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Effects of Superflex Curriculum on Social Skills of Children With Autism

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Walden University

College of Allied Health

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Charli Doyle

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Walden University
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Abstract

Effects of Superflex Curriculum on Social Skills of Children With Autism

by

Charli Doyle

MA, Walden University, 2015

BS, Midwestern State University, 2012

Dissertation Submitted in Fulfillment
of the Requirements for the Degree of
Doctor of Philosophy

Walden University

November 2022

Abstract

Applied behavior analysis (ABA) is considered an applied science under the umbrella of behavior analysis and was accepted into the mainstream science in the mid-1900s. An increase in the prevalence of autism gave rise to the need for evidence-based social skills curricula. Previous research indicated many children respond well to video modeling and positive reinforcement. However, literature on social curricula for children aged 7 to 10 years in a clinical setting versus a school setting was limited. The purpose of this quantitative study with a single-subject design was to examine the effectiveness of Superflex, a superhero social thinking curriculum, on social skills and maladaptive behavior in children aged 7 to 10 years diagnosed with autism spectrum disorder (Level 1 or 2) in a clinical setting. ABA provided the theoretical framework for the study. Secondary data were collected from a local ABA clinic in a small town in the central United States. Data were evaluated using visual inspection and percentage of nonoverlapping data. Effect size between baseline and intervention and baseline and maintenance was calculated using Cohen's *d*. Results indicated the curriculum increased conversational skills and decreased maladaptive behaviors in Client 1 and Client 2. Findings may enhance positive social change initiatives through prompting of best practices for teaching social skills to children with autism spectrum disorder.

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Dedication

I would like to thank my family, friends, and Dr. Little for the support through this process. I have been in school for as long as I can remember, and my family has been there for me along way and joked about my professional student status! Dr. Little has been a wonderful mentor and support through the dissertation process. I am so happy he was able to take on my research project, to help and guide me through such a large undertaking.

Table of Contents

| | |
|---|----|
| List of Figures | iv |
| Chapter 1: Introduction to the Study..... | 1 |
| Background..... | 1 |
| Problem Statement..... | 3 |
| Purpose..... | 5 |
| Research Questions and Hypotheses | 6 |
| Theoretical Framework..... | 8 |
| Nature of the Study | 9 |
| Definitions..... | 10 |
| Assumptions..... | 13 |
| Scope and Delimitations | 14 |
| Limitations | 14 |
| Significance..... | 15 |
| Summary..... | 15 |
| Chapter 2: Literature Review..... | 16 |
| Literature Search Strategy..... | 16 |
| Theoretical Framework..... | 18 |
| Behaviorism | 20 |
| Radical | 20 |
| B.F. Skinner | 21 |
| ABA | 22 |

| | |
|--|----|
| Social Thinking Methodology | 24 |
| Social Awareness of Children with ASD..... | 25 |
| Elements of a Strong Social Intervention Program..... | 26 |
| Superflex Curriculum..... | 27 |
| Literature Review Related to Key Variable and Concepts | 30 |
| Summary | 32 |
| Chapter 3: Research Method..... | 33 |
| Research Design and Rationale | 33 |
| Methodology | 39 |
| Population | 39 |
| Data Analysis | 40 |
| Topographical Definitions | 41 |
| Procedures for Recruitment of Participants | 46 |
| Data Analysis Plan..... | 46 |
| Ethical Procedures | 47 |
| Summary | 47 |
| Chapter 4: Results..... | 49 |
| Data Collection | 49 |
| Treatment | 50 |
| Results..... | 51 |
| Client 1..... | 51 |
| Client 2..... | 59 |

| | |
|---|----|
| Summary | 67 |
| Chapter 5: Discussion, Conclusions, and Recommendations | 70 |
| Interpretation of the Findings..... | 70 |
| Limitations of the Study..... | 73 |
| Recommendations..... | 74 |
| Implications..... | 74 |
| Conclusion | 75 |
| References..... | 76 |

List of Figures

| | |
|--|----|
| Figure 1. Client 1 Asking “WH” Questions Graphic Description | 53 |
| Figure 2. Client 1 Back-and-Forth Conversations Graphic Description..... | 55 |
| Figure 3. Client 1 Tantrum Behavior in Clinic Graphic Description | 57 |
| Figure 4. Client 1 Tantrum Behavior in Home, Parent Measure Monthly Totals Graphic Description..... | 59 |
| Figure 5. Client 2 Asking “WH” Questions Graphic Description | 61 |
| Figure 6. Client 2 Back-and-Forth Conversations Graphic Description..... | 63 |
| Figure 7. Client 2 Tantrum Behavior in Clinic Graphic Description | 65 |
| Figure 8. Client 2 Tantrum Behavior in Home, Parent Measure Monthly Totals Graphic Description..... | 67 |

Chapter 1: Introduction to the Study

ASD and social skills are generally tied together because those on the spectrum have social deficits and may need help navigating different types of social situations. Social skills help can come from a variety of places such as friends, family, school therapy, some behavior therapies, and applied behavior analysis (ABA). A social skills curriculum can also be hard to find when looking for evidence-based programming used in ABA or any other type of therapy. Superflex, a superhero social thinking curriculum, has been researched by individuals in the education setting and one researcher in the ABA setting with mixed reviews on success. (Crooke et al., 2007) In the current study, Superflex was used with children diagnosed with ASD Levels 1 and 2 using positive reinforcement and differential reinforcement to help increase socially significant behaviors while decreasing socially maladaptive behaviors. To further investigate the efficacy of Superflex, I examined Superflex's effects on social skills and maladaptive behaviors while using ABA techniques.

Background

Behavior analysis has been defined as a field, a discipline, and a practice, with each diverging, making it hard to pinpoint an exact date of the founding (Morris et al., 2013). ABA is considered an applied science under the umbrella of behavior analysis and was not accepted into the mainstream science until 1968; however, it had been in development since the early 1900s (Morris et al., 2013). Research in ABA blossomed from the late 1960s. However, the field has not seen a significant growth in intervention methods for social skills and curriculum for teaching social deficits to children on the

spectrum (Smith, 2012). In 2018, children were being diagnosed with ASD at an alarming rate with 16.8 children out of 1,000 age 8 to 11 at testing sites monitored by the Autism and Developmental Disabilities Monitoring Network (Baio et al., 2018). In 2021, it was reported that one in 44 children are diagnosed with ASD (Maenner et al., 2021).

One curriculum that has been studied by others but has yet to be found as evidence based is Superflex, a superhero social thinking curriculum. This curriculum has been researched mostly by the authors/developers, a few students in different fields, and a few researchers in ABA. In a study conducted using children with high-functioning autism, Bolton (2010) found that using the curriculum produced positive results when using direct observation as a measure. The use of reinforcement during tasks is an important component of ABA and has been used to increase responding across many different domains including social interactions. The use of social interactions as their own reinforcement is an area of growth in ABA (Clay et al., 2018). Superflex, a superhero social thinking curriculum, is based on cognitive-based methodologies that are considered private events in ABA terms (Cook et al., 2015; Wolfe et al., 1968). The researchers were also able to incorporate interactive activities to encourage learning, which would equate to having a permanent product in ABA.

The Verbal Behavior Milestones Assessment and Placement Program has been used to assess and guide treatment intervention as a curriculum for children 4 to 12 years diagnosed with ASD and Pervasive Developmental Disorder (Hansen et al., 2017). However, the program is missing some critical skills and intervention techniques such as peer and video modeling to teach complex social skills (Hansen et al., 2017). The

Superflex curriculum suggests that the use of video modeling, social peers, and active participation with hands-on activities are the best ways to teach social skills (Richman, 2015). Superflex is a social skills curriculum that can be implemented using different methods depending on the background of the individual's field. However, Superflex is not an evidence-based intervention in ABA, and further research is needed to show how the principles of ABA can be integrated into the curriculum (Leaf et al., 2016).

Superflex was used in an elementary school setting to teach children on the spectrum social skills (Müller et al., 2016). Using the curriculum, students were able to improve “wh” questions, attempts at conversations, and attention-gaining behaviors. In the teaching of social skills, the school setting was found to be limiting in ways other settings would not, and it was suggested to use the curriculum in different settings (Müller et al., 2016).

Based on my review of the literature, the gap was the lack of data supporting the efficacy of social skills curricula in ABA. The field of ABA is still considered to be young because it was first accepted into practice in the mid to late 1900s (Lovaas, 1987). I sought to identify whether Superflex could be used to teach social skills to children diagnosed with autism, while also helping to reduce maladaptive social behaviors if used in conjunction with ABA techniques.

Problem Statement

In 2016, the Centers of Disease Control and Prevention found that 1 in 44 children are diagnosed with ASD by the age of 8 (Maenner et al., 2021). This is an increase from the 2010 report, which indicated 1 in 75 children are diagnosed with autism

(Maenner et al., 2021). Children diagnosed with ASD have social communication and social interactions deficits (Speaks, 2014). There is a limited number of evidence-based social skills curricula to teach children with autism or guide therapists or teachers in teaching social skills (Wang & Spillane, 2009).

Superflex has been researched by dissertation students, speech therapists, and others in school settings but has not been looked at in a clinical setting (Müller et al., 2016). In a mixed-methods pilot study, Müller et al. (2016) found an increase in “wh” questions, attempts at conversations, and attention-gaining behaviors. Müller et al. noted it is possible to teach children with high-functioning autism to engage in peer-to-peer conversations when given the proper tools. Müller et al. also recommended further research using a control group, different sample sizes, and new settings outside of a school-based setting to test the effects on peer interactions.

