
19. Give praise only										
20. Record error correction										
21. Have brief inter-trial interval (3-5 secs.)										

Skill Acquisition	
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

Across All Trials

	Trials									
	1	2	3	4	5	6	7	8	9	10
22. Fade prompts across trials										

APPENDIX H – BEHAVIOR INTERVENTION RATING SCALE (BIRS)

Please respond to each of the following statements thinking about the intervention you implemented (i.e., Peer Tutoring). Please then circle the number associated with your response. Be sure to answer all statements.

	Strongly Disagree	Disagree	Slightly Disagree	Slightly Agree	Agree	Strongly Agree
Peer tutoring would be an acceptable intervention for teaching others.	1	2	3	4	5	6
Most kids would find this intervention appropriate for teaching other skills in addition to the one taught.	1	2	3	4	5	6
Peer tutoring should prove effective in changing a student's learning.	1	2	3	4	5	6

I would suggest the use of peer tutoring to other kids.	1	2	3	4	5	6
Students' accuracy in responding was severe enough to warrant use of peer tutoring.	1	2	3	4	5	6
Most kids would find this intervention suitable for teaching others.	1	2	3	4	5	6
I would be willing to use peer tutoring with other students.	1	2	3	4	5	6
Peer tutoring would *not* result in negative side-effects for students.	1	2	3	4	5	6
Peer tutoring would be appropriate intervention for a variety of students.	1	2	3	4	5	6

Peer tutoring is consistent other things I have done in classroom settings.	1	2	3	4	5	6
Peer tutoring was a fair way to teach others.	1	2	3	4	5	6
Peer tutoring is reasonable for teaching others.	1	2	3	4	5	6
I like the procedures used in the intervention.	1	2	3	4	5	6
Peer tutoring was a good way to teach other students.	1	2	3	4	5	6
Overall, peer tutoring would be beneficial for other students.	1	2	3	4	5	6
Peer tutoring would quickly improve student learning.	1	2	3	4	5	6

Peer tutoring would produce a lasting improvement in student learning.	1	2	3	4	5	6
Peer tutoring would improve a student's knowledge to the point that it would not noticeably deviate from other classmates' knowledge.	1	2	3	4	5	6
Soon after using peer tutoring, you would notice a positive change in learning.	1	2	3	4	5	6
A student's knowledge will remain at an improved level even after peer tutoring is discontinued.	1	2	3	4	5	6
Using peer tutoring should not only	1	2	3	4	5	6

improve the student's learning in the classroom, but also in other settings (e.g., other classrooms, home).						
When comparing student with a peer before and after the use of the peer tutoring, the student's and the peer's knowledge would be more alike after using peer tutoring.	1	2	3	4	5	6
Peer tutoring should produce enough improvement in a student's knowledge so the skill no longer is a problem in the classroom.	1	2	3	4	5	6

Other behaviors related to task knowledge also are likely to be improved by peer tutoring.	1	2	3	4	5	6

Adapted from Elliott, S., & Von Brock Treuting, M. (1991). The behavior intervention rating scale: Development and validation of a pretreatment acceptability and effectiveness measure. *Journal of School Psychology*, *29*, 43-51.

APPENDIX I – ACCEPTANCE SCALE FOR KINDERGARTNERS (ASK)

1. Would you like to be good friends with a kid who can't talk yet?

   YES NO MAYBE

2. Would you like to be good friends with a kid who can't see?

   YES NO MAYBE

3. Would you like to push a handicapped kid in a wheelchair?

   YES NO MAYBE

4. Do you play with kids even if they look different?

   YES NO MAYBE

5. Would you play with a kid, even if he couldn't walk?

   YES NO MAYBE

6. Would you play with a kid even if he was handicapped?

   YES NO MAYBE

7. Have you helped someone who is handicapped?

   YES NO MAYBE

8. Would you still talk to a kid even if he was handicapped?

   YES NO MAYBE

9. Would you like to play with a handicapped kid?

   YES NO MAYBE

10. Do you have a friend who is handicapped?

    YES NO MAYBE

11. Do you sometimes call kids names like "dumb"?

YES NO MAYBE

12. Do you play with someone who is handicapped?

YES NO MAYBE

13. Have you ever talked to a handicapped kid?

YES NO MAYBE

14. Would you move to another chair if a handicapped kid sat next to you?

YES NO MAYBE

15. Would you like to be good friends with a handicapped kid?

YES NO MAYBE

16. Are you sometimes mean to other kids?

YES NO MAYBE

17. Would you like to spend your recess with a handicapped kid?

YES NO MAYBE

18. Do you sometimes pick on kids who are different?

YES NO MAYBE

APPENDIX J – IRB Approval Letter

THE UNIVERSITY OF
SOUTHERN MISSISSIPPI

INSTITUTIONAL REVIEW BOARD
118 College Drive #5147 | Hattiesburg, MS 39406-0001
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NOTICE OF COMMITTEE ACTION

The project has been reviewed by The University of Southern Mississippi Institutional Review Board in accordance with Federal Drug Administration regulations (21 CFR 26, 111), Department of Health and Human Services (45 CFR Part 46), and university guidelines to ensure adherence to the following criteria:

- The risks to subjects are minimized.
- The risks to subjects are reasonable in relation to the anticipated benefits.
- The selection of subjects is equitable.
- Informed consent is adequate and appropriately documented.
- Where appropriate, the research plan makes adequate provisions for monitoring the data collected to ensure the safety of the subjects.
- Where appropriate, there are adequate provisions to protect the privacy of subjects and to maintain the confidentiality of all data.
- Appropriate additional safeguards have been included to protect vulnerable subjects.
- Any unanticipated, serious, or continuing problems encountered regarding risks to subjects must be reported immediately, but not later than 10 days following the event. This should be reported to the IRB Office via the "Adverse Effect Report Form".
- If approved, the maximum period of approval is limited to twelve months.
  Projects that exceed this period must submit an application for renewal or continuation.

PROTOCOL NUMBER: 15091708
PROJECT TITLE: An Evaluation of Peer Mediated Discrete Trial Training Procedures on the Acquisition of Academic Skills in Children with Autism Spectrum Disorder
PROJECT TYPE: New Project
RESEARCHER(S): Christopher Furlow
COLLEGE/DIVISION: College of Education and Psychology
DEPARTMENT: Psychology
FUNDING AGENCY/SPONSOR: N/A
IRB COMMITTEE ACTION: Expedited Review Approval
PERIOD OF APPROVAL: 10/14/2015 to 10/13/2016
Lawrence A. Hosman, Ph.D.
Institutional Review Board

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