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A Comparative Evaluation of the Effects of Social Skills Group Training and Computer- Based Social Skills Training

Indira Hightower

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A Comparative Evaluation of the Effects of Social Skills Group Training and Computer-
Based Social Skills Training

by
Indira Hightower

An Applied Dissertation Submitted to the
Abraham S. Fischler College of Education
and School of Criminal Justice in Partial
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Approval Page

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Statement of Original Work

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Abstract

A Comparative Evaluation of the Effects of Social Skills Group Training and Computer-Based Social Skills Training, Indira Hightower, 2022: Applied Dissertation, Nova Southeastern University, Abraham S. Fischler College of Education and School of Criminal Justice. Keywords: social skills, autism, autism spectrum disorder, social skills training, computer-based social skills training, alternating treatment design

This applied dissertation was designed to evaluate the effects of social skills training programs as a method to improve social skills in children diagnosed with autism spectrum disorder. The study sought to advance the social skills training options for children with autism spectrum disorder by comparing various evidence-based social skills training programs in hope to provide meaningful, significant, and sustainable social-emotional changes that are explicitly taught and later generalized across individuals, settings, and environments. The researcher specifically evaluated the effects of social skills group training and computer-based social skills training among the three study participants with autism spectrum disorder.

The researcher developed appropriate group training and computer-based interventions. Daily sessions provided participants with the skill-based training on nonverbal behavior, social interaction, and social engagement. Participants completed various group and computer-based training sessions and demonstrated the use of appropriate social skills.

An analysis of the data revealed that there was an improvement in social skills during both treatment conditions. However, the participants' social skills increased at a higher rate when the social skills program included technology-based components. The research findings suggest that technology-based strategies appear to be the most effective tool to teach communication and social skills to young children with autism spectrum disorder because it produced a high rate of responding and skill acquisition across all participants.

Table of Contents

	Page
Chapter 1: Introduction.....	1
Statement of the Problem.....	1
Setting of the Study.....	8
Researcher’s Role.....	8
Purpose of the Study.....	8
Definition of Terms.....	9
Chapter 2: Literature Review.....	10
Autism Spectrum Disorder.....	10
Measuring Deficits in Social Skills.....	13
Defining Relevant Social Skills.....	15
Education and Rights of Children With Disabilities.....	18
Applied Behavior Analysis.....	20
Theoretical Perspective.....	24
Social Skills Training Programs.....	25
Research Questions.....	33
Chapter 3: Methodology.....	34
Participants.....	34
Instruments.....	35
Materials.....	38
Measures.....	38
Design.....	40
Procedures.....	41
Chapter 4: Results.....	46
Introduction.....	46
Demographic Characteristics.....	47
Data Analysis.....	47
Research Question 1.....	48
Research Question 2.....	50
Research Question 3.....	59
Interobserver Agreement.....	60
Treatment Fidelity.....	61
Social Validity Assessment.....	61
Chapter 5: Discussion.....	63
Introduction.....	63
Summary of Findings.....	63
Interpretation of Findings.....	65
Context of Findings.....	71
Implications of Findings.....	74

Limitations of the Study.....	77
Future Research Directions.....	78
References.....	80
Appendices	
A Prequalifying Questionnaire	88
B Observation Data Sheet	91
C Treatment Fidelity Checklist	93
D Abbreviated Version of the Intervention Rating Profile-15	95
E Interobserver Agreement (IOA) Data Sheet	97
Tables	
1 Percentage of Non-Overlapping Data Points.....	49
2 Interobserver Agreement Data Across Participants and Phases	61
3 Average Treatment Fidelity Score for Participants Across Phases	61
4 Social Validity Treatment Score for Participants	62
Figures	
1 Participant 1 Independent Engagement in Nonverbal Behavior.....	54
2 Participant 1 Independent Engagement in Social Interaction	55
3 Participant 1 Independent Engagement	55
4 Participant 2 Independent Engagement in Nonverbal Behavior.....	56
5 Participant 2 Independent Engagement in Social Interaction	56
6 Participant 2 Independent Engagement	57
7 Participant 3 Independent Engagement in Nonverbal Behavior.....	57
8 Participant 3 Independent Engagement in Social Interaction	58
9 Participant 3 Independent Engagement	58

Chapter 1: Introduction

This study evaluated the effects of social skills training programs as a method to improve social skills in children with autism spectrum disorder (ASD). Initial findings of the study indicated that children with ASD can increase the occurrence of social interaction, nonverbal behavior, and engagement after receiving a targeted social skill intervention. The study also examined the effectiveness of a traditional social skills training in comparison to a technology-based social skills training. The introduction of treatment produced a significant increase in the rate of responding across all participants. However, the rate of responding was higher during technology-based intervention than during non-technology-based intervention across all participants.

Statement of the Problem

According to the Centers for Disease Control and Prevention ([CDC], 2022), it is estimated that one in 44 eight-year-old children are diagnosed with ASD in the United States. According to the *Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition* (American Psychiatric Association [APA], 2013), key impairments of ASD include deficits in social-emotional reciprocity, nonverbal communicative behaviors, and impairments in developing and maintaining relationships. Social skills are a foundational skill that enhances an individual's life experience. One of the main characteristics of ASD is a deficit in the social-emotional domain (APA, 2013). More specifically, children diagnosed with ASD struggle with forming and maintaining the concept of friendship and understanding social norms (Carrington et al., 2003; Ong et al., 2021). There is an overall inability to define friendship or initiate appropriate relationships with the same-age peers (Carrington et al., 2003; Ong et al., 2021). School age children with ASD encounter

challenges with social-emotional aspects of daily interactions with peers in educational settings (Carter et al., 2015).

Many children and adolescents diagnosed with ASD require additional training and therapy to encourage, teach, and maintain appropriate social skills (Carrington et al., 2003; Karedis & Sadik, 2018; Olsson et al., 2016; Pekdogan, 2016; Radley et al., 2016; Taheri et al., 2016). The lack of social skills is closely aligned with the Theory of Mind (Baron-Cohen et al., 1985). According to the theory, children with ASD are not naturally capable of understanding other's mental state to include beliefs, desires, intentions, and emotions (Baron-Cohen et al., 1985). The deficits in theory of mind affect individuals with ASD and lessen quality of life and human interaction in various environments and situations. The perceptions of friendship among children with ASD do not occur innately and require effective intervention strategies to foster positive outcomes in relevant social skills. If timely and effective social skills training is not provided, the child will continue to lack relevant social skills, avoid social interactions, and misunderstand social norms to establish and maintain relationships, which will lead to a diminished quality of life (Ong et al., 2021; Sigman et al., 1999).

There is an array of evidence-based strategies and approaches to teach social skills to children and adolescents with ASD (Carrington et al., 2003; Olsson et al., 2016; Taheri et al., 2016). Some common models include story-based, peer-mediated programs, social skills groups, script fading procedures, pivotal response training, and video modeling. With so many interventions and treatment models, it is not evident what model yields the most effective and efficient results for individuals with ASD. While the social skills group training is considered the most common and widely used (Olsson et al.,

2016), there is currently a deficiency or lack of comparative literature on social skills training.

Children and adolescents with ASD exhibit deficits in the age appropriate social skills (Carter et al., 2015; Carrington et al., 2003; Ong et al, 2021). Despite a well-documented need for social skills training and availability of the various intervention models, children with ASD lack social competence necessary for healthy and successful integration into society (Carrington et al., 2003; Olsson et al., 2016; Taheri et al., 2016). This problem negatively impacted the social-emotional development as well as availability of training options for children with ASD because without a specific targeted training, there would be a lack of appropriate skills. A possible cause of this problem is the numerous social skills training options for children with ASD, without comparative assessments as to the efficacy and best outcomes of the specific models. A study that investigated the effectiveness of social skills training by utilizing single-subject research design could remedy the situation.

The Research Problem

A review of the current literature indicated that there are significant deficits in social skills among children diagnosed with ASD (Carrington et al., 2003; Olsson et al., 2016; Taheri et al., 2016). Despite a well-documented need for social skills training and availability of the various intervention models, children with ASD lack social competence necessary for healthy and successful integration into society (Carrington et al., 2003; Olsson et al., 2016; Taheri et al., 2016). There are difficulties and challenges that children with ASD face without having an adequate social-emotion skill repertoire, such as inability to establish and maintain friendships or a lack of participation in

activities within the community (Carrington et al., 2003; Olsson et al., 2016; Taheri et al., 2016). The problem to be addressed in the study is a need for a targeted, evidence-based social skill training for children with ASD. The proposed research study seeks to improve the social skills training options for children with ASD by comparing various evidence-based social skill training programs and in hope to provide meaningful, significant, and sustainable social-emotional changes that are explicitly taught and later generalized across individuals, settings, and environments.

According to Carrington and Tahir (2003; 2016), individuals diagnosed with a developmental disability lack social skills. The authors conducted a comparative study to explore social skills deficit outcomes among children and adolescents with a developmental disability and typically developing children. The results of the study indicated that children and adolescents with a developmental disability participate in significantly fewer activities compared to their typically developing peers. The researchers also found that individuals with disabilities also had fewer friends than their typically developing peers (Taheri et al., 2016).

Although social skills are among the most important components of healthy childhood development, there is a limited number of studies that focused on the targeted social skills interventions and strategies for children with ASD (Carrington et al., 2003; Karedis & Sadik, 2018; Olsson et al., 2016; Pekdogan, 2016; Radley et al., 2016; Taheri et al., 2016). Studies completed by Karedis and Sadik (2018) and Einfeld et al. (2018) contributed to the development of social skills programs in the last several years. These studies implemented specific training and measured the effectiveness of teaching social skills to participants diagnosed with ASD. Karedis and Sadik incorporated computerized

games with the study participants, while Einfield and colleagues utilized a school-based social skills training program. Both models produced positive outcomes among the participants. The participants improved their social skills after implementation of the training program. Despite of the positive and significant gains in research and application of knowledge on social skills training, both researchers did not test for comparative effectiveness, generalization of skills across people, behaviors, and settings, and long term effects of the interventions. While all of the aforementioned concerns call for immediate attention, a comparative analysis of the effective social skills training programs and their components could be a first step towards a targeted approach.

Background and Justification

In the study conducted by Carrington et al. (2003), the authors examined the perception and theme of friendship. In this qualitative research study, Carrington et al. recruited five participants and their families and scrutinized their views and beliefs about friendship and social skills benefits. With a help of the semi-structured interview, the authors identified several themes relative to the description, identification, and acquisition of the concept of friendship. The result of the study revealed that there was a lack of an in-depth understanding of friendship. The participants struggled to articulate what a friend is or how to establish or maintain friendship. The participants also required prompting and rewording of the questions to complete the interview. The results of the study justify the need for social skills training for individuals diagnosed with ASD .

Another research study that measured the usefulness and effectiveness of social skills training was conducted by Olsson et al. (2016). The study results provided a unique perspective on social skills training, which highlighted the experience from the

perspective of the participants and their families. To be specific, Olsson et al. assessed 22 participants, 11 children and adolescents between the ages of 8–17, and 11 parents participated in the study. The child participants were exposed to the Social Skills Group Training (SSGT). One year after the SSGT ended, the researchers utilized qualitative research methods to examine the participants' experiences. The results of the research study demonstrated positive outcomes. Overall, all participants reported receiving benefits from social skills training. The newly acquired skills were also retained over time as reported by the participants legal guardians.

After a thorough review of the literature, it is apparent that the need for social skills training is essential for individuals who are diagnosed with ASD (Carrington et al., 2003; Olsson et al., 2016; Taheri et al., 2016). There are multiple intervention strategies that various professionals and parents can employ to teach appropriate social skills to children with ASD. Some of the notable interventions include story-based, peer-mediated programs, social skills groups, script fading procedures, pivotal response training, and video modeling (Carrington et al., 2003; Olsson et al., 2016; Taheri et al., 2016).

Story-based social skills training includes the use of social stories to teach various social skills. Social skills group training incorporates training across a group of peers. Script fading procedures utilizes scripts to teach appropriate conversation skills. Video modeling uses video lessons of various skills to model social skills (Carrington et al., 2003; Olsson et al., 2016; Taheri et al., 2016).

In the research study conducted by Karedis and Sadik (2018), the authors employed a unique strategy to teach social skills to individuals with ASD. The researchers used eight computerized educational games to teach social skills to five

participants. The purpose of the research study was to measure the effects of computer-based training to increase social skills. The participants completed a pre- and posttest to measure the effectiveness of the intervention. As a result of the study, Karedis and Sadik found that the computer-based educational games have positive effects on some social skills such as matching skills, imitation skills, following instructions skills, visual support use, receptive language skills, communicative language skills, game and music skills, self-care skills, daily life skills, motor skills, socialization skills, and mathematics. The 8-week educational computer game program brought about a multi-dimensional improvement in social skills among all participants.

Deficiencies in the Evidence

There are multiple ways to teach social skills to children and adolescents with ASD (Carrington et al., 2003; Olsson et al., 2016; Taheri et al., 2016; Beaumont et al., 2019; Jonsson et al., 2019). With so many interventions and treatment models, it is not evident what model yields the most effective and efficient results for individuals with ASD. While the SSGT model is considered the most common and widely used (Olsson et al., 2016), there is currently a deficiency or lack of comparative literature on social skills training. The social skills training research typically evaluated one type of model and measured its effectiveness across participants (Carrington et al., 2003; Karedis & Sadik, 2018; Olsson et al., 2016; Pekdogan, 2016; Radley et al., 2016; Taheri et al., 2016).

Audience

The audience for the research study is board-certified behavior analysts, teachers, parents, and other professionals who are working with children and adolescents

diagnosed with ASD. Readers of the study will acquire an in-depth analysis of social skills training, and, therefore, benefit from learning about various social, emotional strategies when working with students with ASD. Individuals diagnosed with ASD will also benefit from the strategies identified in the study.

Setting of the Study

The study took place in a community-based applied behavior analysis therapy clinic in Florida. The site served over 20 school-age children with disabilities at the time of the study. The clinic provides individual and group ABA therapy as well as individual training on the behavior support plan to parents and caregivers.

Researcher's Role

The researcher is a board certified behavior analyst with a graduate degree in developmental disabilities and applied behavior analysis. The researcher has a history of providing behavior analytic services to children with developmental disabilities, which include skill acquisition and behavior modification. In the field of behavior analysis, the researcher often encounters children that display a lack of social skills and are in need of additional training and skill acquisition. The researcher has a keen interest in identifying the effective and practical evidence-based strategies to teach social skills to children with ASD.

Purpose of the Study

The purpose of this single-subject research study was to evaluate the effects of traditional social skills group training and computer-based social skills training as a method to improve social skills in children with ASD. Relying on the pre- and postassessment measure of the two trainings, the researcher aimed at detecting any

changes to the basic social skills in children with ASD. The researcher also pursued a potential effect of the use of robots, computers, and games in increasing social skills as well as the rate of independent socially induced responses in children with ASD.

Definition of Terms

Autism Spectrum Disorder (ASD) is a developmental disability with persistent deficits in social communication and social interaction across multiple contexts (APA, 2013).

Theory of Mind (ToM) is defined as an assessment of an individual human's degree of capacity for empathy and understanding of others (Baron-Cohen et al., 1985).

Applied Behavior Analysis (ABA) is a scientific approach to understanding behavior that incorporates evidence-based treatments to produce socially significant behavior changes (Cooper et al., 2020).

Chapter 2: Literature Review

Autism Spectrum Disorder

ADS is a developmental disability that is often categorized by social, communication, and behavioral challenges (APA, 2013). According to CDC (2022), it is estimated that 1 in 44 children are diagnosed with ASD in the United States. Noticeable abnormalities in a child's development typically occur within the first 2 years (Sacrey et al., 2021; Suckle et al., 2020). Despite the early detection of delays in development, most children are not diagnosed until age 4. This could be due to a lack of reliable and accurate early screening tools. The current ASD screening measures are primarily focused on toddlers (Sacrey et al., 2021; Suckle et al., 2020). Additional screening options such as biological markers of brain growth function and connectivity can be utilized as early as 6 months of age. However, biological screening tools are expensive and create a barrier for most families.