Some would say that social thinking is a pseudoscience and is not to be used to teach social skills in any setting (Leaf et al., 2016). As suggested by Leaf et al. (2016) and Leaf et al. (2009), the social thinking curriculum does not meet the stringent written requirements of evidence-based science due to only two articles being published in peer-reviewed journals at the time of the inquiry. Leaf et al. (2016) also noted that social thinking does not conform to the field of ABA or scientific evidence and recommended conducting highly controlled studies utilizing ABA-based procedures to teach meaningful pro-social relationships, complex social behaviors, and authentic social behaviors.

Hansen et al. (2017) suggested the exploration of advanced social skills in early intervention and the need for more research into the underpinnings that lead to reciprocal

conversation and peer interactions. Hansen et al. found that the current literature is missing some key elements needed for teaching advanced social communication, such as empathy and telling jokes. Hansen et al. suggested further research is needed to identify effective interventions and the introduction of peer models and video modeling to teach complex social skills.

Teaching social skills can be difficult and can be hard to reinforce. Finding ways to make learning social skills fun yet educational is another area of needed research (Clay et al., 2018). Clay et al. (2018) found that a combination of reinforcement (e.g., edible, vocal, and physical interactions) used with different schedule types (e.g., fixed and variable) is needed to increase social skill acquisition. Clay et al. suggested further research to examine ways to teach social skills to make them automatically rewarding while incorporating fun teaching methods. Superflex is a superhero social thinking curriculum that was created to help teach children 7 to 10 years of age with social difficulties. Children develop awareness of their own social thinking behaviors while learning strategies to help regulate emotions using fun playful characters. The purpose of the current study was to evaluate the effectiveness of Superflex at teaching social skills to children with ASD using ABA techniques.

Purpose

The purpose of this single-subject design study was to examine the effectiveness of Superflex, a superhero social thinking curriculum, on social skills and maladaptive behavior in children 7 to 10 years of age diagnosed with ASD (Level 1 or 2) in a clinical

setting. The independent variables were level of autism, Superflex, and settings (clinic and home). The dependent variables were social skills and maladaptive behavior.

Research Questions and Hypotheses

RQ1: Will Superflex increase back-and-forth conversations with peers in children 7 to 10 years of age diagnosed with ASD (Level 1 or 2) in a clinical setting?

H₀1: Superflex will not increase back and forth conversations with peers in children 7 to 10 years of age diagnosed with ASD (Level 1 or 2) in a clinical setting.

H_a2: Based on the research, the back-and-forth conversations with peers will increase by 15% halfway through the lessons. Superflex will increase back-and-forth conversations with peers in children 7 to 10 years of age diagnosed with ASD (Level 1 or 2) in a clinical setting.

RQ2: Can the conversation skills gained during the lessons generalize into novel settings without training?

H₀2: Back-and-forth conversation skills will not generalize into novel settings without further training. This will be measured using data collect in home by parents on the provided data sheet.

H_a2: Back-and-forth conversation skills will generalize into novel settings without further training. This will be measured using data collect in home by parents on the provided data sheet.

RQ3: Will Superflex decrease crying/screaming (any instance in which a participant engages in a vocalization louder than is used for communication for longer

than 3 seconds during which time the child may or may not produce tears.) in children 7 to 10 years of age diagnosed with ASD (Level 1 or 2) in a clinical setting?

H₀3: Superflex will not decrease crying/screaming in children 7 to 10 years of age diagnosed with ASD (Level 1 or 2) in a clinical setting.

H_a3: Superflex will decrease crying/screaming in children 7 to 10 years of age diagnosed with ASD (Level 1 or 2) in a clinical setting as measured by 50% or less crying/screaming in the setting across five consecutive sessions.

RQ4: Can the decrease in crying/screaming generalize into novel settings without formal training?

H₀4: Superflex will not decrease crying/screaming behaviors in novel settings without formal training.

H_a4: Superflex will decrease crying/screaming behaviors in novel settings without formal training as measured by 50% or less crying/screaming in the setting across five consecutive sessions.

RQ5: Will Superflex increase the use of “wh” questions to gain knowledge of the environment and people nearby?

H₀5: Superflex will not increase the use of “wh” questions to gain knowledge of the environment and people nearby.

H_a5: Superflex will increase the use of “wh” questions to gain knowledge of the environment and people nearby as measured by 80% or better responding across five consecutive sessions.

Theoretical Framework

Behavior analysis has roots in behaviorism, and many of its principles were established in Skinner's work (Morris et al., 2005). The basic principles of ABA were developed by Skinner (1957) who discovered that reinforcement could change the outcome of a behavior. Skinner (1990) demonstrated that behavior could be increased or decreased by manipulating the consequence to a favorable or unfavorable outcome. Skinner (1990) discovered how responses could be developed or changed over time by give reinforcing consequences for successful approximations of the final target response known as shaping.

Lovaas (1987) followed with the development of the first intensive ABA treatment for children with ASD. Lovaas's program delivers a comprehensive treatment model 5 to 7 days a week for up to 40 hours a week. This treatment is delivered one-to-one and focuses on the elimination of maladaptive behavior and the establishment of learning skills. This style of teaching became known as discrete trial training (DTT), and short instructions are given such as "touch the circle" (Lovaas, 1987, p. 5). Correct responses will earn reinforcement, and the incorrect response will be corrected and the instructions repeated (Lovaas, 1987). During DTT, ongoing data are collected and analyzed based on the child's progress to determine whether modification is warranted (Lovaas, 1987).

Baer et al. (1968) developed seven dimensions of applied behavior analysis:

- (1) target socially significant behavior, (2) objectively measure this behavior, (3) employ basic principles of behavior in the design of the intervention, (4) describe

the intervention in adequate detail so that it could be replicated by others, (5) demonstrate a causal relation between the intervention and behavior change, (6) produce a lasting behavior change that generalizes to new contexts, and (7) change behavior in a way that is meaningful to participants diagnosed with ASD. (pp. 91-97)

Each author contributed to the theory of ABA and its use with children on the spectrum. Understanding background information can help researchers gain knowledge and build future social change.

Nature of the Study

The nature of this study was quantitative with a single-subject design. I used a multiple baseline design in which data were collected in home and in the clinic on target behaviors for each child (a) before the intervention occurred, known as the baseline phase; (b) during the intervention, known as the intervention phase; and (c) at 1 month posttreatment, known as the maintenance phase (see Barger-Anderson et al., 2004). Collecting data in this manner allowed me to compare baseline data to the intervention data and then to the maintenance data to determine whether the child had made meaningful changes in behavior and whether the behavior change was meaningful enough to last. Collecting data in this manner allowed me to compare data across environments on the same subjects and across subjects. Data were evaluated using visual inspection and percentage of nonoverlapping data (PND) to calculate the effect size. Visual inspection allowed me to quickly evaluate the data to determine whether the intervention had an effect by visually inspecting the graphed data points and determining

whether have met a the predetermined master criterion. PND allowed me to determine whether during the treatment phase data surpassed a single noteworthy point within the baseline phase. A therapeutic criterion was also used in the form of a short essay-style questionnaire at the onset of the study to evaluate the child's social skills and behavior. The same short essay-style questionnaire was given at the end of the program to determine whether any changes had been made (Sharpley, 2007).

Definitions

The dependent variables were social skills and maladaptive behavior. Social skills were defined as social initiations such as greeting others, asking questions of others, commenting to others, and asking to join ongoing activities (Sundberg, 2008). Social skills also included responding to questions and the social overtures of others.

Maladaptive behaviors were defined as behaviors that were responses, adaptations, or reactions to situations that had been deemed dysfunctional and less beneficial (Sundberg, 2008). Examples of maladaptive behaviors were talking above conversational levels when things were not correct, withdrawal from the social group when things were not perfect, or crying when a game had been lost or the situation had become uncomfortable due to the inability to communicate shared interests.

Greeting others was defined as a verbal or nonverbal response paired with physical orientation, both of which were directed toward the peer immediately following the entry into the area or the peer's greeting. Asking questions of others was defined as asking at least one question related to the topic of conversation, such as information the person may be curious about. Commenting to others was defined as any statement that

makes the other person feel good, extends the conversation, is about the other person, includes details to highlight the point being made, or demonstrates listening and comprehension. Asking to join ongoing activities was defined as any instance of the child speaking to a peer about joining an ongoing activity. An example was “Tim, can I play red rover with you?” A nonexample was “man, red rover sure looks fun. “

Responding to the social overtures of others was defined as any nonliteral language of a peer with the intention of opening a dialogue or establishing a friendship. Responding to questions was defined as a reply to the peer within 3 to 5 seconds at the end of the question and responding with an on-topic answer. An example was “how many ducks are in the pond?” A response was “four ducks are in the pond.” A nonexample was “how many ducks are in the pond?” A response was “yellow.” Another example was “how are you today?” A response was “I am doing great.” Another nonexample was “how are you today?” A response was “yes.”

Maladaptive behaviors are behaviors that are often used to reduce a person’s anxiety, but the results are dysfunctional and less beneficial. Crying was defined as the occurrence of vocalization (sounds or words) accompanied by facial contraction with or without tears for any period of time. Screaming was defined as the occurrence of vocalizations at a volume above normal conversational level for any period of time. Lying was defined as any instance of the student lying on the floor when doing so was not part of the social activity. Disruptive behaviors were defined as any occurrence of displacing desks, chairs, objects, or work material from their original location without permission. Elopement was defined as being more than 3 feet away from a designated

area (seat or rug) without adult permission for any duration of time. Running away from an adult was defined as any period of time being more than 6 feet away from an adult without permission.

Property destruction was defined as damaging personal or public property (e.g., breaking an object into two or more pieces; using an object to break other objects; ripping objects or parts of objects from walls, floors, or furniture; and denting cars, objects, or walls). Episodes of property destruction were scored as a single response unless at least X (e.g., 30 or 60) seconds had elapsed since the last break, rip, or dent. Biting was defined as any occurrence of opening and closing of the jaw with upper and/or lower teeth making contact with any part of a person's body (except kissing). Hitting was defined as any occurrence of making contact with any part of another person's body with an open or closed hand from a distance of 6 inches or more. Kicking was defined as any occurrence of making contact with any part of another person's body using a foot from a distance of 6 inches or more and/or propelling objects at least 1 foot from their original location by movement of a foot or leg in the direction of another person. Pinching was defined as any occurrence of making contact with another person's skin with fingers shaped like forceps. Scratching was defined as any occurrence of digging the fingernails into another person's skin and/or moving them across another person's skin or clothing. Spitting was defined as any occurrence of projecting matter or objects from the mouth, excluding drooling or saliva leaving the mouth during the course of eating. Throwing objects was defined as propelling objects at least 1 foot from their original location by movement of hand or arm.

Yelling with profanity was defined as any vocalization that was at a volume above normal conversational level for given setting and included using profanity or language that was not appropriate for the setting (e.g., calling a peer the “B” word or “stupid” and so on). Yelling was further defined as any vocalization that was above normal conversational level for given setting without permission. Verbal aggression was defined as any threat or comment directed toward others that indicated any form of physical harm to another person (e.g., “I am going to throw you down the stairs!”). Profanity was defined as any vocalization consisting of or including vulgarities (e.g., racial slurs, sexually overt comments) or expletives (e.g., the F-word, S-word, B-word) or words that were not age appropriate (e.g., for younger students words such as stupid, idiot, poopyhead). Appropriate vocalizations were defined as any contextually appropriate vocalizations that included requests for attention, breaks, tangible activities, and/or conversational exchange. Professionals working with the children were defined as registered behavior technicians (RBTs), paraprofessionals who were 18 years or older and had completed 40 hours of approved training and completed an Initial Competency Assessment regulated by the close, ongoing supervision of a board certified behavior analyst (BCBA).

Assumptions

A single-subject multiple baseline design is experimental and includes a pattern in which an initial baseline and intervention are begun and subsequent baselines are added in a staggered or delayed pattern as needed per data findings. There are three situations in which a delayed multiple baseline design should be used. Adding social skills would fall

into one of the categories, in which a new behavior, setting, or subject is available to measure. Multiple baseline data assumes that behaviors are functionally independent of one another, but each behavior should change if functionally linked when the same independent variable is applied.

Scope and Delimitations

This single-subject design was used to examine the effectiveness of Superflex, a superhero social thinking curriculum, on social skills and maladaptive behavior in children 7 to 10 years of age diagnosed with ASD (Level 1 or 2) in a clinical setting. I used skilled RBTs and a BCBA to collect the data. Interobserver agreement was used to mitigate weakness related to validity. Once skills were mastered in the clinical setting, parents were asked to collect data in their home and community to measure generalizability of skills. Data collection was taught to each parent willing to collect the data, and materials were provided. Parents collected and reported data weekly.

Limitations

The population was a limitation, children diagnosed with ASD. A second limitation to the study was the use of or need for a standardized instrument sensitive enough to measure social skills at baseline and then a short amount of time (6 months) later. A third limitation to the study was the need for observation and measurement of each skill to be taken by a skilled RBT and BCBA for each child to create a baseline and then periodically throughout the study to track progress and interobserver agreement.

Significance

The results of this study may provide insight into the effects of Superflex, a curriculum for teaching social skills to children diagnosed with ASD in a clinical setting. Superflex is a curriculum that can be used in many different areas and can be taught by anyone with the ability to understand and implement the procedures. This means that a line therapist or an RBT can implement these procedures throughout the session. Licensed behavior analysts can train parents to implement the lessons taught in the clinic, in the home, and in the community. Due to the limited number of evidence-based social skills curricula, Superflex may add a needed structure to teaching and planning group social lessons for children diagnosed with ASD. Teaching appropriate social skills is important to each child so they are able to find a way to problem solve effectively, recognize the impact of their behavior, and take responsibility for it. Teaching social skills can bolster a child's confidence in group skills as well as spoken language and can help collaboration with peers in adulthood, which can lead to successful careers instead of group home placements.

Summary

With the diagnosis of autism on the rise, a social skills curriculum for children 7 to 10 years of age with ASD is needed. Evidence-based materials used in social skills teaching are missing from the library of materials used by BCBA's. A review of the literature on current materials used in teaching social skills to this population as well as how Superflex can be used to bridge the gap is provided in Chapter 2.

Chapter 2: Literature Review

The rise in diagnosed cases of ASD in children age 8 being reported by the CDC and the reported social deficits in communication and interaction have led ABA providers on a search to find ways to assess and mitigate these deficits (Maenner et al., 2020; Speaks, 2014). In the search for social skills curriculum, ABA providers have found a limited number of skills-based programs that are also evidence based (Wang & Spillane, 2009). This limited number of skills-based programming leaves an important population at risk of falling behind peers or losing out on the skills altogether. Personal observations indicated that some programs are geared toward specific age groups such as 12 months to 5 years, whereas others are designed for older children age 13 to 19 years. Superflex is not well known in the ABA field, but it is written for the group that has been left out: those 7 to 10 years of age.

Literature Search Strategy

The keywords searched were *Applied Behavior Analysis*, *ABA*, *social skills*, *Superflex*, and *Social Thinking* in Google Scholar, SAGE Journals, ERIC, and Thoreau multidatabase. Superflex has been researched by dissertation students, speech therapists, and others in school settings but has not been looked at in a clinical setting (Müller et al., 2016). In this mixed-methods pilot study, Müller et al. (2016) found an increase in “wh” questions, attempts at conversations, and attention-gaining behaviors. Müller et al. noted that it is possible to teach children with high-functioning autism to engage in peer-to-peer conversations when given the proper tools. Müller et al. recommended further research

using a control group, different sample sizes, and new settings outside of a school-based setting to test the effects on peer interactions.

Some would say that social thinking is a pseudoscience and is not to be used to teach social skills in any setting (Leaf et al., 2016). Leaf et al. (2016) suggested that the social thinking curriculum does not meet the stringent written requirements of evidence-based science due to only two articles being published in peer-reviewed journals at the time of the inquiry. Leaf et al. also noted that social thinking does not conform to the field of ABA or scientific evidence and recommended conducting highly controlled studies utilizing ABA-based procedures to teach meaningful pro-social relationships, complex social behaviors, and authentic social behaviors.

Hansen et al. (2017) suggested the exploration of advanced social skills in early intervention and the need for more research into the underpinnings that lead to reciprocal conversation and peer interactions. Hansen et al. found that the current literature is missing some key elements needed for teaching advanced social communication, such as empathy and telling jokes. Hansen et al. suggested further research is needed to identify effective interventions and the introduction of peer models and video modeling to teach complex social skills.

Teaching social skills can be difficult and can be hard to reinforce. Finding ways to make learning social skills fun yet educational is another area of needed research (Clay et al., 2018). Clay et al. (2018) found that a combination of reinforcement (edible, vocal, and physical interactions) used with different schedule types (fixed and variable) is needed to increase social skill acquisition. Clay et al. suggested further research to

examine ways to teach social skills to make them automatically rewarding while incorporating fun teaching methods. Superflex is a superhero social thinking curriculum that was created to help teach children 7 to 10 years of age with social difficulties. Superflex is said to help children develop awareness of their own social thinking behaviors while learning strategies to help regulate emotions using fun playful characters. The purpose of the current study was to evaluate the effectiveness of Superflex in teaching social skills to children with ASD using ABA techniques.

The purpose of this single-subject design study was to examine the effectiveness of Superflex, a superhero social thinking curriculum, on social skills and maladaptive behavior in children 7 to 10 years of age diagnosed with ASD (Level 1 or 2) in a clinical setting. The independent variables were level of autism, Superflex, and settings (clinic and home). The dependent variables were social skills and maladaptive behavior. The results of this study may provide insight into the effects of Superflex, a curriculum for teaching social skills to children diagnosed with ASD in a clinical setting. Superflex is a curriculum that can be used in many different areas and can be taught by anyone with the ability to understand and implement the procedures. This means that a line therapist or an RBT can implement these procedures throughout the session. Licensed behavior analysts can train parents to implement the lessons taught in the clinic, in the home, and in the community.

Theoretical Framework

Behavior analysis has roots in behaviorism and was founded by Skinner (date, as cited in Morris et al., 2005). The basic principles of ABA were developed by Skinner

(1957) who discovered that reinforcement could change the outcome of a behavior.

Skinner (date) demonstrated that behavior could be increased or decreased by manipulating the consequence to a favorable or unfavorable outcome. Skinner (1990) also discovered how responses could be developed or changed over time by give reinforcing consequences for successful approximations of the final target response known as shaping.

Lovaas (1987) followed with the development of the first intensive ABA treatment for children with ASD. Lovaas's program delivers a comprehensive treatment model 5 to 7 days a week for up to 40 hours a week. This treatment is delivered one-to-one and focuses on the elimination of maladaptive behavior and the establishment of learning skills. This style of teaching became known as DTT, and short instructions are given such as "touch the circle." Correct responses earn reinforcement, and incorrect responses are corrected and the instructions are repeated (Lovaas, 1987). During DTT, ongoing data are collected and analyzed based on the child's progress to determine whether modification is warranted (Lovaas, 1987). Baer et al. (1968) developed seven dimensions of applied behavior analysis: (a) target socially significant behavior, (b) objectively measure this behavior, (c) employ basic principles of behavior in the design of the intervention, (d) describe the intervention in adequate detail so that it can be replicated by others, (e) demonstrate a causal relation between the intervention and behavior change, (f) produce a lasting behavior change that generalizes to new contexts, and (g) change behavior in a way that is meaningful to participants diagnosed with ASD.