There have been numerous studies regarding biological screenings that can lead to early detection and reduce diagnostic issues (Bratlen et al., 2018; Abraham et al., 2017; Hofer et al., 2022; Sturmer et al., 2022). Two interesting studies that investigated biological screening were conducted by Bratlen et al. (2018) and Abraham et al. (2017). Both sets of researchers utilized biomarkers and genetic traits to detect and diagnose ASD.

In the study conducted by Bralten et al. (2018), the researchers investigated the shared genetic and biology among autism traits. The researchers found compelling evidence linking multiple autistic traits to a shared gene. Based on the genome-wide association studies, five autistic traits were found in 1,981 participants. These traits

include childhood behavior relative to rigidity in attention to detail. These findings imply that ASD can be detected definitively and earlier due to the genetic traits and biology of ASD (Bralten et al., 2018).

Abraham et al. (2017) also explored the use of biomarkers to detect ASD in children. The researchers utilized functional magnetic resonance imaging (fMRI) to build on early detection via biomarkers and genetics. The researchers used large multi-site datasets and pipelines to extract autism biomarkers. The study clearly demonstrated that the fMRI has the ability to detect ASD traits in infants (Abraham et al., 2017). In addition to early detection, the fMRI has also been proven as an effective tool to classify ASD correctly. The study has proven to detect biomarkers for early detection. The personalized map derived from the fMRI can be used in children as young as 6 months (Abraham et al., 2017; Dekhali et al., 2018).

The central diagnostic guide for ASD diagnosis is the *Diagnostic and Statistical Manual of Mental Disorder, Fifth Edition* ([DSM-5], APA, 2013). It provides a standard criterion for medical professionals to accurately diagnose ASD. A licensed medical professional assess the child's social, communication, and behavior impairments. Key impairments that are listed in the DSM-5 include deficits in social-emotional reciprocity, nonverbal communicative behaviors, and impairments in developing and maintaining relationships. A level of severity in these key characteristics is an indicator of the ASD diagnosis on the spectrum (Sacrey et al., 2021; Suckle et al., 2020).

Despite the use of the central diagnostic guide, there is an underrepresentation of children accurately and appropriately being diagnosed with ASD. ASD occurs across racial, ethnic, and socioeconomic groups (CDC, 2020). It is also 4 times more prevalent

among boys than girls according to the CDC. According to a study completed by McDonnell et al. (2019), only 60% of the clinicians in the study were confident in their diagnosing capabilities. The clinicians reported some difficulty confidently and accurately diagnosing children who presented with moderate ASD symptoms and adolescent aged children. The diagnostic uncertainty can account for the misrepresentation and gaps.

The underrepresentation of ASD diagnosis is also prevalent within varying cultures and races. African American children typically do not receive early evaluations or diagnosis when compared to White children (Maenner et al., 2020). Hispanic children are also underdiagnosed when compared to African Americans and White children.

An individual who is diagnosed with ASD will display some abnormality in speech and communication skills, lack of emotions or affection (Sacrey et al., 2021; Suckle et al., 2020). There can also be the presence of poorly integrated verbal and nonverbal communication. This can include difficulty with eye contact and body language. Individuals with ASD can also exhibit a lack of understanding or use of gestures, facial expressions, or other forms of nonverbal communication. These deficits can hinder one's ability to adjust their behavior to suit various social contexts or show an interest in same aged peers (Sacrey et al., 2021).

Social skills are a foundational skill that enhances an individual's life experience. One of the main characteristics of ASD is a deficit in the social-emotional domain (APA, 2013). Many children and adolescents diagnosed with ASD require additional training and therapy to encourage appropriate social skills (Sacrey et al., 2021). Social skills

training seeks to bridge the gap between the deficits and naturally occurring social reinforcers.

Measuring Deficits in Social Skills

There are various methods that researchers, practitioners, and educators use to assess and measure social skills deficits. Some common tools that are found in quantitative studies are behavioral observation, the Social Responsiveness Scale, Early Social Communication Scale, Vineland Adaptive Behaviors Scales, and Autism Diagnostic Observation Schedule, Second Edition (ADOS-2), and Autism Diagnostic Interview-Revised ([ADI-R], Cunningham, 2012). Each of these assessment tools offers a unique view on the captured data.

The Social Responsive Scale (SRS) is a commonly used questionnaire that intends to measure deficits in social behaviors (Cunningham, 2012). The SRS is composed of 65 items with a severity rating range from 0 to 3. The rating scale is typically used among teachers, parents, and caregivers. The SRS is a standardized method to target clinically significant impairments in social interactions. The individuals completing the rating scale are observing the child within the natural/social environment. The scale targets social awareness, social cognitions, social communication, and stereotypical patterns of behavior. Some of the noted targets offer a similarity to the DSM-5 targets as well.

Another effective measurement tool for social skills is the Early Social Communication Scales ([ESCS]; Cunningham, 2012). The ESCS is a semi-structured behavioral observation that evaluates early communication of children diagnosed with social deficits. The observation typically occurs for 20–30 min with a trained

administrator, the child, and the parent, if available. The communication scale targets early forms of social communicative behaviors, such as joint attention, sharing, eye contact, and taking turns.

The Vineland Adaptive Behavior Scales (VABS) is another great measurement for social behavior (Cunningham, 2012). The VABS is a semi-structured interview similar to the ESCS and SRS. The rating scale was developed to evaluate the age-appropriate skills in an individual's life. These skills are considered foundational in order to live an independent life within the community. The skill domains include communication, socialization, self-help, and motor skills. Participants of the rating scale receive an adaptive behavior composite score, which includes percentile rank, adaptive levels, and age equivalents.

Two interesting research studies that effectively measured deficits in social skills of children diagnosed with ASD were conducted by Taheri et al. (2016) and Adibsereshki et al. (2015). Both studies highlighted the need for accurate measurement in the vast difference between social participation and skills between children diagnosed with ASD in comparison to their typically developing peers. The identified studies offer an interesting view of the quality of friendships and understanding of themes associated with social skills.

Taheri et al. (2016) provided an additional perspective on the need for socialization training of young children diagnosed with ASD. The purpose of the Taheri et al.'s research study was to examine and measure social participation and friendships of children and adolescents diagnosed with a developmental disability and typically developing children and adolescents. The comparative study recruited 418 participants of

various ages, disabilities, and genders from different schools. The participants' caregivers were administered a survey to assess the child's social skills. The results of the study indicated that children and adolescents diagnosed with a developmental disability participated in significantly fewer activities compared to their typically developing peers. The researchers also found that students with disabilities also had fewer friends than their typically developing peers (Taheri et al., 2016).

The research conducted by Adibsereshki et al. (2015) measured the effectiveness of Theory of Mind training as a tool to improve social skills of children diagnosed with ASD on a high functioning spectrum. The researchers theorized that the deficits in social skills is a direct result of a deficit in the Theory of Mind. Adibsereshki et al.'s quasi-experimental research design included a sample of 24 children between the ages of 7–12. The sample included 12 girls and 12 boys diagnosed with ASD. The participants were separated into two groups: experimental and control. The participants received a pre and posttest, Theory of Mind Test, and the social skills questionnaire. The results of the experiment indicated an improvement in the social skills of the experimental group in comparison to the control group. There were improvements in social understanding, social insight, and expanded knowledge of relationships. The Theory of Mind training was proven to increase social skills in children diagnosed with ASD.

Defining Relevant Social Skills

Definition of what is considered a relevant social skill was explored by Carrington et al. (2003). The purpose of the authors' qualitative research study was to examine the perception and theme of friendship. The authors recruited five participants and their families to rate their views and beliefs about friendship and how they defined

social skills. The researchers created a semi-structured interview that had a total duration of about 40 min. The overall themes that were revealed after data analysis from the computer-based analysis tool called NUD*IST was the understanding of concepts or language regarding friendship. That accounted for description of (a) what is not a friend, (b) what a friend is, (c) an acquaintance, and (d) using masquerading to cope with social skill deficits. The use of a computer-based analysis reduced the margin of error and identified the themes accurately. The result of the research study determined that there was a lack of in-depth understanding of friendship. The participants required prompting and rewording of the questions to complete the interview. The findings suggest that the participants struggled with the concept of friendship and social skills. Therefore, there is a need to identify the lack of social skills, provide targeted training to establish and maintain friendships, and acquire appropriate social skills.

The concept of friendship was also explored by Ong et al. (2021). The group of researchers identified friendship as a relevant and foundational social skill. The researchers described friendships as a connection formed among individuals that has reciprocal interactions. Building a deep connection among peers can be considered especially difficult for children diagnosed with ASD. The difficulty with social skills derives from a lack of understanding what a friendship is and how to develop a friendship (Ong et al., 2021).

Using the mixed methods research design, Ong et al. (2021) evaluated the effectiveness of a friendship training interventions as a tool to enhance friendship qualities and social skills overall. The relevant social skills were determined by the social skills improvement rating scale and the quality of play questionnaire. The key target

skills evaluated in the study were social connection, trading information with peers, participating in ongoing play activities, play dates, conflict evasion, and deliberation. The results of the social skills rating scale demonstrated positive outcomes and improvement in skills overall as a result of the children's friendship training program.

The social competency of children diagnosed with disabilities, specifically ASD, Down Syndrome, and developmental delays were compared to their typically developing peers in a study completed by Sigman et al. (1999). The longitudinal study consisted of 70 children with ASD, 93 children with Down Syndrome, 59 children with a developmental delay, and 108 typically developing children. The aim of the study was to track the continuity of change in language and social skills among participants, as well as, identify deficits in social competency. Results of the Sigman et al.'s study indicated that only 27% of the participants reported having at least one friend who they considered a best friend. After further analysis, the researchers found that the participants with ASD appeared to have difficulty developing friendships as a social skill due to their lack of comprehension of the concept of friendship. The lack of understanding did not change over the time of the study, therefore, indicating the skill would not improve without specific training. The overall perceptions of friendship among children with ASD were that friendship does not occur naturally and would require effective intervention strategies to foster positive outcomes in relevant social skills. If timely and effective social skills training were not provided, the child would continue to lack relevant social skills, avoid social interactions, and misunderstand social norms to establish and maintain relationships (Ong et al., 2021; Sigman et al., 1999).

The overall absence or lack of appropriate social skills can affect many aspects of an individual's life. Children and adolescents diagnosed with ASD have a higher rate of depressive symptoms when there is a lack of socio-emotional skills (Hollocks et al., 2019). Poor mood regulation, anxiety, isolation, and depression are all contributing factors to a poorer quality life for individuals diagnosed with ASD (Smith & White, 2020). These symptoms are a direct result of a lack of social skills that do not improve naturally, or without training (Smith & White, 2020; Ong et al., 2021). Hollocks et al. (2019) found that 37% of adults diagnosed with ASD reported the prevalence of depression. The overall behaviors associated with the identification of depression include social isolation, poor communication skills, lack of appropriate relationship, limited access within the community and impaired independence skills (Hollocks et al., 2019; Smith & White, 2020). Each of the identified behavior markers would equate poor outcomes and a diminished quality of life.

Education and Rights of Children With Disabilities

As the rate of ASD continues to increase (CDC, 2022), new needs have begun to arise over the last few years when it comes to educational rights (Stevenson & Correa, 2019). Federal and state laws mandate that students who are diagnosed with ASD receive a free appropriate public education in the least restrictive environment (Individuals with Disabilities Education Act [IDEA], 1990/1997/2004; Ysseldyke & Algozzine, 2006). The groundbreaking educational act that shaped the current legal rights for students with ASD is the IDEA (1990). The IDEA was initially authorized in 1990 to include autism as a qualifying disability category, but the act had since been reauthorized in 1997 and 2004. The IDEA (2004) is divided into five key parts. The parts include General Provisions,

Assistance for Education of All Children with Disabilities, Infants and Toddlers with Disabilities, National Activities to Improve Education of Children with Disabilities, and National Center for Special Education Research (Ysseldyke & Algozzine, 2006). The overall purpose for the IDEA (2004) is to ensure that students with qualifying disabilities, such as ASD, have access to free appropriate public education in the least restrictive environment. The act also ensures that qualified students receive a comprehensive individualized education plan (IEP) with accommodations and appropriate services to address the student's unique needs. The IDEA (2004) is similar to the Every Student Succeeds Act (ESSA) of 2015. Both acts are intended to ensure that students with disabilities receive quality education and necessary accommodations to be successful in an academic and social settings (Stevenson & Correa, 2019).

Under the IDEA (2004), students diagnosed with ASD are entitled to an assessment and placement into a special education program that meets their individual needs. Qualified students are also entitled to an IEP. The IEP team has a responsibility to identify appropriate evidence-based intervention programs for qualified students (Stevenson & Correa, 2019). When a student's social skills deficits hinder their ability to adjust behaviors to suit various social contexts, impedes their learning, and leads to inappropriate behaviors (Sacrety et al., 2021), the IEP team must consider the use of positive interventions and develop a behavior intervention program (BIP) that addresses a student's behaviors. When a lack of social skills continuously results in challenging behaviors that may be disruptive to the learning of the student and others, the IEP team conducts a functional behavioral assessment that guides development of a BIP (Stevenson & Correa, 2019). As such, an IEP and BIP are important documents for

students with ASD because they describe the student's current level of performance, strengths and weaknesses, as well as measurable academic and behavioral goals. The implementation of a BIP relies upon the observable and measurable components, implementation of which is grounded in evidence-based research. It is important to note that the IDEA (2004) describes evidence-based research as one that is published in a peer-reviewed journal or is acknowledged by a panel of independent experts through a rigorous and objective review process. While there are many evidence-based intervention approaches to teach social skills to a student with ASD (Carrington et al., 2003; Olsson et al., 2016; Taheri et al., 2016), it is important to identify the most optimal approach that would yield effective and efficient results for individuals with ASD.

Applied Behavior Analysis

Applied behavior analysis is a scientific approach to understanding behavior that incorporates evidence-based treatments to produce socially significant behavior changes (Cooper et al., 2020). ABA embodies a set of principles that analyzes the relationship of behavior and the environment. ABA is commonly paired with ASD as an effective therapy and treatment that can target various deficits associated with the ASD diagnosis. ABA has been proven to improve social skills, communication, adaptive learning skills, and academic skills (Slocum et al., 2014).

One of the foundational principles of ABA is the seven dimensions (Cooper et al., 2020). ABA was founded under these key dimensions described by Baer, Wolf, and Risley in 1968. The seven dimensions of ABA are generality, effective, technological, applied, conceptually systematic, analytic, and behavioral. The dimensions ensure that the targeted interventions are socially significant, data driven, and supported by evidence-

based research. The seven dimensions are the framework for an effective ABA treatment intervention (Slocum et al., 2014).

The first dimension, generality, is based on the concept that a behavior change has endured over time, across settings, and can pivot to new skills (Baer et al., 1968). A behavior is considered having generality when the acquired behavior/skill is implemented across multiple settings, across multiple people, and has continued to be used in the future.

The second ABA dimension, effective, is based on the idea that there has been some improvement in the behavior (Baer et al., 1968). If the application of behavioral techniques does not produce large enough effects for practical value, then the application has failed.

The third ABA dimension, technological, is the detailed treatment procedure (Baer et al., 1968). The procedure has to be clearly and concisely described for others to implement the procedure accurately.

The fourth dimension, applied, refers to the social significance of the behavior change (Baer et al., 1968). The chosen behavior for change has to improve the life of the individual.

The fifth dimension, conceptually systematic, is based on the concept that interventions utilized should continue to be based on ABA principles and research (Baer et al., 1968).