Behaviorism

The term *behaviorism* can have many different meanings depending on when a person grew up or when they went to school and studied the topic. Watson (1927) was the first to use the term in print in 1913 along with the two other terms: behavioristic and behaviorist. Watson's work was cited 1 year later in 1914 by Angell who was able to disseminate and apply Watson's work in a way that became a philosophical, psychological, and public discussion (Rucker, 1969). The terms behaviorism and deviations spread quickly and were found in quotations as late as the mid 1950s (Drew & George, 1953).

Radical

Warren (1934) provided a summary of psychological uses for the term *radical*: “radical = a loose term signifying thoroughgoing or extreme. [Lit. going to the root] [sic].... in psychology it is usually applied loosely to the holder of any very unusual views” (pp. 221–222). Radical has been used in psychology in four different senses; however, only three (extremes, iconoclastic, and political) are relevant to the term radical behaviorism (Morgan, 1922). Jones (1915) suggested that psychology must take an extreme step to become a science; it must turn its back on all purely private information and focus solely on objective measures such as those of other sciences (e.g., biology).

The two most radical principles suggested by the behaviorist were that consciousness does not exist and that psychology should abort the introspective method (Washburn, 1922). Watson (date, as cited in Woodworth, 1931) argued that behavior and consciousness are mutually exclusive, and to define psychology as the science of

behavior meant making a radical change that would rule out all introspection and all reference to consciousness. Cooper et al. (2019) defined radical behaviorism as “a form of behaviorism that attempts to understand all human behavior, including private events such as thoughts and feelings, in terms of controlling behaviors in the history of the person (ontogeny) and the species (phylogeny)” (p. 7).

B.F. Skinner

Skinner published a paper that made radical behaviorism more of a household name; although Skinner did not coin the term “radical” when speaking of behaviorism, he was the man to bring the most attention to the process (Day, 1980; Skinner, 1945).

Skinner (1979) stated in his autobiography

I preferred the position of radical behaviorism, in which the existence of subjective entities is denied. I proposed to regard subjective terms ‘as verbal constructs, as grammatical traps into which the human race in the development of language has fallen.’ (p. 117)

Skinner’s view of the old radical behaviorism was that it was missing a few critical pieces to be complete. Skinner thought that it was his job to fill in those gaps to complete the theory. Skinner (1945) wrote about how radical behaviorism was missing the verbal report, which was the area of behaviorism that would allow people to describe their private events or the events that happen in the body or head, such as thoughts or pain. These are real things that people cannot see or hear for themselves but as a group know they occur on a daily basis (Skinner, 1945). Skinner was the first to publish and refer to his own work as radical behaviorism in 1945. Skinner was also the first of the

radical behaviorists to describe one of the most important features of his philosophy in his 1945 paper, the treatment of private events (Schneider & Morris, 1987)

ABA

ABA is a therapy focused on improving target behaviors such as social skills, communication, reading, and adaptive learning skills. ABA can be used to improve hygiene skills, domestic tasks, time management skills, and vocational skills (Leaf et al., 2021). ABA has been proven effective with children and adults with psychological disorders in many different settings including schools, homes, work environments, and clinics (Yu et al., 2020). ABA has been shown to increase skills across domains and decrease maladaptive behaviors in many settings while helping to decrease the need for other special needs services (Leaf et al., 2021). ABA is commonly used for individuals with ASD (Yu et al., 2020). Treatment with ABA is usually intensely applied with more than 20 hours a week occurring for children younger than 4. The treatment intensity has shown that early and intensive intervention is the best treatment to increase skills and maintain lasting effects (Linstead et al., 2017).

ABA was first developed into a practice in the 1970s by Lovaas and Koegel (Morris et al., 2013). Lovaas and Koegel worked with the mentally ill for 40 hours at a time in a setting that became known as DTT (Leaf et al., 2016). DTT is a technique used in ABA to teach skills in a structured setting with an antecedent such as instruction, response such as the learner performs a behavior, and a consequence such as a reinforcer delivered or error correction done (Leaf et al., 2016). DTT is commonly used today and can be referred to as table time (Morris et al., 2013).

ABA is characterized by seven dimensions: generality, effective, technological, applied, conceptually systematic, analytic, and behavioral (Baer et al., 1968). Generality means that the behavior being targeted for change should maintain across different people (parents, teachers, therapists, and friends), settings (community, school, home, and clinic), and stimuli when applicable (Baer et al., 1968). Effective means that the interventions being used are working in the way desired. This can be understood by closely monitoring the data for progress and watching the data to determine whether they are going in the direction desired (Baer et al., 1968).

Technological means the intervention should be written in a way that all components are clearly detailed so that anyone can replicate them (Baer et al., 1968). This can be done by clearly identifying and describing the intervention details such as those seen in a recipe (Baer et al., 1968). Applied refers to interventions that can be used in society and not in the laboratory. Each intervention should be able to be taken and individualized to the child's specific needs and generalized across settings as well as people and stimuli. It is important that the intervention be useful in society (Baer et al., 1968). For example, if a child is unable to read at the age of 10 years but has the ability to learn and has severe maladaptive behaviors when being taught (e.g., hair pulling [self and others] hitting, yelling, and property destruction), a meaningful goal would be to teach tolerance of basic reading skills.

Conceptually systematic means that the intervention is research based and represents the principles of ABA (Baer et al., 1968). Analytic means that the BCBA looks at the data before decisions are made to change anything. This means that data must

be collected on the interventions and reviewed prior to a change being made step (Baer et al., 1968). When the change is made and the behavior changes in the way expected, a reliable relationship has created believability. Behavioral means the behavior must be observable and measurable so that it can be changed (Baer et al., 1968).

At the onset of therapy, the BCBA or licensed behavior analyst will first determine which behaviors require change, set goals and expected outcomes, establish ways to measure the outcomes, evaluate ongoing progress/results, and reevaluate and assess ongoing skills for changes that need to be made or if treatment can be terminated (Linstead et al., 2017). This is done with the use of treatment plans to improve behavior skills in the individuals' personal and/or professional lives. Parent training can also be provided by ABA therapists to help parents understand ways to interact with their children to improve behavior skills and reduce problem behaviors (Yu et al., 2020). Due to the intensive treatment and shaping of behavior, ABA therapists must evaluate and modify treatment on a regular basis (Linstead et al., 2017).

Social Thinking Methodology

Social thinking refers to a process our mind goes through when we enter any social situation. It refers to the process of how we figure out our thoughts, feelings, and intentions as well as other, while trying to co-exist, actively participate, or determine what is going on from a distance (Crooke et al., 2016). Social thinking is important for children to be flexible social thinkers and problem solvers. It helps them to think about their own behaviors and others so that they can be better decision makers during social

interactions such as play dates. Social Thinking Methodology is all about adapting to the social world around us while being a flexible social thinker.

Social thinking embraces working directly with individuals with disabilities and uses visual supports, modeling, naturalistic teaching, and self-management to social skills. Components of Social Thinking fit well into the framework of Positive Behavioral Intervention and Supports (PBIS) (Chard et al., 2008; Sugai et al., 2002). CASEL's five social and emotional learning (SEL) core competencies such as social awareness, relationship skills, responsible decision making, self-awareness, and self-management (Crooke et al., 2016).

Social Awareness of Children with ASD

Children with ASD typically have deficits in joint attention, communication, and social skills (Hume et al., 2009; Rao & Gagie, 2006). According to the DSM-V (APA, 2013), children with ASD exhibit impairments in social interaction and communication in conjunction with deficits in social-emotional reciprocity and nonverbal communication for social interactions. These children will also exhibit restricted, repetitive patterns of behavior, interests, or activities with deficits in stereotyped or repetitive motor movements, use of objects, or speech; insistence on sameness, inflexible, ridged think; highly restricted, fixated interests that are to a peculiar amount; and hyper – or hypoactivity to sensory input or unusual interests in sensory items in the environments (APA, 2013). Deficits in social interactions may include a lack of joint attention, limited or lack of friendships with peers, flat affect, or difficulty making eye contact (APA, 2013).

Communication deficits may be evidenced by a delay or lack of language, echolalia, limited imitation of others, and difficulty engaging in imaginative play (APA, 2013). Social skill deficits are one of the greatest deficits' children with ASD struggle to overcome throughout life (MacKay et al., 2007). Deficits in perspective taking can also limit the ability of a child with ASD to adjust social behaviors across social environments and use eye contact to maintain interactions (Hume et al., 2009; Mackay et al., 2007). They may struggle to understand the back-and-forth rules of the conversation, which can lead to endless talk about their favorite topic (animals, cars, computer, movies) (Mackay et al., 2007). Children with ASD may also struggle to develop and/or maintain friendships due to their social deficits (Hume et al., 2009; Mackay et al., 2007).

Elements of a Strong Social Intervention Program

Weiss (2013) defined a good social skills program will have rule cards, social stories, video modeling, social compression, but could also include joint attention, perspective taking, and problem solving. Dowd and Tierney (1999) suggested that there are eight social skills that have been defined as a set of behaviors that must be taught. Additionally, social skills must be defined in a language that is specific, clear, and at the child's level of understanding (Dowd & Tierney). Additionally, RBT's must explicitly describe and model the skill, provide opportunities to practice, give feedback, and reinforce for demonstration of the skill in the natural environment (Dowd & Tierney). Hume et al., (2009) also recommend using video modeling to increase independence and increase awareness of body language. Students must first be taught why they need to demonstrate a skill and then how to execute it (Winner, 2007; Winner & Croke, 2009).

Superflex Curriculum

The Superflex Curriculum (SC) was developed for educators, therapists, and parents by Stephanie Madrigal and Michelle Garcia Winner (Rachmah, 2016). The curriculum was created for children in kindergarten through grade 5 (Madrigal & Garcia, 2008). Madrigal and Garcia suggest the program is effective for students with a range of disabilities including ASD, social communication disorders, and ADHD (Rachmah, 2016). They also suggest it is beneficial for typically developing children in a classroom (Madrigal & Garcia, 2008). The authors describe SC as a curriculum to teach children to identify social expectations, monitor their behaviors, and modify them as needed using (Madrigal & Garcia, 2008; Rachmah, 2016). The SC strategies are introduced using a cartoon superhero, “Superflex,” and his rivals, the “Unthinkables™.” The 14 rival characters represent behaviors that students must use their brains to defeat when interacting in social environments (Madrigal & Garcia, 2008). Each character has a catchy name that connects him or her to the behavior (Rachmah, 2016). Madrigal and Garcia (2008) include the following characters: Rock Brain™, Brain Eater™, Body Snatcher™, D.O.F. Destroyer of Fun™, Un-Wonderer™, Space Invader™, Glass Man™, Grump-Grumpaniny™, Topic Twister Meister™, Wasfunnyonce™, Energy Hare-y™, One-Sided Sid™, Worry Wall™, and Mean Jean™. Pre-made lessons are outlined in the Superflex™ curriculum guide. It uses child friendly language to introduce 11 characters (Rachmah, 2016).

Superflex is a story told of, a young boy, and his dog as they help citizens of their town defeat the “Unthinkables™” while using “Superflexible™” strategies taught by the

curriculum (Madrigal & Garcia, 2008; Rachmah, 2016). Each lesson use games, video modeling, and/or activities to keep the children engaged. SC is divided into three levels: Lessons 1 through 5 explore social thinking concepts and vocabulary. Lessons 6 through 9 increases awareness of the child's own social behaviors he or she is to modify and appropriate strategies to use. Lessons 10 through 13 address self-monitoring and modifying behaviors using SC strategies (Madrigal & Garcia, 2008). SC is recommended to be implemented in a small group setting but is possible to implement in a 1:1 setting (Madrigal & Garcia, 2008; Rachmah, 2016). Each lesson also has a corresponding handout and take-home activity for reinforcement, props such as capes and miniature foam brains for use during each lesson to keep engagement up (Madrigal & Garcia, 2008; Rachmah, 2016).

In a study conducted by O'Handley, et al., (2016) Superflex was used to treat six elementary-age children from a self-contained classroom. The participants were chosen by two special education teachers based on severe disruptive and aggressive behaviors towards peers, especially during unstructured play activities (O'Handley et al., 2016). Baseline data were collected, and an ABC design (baseline, intervention, follow-up) was used (O'Handley et al., 2016). Three target skills were probed: Get ready was defined as orienting their body toward the speaker; placing feet on the floor; putting hands on knees; initiating eye contact with the speaker; and maintaining eye contact for a minimum of 3 seconds (O'Handley et al., 2016). Following directions was defined as initiating eye contact with the group leader, following a directive (e.g., "Stand up and push in your chair"); eye contact for a minimum of 3 seconds; nodding head and stating "OK" in

response to the directive; and initiating the directive within 5-seconds and complying with the directive (O’Handley et al., 2016). Turn Taking was defined as verbally deciding who gets the first turn; waiting for their turn; and allowing everyone to have a turn (O’Handley et al., 2016). O’Handley et al., (2016) found in the piolet study that the Superflex curriculum was successful in decreasing disruptive behavior in children in a small group instruction.

There is little peer reviewed research on the Superflex curriculum, and many attempts were made to find and obtain research from the author and other authors who have been able to research this topic. However, these attempts were unsuccessful. In the pursuit to find research to support the curriculum dissertations were found in the education area of research that has shown some success in treating children with disruptive behaviors. Research Gate was used to reach out to the authors who have researched the curriculum and they were unresponsive.

The Walden Library and Librarians were consulted over a year to find further research in supporting the evidence based claims the authors make for this curriculum, but each step taken was met with unsuccessful attempts to find the needed materials. Research terms were autism social skills curriculum, social skill curriculum, Superflex curriculum, Autism social skills, Superflex, the Unthinkables, ASD and social skills. Based on the number of research articles available to the public, the amount of social skills curriculum available to help children with ASD and the need to increase research in Autism interventions this study is needed to increase the amount of peer reviewed research in this area.

Literature Review Related to Key Variable and Concepts

Using key terms to search for literature related to Superflex and the Unthinkables, an article was found that explored the use of Superflex with children with high-functioning autism in a school setting. They go on to find that significant results were report during direct behavior observations but not with the use of the Behavior Assessment System for Children-Second Edition (BASC-2) due to the measure sensitivity (Bolton, 2010).

A further search into autism and the need for social skills curriculum led to the discovery of The Autism and Developmental Disabilities Monitoring (ADDM) Network. They estimated the prevalence of autism spectrum disorder among children aged 8 years who live within 11 ADDM sites in the United Sates. Among the 11 sites 16.8 per 1,000 children aged 8 years were diagnosed with ASD. Even though it was found that the sites are not representative of the United States as a whole and age at which providers will diagnose is another area in need of further study, research in social skills is a going area of need as the number of children diagnosed with ASD grows (Baio et al., 2018).

Principles of ABA are another area of research that led to understanding the differences between Superflex curriculum and ABA when it comes to a theoretical background (Clay et al., 2018). Superflex is based on a cognitive methodology using a learning theory to help explain and define its principles (Cook et al., 2015; Cook et al., 2016) Where ABA is more positive and negative reinforcement and differential reinforcement interventions based on applied behavior sciences with an end goal to increase wanted behaviors and decrease unwanted behaviors (Cook et al., 2015).

Children on the spectrum tend to have a love for technology and it can be a critical tool in teaching skills. In a search for social skills curriculum used with 7- to 16-year-old people with ASD and related disorders, a study with the use of virtual reality (VR) was found (Didehbani et al., 2016). They used VR to aide in teaching social skills and emotion recognition and had success over 10 sessions, suggesting more research was needed in the area of emotion recognition and social attribution skills (Didehbani et al., 2016).

One curriculum that has been used to teach social skills to children on the spectrum is the Verbal Behavior Milestones Assessment and Placement Program (VB-MAPP) (Hansen 2017). However, it has been found that crucial skills for children with ASD were missing and suggested further research to identify effective interventions and the introduction of peer models and video modeling to teach complex social skills (Hansen, 2017). Using the search terms Superflex Social thinking curriculum and autism a mixed method pilot study completed in a school setting with elementary aged high-functioning children diagnosed with autism using Superflex curriculum was found (Muller et al., 2016). They analyzed video footage of conversation skills at Baseline, during intervention, and postintervention. They were able to perform interviews with stakeholders, about progress and interviews with instructors about implementing programs. The authors found an increase in “wh” questions, attempts at conversations and attention-gaining behaviors. Due to the findings the authors believe it is possible to teach children with high functioning autism to engage in peer-to-peer conversations when given the proper tools.

Defining communication during social skills is very important and when researching the definition of communication. Rachmah (2016) provides the best definitions of communication, what and why we need social skills and social interactions to be successful. It goes on to describe the Superflex characters and the basis for the curriculum (Rachmah, 2016). It is important to understanding definitions in Superflex and Social Thinking that are not typically used in day-to-day tasks. Richman (2015) defines expected and unexpected behaviors as, how to fit in with the population around them.

Further research into social skills and interventions led to the discovery of the many ways social skills can be taught. Many interventionists and researchers suggest that social skills can be taught in a fun and interactive way that allows for a hands-on approach (Richman, 2015).

Summary

Social skills curriculums are a topic that has little research in ABA. The use of Superflex as a curriculum to increase socially acceptable behaviors while decreasing socially maladaptive behaviors has even less research. However, children with autism often have social deficits that need special training. In the next chapter methods will be discussed.

Chapter 3: Research Method

The purpose of this single-subject design study was to examine the effectiveness of Superflex, a superhero social thinking curriculum, on social skills and maladaptive behavior in children 7 to 10 years of age diagnosed with ASD (Level 1 or 2) in a clinical setting. The independent variables were level of autism, Superflex, and settings (clinic and home). The dependent variables were social skills and maladaptive behavior. The single subject design included a multiple baseline design to analyze data taken from the clinical setting across baseline, intervention, and maintenance phases using the principles of ABA to inform the research decisions made. The sample of secondary data for the study was taken from a local ABA clinic in a small town in the central United States. Further discussion of the design rationale, methodology, and procedures is provided in this chapter.

Research Design and Rationale

The independent variables were level of autism, Superflex, and settings (clinic and home). Level of autism referred to the level of support the child is suspected to need based on the restricted, repetitive behaviors the child presents with; the child's nonverbal communication skills; and the child's language abilities. According to the American Psychiatric Association (2013), Level 1 includes individuals who require minimal support for deficits in social communication, social interactions, and overtures toward others. Individuals may be inflexible in certain behaviors causing functioning impairment. Individuals may also struggle with switching between activities and planning or organization and may be lower than that of their peers (American Psychiatric

Association, 2013). Level 2 includes individuals requiring substantial support with deficits in verbal and nonverbal social communication (American Psychiatric Association, 2013). Individuals may have limited social interactions and lower than average social overtures from those of their peers. Individuals may be inflexible in some situations with deficits in coping skills when change occurs. Individuals may also struggle with restricted or repetitive behaviors that are evident to the casual passerby and interfere with the person's ability to learn or function in the environment (American Psychiatric Association, 2013). Level 3 includes individuals requiring substantial support over long periods of time (American Psychiatric Association, 2013). Individuals may have deficits in verbal communication, nonverbal social communication, and lower than average IQs. Level 3 children were not included in the current study.