The sixth dimension, analytical, is ensuring that practitioners are using data to lead the course of treatment (Baer et al., 1968).

The seventh dimension, behavioral, is defined as the target behavior ability to be observed and measured (Baer et al., 1968). The behavior is then defined by its observable and measurable abilities, which also allows for others to easily collect data (Slocum, et al., 2014).

The use of the seven dimensions of ABA ensures that the interventions are data driven and supported by research (Baer et al., 1968; Cooper et al., 2020). The application of the seven dimensions also ensures that the target behavior for change is socially significant and improves the individual's life. Social skills are considered socially significant and can enhance the individual's quality of life. The use of ABA strategies and core principles will ensure that the social skills interventions will be closely monitored, implemented with fidelity, and carried out with consistency across various environments (Slocum, et al., 2014; Louie et al., 2020).

Louie et al. (2020) researched the use of ABA to teach listening comprehension for children diagnosed with ASD. In his research, the researchers recruited three participants between the ages 3–5. The intervention training took place within a private therapy room in an ABA clinic. The implemented teaching strategies included discreet trial training and a robot mediator. The listening comprehension and communication abilities were assessed using the Vineland Adaptive Behavior Scales–Third Edition (VABS-3). Each participant received an adaptive behavior composite score, communication score, socialization score, and a daily living skills score. The results of the VABS-3 posttest scores indicated an increase in responding and positive interactions with the robot mediator. One out of the three participants reached mastery criteria while

the other two participants were close to reaching the mastery criteria with some prompting (Louie et al., 2020).

Another study that employed the ABA techniques to teach social skills was conducted by Kasari et al. (2016). This quantitative research study utilized a teaching approach that included the clinic-based social skills group training that comprised of modeling and natural environment teaching. There were 150 participants who represented a combination of typically developing children and children with ASD. The participants were randomly divided into two groups. The targeted social skills included greetings, humor, conversation, dealing with emotions, friendship, and nonverbal communication. Participants in the intervention condition received 16 training sessions for 8 weeks. Each training session lasted 30–45 min. Data were collected prior to treatment and post-treatment. The results of the study indicated an improvement in peer engagement across settings. The children also responded well to direct instruction teaching procedure. The use of children diagnosed with ASD and typically developing children highlighted deficits in social skills among the children with ASD. The comparison offered comparative data on various targeted social skills (Kasari et al., 2016).

Overall, the use of ABA strategies has a positive effect on social skills training. Researchers who have employed the ABA approach as a tool to improve social skills in children with ASD have seen positive gains and high skill acquisition. Leaf et al. (2017) and Leaf et al. (2016) both evaluated the effectiveness of a progressive ABA model to teach social skills. The researchers used an experimental research design which included a randomized control group and treatment group. The treatment group of participants received evidence-based interventions that were grounded in the ABA principles. Some

of the procedures included discreet trial teaching, shaping, and cool-vs-not role play. Each treatment package was individualized to meet the participant's needs. The participants' progress was recorded and measured by aberrant behavior checklist, social validity survey, social skills improvement system, and the social responsiveness scale. The results of both studies demonstrated that the use of ABA strategies and principles significantly improved prosocial behaviors of children with ASD. The targeted outcomes also demonstrated the long-term effects of the interventions. The participants maintained the mastered skills over a month after the training ended. There was also a high parent satisfaction rate in the improvements in the participants' social skills overall.

In the absence of social skills trainings, there is an increase in varying maladaptive behaviors (Radley et al., 2018; Wolfe et al., 2014). The increased presences of restrictive and repetitive behaviors have been proven to increase over time without the use of social communication training. The increase in challenging behaviors can occur across domains, environments, and situations in the absence of social skills training. Limitations in social context can result in blocking access to naturally occurring reinforcers, which can lead to social isolation, lack of problem-solving skills, and an aversion to peers.

Theoretical Perspective

The problem of deficits in social skills in children diagnosed with ASD is grounded in the Theory of Mind. This theory was originally developed by Simon Baron-Cohen (Baron-Cohen et al., 1985) and was primarily used to study a person's mental state as it pertains to empathy and social skills. The Theory of Mind indicates that one of the main reasons to account for the lack of social skills among children with ASD is a lack of

theory of mind (Baron-Cohen et al., 1985). Children with ASD are often lacking in the cognitive area of empathy according to the theory of mind. The lack of empathy will lead to an inability to understand the mental states of other people as well as responding appropriately to different social situations. Therefore, a lack of understanding on how to establish or maintain relationships with others cannot be achieved without specific training (Carrington et al., 2003; Olsson et al., 2016; Taheri et al., 2016).

Social Skills Training Programs

There are multiple intervention strategies that researchers, practitioners, and educators employed to teach appropriate social skills (Carrington et al., 2003; Karedis & Sadik, 2018; Olsson et al., 2016; Pekdogan, 2016; Radley et al., 2016; Taheri et al., 2016). Some of the notable interventions include story-based, peer-mediated programs, social skills groups, script fading procedures, pivotal response training, and video modeling. All of the strategies have their individual strengths as well as weaknesses. Social skills training programs are often designed with multiple components and activities to help strengthen an individual's social skills.

Pekdogan (2016) explored the use of story-based training to teach social skills and investigated the outcome of a story-based social skills training program with 60 children between the ages of 5–6. The participants attended an independent preschool within the Turkish Ministry of National Education. The participants and the school were chosen by random sample. There were 30 children in the experimental group and 30 children in the control group. Pekdogan administered the Social Skills Evaluation Scale (SSES) in a form of pre- and post-test to the participants. The SSES is a Likert scale that consisted of 62 items and nine subscales. The subscales included interpersonal skills, anger

management, coping with peer pressure, self-control skills, accepting consequences, verbal expression, and listening skills. During data collection, the administrator read various statements and then marked the appropriate score for the evaluated skill of the participant. The data collection provided the researcher with the statistical data on the effects of the story-based social skills training program. The results of the study indicated positive effects on the social skills of the participants, therefore, showing the positive effects of different intervention strategies for teaching social skills.

Another thought-provoking intervention component to teaching social skills training with younger learners is the incorporation of educational games. In the research study conducted by Karedis and Sadik (2018), the authors employed a unique strategy to teach social skills to individuals with ASD. The researchers used eight computerized educational games to teach social skills to five participants. One of the many strengths of the study is the exceptional approach to teaching social skills paired with physical parameters. The purpose of the research study was to measure the effects of educational game training on the increase in social skills. The participants completed a pre- and post-test to measure the effectiveness of the intervention. As a result of the study, Karedis and Sadik found that the educational games have positive effects on some social skills such as matching skills, imitation skills, following instructions skills, visual support use, receptive language skills, communicative language skills, game and music skills, self-care skills, daily life skills, motor skills, socialization skills, and mathematics. The 8-week educational game program brought about a multi-dimensional improvement in social skills among all participants.

Another research study that investigated the benefits of specific social skill training programs employed a modernized treatment intervention (Radley et al., 2016). The researchers utilized similar quantitative methods as in the previously mentioned research study (Kareidis & Sadik, 2018). The researchers employed a superhero social skills computer-based program to teach a group of two children with ASD. The superhero social skills program consisted of 18 individual lessons that targeted specific social skills. The lessons included video modeling and animated superhero characters to guide the participants throughout the lessons. The study also aimed to minimize poor generalization effects and incorporates typically developing peers in the training. The results of the study indicated positive effects of the superheroes social skills program. The participants demonstrated improvements in targeted social skills and retention in the skills learned over time by multiple observers. The study also highlights the need for manualized social skills programs for children diagnosed with ASD.

Another distinct perspective to teaching social skills is the school-based social skills training program. Einfeld et al. (2018) attempted to use a school-based social skills training program to improve social skills for adolescents diagnosed with ASD. The group of researchers utilized the secret agent society computer-based program, which is an intervention that focuses on improving social-emotional skills through technology. The aim of the research study was to determine if the SAS program could lead to improvements in social skills at home and in the school. There were 84 participants in the study, who were separated into two groups. The researchers openly chose the participants from both groups. Each participant received a pre and posttest. The collected data revealed information relative to the effectiveness of the school-based social skill training

in home and at school. The school-based curriculum was administered via a computer game and other activities. These activities also included role-play, board games, and skill-based lessons. The curriculum focused on identifying emotions, expressing feelings appropriately, communicating with others, reciprocal play, solving social problems, and managing bullying. The skill-based lessons were administered weekly by a trained SAS facilitator. The unique delivery method encouraged learning in a new and creative way. The result of the research study indicated an improvement in social skills during both treatment phases. There was also the presence of retained information from the school-based training after 12 months of no treatment. The combination of a computer-based game and other activities were proven to be an effective strategy to teach social skills within this specific group of participants and maintained over time. There was the presence of generalization across settings. The intervention strategies were also implemented in the home with the parent as the facilitator.

An additional intervention strategy for teaching social skills is the group model approach (Olsson et al., 2017). Social skills group training (SSGT) is an umbrella term to describe behavior modification of socially instructive techniques in a group setting. The SSGT model is considered the most effective intervention strategy for children with ASD. Olsson et al. set out to test the effectiveness of the SSGT in their 12-week randomized controlled research trial. The authors recruited 296 participants with ASD between the ages of 8–17. The researchers utilized the Social Responsive Scale to determine the outcomes of the intervention. Parents and teachers completed a social validity rating scale. The child participants were assessed at three separate times throughout the research process: baseline, posttreatment, and during the 3-month follow

up. The SSGT model employed the cognitive behavior therapy approach, which included computer-based training, behavioral activation, psycho-education, observational learning, parent participation, etc. The training sessions consisted of social rules, developing conversation skills, managing conflict, social role-play, verbal, and nonverbal social signals. The content of the training session of the SSGT model is similar to other social skills training. There is a level of importance placed on managing conflict, social rules, and the use of role-playing and games as an effective means to teach these skills. Multiple teaching modules cover several components of social skills. The content area was appropriate for the identified age group within the study, which is another strength of the research design of this study.

The results of the randomized control trials of the SSGT model appeared to be positive with some of the groups, specifically adolescent females, but overall yielded moderate improvements across the other participant groups (Olsson et al., 2017). The moderate increase in social skills within the adolescent group could be due to the increase in session times for the second group. The second group received 60 min of training every week vs. 30 min of training for group one. The implication of the study indicated that there is a moderate correlation between the SSGT model and the emergence or increase in social skills over time.

The long-term effects of the SSGT model were further researched by Jonsson et al. (2019). The researchers built on the previous research study (Olsson et al., 2017) by increasing the length of the intervention time to see if the study would yield more substantial results across all groups with additional intervention time. Increasing the treatment time while applying the SSGT model could add to the strength and validity of

previous research by Olsson et al. (2017). Jonsson et al. extended the study to 24 weeks in comparison to 12 weeks in Olsson et al.'s research study. The authors implemented the SSGT model with 50 participants with ASD (15 females and 35 males) between the ages of 8–17. The new study shifted to skill acquisition and the real-world application of the lessons. The method and assessment mirrored the previous SSGT research model. The results of the long-term research imply that a long-term SSGT program could produce significant gains in social skills. The positive outcomes suggest that additional training may increase the emergence and retention of social skills. The social skills were maintained over 3 months after completion of the training. The researchers, however, warned the reader to cautiously review the findings because there are some limitations and flaws within the research such as the competency of the teachers and parents who administered the intervention and recorded data. There were also missing data within the study, and several participants did not complete the study. Overall, the results of the extended intervention in terms of duration yielded positive outcomes.

Beaumont et al. (2019) offered another perspective on teaching social skills training. The researchers identified barriers to the success of social skills training programs. They found that the success of SSTP lies in the implementation, evaluators, and program maintenance. Many of the identified limitations and flaws found within the literature review have been associated with the evaluators' knowledge during the implementation and accuracy of data collection. To be specific, Beaumont et al. identified insufficient resources within schools. The absence of social-emotional skills training, staff shortages, lack of ASD-specific staff training and professionals to deliver evidence-based interventions, poor control over program fidelity, and a failure to design

programs that can be continued once the research trial terminates were named among a few insufficient school resources. With the identification of barriers, the researchers made recommendations and created intervention strategies to address each of the identified barriers.

The researchers tested two separate groups: children with ASD and teachers (Beaumont et al., 2019). The participants in Group 1 consisted of 68 children with ASD who received social skills training from the SAS program. The participants in Group 2 consisted of 31 school staff members with various academic backgrounds and who received a 13-week training on the SAS program model prior to the implementation stage. The research study utilized multiple measures to capture the effectiveness of the interventions, such as the Consultation Skills Checklist, Workshop Evaluation Survey, Teacher Confidence Ratings, and Facilitator Ratings. Each measurement tool captures a different set of information. The results of the Beaumont et al.'s study showed positive outcomes and correlation between the intervention strategies and overall increase in the students' skills. The facilitators reported an anecdotal increase in confidence and knowledge among participants.

A qualitative research study by Olsson et al. (2016) furthered the work by Beaumont et al. (2019). The study explored the use of SSGT with individuals with high functioning autism. Olsson et al. focused on assessing the generalizability of SSGT and the experiences of the participants. The authors demonstrated a unique aspect of the social skills training. They highlighted the experience from perspective of participants and their families. It sets this study apart from other research studies relative to the social skills training. In Olsson et al.'s study, the participants identified the strengths and

weaknesses of the SSGT model from a first-person account and, hence, provided a valuable information.

Olsson et al. (2016) assessed 22 participants, 11 children, and adolescents with ASD between the age of 8–17, and 11 parents. All participants, except parent participants, were exposed to SSGT. This research study utilized a quantitative research design and employed the Social Responsive Scale in a form of pre and posttest. One year after the SSGT intervention ended, the researchers utilized qualitative research approach to examine the participants' experiences. Each participant was interviewed during the study. As a result of the interviews, various themes emerged. The collected data were scrutinized using a thematic analysis. The results of the research were positive. Overall, both groups of participants reported receiving benefits from SSGT. However, the groups also indicated that a longer treatment protocol would be more effective than the short-term intervention phase. This appears to be a consistent limitation within the social skills training programs.

After a thorough review of the research studies relative to the social skills training, it is apparent that the need for social skills training is essential for individuals who are diagnosed with ASD. There are several different programs a researcher can employ to teach these skills. There are some common themes among the research studies that were reviewed. It appears the group model is an effective intervention strategy when it is paired with a more extended treatment phase, variability in participants, and identified treatment lessons. The combination of these components will likely yield positive results within the research.

Research Questions

The study intended to measure the effectiveness of social skills training programs as a method to improve social skills in children diagnosed with ASD.

1. How does social skills training increase basic social skills in children with ASD as indicated by pre- and post-assessment measures?
2. Will the use of modern technology i.e., robots, computers, or games increase social skills in children with ASD?
3. What is the rate of independent responses of target behaviors after implementation of the alternating social skills treatment programs?

Chapter 3: Methodology

Participants

The target participants were children who were (a) formally diagnosed with ASD, (b) identified with social-emotional deficits based on a pre-qualifying questionnaire, (c) between 4–12 years of age, and (d) English speaking. The researcher aimed at recruiting participants from diverse ethnic groups, who, at the time of the study, were also actively enrolled or seeking enrollment in a social-emotional skill deficits intervention program in a southwest Florida's applied behavior analysis treatment facility. Social-emotional deficits are presented by deficits in nonverbal behaviors, age-appropriate peer relations, and a lack of social/emotional reciprocity. Potential participants who had any communication, vision, or hearing impairments that prevented them from expressing their wants or needs verbally or nonverbally, or processing visual or auditory information, were excluded from the study.