Superflex includes a cast of colorful characters and a comic book style to bring a curriculum to life in an effort to help children learn self-regulation skills (Madrigal & Garcia, 2008). Superflex is the name of the main character, a superhero who teaches children they have a superhero inside their brains who looks just like they do (Madrigal & Garcia, 2008). Superflex helps the child learn about their thoughts and behaviors as well as others while strengthening their flexible thinking and giving them coping skills to self-regulate during a period a time when they might have otherwise been inflexible (Madrigal & Garcia, 2008).

Superflex has characters called the Unthinkables and Thinkables, and an environment called Social Town in which the stories in books and music play out. The Superflex character has powers to provide people with flexible thinking and problem-

solving skills, while the Unthinkables have the power to derail aspects of social behavior that can lead the child to do something unexpected. Children are encouraged to define, describe, and develop strategies to reduce the impact of the Unthinkables who show up to spoil their flexible thinking. For every Unthinkable there is an equally powerful Thinkable with its own special powers to help the child be a strong social detective and self-regulator (Madrigal & Garcia, 2008).

The clinic site for the current study was a small ABA clinic in the central United States. All data collected in the clinical setting were collected by an RBT or a licensed behavior analyst. Home services were provided in the client's home or place of residence. Home data were tracked by the parents and provided to the behavior analyst for review. Home data were used to track progress and generalization of skills from the clinical setting to the natural environment. Each parent was asked to collect data on the same behaviors targeted in the clinic and then return the information to the behavior analyst on a weekly basis.

The dependent variables were social skills and maladaptive behavior. Social skills were social initiations such as greeting others, asking questions of others, commenting to others, and asking to join ongoing activities. Social skills included asking questions and responding to the social overtures of others. Maladaptive behaviors were behaviors used to reduce a person's anxiety, but the results were dysfunctional and less beneficial. Examples of maladaptive behaviors were talking above conversational levels when things were not correct, withdrawing from the social group when things were not perfect, or

crying when a game was lost or the situation was uncomfortable due to the inability to communicate shared interests.

Greeting others was defined as a verbal or nonverbal response paired with physical orientation, both of which were directed toward the peer immediately following the entry into the area or the peer's greeting. Asking questions of others was defined as asking at least one question related to the topic of conversation, such as information a person may be curious about. Commenting to others was defined as any statement made the other person feel good, extended the conversation, addressed the other person, included details to highlight the point being made, or demonstrated listening and comprehension. Asking to join ongoing activities was defined as any instance of the child speaking to a peer about joining an ongoing activity. An example was "Tim, can I play red rover with you?" A nonexample was "man, red rover sure looks fun."

Responding to the social overtures of others was defined as any non-literal language of a peer with the intention of opening a dialog or establishing a friendship. Responding to questions was defined as a reply to the peer within 3 to 5 seconds at the end of the question and responding with an on-topic answer. An example was "how many ducks are in the pond?" A response was "four ducks are in the pond." A nonexample was "how many ducks are in the pond?" A response was "yellow." Another example was "how are you today?" A response was "I am doing great." Another nonexample was "how are you today?" A response was "Yes."

Maladaptive behaviors are behaviors that are often used to reduce a person's anxiety, but the results are dysfunctional and less beneficial. Crying was defined as the

occurrence of vocalizations (sounds or words) accompanied by facial contractions with or without tears for any period of time. Screaming was defined as the occurrence of vocalizations at a volume above normal conversational level for any period of time. Lying was defined as any instance of the student lying on the floor when doing so was not part of the social activity. Disruptive behaviors were defined as any occurrence of displacing desks, chairs, objects, or work material from their original location without permission. Elopement was defined as being more than 3 feet away from a designated area (seat or rug) without adult permission for any duration of time. Running away from an adult was defined as any period of time being more than 6 feet away from an adult without permission.

Property destruction was defined as damaging personal or public property (e.g., breaking an object into two or more pieces; using an object to break other objects; ripping objects or parts of objects from walls, floors, or furniture; and denting cars, objects, or walls). Episodes of property destruction were scored as a single response unless at least X (e.g., 30 or 60) seconds has elapsed since the last break, rip, or dent. Biting was defined as any occurrence of opening and closing of the jaw with upper and/or lower teeth making contact with any part of a person's body (except kissing). Hitting was defined as any occurrence of making contact with any part of another person's body with an open or closed hand from a distance of 6 inches or more. Kicking was defined as any occurrence of making contact with any part of another person's body using a foot from a distance of 6 inches or more and/or propelling objects at least 1 foot from their original location by movement of foot or leg in the direction of another person. Pinching was defined as any

occurrence of making contact with another person's skin with fingers shaped like forceps. Scratching was defined as any occurrence of digging the fingernails into another person's skin and/or moving them across another person's skin or clothing. Spitting was defined as any occurrence of projecting matter or objects from the mouth, excluding drooling or saliva leaving the mouth during the course of eating. Throwing objects was defined as propelling objects at least 1 foot from their original location by movement of hand or arm.

Yelling with profanity was defined as any vocalization that was at a volume above normal conversational level for a given setting and included using profanity or language that was not appropriate for the setting (e.g., calling a peer the "B" word or "stupid" and so on). Yelling was defined as any vocalization that was above normal conversational level for a given setting without permission. Verbal aggression was defined as any threat or comment directed toward others that indicated any form of physical harm to another person (e.g., "I am going to throw you down the stairs!"). Profanity was defined as any vocalization consisting of or including vulgarities (e.g., racial slurs, sexually overt comments) or expletives (e.g., the F-word, S-word, B-word) or words that were not age appropriate (e.g., for younger students words such as stupid, idiot, poopyhead). Appropriate vocalizations were defined as any contextually appropriate vocalizations that included requests for attention, breaks, tangible activities, and/or conversational exchange.

Working to gather materials for this project involved many resource constraints. It was difficult to find current literature on Superflex due to the need to purchase any

related materials. The field of ABA was relatively new, making it difficult to find peer-reviewed articles to support the need for the current study. ABA is a growing field with many practitioners working to improve the autism population's quality of life. However, there was much less support for the field of ABA on the research side, meaning that ABA was lacking in ongoing research to develop the field. Autism is hallmarked by the social deficits its population suffers; however, there was a lack of research and intervention for children needing social skills. Findings from the current study may help a growing field gain insight into the best practices and gain effective materials needed for teaching social skills to children with ASD in a clinical setting.

Methodology

All data and information collected and assessed in this study were secondary data. Secondary data are those that have been collected through a primary source and made available for other researchers to use. The data collected can be used for a project or to help in programming, and then made available to another researcher (Johnston, 2017).

Population

The target population for this study was children 7 to 10 years of age diagnosed with ASD (Level 1 or 2) in a clinical and home setting. The population sample was considered convenient based on participants' ability to choose the clinic and the researcher's population on hand. The estimated sample size in the small clinic was one to five children.

Data Analysis

The archival data were collected across settings, baselines, interventions, and maintenance phases using the principles of ABA to inform the research decisions being made. Data analysis did not require me to withdraw treatment but instead to demonstrate effects by showing that behavior change accompanied introduction of the intervention at different points in time. In a multiple baseline design, the dependent variables may covary, and a multiple baseline design may not be as strong as a withdrawal design. A multiple baseline design can also be time-consuming and/or require more resources than other designs. Multiple baseline design data were collected in home and in the clinic on target behaviors for each child (a) before the intervention occurred, known as the baseline phase; (b) during the intervention, known as the intervention phase or treatment phase; and (c) at 1 month posttreatment, known as the maintenance phase (see Barger-Anderson et al., 2004). Collecting data in this manner allowed me to compare baseline data to the intervention data and then to the maintenance data to determine whether the child had made meaningful changes in behavior and whether the behavior change was meaningful enough to last. Collecting data in this manner allowed me to compare data across environments on the same subjects and across subjects. Data were evaluated using visual inspection and PND to calculate the effect size. Visual inspection allowed me to evaluate the data to determine whether the intervention had an effect by visually inspecting the graphed data points and determining whether they had met the predetermined master criterion. PND allowed me to determine whether during the treatment phase data surpassed a single significant point within the baseline phase. A therapeutic criterion was

also used in the form of a short essay-style questionnaire at the onset of the research to evaluate the child's social skills and behavior. The same short essay-style questionnaire was given at the end of the program to determine whether any changes had been made (see Sharpley, 2007).

Topographical Definitions

Greeting others was defined as a verbal or nonverbal response paired with physical orientation, both of which were directed toward the peer immediately following the entry into the area or the peer's greeting. This behavior was measured by collecting "yes" or "no" data on the first 10 cold probes for 3 consecutive days to be considered mastered at each level presented. Asking questions of others was defined as asking at least one question related to the topic of conversation, such as information a person may be curious about. This behavior was measured by collecting "yes" or "no" data on the first 10 cold probes for 3 consecutive days to be considered mastered at each level presented.

Commenting to others was defined as any statement that made the other person feel good, extended the conversation, was about the other person, included details to highlight the point being made, or demonstrated listening and comprehension. This behavior was measured by collecting "yes" or "no" data on the first five cold probes every hour the child was in therapy for 3 consecutive days to be considered mastered at each level presented. Asking to join ongoing activities was defined as any instance of the child speaking to a peer about joining an ongoing activity. An example was "Tim, can I play red rover with you?" A nonexample was "man, red rover sure looks fun." This

behavior was measured by collecting “yes” or “no” data on the first five cold probes every hour the child attended therapy for 3 consecutive days to be considered mastered at each level presented.

Responding to the social overtures of others was defined as any non-literal language of a peer with the intention of opening a dialog or establishing a friendship. This behavior will be measured by collecting “yes” “no” data on the first 10 cold probes, for 3 consecutive days to be considered mastered at each level presented. Responding to questions were defined as a reply to the peer within 3 to 5 seconds at the end of the question and responding with an on-topic answer. An example is, “how many ducks are in the pond?” Response: “4 ducks are in the pond”. Non-example, how many ducks are in the pond? Response: “yellow”. Example, how are you today? Answer, I am doing great. Non-example, how are you today? Answer, yes. This behavior was measured by collecting “yes” “no” data on the first 10 cold probes, for 3 consecutive days to be considered mastered at each level presented.

Crying was defined as the occurrence of vocalization (sounds or words) accompanied by facial contraction with or without tears for any period of time. This behavior was measured by starting a timer at the onset of the behavior or within 3 seconds of the onset and then stopping the timer when the behavior ends. Then record the duration of the behavior. Screaming was defined as the occurrence of vocalizations at a volume above normal conversational level for any period of time. This behavior was measured by starting a timer at the onset of the behavior or within 3 seconds of the onset

and then stopping the timer when the behavior ends. Then record the duration of the behavior.

Lying down was defined as any instance of the student laying on the floor when doing so is not part of the social activity. This behavior was measured by starting a timer at the onset of the behavior or within 3 seconds of the onset and then stopping the timer when the behavior ends. Then record the duration of the behavior. Disruptive behaviors are defined as any occurrence of displacing desks, chairs, objects, or work material from their original location without permission. This behavior was measured using a clicker, then click for every instance of behavior, i.e., frequency data. Elopement is defined as being more than 3 feet away from a designated area (seat or rug) without adult permission for any duration of time. This behavior was measured using a clicker, then click for every instance of behavior, i.e., frequency data. Running away from an adult is defined as any period of time being more than 6 feet away from an adult without permission. This behavior was measured using a clicker, then click for every instance of behavior, i.e., frequency data

Property destruction was defined as damaging personal or public property (e.g., breaking an object into two or more pieces, using an object to break other objects, ripping objects or parts of objects from walls, floors, or furniture, and denting cars, objects, or walls.) This behavior was measured using a clicker, then click for every instance of behavior, i.e., frequency data. The therapist was recording the time between episodes to determine if it is a single occurrence of property destruction or an episode. Episodes of property destruction are scored as a single response unless at least x (e.g., 30 or 60)

seconds has elapsed since the last break, rip, or dent. This behavior was measured using a clicker, then click for every instance of behavior, (i.e., frequency data).

Biting was defined as any occurrence of opening and closing of the jaw with upper and/or lower teeth making contact with any part of a person's body (except kissing). This behavior were measured using a clicker, then click for every instance of behavior. Hitting is defined as any occurrence of contacting any part of another person's body with an open or closed hand from a distance of six inches or more. This behavior was measured using a clicker, then click for every instance of behavior. Kicking was defined as any occurrence of making contact with any part of another person's body using a foot from a distance of six inches or more and/or propelling objects at least one foot from their original location by movement of foot or leg in the direction of another person. This behavior was measured using a clicker, then click for every instance of behavior. Pinching is defined as any occurrence of making contact with another person's skin with fingers shaped like forceps. This behavior was measured using a clicker, then click for every instance of behavior.

Scratching was defined as any occurrence of digging the fingernails into another person's skin and/or moving them across another person's skin or clothing. This behavior was measured using a clicker, then click for every instance of behavior, i.e., frequency data. Spitting was defined as any occurrence of projecting matter or objects from the mouth, does not include drooling or saliva leaving the mouth during the course of eating. This behavior was measured using a clicker, then click for every instance of behavior, i.e., frequency data. Throwing objects was defined as propelling objects at least one foot

from their original location by movement of hand or arm. This behavior was measured using a clicker, then click for every instance of behavior.

Yelling with profanity was defined as any vocalization that is at a volume above normal conversational level for given setting and includes using profanity or language that is not appropriate for the setting (e.g., calling a peer the “B” word or “stupid” and so on). This behavior was measured using a clicker, then click for every instance of behavior. Yelling was defined as any vocalization that is above normal conversational level for given setting without permission. This behavior was measured using a clicker, then click for every instance of behavior. Verbal aggression is defined as any threat or comment directed towards others that indicates any form of physical harm to another person (e.g., “I am going to throw you down the stairs!”). This behavior was measured using a clicker, then click for every instance of behavior, i.e., frequency data. Profanity was defined as any vocalization consisting of or including vulgarities (e.g., racial slurs, sexually overt comments) or expletives (e.g., the F-word, S-word, B-word) or words that are not age-appropriate (e.g., for younger student’s words such as stupid, idiot, poopyhead). This behavior was measured using a clicker, then click for every instance of behavior. Appropriate vocalizations are defined as any contextually appropriate vocalizations that include requests for attention, breaks, or tangible activities, and/or conversational exchange. This behavior was measured using a clicker, then click for every instance of behavior.

Procedures for Recruitment of Participants

Participants were first referred to the clinic by a psychologist or primary care physician based on the child's need for ABA and then further narrowed based on the case supervisor's assessment and the need for social skills training. The participants had to be between the ages of 7-10 years old and have a level 1 or level 2 autism diagnosis. Each participant needed to understand reality and fiction so that they would understand the material. Parents/Guardians were given a release of information waiver in the application package and were informed that the data collected during their time at the clinic may be used for research. They were informed of their rights to be excluded from future research and that all identifying information is redacted when used for research purposes.

Data Analysis Plan

This single-subject design was to explore the effectiveness of Superflex, a Superhero Social Thinking Curriculum, on social skills and maladaptive behavior in children 7 to 10 years of age diagnosed with autism spectrum disorder (level 1 or 2) in a clinical setting. Interobserver agreement is commonly used in the clinic where both the RBT and the BCBA collected data on sessions. Interobserver agreement was used, for this study, during data collection in the clinic, to help mitigate weakness related to validity. Once skills were mastered in the clinical setting, parents were asked to collect data in home and community to measure generalizability of skills report on data weekly. Data was evaluated using Visual Inspection and PND to calculate the effect size. Visual inspection allows the researcher to quickly evaluate the data to see if the intervention had

an effect, while PND will allow the researcher to determine the significance of the change in data across phases of the study (baseline, intervention, maintenance), if any.

Ethical Procedures

Data were collected by an ABA company in the Central US, where a BCBA gained access to the Superflex program. She trained her staff on the programming and collected data throughout the course of the program. She collected data in the clinic on treatment goals relating to the increase in social skills and the decrease in maladaptive behaviors. She also collected data on parent goals related to the use of new social skills seen in the home and community. She asked the parents to collect data on maladaptive behaviors seen in the home and community. In the clinic application paperwork, permission was granted from each participants parent/guardian for data to be used for research purposes. All identifying information was redacted for privacy. Each participant was given the right to leave the program at any time or may choose to have their data remain private and not used for research purposes. Data will be stored for 7 years from the original collection date.

Summary

All data and information collected and assessed in this section was secondary data. The target population for this study were children 7 to 10 years of age diagnosed with autism spectrum disorder (level 1 or 2) in a clinical and home setting. Participants were first referred to the clinic by a psychologist or primary care physician based on the child's need for ABA and then further narrowed based on the case supervisor's assessment and the need for social skills training. A single subject design will be used in

this study, Multiple Baseline Design (MBD). MBD analyzes data taken across settings, baseline, intervention, and maintenance phases using the principles of Applied Behavior Analysis (ABA) to inform the research decisions being made. It does not require one to withdraw treatment but instead demonstrates effects by showing that behavior change accompanies introduction of the intervention at different points in time.

Chapter 4: Results

The purpose for this study was to explore the effectiveness of Superflex, a superhero social thinking curriculum, on social skills and maladaptive behavior in children 7 to 10 years of age diagnosed with ASD (Level 1 or 2) in a clinical setting using a single-subject design. The following research questions were assessed: Will Superflex increase back-and-forth conversations with peers in a clinical setting? Can the conversation skills gained during the lessons generalize into novel settings without training? Will Superflex decrease crying/screaming (any instance in which a participant engages in a vocalization louder than is used for communication for longer than 3 seconds during which time they may or may not produce tears) in a clinical setting? Can the decrease in crying/screaming generalize into novel settings without formal training? Will Superflex increase the use of “wh” questions to gain knowledge of the environment and people around? Data collection, treatment, and statistical findings are discussed in this chapter.

Data Collection

The data for this study were collected across several months. Baseline data were collected across three consecutive sessions across 1 week for each client. Intervention data were collected across a 2-month period with a month gap before starting maintenance for each client. Finally, maintenance data were collected in the home by the parents for 2 months. Each client was picked based on age, level of autism, need for social intervention, and ability to distinguish fiction from reality. Once these factors were identified, two clients remained eligible to participate in the study. Behavior Assessment

System for Children-Second Edition forms and parent questionnaires were incomplete for one client and missing for one client. Data were not collected simultaneously.

Client 1 was a 7-year-old male with Level 2 autism who had no comorbid diagnoses. Client 2 was a 9-year-old male with Level 2 autism who had no comorbid diagnoses. Both clients were new to the small clinic and were highly reinforced by superheroes such as Batman and Sonic the Hedgehog.