The researcher employed convenience sampling (Creswell, 2015; Creswell & Gutterman, 2019), which allowed the researcher to conveniently select potential participants because of their proximity, availability, and unique set of targeted diagnostic characteristics and behavioral deficits that are of interest to the study. The researcher recruited three participants for the study. According to Ledford and Gast (2018), a minimum three participants is typically needed for any single-subject research design. In order to avoid participant attrition and impact on the independent variable generality, the researcher attempted to recruit up to five participants. All participants were randomly assigned a combination of a letter and number in effort to protect participants' anonymity.

Instruments

Due to the unique nature of ABA research, standard data collection forms are uncharacteristic. Therefore, it is common practice for researchers to develop their own forms that are designed to fit their purposes (Bailey & Burch, 2002). A prequalifying questionnaire, fidelity checklist, social validity survey, observation form, and intervention data sheets were developed by the researcher following the recommendations of Bailey and Burch (2002).

One of the data collection instruments utilized within the research is a prequalifying questionnaire (See Appendix A). The questionnaire is based on the Autism Social Skills Profile (ASSP) created by Bellini in 2006. The intended purpose of the questionnaire is to identify appropriate participants for the study. The original questionnaire consists of 49 questions and addresses the potential participants' demographic, diagnosis, nonverbal behavior, social engagement, and communication skills. For the purpose of this study, the researcher used a slightly modified abbreviated version of the ASSP's instrument. It includes 20 questions. The questionnaire is a 4-point Likert scale that also incorporates an opened-ended choice of response. The scale is designed to detect a level of the participant's agreement to the 20 questions in 4 points that range from (1) Never occurs to (4) Occurs. The questionnaire aims to ascertain whether or not potential child participants can introduce themselves, allow peers to join them, engage in positive peer responses, use appropriate tone and volume to communicate with peers, read cues to terminate conversations, and engage in socially appropriate behaviors.

The ASSP is a psychometrically validated instrument (Bellini, 2006; Pekin et al., 2018). The assessment tool has a high internal consistency and test reliability. The rating scale has been used in number of research studies, such as a comparative analysis of social skills by Pekin in 2018. The ASSP has been proven effective in strength-based social skills educational research and theory driven research designs to assess social skills and test their effectiveness (Bellini & Hopf, 2007; Pekin et al., 2018).

The questionnaire was completed after the Institutional Review Board (IRB) approval was obtained. Potential participants' guardians completed the questionnaire to identify participants who met the study inclusion criteria. If a potential participant did not meet the inclusion criteria, they were not invited to participate in the study. The potential participants received a numerical score from the Likert scale. An eligible participant was invited to participate in the study if their score was in the range 30–80 on the questionnaire. The score was calculated by adding numerical assigned to all points that were circled.

The researcher also created a treatment observation form to measure the effects of the intervention (See Appendix B). The researcher observed the participants during 15-min observation periods during free play. Each time the participant engaged in the target behavior, the research recorded the occurrence of the behavior. The observation form contains the following components: participant's identification letter, setting, target behavior, and recording system. The behavior components of the observation form that occurred per the observation period were scored as X. All occurrences (X) were added at the end of the observation period.

A treatment fidelity checklist is an additional instrument in the study (see Appendix C). The fidelity checklist was created by the researcher and is based on the procedural fidelity checklist created by Ledford and Gast (2018). The fidelity checklist is intended to assist with tracking the treatment's implementation accuracy and reliability. The checklist lists all predetermined items identified for the study's full implementation. These items include measurement materials, datasheets, intervention stimuli, and discriminative stimulus. The checklist also contains listed training objectives, such as greetings, eye contact, and sharing. In addition to training materials, the checklist includes treatment steps.

A social validity survey was distributed to the participants' caregivers (see Appendix D). The survey is based on the adapted version of the Intervention Rating Profile-15 (IRP-15; Witt & Marken, 1983). The abbreviated adapted version of IRP-15 assess the caregiver's perspective regarding the treatment's effectiveness and the overall impact of the intervention. The original survey consists of 15 questions, which are rated on a 6-point Likert scale. The abbreviated adapted version of the survey contains 12 questions. To be specific, the scale range comprises of (1) Strongly Disagree, (2) Disagree, (3) Slightly Disagree, (4) Slightly Agree, (5) Agree, and (6) Strongly Agree. The survey questions are designed to ascertain the intervention's acceptability to caregivers and participants, and appropriateness in meeting the participants' needs. It also includes several questions relative to any negative effects or barriers to the intervention or lack of its intended outcomes. The researcher utilized standard scoring measures as they are outlined by Witt and Marken (1983). She calculated the sum of all points (range from 12–72). The high score is indicative of high acceptability level.

The adapted version of the IRP-15 is considered to be a reliable instrument based on its .91 scaled score as determined by Cronbach's Alpha (Witt & Marken, 1983). The rating scale has been used in various research studies. For example, Hier and Eckard (2014) utilized a modified IRP-15 to examine performance feedback for interventions that were used with elementary students who had difficulty with writing. The researchers found the survey to be valid and reliable measurement tool (Hier & Eckert, 2014).

Another measurement tool within the study is the interobserver agreement (IOA) data sheet (See Appendix E). The IOA data sheet was used to ensure the reliability of the collected data. The IOA was obtained during both baseline and treatment phases. The data sheet is based on the recommendations of Ledford and Gast (2018). The researcher utilized a trial-by-trial analysis to determine occurrence or nonoccurrence of social behavior that accounts for nonverbal behavior, social interaction, and engagement for which count for each trial can only be 0 or 1. Trial-by-trial IOA was calculated by dividing the total number of trials with agreement by the total number of trials and multiplying by 100.

Materials

The following materials were utilized in the study: construction paper, pencils, pens, markers, crayons, various board games, iPad, and flashcards. The following devices were also used for event recording: datasheet, hand-tally digital counters, digital timer, and pocket calculators.

Measures

The primary dependent variable was social behavior that accounted for nonverbal behavior, social interaction, and engagement. Nonverbal behavior is defined as nonverbal

communication, including facial expressions, volume tone and pitch, body language, and proxemics. Nonexamples of nonverbal behavior include any form of verbal communication, such as written or spoken words. Occurrences of nonverbal behavior were measured using a direct, systematic observation and recording (DSOR). The researcher continuously observed the participants during free operant timed events and record occurrences of the behavior. A simple count was derived from contrived opportunities for the participants to engage in the target behavior during the session (Kazdin, 2011; Ledford & Gast, 2018).

Social interaction is defined as verbal or nonverbal communication directed towards a peer. Nonexamples of social interaction include verbal or nonverbal interactions directed towards an adult. Occurrences of social interaction were measured using a DSOR. The researcher continuously observed the participants during free operant timed events and recorded occurrences of the behavior. A simple count was derived from contrived opportunities for the participants to engage in the target behavior during the session (Kazdin, 2011; Ledford & Gast, 2018).

Engagement is defined as accurately and appropriately engaging with materials or peers. Nonexamples include not engaging with materials for their intended use and wandering away from peers. Occurrences of engagement were measured using a DSOR. The researcher continuously observed the participants during free operant timed events and record occurrences of the behavior. A simple count was derived from contrived opportunities for the participants to engage in the target behavior during the session (Kazdin, 2011; Ledford & Gast, 2018).

The independent variable in this study was the social skills training program, which was introduced to compare alternating treatment components, such as the use of technology to determine its impact on the participants' social skills (Kazdin, 2011; Ledford & Gast, 2018). The social skills training program incorporated evidence-based practices that include video modeling, social stories, role playing, and social games. The social skills curriculum is based on the Superheroes Social Skills Program created by Jensen in 2011. The Superhero Social Skills Program consists of 18 individual lessons that target specific social skills. The lessons include video modeling and animated superhero characters to guide the participants throughout the lessons. This evidence-based training program consists of interactive sessions that incorporate social rules, development of conversation skills, management of conflicts, engagement in social role-play, and the use of verbal and nonverbal social signals (Jenson et al., 2011). The researcher conducted a comparative analysis of the use of technology in the social skills training program to improve social skills in children diagnosed with ASD.

Design

The study used the alternating treatment design ([ATD], Ledford & Gast, 2018). It suited this study because it allowed the researcher to quickly manipulate two or more conditions repeatedly across multiple sessions. The data derived from the design compared effectiveness of the interventions (Kazdin, 2011; Ledford & Gast, 2018). The researcher applied three treatment phases: baseline, comparison, and the best alone phase. The two treatment conditions, social skills training program with a technological component and the social training program without a technological component were alternated during Phase 2. Within the design, baseline data on the participants' social

skills were recorded. After acceptable level of stability of baseline data points was established and there was no evidence of contratherapeutic trend direction, the researcher implemented the interventions in an alternating randomized pattern across multiple sessions. There was a minimum of five data points per condition (Kazdin, 2011; Ledford & Gast, 2018).

The ATD was well suited for the studies that rely on a practical nature of the intervention in an applied setting such as an educational or treatment facility (Kazdin, 2011; Ledford & Gast, 2018). One of the most significant advantages of the design is that it quickly allows the researchers to evaluate multiple interventions at once. Therefore, it reduces the amount of resources and time needed for the study. Despite the many advantages, there are also some limitations to the design. These limitations include multitreatment interference and limited information regarding the effects of the intervention (Kazdin, 2011; Ledford & Gast, 2018).

Procedures

Data Collection Procedures

1. After obtaining the IRB approval, the researcher began the recruitment and intervention process for the study.
2. A one-page flyer was sent to potential participants' caregivers electronically.
3. Prior to the beginning of the study, the researcher identified and defined a target behavior.
4. Prior to the beginning of the study, the researcher determined a fidelity data collection system (e.g., 33% of sessions) and collected data for the duration of the study.

5. Prior to the beginning of the study, the researcher determined the order of treatment conditions.
6. The researcher collected baseline data (A) on target behaviors for all participants simultaneously.
7. The researcher introduced intervention (B1) to the participants only after data stability had been established in the initial baseline (A) condition and collected data on target behaviors during intervention (B1) for a minimum of 5 consecutive sessions.
8. After 5 consecutive sessions under intervention (B1), the researcher introduced intervention (B2) to the participants for a minimum of 5 consecutive sessions or until data was stable.
9. After initial data collection for intervention phase, the researcher engaged in visual analysis to evaluate whether or not a functional relation existed, or whether additional data collection were needed.
10. After visual analysis, the researcher conducted best alone phase, during which she implement the intervention that yielded a stronger functional relationship for a minimum of 3 consecutive days.
11. After visual analysis, the researcher conducted a follow-up phase.
12. Throughout the study, two observers, who were trained by the researcher, used recordings to collect reliability data for 30% of sessions across different phases of the study.

Internal Validity

Within the ATD, there are several specific threats to internal validity. Some common threats include maturation, instrumentation, procedural infidelity, testing,

attrition, adaptation, Hawthorne Effect, multiple treatment interference, and instability (Gast & Ledford, 2018). The most common threats within ATD are procedural infidelity, clinical variability, multitreatment interference, and adaptation. The common threats can often be detected by visual and formal analysis of the data. The researcher looked for shallow trend lines, differences among observers, deteriorating trends, participant behavior changes, inconsistent responding, and delays in behavior changes. The researcher attempted to control for the common threats to internal validity by providing accurate and explicit training procedures for everyone who was involved in collecting data. The research utilized cheat sheets and took baseline and intervention data for as long as data points appeared to be stable (Gast & Ledford, 2018).

Social Validity

According to Baer et al. (1968), behaviors targeted for change should be socially important. Within the seven dimensions of ABA, the fourth dimension, applied, refers to the social significance of the behavior change (Baer et al., 1968). The chosen behavior for change has to improve the life of individuals in meaningful manner. Social skills are foundational skills that can enhance life of the individual. An improvement in social skills can lead to a high quality of life and successful integration into society. Social validity was assessed and measured by a survey, which was completed by caregivers (see Appendix D). The survey assessed the caregivers' perspective regarding treatment fidelity and the impact of the intervention.

Reliability of Measurement

To ensure the reliability of the collected data, IOA was obtained during baseline and treatment phases. Relying on the recommendations of Gast and Ledford (2018), the

researcher utilized a trial-by-trial analysis to determine occurrence or nonoccurrence of social behavior that accounts for nonverbal behavior, social interaction, and engagement for which count for each trial can only be 0 or 1. Data were recorded simultaneously and independently between two independent observers. The researcher reviewed the percentage of agreements between the two observers. Trial-by-trial IOA was calculated by dividing the total number of trials with agreement by the total number of trials and multiplying by 100. The measurement is considered valid if there is 80% or higher agreement between the two observers. IOA data were collected for 30% of intervention sessions. The collected IOA data allowed the researcher to ascertain the accuracy of the definition of the target behaviors and hence make necessary corrections if clarification or different coding is necessary. It also determined the competence of observers and detect observer drift. Finally, the reported IOA data also increased believability of data.

Treatment Fidelity

Measurement of treatment fidelity is an important and necessary part of single-subject research designs (Cooper et al., 2020; Gast & Ledford, 2018). Treatment fidelity assists the researcher with locating errors within the design, implementation, and measurement. Identifying these errors ensures that the researcher has all of the necessary data to amend the treatment procedure (Gast & Ledford, 2018). The research utilized a fidelity rating checklist to ensure treatment fidelity (see Appendix C). The fidelity checklist was intended to assist with multiple implementors' replicating the treatment as intended. The checklist listed all needed items for implementation. These items include measurement materials, datasheets, intervention stimuli, and discriminative stimulus. The

researcher collected procedural fidelity data on 33% of the sessions across all phases of the study.

Data Analysis Procedures

The collected data were exported into Microsoft® Excel wherein the raw data were formatted into a line graph. Visual analysis of trend, variability, and level was performed to determine the effect of intervention on the target behaviors and compare the baseline data to intervention data as well as the two sets of intervention data between themselves (Ledford & Gast, 2018). Data patterns of two intervention conditions were of particular interest to the researcher. The researcher looked for differentiation between data paths in a therapeutic direction to establish one intervention which is more effective than the other one.

Chapter 4: Results

Introduction

This study evaluated the effects of social skills training programs as a method to improve social skills in children diagnosed with ASD. The study also evaluated the effects of using a technology-based component to teach social skills. The effectiveness of different types of social skill training programs, such as the social skills group training and computer-based social skills training were implemented among the study participants.

The participants received social skills training using the ATD across three phases. The two treatment conditions, the social training program without a technological component (Treatment A) and the social skills training program with a technological component (Treatment B) were alternated every four sessions during the treatment phase. Participants were then observed engaging in the trained skills in the natural environment with support of the researcher and relying on the intervention components. The researcher also conducted the best-alone phase to combat multitreatment interference as a potential threat to internal validity. This research study aimed at answering the following research questions:

1. How does social skills training increase basic social skills in children diagnosed with ASD as indicated by pre- and post-assessment measure?
2. Will the use of modern technology i.e., robots, computers, or games increase social skills in children with ASD?
3. What is the rate of independent responses of target behaviors after implementation of the alternating social skills treatment programs?

Demographic Characteristics

There were three children who participated in the study: two females and one male child. In addition to the minor participants, their legal guardians completed the prequalifying questionnaire, social validity survey, and treatment consent. All three minor participants were 49 years of age. No participants fell outside of this age range. Furthermore, all participants were children with ASD, identified with social-emotional deficits based on pre-qualifying questionnaire, and English speaking. They were also receiving applied behavior analysis treatment prior to the study. They had no reported communication, vision, or hearing impairments which could have prevented them from expressing their wants or needs verbally or nonverbally, or processing visual or auditory information.

Data Analysis

The researcher used visual analysis to evaluate this research study data. Raw data were exported into Microsoft® Excel and formatted into a line graph. A visual analysis of trend, variability, and level were compared against each participant's individual baseline and intervention data. The visual analysis determined the effect of the intervention on the target behaviors in comparison to the baseline data and the two intervention conditions. Data patterns of two comparative intervention conditions were of particular interest to the researcher. The researcher analyzed data to determine differentiation between the data paths in hope to detect a therapeutic direction and establish superiority of one intervention versus the other one.

The mean scores of social interaction, engagement, and nonverbal behavior for each participant were calculated and analyzed. Furthermore, to compare baseline

performance data to that of intervention performance data, the researcher applied the percentage of nonoverlapping data (PND) analysis. PND was determined by calculating the range of the data points in the baseline condition, counting the number of data points in the experimental condition exceeding this range in the intended direction, dividing by the total number of data points in the experimental condition, and multiplying by 100 (Ledford & Gast, 2018).

Research Question 1

The first research question attempted to assess a potential increase in the participants' social skills as indicated by the assessment measures. The mean score of the participants' social skills as indicated by the prequalifying questionnaire (Appendix A) was 32 out of a possible 80 points. Participant 1 scored 35 points, Participant 2–33 points, and Participant 3–29 points. A score between 29–35 points indicates the presence of some foundational social skills such as the ability to communicate with others, ability to participate in unstructured activities, and/or some age-appropriate play skills.

The primary measurable dependent variable within the study is social behavior. Social behavior accounts for nonverbal behavior, social interaction, and engagement. Prior to implementation of intervention strategies, baseline data were recorded for each participant for four sessions. The average independent responses of Participant 1 during the baseline phase was 0 for nonverbal behavior, 0.75 for social interactions, and 0.2 for engagement. The average independent responses of Participant 2 during the baseline phase was 1.2 for nonverbal behavior, 0.7 for social interactions, and 1 for engagement. The average independent responses of Participant 3 during the baseline phase was 0 across nonverbal behavior, social interactions, and engagement.

The average independent responses in the best treatment condition for Participant 1 was 12.6 for nonverbal behavior, 10.5 for social interactions, and 9.6 for engagement. The average independent responses of Participant 2 during the best treatment phase was 7 for nonverbal behavior, 18.6 for social interactions, and 20.3 for engagement. The average independent responses of Participant 3 during the best treatment phase was 8.3 for nonverbal behavior, 2.3 for social interactions, and 2.6 for engagement.

Based on the baseline and best treatment condition, there is a significant difference in the frequency of social skills among participants. The frequency of the participants' independent responses increased as a result of the social skills training. The visual analysis of data revealed that the training did produce learning gains for all participants regardless of the comparative treatment condition. A PND of 98% ($p = 0.0006$) was calculated across all participants from baseline to all intervention phases, including both treatments and the best alone phases (see Table 1).

A higher percentage of nonoverlapping data has a greater level of confidence in that the behavior change is a direct result of the intervention. According to Ledford and Gast (2018), the fewer the data points that overlap, the higher probability the intervention produced the intended effect. Participants 1 and 2 had the highest PND across the research study. A PND with a value above the 50% indicates a positive correlation between the intervention and behavior change (Ledford & Gast, 2018).

Table 1

Percentage of Non-Overlapping Data Points

Category	P1	P2	P3	Average
PND	100	100	96	98
P-Value	0.001	0.001	0.000	0.0006

Research Question 2

The second research question of the study addressed the use of modern technology: i.e., robots, computers, or games to increase social skills of participants. All of the participants received two treatments that were systematically alternated and hence compared to yield the strongest treatment outcome. Treatment A consisted of non-technology-based intervention strategies and Treatment B consisted of technology-based intervention strategies. Treatment B incorporated social skills training that involved the use of interactive computer lessons, social skills robot, and games. After receiving Treatment B, the participants' social skills were recorded during free play and group activities.

From the visual analysis perspective, an immediate change occurred when participants were exposed to Treatment B (see Figures 1–9). There was a higher rate of independent responses for nonverbal behavior, social interactions, and engagement. There was an ascending trend across all participants' during Treatment B. The ascending trend indicates an improvement in the participants social skills under the treatment condition.

There was also low variability across the participants in the treatment condition. The level of the target behavior is significantly different from the baseline compared to treatment conditions. There was a consistent difference in level between data points from different conditions. All of the participants displayed a significant improvement in social skills after receiving Treatment B.

The data illustrated in Figure 1 demonstrate Participant 1 nonverbal behavior. It is marked by an ascending trend with somewhat high variability and moderate level. There

is a low level in the baseline condition compared to the treatment conditions, specifically in the Treatment B. The directional slope is ascending in a steep trend. The directional slope is steeper in Treatment B when compared to Treatment A. Therefore, it is indicating a positive skill acquisition. While variability is high during both treatment conditions, the last three data points are stable and increasing in a positive therapeutic direction. In the best alone phase, there was an initial downward dip in data before it increased.

Participant 1 social interaction data, which is illustrated in Figure 2, show an ascending trend with some variability. The data slope is steep for the first three data points of the Treatment B. However, both comparative treatment data points are not as steep as they are in Figure 1. In addition, an upward trend is seen for the last three data points in both treatment conditions. There is also a low level in the baseline condition compared to treatment conditions. The variability is somewhat high during both of the treatment conditions, but overall, the data points increased in a therapeutic direction. In the best alone phase, there was an initial downward dip in data. The data path steadily progressed on an upward trend.

Participant 1 social engagement data indicate an ascending trend for the last two data points with low variability and low range level (see Figure 3). The directional slope is a gradual acceleration trend. The variability is also low for both treatment conditions. There is a small degree of fluctuation between data points. Participant 1 social engagement moved in a positive therapeutic direction. Data appears to be stable across treatment conditions. In the best alone phase, there was an initial downward dip in data before it increased.

The data illustrated in Figure 4 depict an ascending trend with low variability among all data points, but moderate level because directional slope is ascending in a steep upward trend. Participant 2 engaged in nonverbal communication at a high rate although not always consistent as to preference of the treatment conditions. Therefore, the data indicate positive skill acquisition regardless of the condition. There is also a low level in the baseline condition compared to both treatment conditions.

Participant 2 social interaction skill acquisition shows an ascending trend with low variability and level in treatment A and B (see Figure 5). The directional slope is ascending in a steep upward trend in both treatment conditions. Participant 2 engaged in social interaction at a high consistent rate, and, as such, demonstrated a positive skill acquisition. There is also a low level in the baseline condition compared to treatment conditions. In the best alone phase, there was an initial downward dip in data before it increased to the level in previous conditions.

Participant 2 engagement data is illustrated in Figure 6. Data points in the treatment phase depict an ascending trend with low variability, but drastic changes in level within the Treatment B condition. The directional slope is ascending in a steep upward trend for the last four point of the Treatment B and only one point of the treatment A. As such, Participant 2 demonstrated social engagement at a high consistent rate during the Treatment B. There is also a low level in the baseline condition compared to both treatment conditions. The level is higher in Treatment B in comparison to Treatment A. In the best alone phase, the data path is on a downward trend. There is low variability within this condition.

Participant 3 nonverbal behavior is demonstrated in Figure 7. Data points show an

ascending trend which is marked by high variability and moderate level. The directional slope is ascending in a steep upward trend for the last three points in the Treatment A and the last two points for the Treatment B. There is also a low level in the baseline condition compared to treatment conditions. The variability is relatively high in both treatment conditions. In the best alone condition, there is an initial decrease in data points before ascending in an upward pattern.

The data illustrated in Figure 8 show Participant 3 social interaction. The last two data points of the Treatment B reveal ascending trend with the overall high variability and level between the two conditions. The last two points of the Treatment A depict descending trend with as low as negative acquisition of skills during Session 14. Participant 3 is engaged in social interaction at a slower rate in comparison to baseline condition and the Treatment A. In the best alone phase, there was an initial downward dip in data before increasing. There is higher variability in this condition.

Participant 3 engagement data, which is illustrated in Figure 9, is similar to the data represented in Figure 8. While there is clear observation of an ascending trend in the last two points of the Treatment B, there is a descending trend in the last two points of the Treatment A. Both comparative treatment conditions demonstrate somewhat high variability and moderate level. There is a low level in the baseline condition compared to treatment conditions. In the best alone phase, there was an initial downward dip in data before it increased. There is higher variability in this condition.

In comparison to Treatment A and Treatment B, there was an increase in independent occurrences of social skills among all participants (see Figure 1 - 9). The participants averaged 7.5 occurrences of nonverbal behavior in Treatment B and 5.25

occurrences of nonverbal behavior in Treatment A. The participants also averaged 9.9 occurrences of social interactions in Treatment B and 4.9 occurrences of social interactions in Treatment A. The participants averaged 9.4 occurrences of engagement in Treatment B and 5.21 occurrences of engagement in Treatment A.

Figure 1
Participant 1 Independent Engagement in Nonverbal Behavior

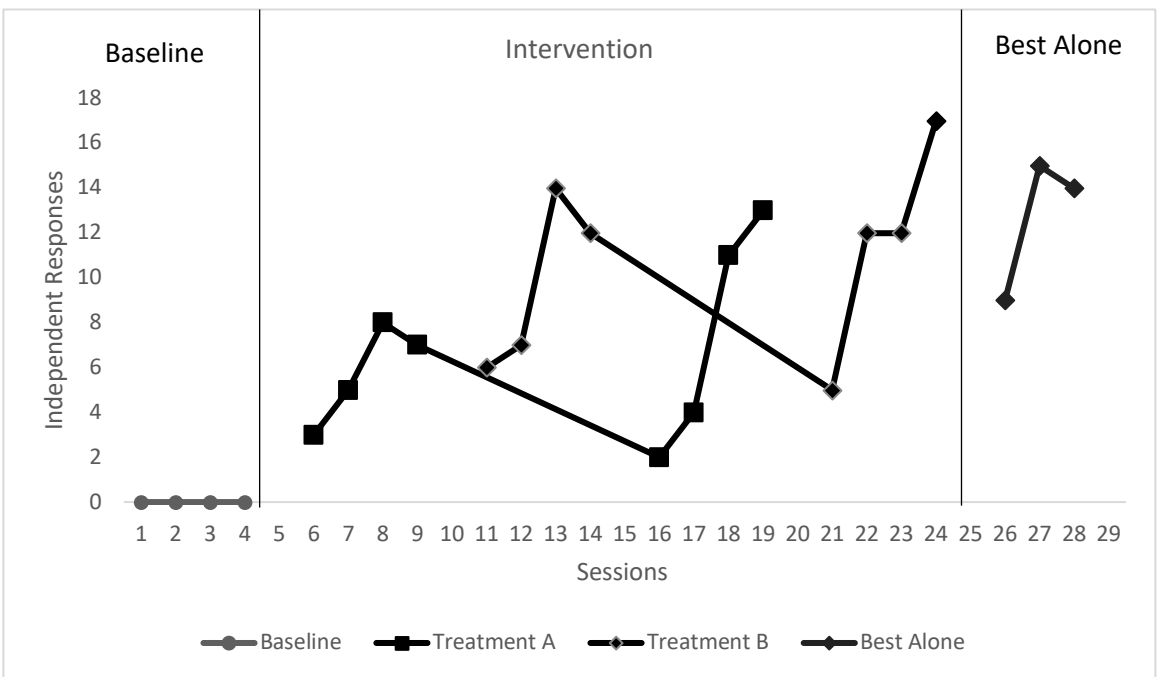


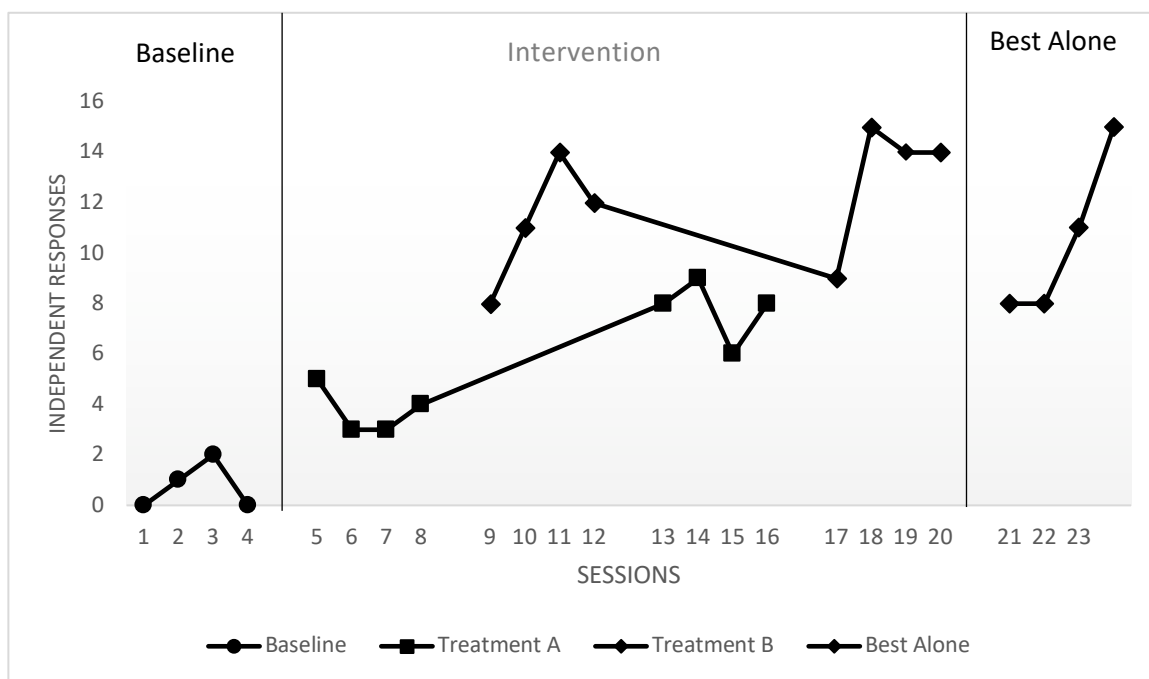
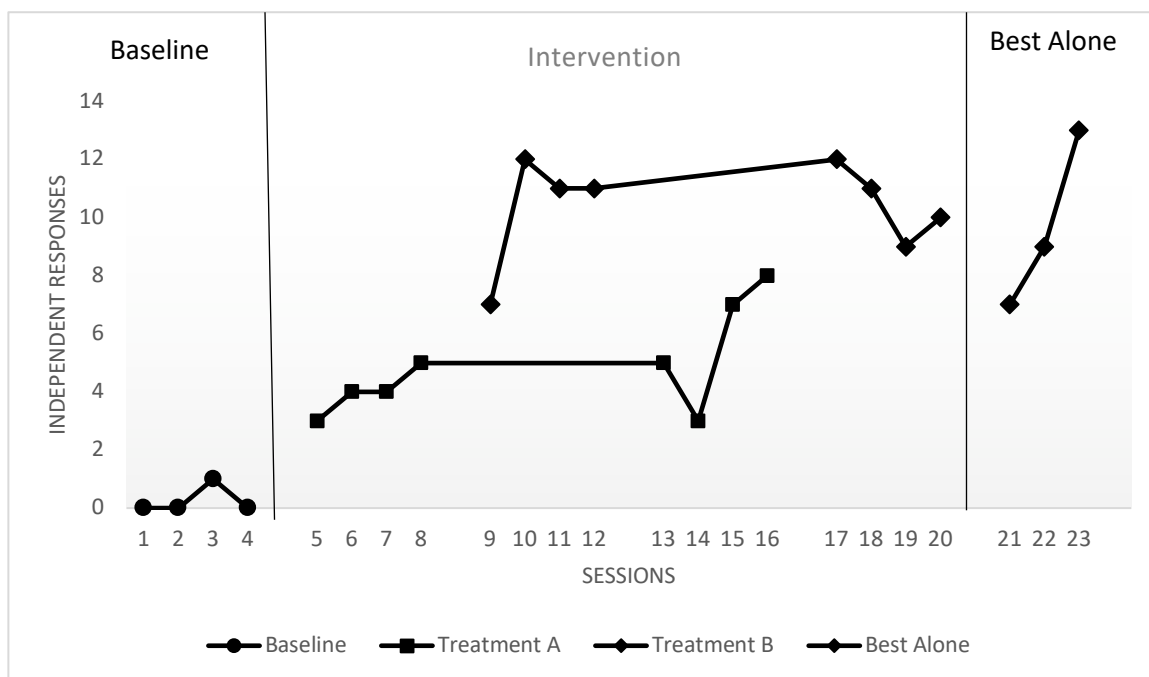
Figure 2*Participant 1 Independent Engagement in Social Interaction***Figure 3***Participant 1 Independent Engagement*

Figure 4

Participant 2 Independent Engagement in Nonverbal Behavior

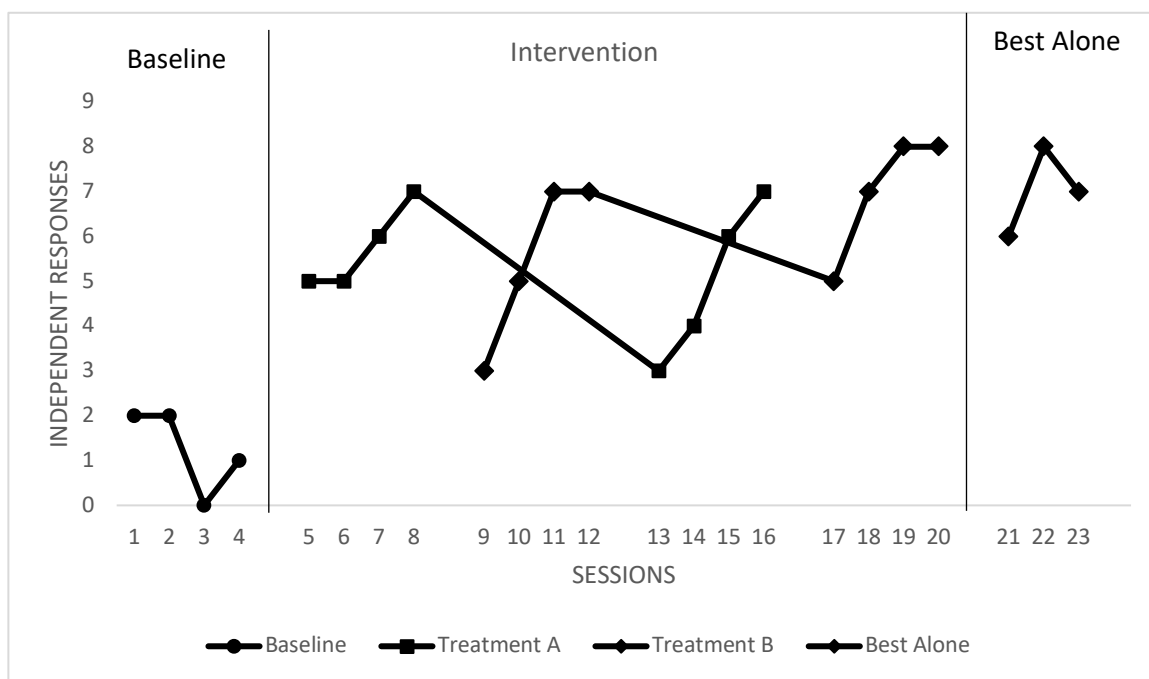


Figure 5

Participant 2 Independent Engagement in Social Interaction

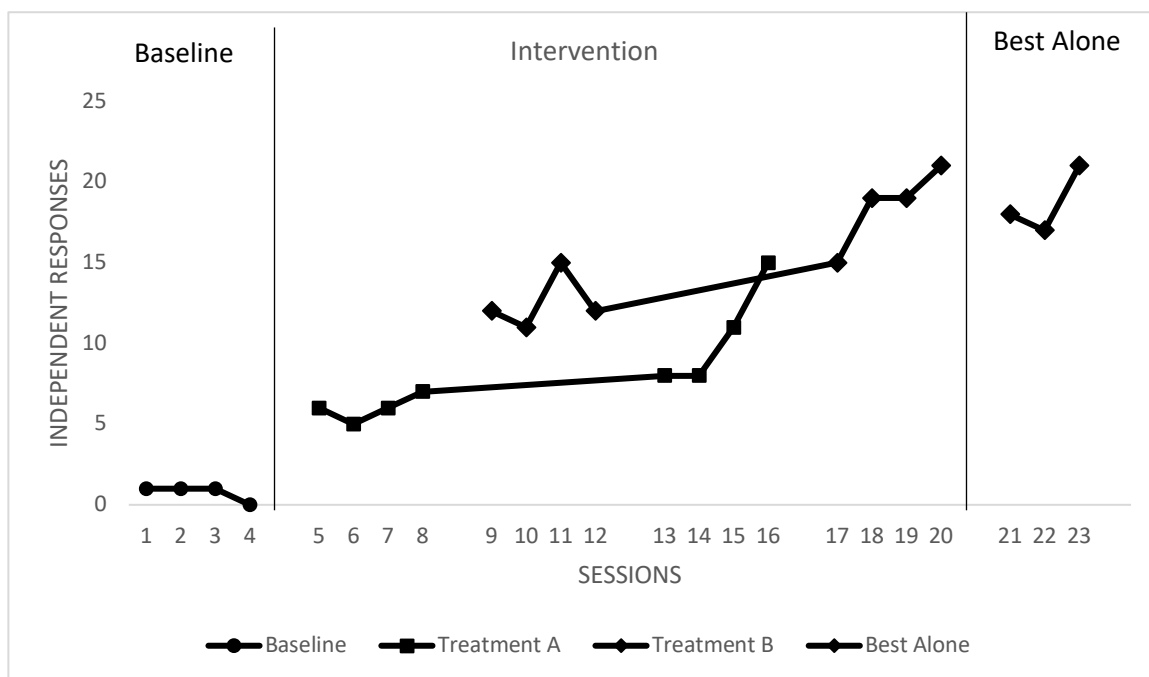


Figure 6

Participant 2 Independent Engagement

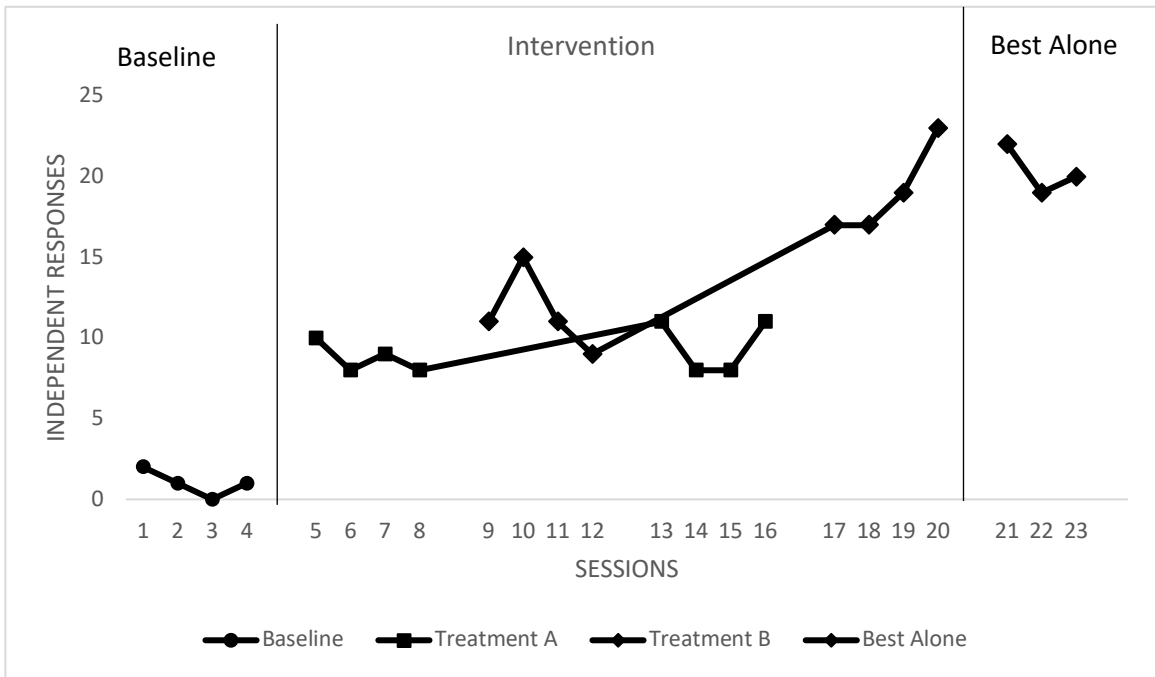


Figure 7

Participant 3 Independent Engagement in Nonverbal Behavior

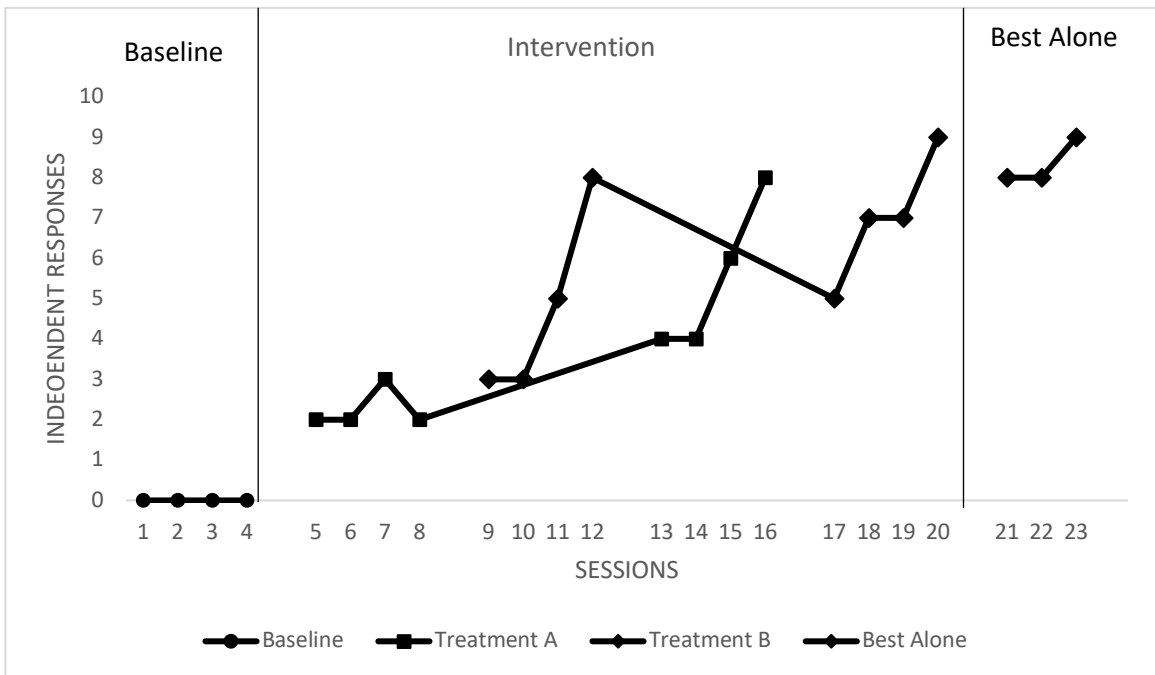
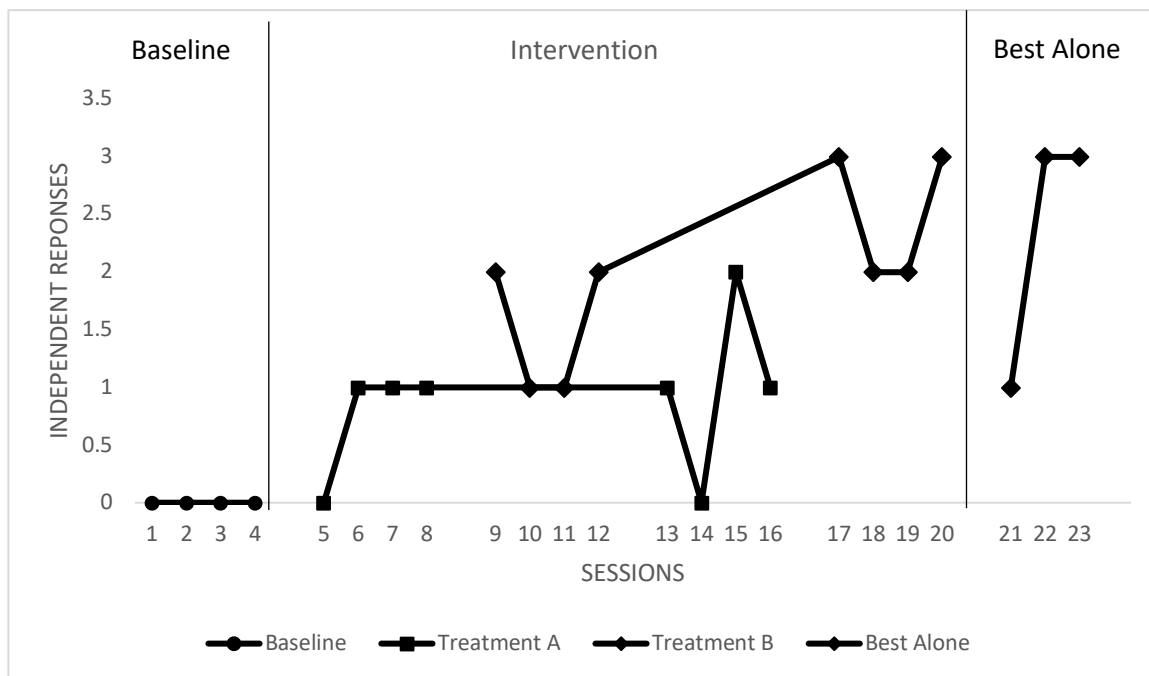
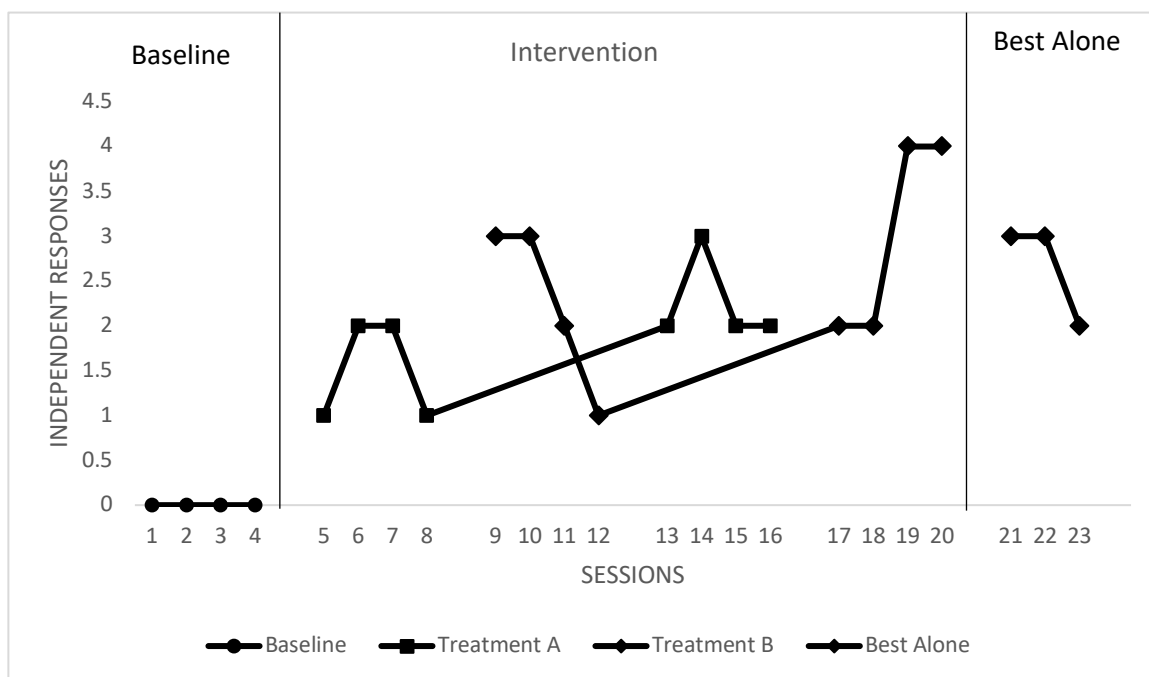


Figure 8*Participant 3 Independent Engagement in Social Interaction***Figure 9***Participant 3 Independent Engagement*

Research Question 3

The third research question addressed the rate of independent responses of target behaviors after implementation of alternating social skills treatment programs. There were four sessions within the baseline condition. Data were recorded for an average of 2 hr per session. The rate of independent responses for Participant 1 for nonverbal behavior was 0 occurrences per 1 hr, 0.37 occurrences of social interaction per 1 hr, and 0.12 occurrence of engagement per 1 hr. The rate of independent responses for Participant 2 for nonverbal behavior was 0.62 occurrences per 1 hr, 0.37 occurrences of social interaction per 1 hr, and 0.5 occurrences of engagement per 1 hr. The rate of independent responses for Participant 3 for nonverbal behavior, social interaction, and engagement was 0 occurrences per 1 hr.

Treatment A consisted of 8 total sessions and data were recorded for an average of 2 hr. The rate of independent responses for Participant 1 for nonverbal behavior was 3.31 occurrences per 1 hr, 2.87 occurrences of social interaction per 1 hr, and 2.43 occurrences of engagement per 1 hr. The rate of independent responses for Participant 2 for nonverbal behavior was 2.6 occurrences per 1 hr, 4.1 occurrences of social interaction per 1 hr, and 4.5 occurrences of engagement per 1 hr. The rate of independent responses for Participant 3 for nonverbal behavior was 1.9 occurrences per 1 hr, 0.43 occurrences of social interaction per 1 hr, and 0.9 occurrences of engagement per 1 hr.

Treatment B consisted of 8 total sessions and data were recorded for an average of 2 hr. The rate of independent responses for Participant 1 for nonverbal behavior was 5.3 occurrences per 1 hr, 6.06 occurrences of social interaction per 1 hr, and 5.1 occurrences

of engagement per 1 hr. The rate of independent responses for Participant 2 for nonverbal behavior was 3.1 occurrences per 1 hr, 7.7 occurrences of social interaction per 1 hr, and 7.6 occurrences of engagement per 1 hr. The rate of independent responses for Participant 3 for nonverbal behavior was 2.9 occurrences per 1 hr, 1 occurrence of social interaction per 1 hr, and 1.3 occurrence of engagement per 1 hr.

The best alone treatment condition consisted of 3 total sessions and data were recorded for an average of 2 hr. The rate of independent responses for Participant 1 for nonverbal behavior was 6.3 occurrences per 1 hr, 5.25 occurrences of social interaction per 1 hr, and 4.8 occurrences of engagement per 1 hr. The rate of independent responses for Participant 2 for nonverbal behavior was 3.5 occurrences per 1 hr, 9.3 occurrences of social interaction per 1 hr, and 10.1 occurrences of engagement per 1 hr. The rate of independent responses for Participant 3 for nonverbal behavior was 4.1 occurrences per 1 hr, 1.1 occurrences of social interaction per 1 hr, and 1.3 occurrence of engagement per 1 hr.

After the implementation of the alternating social skills treatment program, there was an increase in the rate of independent responses of target behaviors compared to the baseline. All of the participants' rate of responding increased during the best alone treatment condition.

Interobserver Agreement

The IOA data were also collected during all phases of the study. The average IOA for the baseline phase across all participants was 83% (see Table 2). Based on IOA, the training was implemented with fidelity across all three treatment phases.

Table 2*Interobserver Agreement Data Across Participants and Phases*

Phase	P1	P2	P3	Average
Baseline	80	90	80	83
Treatment	70	90	80	80
Best Alone	80	100	90	90

Treatment Fidelity

Treatment fidelity checks were performed throughout all phases of the study (see Table 3). Treatment fidelity was scored at 100% ($N = 3$) across all participants. This indicates that errors in implementation and training are highly unlikely and did not influence the participant acquisition of social skills.

Table 3*Average Treatment Fidelity Score for Participants Across Phases*

Phase	P 1	P 2	P 3	Average
Intervention	100	100	100	100
Generalization	100	100	100	100

Social Validity Assessment

Social validity was measured by the survey, which was completed by the participants' legal guardians (see Appendix D). The survey assessed the caregivers' perspective regarding treatment fidelity and the impact of the intervention. The average social validity rating score was 66 (see Table 4). The participants' guardians indicated that the social skills training program was an acceptable intervention to meet their child's needs.

Table 4*Social Validity Treatment Score for Participants*

Phase	P 1	P 2	P 3	Average
Post Intervention	65	70	63	66

More specifically, the participants' guardians strongly agreed that the intervention was effective in supporting their child's needs. They also agreed that the intervention did not result in negative side effects. The guardians were in strong agreement that the approach is suitable for a variety of children and they would recommend the intervention to others. Overall, each of the participants strongly agreed that the intervention was beneficial for their child. Therefore, social skills training is a socially valid intervention according to the participants guardians.

Chapter 5: Discussion

Introduction

One of the main characteristics of ASD is a deficit in the social-emotional domain (APA, 2013). Due to this deficiency, many children and adolescents with ASD require a targeted training and social-emotional therapy to encourage appropriate acquisition of social skills across various environments and individuals (Carrington et al., 2003; Olsson et al., 2016; Taheri et al., 2016). The lack of social skills has led to creation of several methods and interventions to teach children and adolescents appropriate social skills. Common methods include story-based and peer-mediated programs, social skills groups, script fading procedures, pivotal response training, and video modeling (Carrington et al., 2003; Olsson et al., 2016; Taheri et al., 2016). To evaluate the effectiveness of different types of social skill training programs and assess their influence on social skill acquisition among children with ASD, the researcher utilized the ATD to analyze the participants' progress data and test the effectiveness of the training programs.

There were three research questions developed: How does social skills training increase basic social skills in children with ASD as indicated by pre and postassessment measure? Will the use of modern technology i.e., robots, computers, or games increase social skills in children with ASD? What is the rate of independent responses of target behaviors after implementation of alternating social skills treatment programs?

Summary of Findings

All participants made improvements in their social skills based on the baseline and intervention data. The average independent responses of Participant 1 was 0 for nonverbal behavior, 0.75 for social interactions, and 0.2 for engagement during baseline

phase. The average independent responses in the best treatment condition for Participant 1 was 12.6 for nonverbal behavior, 10.5 for social interactions, and 9.6 for engagement. The average independent responses of Participant 2 during the baseline phase was 1.2 for nonverbal behavior, 0.7 for social interactions, and 1 for engagement. The average independent responses of Participant 2 was 7 for nonverbal behavior, 18.6 for social interactions, and 20.3 for engagement during the best treatment phase. The average independent responses of Participant 3 was 0 across nonverbal behavior, social interactions, and engagement during the baseline phase. The average independent responses of Participant 3 was 8.3 for nonverbal behavior, 2.3 for social interactions, and 2.6 for engagement during the best treatment phase.

The rate of responding also increased significantly across participants. The rate of independent responses per 1 hr for Participant 2 increased to 3.1 occurrences for nonverbal behavior, 7.7 occurrences for social interaction, and 7.6 occurrences for engagement during Treatment B. Participant 3 rate of responding increased as well but not as significantly when compared to participants 1 and 3.

Based on the baseline and treatment conditions, there is a significant difference in the frequency of social skills among participants. The frequency of the participants' independent responses and rate of responding increased as a result of the social skills training. The visual analysis of data revealed that the training did produce learning gains for all participants regardless of the comparative treatment condition.

Within the study, all of the participants received two treatments that were systematically alternated and hence compared to yield the strongest treatment outcome. Treatment A consisted of non-technology-based intervention and Treatment B consisted

of technology-based intervention. Treatment B comprised of social skills training that involved the use of interactive computer lessons, social skills robot, and games. After receiving treatment, the participants' social skills were recorded during free play and group activities. The results of the comparative analysis of the treatment conditions resulted in the best alone treatment phase, which was Treatment B.

From the visual analysis perspective, an immediate change occurred when participants were exposed to Treatment B (see Figures 1-9). There was a high rate of independent responses for nonverbal behavior, social interactions, and engagement. There was an ascending trend across all participants' during Treatment B. The ascending trend indicates an improvement in the participants' social skills under the treatment condition. All participants displayed a significant improvement in social skills after receiving Treatment B.

Interpretation of Findings

Social skills training programs are a valuable tool for increasing social skills among children with ASD (Carrington et al., 2003; Karedis & Sadik, 2018; Olsson et al., 2016; Pekdogan, 2016; Radley et al., 2016; Taheri et al., 2016). The effectiveness of social skills training was validated through this study by all participants. The intervention resulted in a significant increase in social skill acquisition and independent responding. A visual analysis of Figures 1–9 further supports an increase in social skills among the participants. These and other improvements in social skills were demonstrated over time and throughout the study in visual and empirical forms. Finally, visual analysis of the comparative data displayed high rate of responding among all participants during the technology-based intervention.

Prior to the onset of the study, all participants were given a prequalifying questionnaire that was completed by the participants' guardians. The questionnaire was a brief assessment of each of the participants' social skills. It provided valuable information pertaining to each participant's social skill deficits. Participant 1 did not engage with peers, identify social cues, and display appropriate social interactions. Participants 2 and 3 had similar deficits in addition to an inability to identify others interests or display empathy. Based on the preassessment data, the participants lacked the ability to engage in multiple aspects of socialization, therefore creating a strong need for social skills training.

Social skills training programs have been found to be an effective strategy to increase social skills among children with ASD (Carrington et al., 2003; Karedis & Sadik, 2018; Olsson et al., 2016; Pekdogan, 2016; Radley et al., 2016; Taheri et al., 2016). Based on the baseline and best treatment phases of the current study, there is a significant difference in the frequency of social skill occurrences among participants. The rate of independent responses for Participant 1 for nonverbal behavior was 0 occurrences per hour, 0.37 occurrences of social interaction per hour and 0.12 occurrence of engagement per hour during baseline. The rate of independent responses for Participant 2 for nonverbal behavior was 0.62 occurrences per hour, 0.37 occurrences of social interaction per hour and 0.5 occurrences of engagement per hour during baseline. The rate of independent responses for Participant 3 for nonverbal behavior was 0 occurrences per hour during baseline. The rate of independent responses for Participant 1 for nonverbal behavior was 6.3 occurrences per hour, 5.25 occurrences of social interaction per hour and 4.8 occurrences of engagement per hour during the best treatment phase.

The rate of independent responses for Participant 2 for nonverbal behavior was 3.5 occurrences per hour, 9.3 occurrences of social interaction per hour and 10.1 occurrences of engagement per hour during the best alone treatment phase. The rate of independent responses for Participant 3 for nonverbal behavior was 4.1 occurrences per hr, 1.1 occurrences of social interaction per hr and 1.3 occurrence of engagement per hour during the best alone treatment phase. All of the participants were averaging 0 occurrences pre-treatment. The rate of responding after the interventions increased to an average of 3–7 occurrences per hr.

The frequency of the participants' independent responses increased as a result of the social skills training. Independent responding is a key indicator of skill acquisition and potential mastery. Data were collected on the frequency of responding without a prompt. The use of prompts is a standard strategy to teach several skills in behavior analysis. Prompts are used to encourage correct responding and teach the learner what the desired response is (Cooper et al., 2020). It also strengthens the target behavior in the presence of the discriminative stimulus. In the absence of prompts errors can occur which will affect the rate of responding and access to reinforcement. Prompt fading procedures should result in the goal of independent responding. Independent responding indicates skill mastery and generalization. Achieving independent responding of social skills is a positive learning outcome and attests to the success of skill acquisition training (Myrna et al., 2008).

Visual analysis of data revealed that the training did produce learning gains for all participants regardless of the comparative treatment condition. The learning gains across treatments indicate that social skills training is an effective strategy to teach social skills.

Regardless of the type of model followed, an evidence-based model that is based on a functional behavior assessment and is conducted with fidelity will likely produce learning gains (Cooper et al., 2020). Dependent on individual skills, cognitive abilities, and environmental variables, the rate of responding and acquisition of social skills may differ but a social skills training will still produce an improvement in skills. The variation in responding and acquisition of skills have been demonstrated as a result of the treatment conditions of this study. Treatment B produced a higher rate of responding and display of social skills when the participants received this treatment versus its alternative.

The use of visual analysis for single subject research designs is important to the analysis of data and detection of functional relationship between dependent and independent variables (Ledford & Gast, 2018). Repeated implementation of the independent variables to establish a correlation in behavior change is illustrated through graphic data of this study. Visual analysis also allows for a thorough examination of data across the length of the study and across conditions (Ledford & Gast, 2018). Data-based decisions are also made through visual analysis. Therefore, allowing the researcher to make necessary adjustments to prevent and combat common threats to internal and external validity of the study. Visual analysis also offers data transparency. General public is more inclined to understand visual display of data rather than statistical presentation of data.

It is important to note that an immediate change occurred when the participants of this study were exposed to treatment (see Figures 1–9). There was high rate of independent responses for nonverbal behavior, social interactions, and engagement in both treatment conditions. The research findings were anticipated based on the evidence-

based strategies and previous research on social skills training.

The definition of social skills as it pertained to the study were measured by nonverbal behavior, social interaction, and engagement. The participants' ability to identify and engage in nonverbal behavior was slightly varied across the participants. Nonverbal communication that accounted for facial expressions, volume tone and pitch, body language, and proxemics were higher for Participant 1 in comparison to the measures of engagement skill. Participants 2 and 3 had a higher rate of responding for engagement vs. the others measures of social skill. The participants functionally engaged with various materials and with peers. Appropriate social engagements were void of wandering away from peers and inappropriately engaging with materials. These findings imply that nonverbal communication skills are a broad but vital skill that requires additional training to yield consistent independent responses. The combined dependent variables of nonverbal behavior, social interaction, and engagement are important to the acquisition of social skills. Each of these variables build up the skills needed to engage in age-appropriate social skills. The acquisition of these variables will lead to the ability to communicate with others, engage in appropriate play skills, and interactions with peers.

While there was an ascending trend across all participants during the treatment phase, there appeared a steep ascending during the technology-based intervention. The ascending trend indicates an improvement in the participants' social skills under the treatment condition (Ledford & Gast, 2018). This is important to notice because Treatment B appears to be more effective treatment approach in comparison to treatment A. The findings also indicate that the use of technology is an effective intervention.

There was also low variability across the participants in the treatment condition. It

indicates data stability (Ledford & Gast, 2018). The data points typically fell within a stable range of responding. The level of the target behavior is significantly different from the baseline compared to treatment conditions. There was a low level of responding within the baseline condition. The level of responding increased with the treatment's introduction. There was a moderate to high level of responding recorded across all of the participants within the treatment condition. There was also a consistent difference in level between data points of different conditions. The level was higher in Treatment B in comparison to treatment A (see Figures 1–9).

All implementation steps were replicated three times across each participant and produced similar findings across all participants. It demonstrates experimental control within the study (Gast & Ledford, 2018). A successful implementation of a single subject research design aims at demonstrating strong internal and external validity and experimental control. A study that has achieved experimental control has the adequate mechanisms in place to guarantee that the behavior change is a direct result of the experimentation.

Confounding variables and threats to internal and external validity that could potentially interfere with treatment were effectively addressed in the study. Within this study, the researcher employed consistent visual and formal analysis of the data to ensure internal validity. The researcher looked for shallow trend lines, differences among observers, deteriorating trends, participant behavior changes, inconsistent responding, and delays in behavior changes (Ledford & Gast, 2018). In addition to visual analysis, the researcher provided accurate and explicit training procedures for everyone who was involved in collecting data. The researcher also included cheat sheets to minimize

extraneous factors and demonstrate experimental control.

The study was conducted with 100% treatment fidelity. Therefore, the treatment procedure was implemented as written across multiple people (Gast & Ledford, 2018). There was the absence of errors within the design, implementation, and measurement. This indicates that errors in implementation and training are highly unlikely and did not influence the participant acquisition of social skills (Gast & Ledford, 2018).

The study was socially valid for the participants. The social validity was assessed and measured by the survey, which was completed by the participants' legal guardians (see Appendix D). The average social validity rating score was 66 out of a possible 72. The social validity results are important to research because according to Baer and colleagues (1968), behaviors targeted for change should be socially important. Within the seven dimensions of ABA, the fourth dimension, applied, refers to the social significance of the behavior change (Baer et al., 1968). The chosen behavior for change has to improve the life of individuals in meaningful manner. Overall, the researcher is confident that the social skills training program was solely responsible for the produced effects on the dependent variables.

Context of Findings

In the study conducted by Carrington et al. (2003), the authors revealed that there was a lack of in-depth understanding or skills to establish or maintain friendships among children with ASD. The participants did not innately possess age-appropriate social skills as compared to their typically developing peers. These findings were also echoed throughout this study and its baseline data in particular. All three participants lacked the ability to socialize or possess age-appropriate social skills. For example, the average

independent responses of Participant 1 was 0 for nonverbal behavior, 0.75 for social interactions, and 0.2 for engagement, and 0 for all dependent measures for Participant 3. The results of this study as well as Carrington et al.'s study justify the need for social skills training for individuals with ASD.

As to the treatment effectiveness, Olsson et al. (2016) assessed the social skills training for children with ASD. Similarly to the current research study, the authors examined the effects of a specific social skill training. However, the current research study went a step further than Olsson et al.'s study and gathered the comparative treatment data to analyze the participants' progress and test the effectiveness of different program types such as a traditional vs. technology-based social skill training. To be specific, the components of the social skills training and their influence on harvesting an increase in social skills were among the important highlights of the study's aim. The present study also demonstrated the need for the opportunity-driven outcomes that could affect the overall quality of life of individuals with ASD. If effective social skills training is not provided, children diagnosed with ASD will continue to lack relevant social skills, avoid social interactions, and misunderstand social norms, which will lead to a diminished quality of life. Children and adolescents diagnosed with a developmental disability participate in significantly fewer activities and have fewer friends compared to their typically developing peers (Ong et al., 2021; Sigman et al., 1999; Taheri et al., 2016).

A general upward trend in data (see Figures 1–9) indicated that children with ASD can learn age-appropriate social skills if they are given an opportunity. The visual analysis of data revealed that the training did produce learning gains for all participants

regardless of the comparative treatment condition. The participants practiced nonverbal communication, engaged with others, and appropriately communicated with peers after receiving the training. Prior to starting the study, the participants were not frequently engaging in these skills as it is evidenced by the results of the prequalifying questionnaire and baseline data.

While Radley and colleagues (2016) examined the effect of a superhero social skill computer-based program to teach two children with ASD, the current research study engaged in comparative analysis of the technology-based vs. non-technology-based social skill training programs for three children with ASD. Radley et al.'s strategies consisted of video modeling and the animated superhero characters in a similar manner to the current studies, which included the use of robots, computer games, and video lessons. The results of Radley et al.'s and the current study indicated positive effects of technology-based strategies as a means of improving targeted social skills. In Radley et al.'s study, the participants' skill accuracy was scored at 100% across probe sessions during the intervention and maintenance conditions. The participants accurately responded to social cues delivered by others throughout the study, which resulted in mastery of each skill within 2-3 sessions. The nonoverlap of all pairs (NAP) scores ranged from 0.81-1.00, which indicates a moderate to strong intervention effects.

In the current study, all participants' data paths demonstrated an upward trend while the researcher applied technology-based intervention (see Figures 1-9). Based on visual analysis, the directional slope ascends in a steep upward trend. The data points ascended as the treatment condition continued. The participants averaged 7.5 occurrences of nonverbal behavior, 9.9 occurrences of social interactions, and 9.4 occurrences of

engagement.

The research studies indicate that there is a correlation between social skill training programs and an increase in acquisition of social skills among children with ASD (Carrington et al., 2003; Karedis & Sadik, 2018; Olsson et al., 2016; Pekdogan, 2016; Radley et al., 2016; Taheri et al., 2016). The present study is aligned with the research studies completed by Carrington and colleagues (2003), Olsson et al. (2016), and Radley and colleagues (2016) in many different ways. It built upon and expanded the studies' findings and contributed to the knowledge base of the most effective treatment options.

Implications of Findings

There are multiple intervention strategies that educators can employ to teach appropriate social skills to individuals with ASD (Carrington et al., 2003; Karedis & Sadik, 2018; Olsson et al., 2016; Pekdogan, 2016; Radley et al., 2016; Taheri et al., 2016). Initial findings of the study indicated that children with ASD can increase the occurrence of social interaction, nonverbal behavior, and engagement after the targeted social skill intervention. Social skills training programs are often designed with multiple components and activities to help strengthen an individual's social skills (Carrington et al., 2003; Karedis & Sadik, 2018; Olsson et al., 2016; Pekdogan, 2016; Radley et al., 2016; Taheri et al., 2016). The two treatment components that were utilized within this study produced an increase in social skills across all participants. The participants averaged 7.5 occurrences of nonverbal behavior in Treatment B and 5.25 occurrences of nonverbal behavior in Treatment A. The participants also averaged 9.9 occurrences of social interactions in Treatment B and 4.9 occurrences of social interactions in treatment

A. The participants averaged 9.4 occurrences of engagement in Treatment B and 5.21 occurrences of engagement in Treatment A.

Prior to the start of the intervention, the participants' level of responding was significantly lower than during the intervention. All of the participants were averaging 0 occurrences pre-treatment. The rate of responding after the interventions increased to an average of 3-7 occurrences per hour. The rate of independent responses for Participant 1 for nonverbal behavior was 6.3 occurrences per hour, 5.25 occurrences of social interaction per hour and 4.8 occurrences of engagement per hour during the best treatment phase. The rate of independent responses for Participant 2 for nonverbal behavior was 3.5 occurrences per hour, 9.3 occurrences of social interaction per hour and 10.1 occurrences of engagement per hour during the best alone treatment phase. The rate of independent responses for Participant 3 for nonverbal behavior was 4.1 occurrences per hour, 1.1 occurrences of social interaction per hour and 1.3 occurrence of engagement per hour during the best alone treatment phase.

The introduction of treatment produced a significant increase in the rate of responding across all participants (see Figures 1-9). However, the rate of responding was higher during technology-based intervention than during non-technology-based intervention across all participants. The participants averaged 7.5 occurrences of nonverbal behavior in Treatment B and 5.25 occurrences of nonverbal behavior in treatment A. The participants also averaged 9.9 occurrences of social interactions in Treatment B and 4.9 occurrences of social interactions in treatment A. The participants averaged 9.4 occurrences of engagement in Treatment B and 5.21 occurrences of engagement in Treatment A.

The results strongly support the use of technology-based intervention strategies which appear to be more effective in comparison to the traditional social skill strategies. The results of this research study suggest that children respond well to technology-based strategies as an effective teaching intervention. The use of modern technology produces high learning gains among children diagnosed with ASD and, as such should be utilized on a wide scale.

In addition, the outcomes of this study imply that the traditional social skill programs may benefit from the auxiliary technology-based strategies such as computerized games, social skills applications, or robots. The use of technology-based interventions appears to resonate with children with ASD because of the diagnostic characteristics of ASD (APA, 2013). Children with ASD have persistent deficits in social-emotional reciprocity. This can often include abnormal approaches to socialization, fixated and perseverative interests, and difficulty with verbal and nonverbal communication. There is also a disinterest in others, which could attest to the success of technology-based learning tools. The use of these strategies may limit the social interaction with others and lead to inaccurate interpretation of social norms to include attending, communication, following directions, or making eye contact.

In the research study conducted by Karedis and Sadik (2018), the authors used eight computerized educational games to teach social skills to five participants. The purpose of the research study was to measure the effects of educational game training on the increase in social skills. The study resulted in the acquisition of social skills among most of the participants. The researchers found that the use of modern technology was beneficial to the participants and was a great teaching strategy for various skills, such as

matching skills, imitation skills, following instructions skills, visual support use, receptive language skills, communicative language skills, game and music skills, self-care skills, daily life skills, motor skills, socialization skills, and mathematics.

Kim et al. (2013) also researched the use of technology-based strategies on a large scale. The researchers measured the use of social robots as an effective strategy to produce social and communication skills among 24 children with ASD. The participants were found to respond to their robot companion and display social behavior that later pivoted to peers and adults. The participants averaged 24 verbal utterances with the robot companion vs. eight verbal responses with the adult interaction component. These research findings as well as the current research suggest that technology-based strategies are an effective tool to teach communication and social skills.

Limitations of the Study

The present study employed an ATD. This research design allows the researcher to manipulate two or more conditions repeatedly across multiple sessions (Kazdin, 2011; Ledford & Gast, 2018). Typical limitations within the ATD include multitreatment interference and limited information regarding the effects of the intervention. There is a strong possibility of multitreatment interference. The increase in social skills in Treatment B could be a result of a carryover effect from treatment A. There was an upward data trend path with Treatment A prior to alternating treatments.

Another limitation within the study is the rate of the manipulation across the treatment conditions (Ledford & Gast, 2018). During the comparison phase, there was a minimum of 5 data points in each treatment condition. The succession of treatments could be better analyzed if there was a rapid and unpredictable succession of treatments

(Kazdin, 2011; Ledford & Gast, 2018). The predictability of ATD creates cyclical variability and can affect the participants' acquisition of skills. For instance, treatment A was implemented in the morning. A lack of social skills could be attributed to fatigue or absence of peers. To reduce cyclical variability, the treatments should be randomized and unpredictable to the participants.

Moreover, adaptation and Hawthorne Effect are likely threats to internal validity because the researcher's observation of all participants was apparent (Ledford & Gast, 2018). It is possible that the participants might have detected being observed and changed their behavior in the presence of the observer.

Small sample size is a prime deficiency in all single-subject research studies (Ledford & Gast, 2018). The sample size was problematic in this study because the researcher recruited and trained three participants. While future studies should secure more than three participants, it is unlikely due to the nature of single-subject research designs. As such, the researcher's recommendation rests with continuous replication of similar studies.

Future Research Directions

Children with ASD can improve social skills by receiving social skills training (Carrington et al., 2003; Kareidis & Sadik, 2018; Olsson et al., 2016; Pekdogan, 2016; Radley et al., 2016; Taheri et al., 2016). The present study analyzed the effects of social skills trainings as a means to increase social skills in a specific group of children. A comparative analysis of treatment conditions was also analyzed to see which produced a higher frequency of socially mediated responses. Further research should analyze the short and long-term effects of social skills trainings and their components and

maintenance as well as generalization of skills over time. The long-term effects of social skills trainings could be dependent on the length of training and interventions utilized during the study.

Moreover, researchers could include comparable control groups to counter some threats to internal validity of single-subject research designs (Ledford & Gast, 2018). If comparable control and treatment groups encounter the same threat, then the study will not be affected.

Finally, the researcher recommends including additional treatment conditions. Including more than two treatment conditions will further narrow down and emphasize the effectiveness of intervention strategies on positive behavior changes. Incorporating story-based, peer-mediated programs, social skills groups, script fading procedures, pivotal response training, or video modeling may produce relevant and rich data that may rule out ineffective treatment conditions.

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Appendix A
Prequalifying Questionnaire

Prequalifying Questionnaire

Background Information

Respondent's Name: _____ Relationship to child: _____
 Child's Name: _____ Child's Date of Birth: _____

Diagnosis: _____

Language Abilities

How would you describe the child's language abilities? (Circle one)

Nonverbal (or Echolalic)

Use of 1–2 words

Phrase speech

Verbally fluent

Behaviors and Interests

Does the child have any particularly intense or unusual interests/behaviors that interfere with his/her social interactions with others? Yes/No

If so, please describe below:

The following phrases describe skills or behaviors that your child might exhibit during social interactions or in social situations. Please rate **HOW OFTEN** your child exhibits each skill or behavior independently, **without assistance from others** (i.e., without reminders, cueing and/or prompting). You should base your judgment on your child's behavior over the last **3 months**.

Please use the following guidelines to rate your child's behavior:

*Circle **N** if your child **never** or **almost never** exhibits the skill or behavior.*

*Circle **S** if your child **sometimes** or **occasionally** exhibits the skill or behavior.*

Circle **O** if your child **often** or **typically** exhibits the skill or behavior.

Circle **V** if your child **very often** or **always** exhibits the skill or behavior.

Skill Area	How Often	Brief Description
Invites Peers to Join Him/Her in Activities	N S O V 1 2 3 4	
Joins in Activities With Peers	N S O V 1 2 3 4	
Takes Turns During Games and Activities	N S O V 1 2 3 4	
Interacts With Peers During Unstructured Activities	N S O V 1 2 3 4	
Interacts With Peers During Structured Activities	N S O V 1 2 3 4	
Engages in One-On-One Social Interactions With Peers	N S O V 1 2 3 4	
Interacts With Groups of Peers	N S O V 1 2 3 4	
Maintains the “Give-and-Take” of Conversations	N S O V 1 2 3 4	
Expresses Sympathy for Others	N S O V 1 2 3 4	
Talks About or Acknowledges the Interests of Others	N S O V 1 2 3 4	
Recognizes the Facial Expressions of Others	N S O V 1 2 3 4	
Recognizes the Nonverbal Cues, or “Body Language” of Others	N S O V 1 2 3 4	
Maintains Eye Contact During Conversations	N S O V 1 2 3 4	
Speaks With an Appropriate Volume in Conversations	N S O V 1 2 3 4	
Responds to the Greetings of Others	N S O V 1 2 3 4	
Experiences Positive Peer Interactions	N S O V 1 2 3 4	
Exhibits Poor Timing With His/Her Social Initiations	N S O V 1 2 3 4	
Experiences Negative Peer Interactions	N S O V 1 2 3 4	
Exhibits Fear or Anxiety Regarding Social Interactions	N S O V 1 2 3 4	
Engages in Solitary Activities in the Presence of Peers	N S O V 1 2 3 4	

Appendix B
Observation Data Sheet

Appendix C

Treatment Fidelity Checklist

Appendix D

Abbreviated Version of the Intervention Rating Profile-15

Abbreviated Version of the Intervention Rating Profile-15

Please write the number which best describes your agreement or disagreement with each statement.

		Strongly Disagree 1	Disagree 2	Slightly Disagree 3	Slightly Agree 4	Agree 5	Strongly Agree 6
1.	This was an acceptable intervention for the child's needs.						
2.	This intervention proved effective in supporting the child's needs.						
3.	I would suggest the use of this intervention to others.						
4.	The child's needs were severe enough to warrant use of this intervention.						
5.	Others would find this intervention suitable for the needs of this child.						
6.	I would be willing to use this intervention in the community setting.						
7.	This intervention did not result in negative side effects for the child.						
8.	This intervention would be appropriate for a variety of children.						
9.	The intervention was a fair way to handle the child's needs.						
10.	This intervention was reasonable for the needs of the child.						
11.	I liked the procedures used in this intervention.						
12.	Overall, this intervention was beneficial for the child.						

Total: _____

Comments:

Appendix E

Interobserver Agreement (IOA) Data Sheet

Interobserver Agreement (IOA) Data Sheet

Date: _____ Observer 1: _____ Observer 2: _____

Trial	Observer 1	Observer 2
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

Score: _____