Treatment

Data were collected on back-and-forth conversation skills with peers, asking “wh” questions, tantrum behavior in the clinic (by session), and in-home tantrum behavior (by month). Phases of treatment were implemented as planned. No adverse events or reactions occurred during or after the data collection. In the baseline phase across all conditions, Client 1 and Client 2 were each paired with a single staff member who had been trained in data collection procedures and all other areas of Superflex. During this phase, there were no interventions used, and the staff began to collect information on the child’s likes and dislikes. Data were then collected for three consecutive sessions on back-and-forth conversation skills, asking “wh” questions, and tantrum behaviors both in home and in clinic.

During the intervention phase, each of the clients was introduced to Superflex, and the lessons were run per guidelines in the book and daily lesson guides. Data were collected on the child’s ability to perform back-and-forth conversation skills such as greetings, comments, and responding to social overtures. Data were collected on each client’s tantrum behaviors including crying, lying, property destruction, biting,

scratching, and yelling. During the maintenance phase, each child took a break from all Superflex interventions for 1 month, and then data were collected on back-and-forth conversation skills, asking “wh” questions, and tantrum behaviors in the clinic and in home with parents.

Results

All data in this section were evaluated using visual inspection and PND. Visual inspection allowed me to quickly evaluate the data to determine whether the intervention had an effect. This was done by visually inspecting the graphed data points and determining whether they had met a predetermined criterion (see Cooper et al., 2019). PND was used to calculate the effect based on whether the data surpassed a single significant point within the baseline phase. Finally, effect size between baseline and intervention and baseline and maintenance were calculated using Cohen’s d (Cohen, 1988).

Client 1

“WH” Questions to Peers

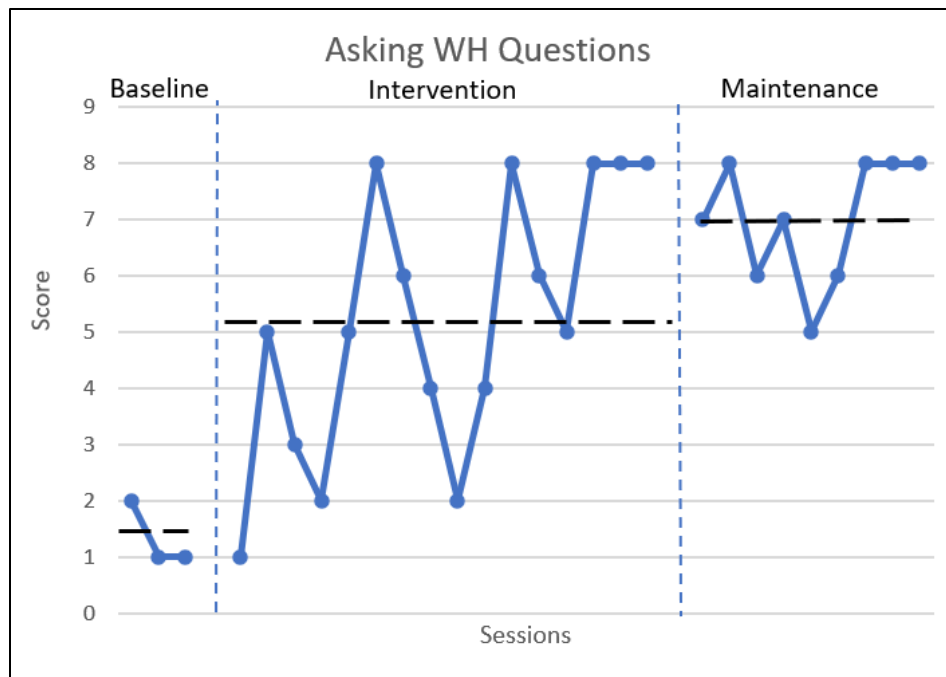
In baseline, Client 1 was observed across three sessions asking an average 1.33 “wh” questions to peers while in the clinic. During the intervention phase, this client was observed asking “wh” questions on 13 out of 16 opportunities that were better than the highest measure in baseline. The PND for the intervention phase of Client 1 was 81.25%. The PND for the maintenance phase was 100%. There were 9 out of 9 successful maintenance sessions. The null hypothesis was rejected.

For Client 1, baseline data started at 2 but leveled off at 1 question per session, with relative stability and minimal variability. During intervention, there was a pattern of increased performance with extreme variability from Sessions 4 to 13 with the behavior plateauing with stable variability for the remainder of the phase. In the maintenance phase, gains made during intervention were maintained with some variability and stable performance on the final three sessions.

Cohen's d is the difference between means divided by the pooled standard deviation (Cohen, 1988). The intervention phase of "wh" questions had a mean of 5.19, the baseline phase of "wh" questions had a mean of 1.33, and the pooled standard deviation of "wh" questions was 2.32. Cohen's $d = (1.33 - 5.19) / \sqrt{2.32}$ with an effect size of 1.66. When comparing the baseline phase mean 1.33 with the maintenance phase mean 7 of "wh" questions, I determined the pooled standard deviation was 1.74. Cohen's $d = (1.33 - 7) / \sqrt{1.74}$ with an effect size of 3.26. According to Matyas and Greenwood (1990), $d = .2$ is typically classified as a small effect size, $d = .5$ is a medium effect size, and $d = .8$ or higher is identified as a large effect size. Therefore, both maintenance and intervention phase comparisons are considered large effect sizes (see Figure 1).

Figure 1

Client 1 Asking “WH” Questions Graphic Description



Back-and-Forth Conversations

Baseline back-and-forth conversations with peers were measured across sessions. Each session the client was able to successfully participate in 3–4 back-and-forth exchanges while in clinic. During intervention, 12 out of 16 opportunities were observed above the highest peak in baseline. The PND for intervention of Client 1 was 75%. There were 9 out of 9 successful maintenance sessions when compared to the highest peak in baseline. The PND for the maintenance phase was 100%. The null hypothesis was rejected.

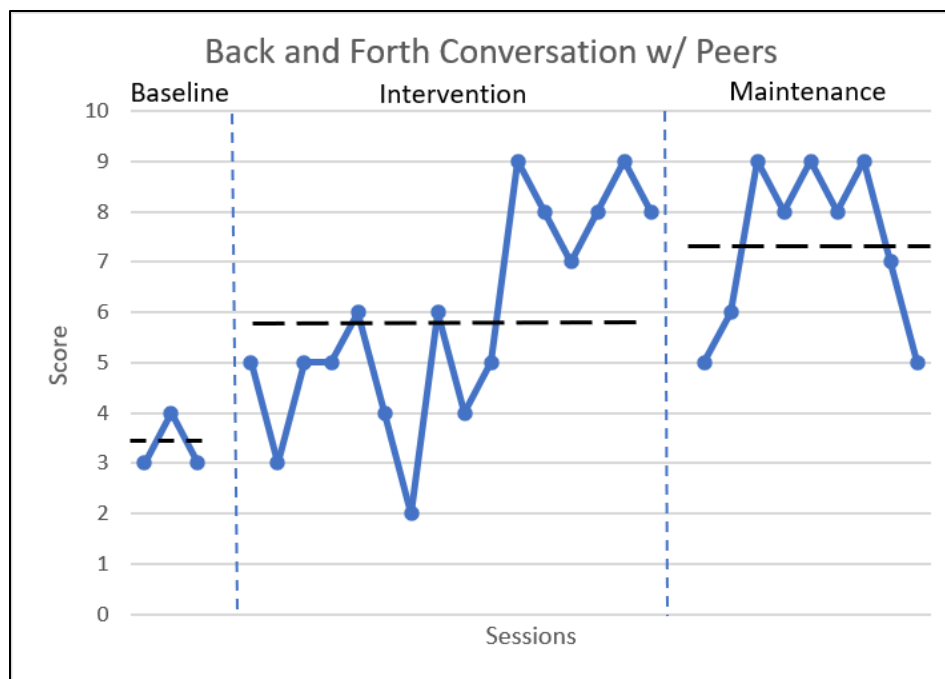
According to visual inspection of the baseline, the client was able to have 3 or more back-and-forth exchanges with peers. The data showed a flat trend with low variability. During the intervention phase, the client was able to increase back-and-forth

conversations with peers with 12 opportunities higher than the peak of baseline. There was an increasing trend and high variability throughout the phase. During the maintenance phase, the client was able to maintain conversation skills above baseline and showed low variability in 7 out of 12 responses with a decreasing trend in the final 2 responses.

Cohen's d is the difference between means divided by the pooled standard deviation (Cohen, 1988). The intervention phase of back-and-forth conversations had a mean of 5.86, the baseline phase of back-and-forth conversations had a mean of 3.33, and the pooled standard deviation of back-and-forth conversations was 2.02. Cohen's $d = (3.33 - 5.86) / \sqrt{2.02}$ with an effect size of 1.25. According to Matyas and Greenwood (1990), $d = .2$ is typically classified as a small effect size, $d = .5$ is a medium effect size, and $d = .8$ or higher is identified as a large effect size. Therefore, back-and-forth conversation were not classified as having a significant effect size. When comparing the baseline phase mean 3.33 with the maintenance phase mean 7.33 of back-and-forth conversations, I determined the pooled standard deviation was 1.8. Cohen's $d = (3.33 - 7.33) / \sqrt{1.8}$ with an effect size of 2.22. According to Matyas and Greenwood (1990), $d = .8$ or higher is identified as a large effect size. Therefore, the effect size was considered large (see Figure 2).

Figure 2

Client 1 Back-and-Forth Conversations Graphic Description



Tantrum Behavior in Clinic

In the baseline phase for tantrum behavior in the clinic, the client had an average of 7 behaviors per session. The best session was measured at 6 behaviors per session during baseline. During the intervention phase, Client 2 had 11 out of 16 sessions better than baseline. The PND for intervention was 68.75%. There were 9 out of 9 successful maintenance sessions with a PND of 100%. The null hypothesis was rejected.

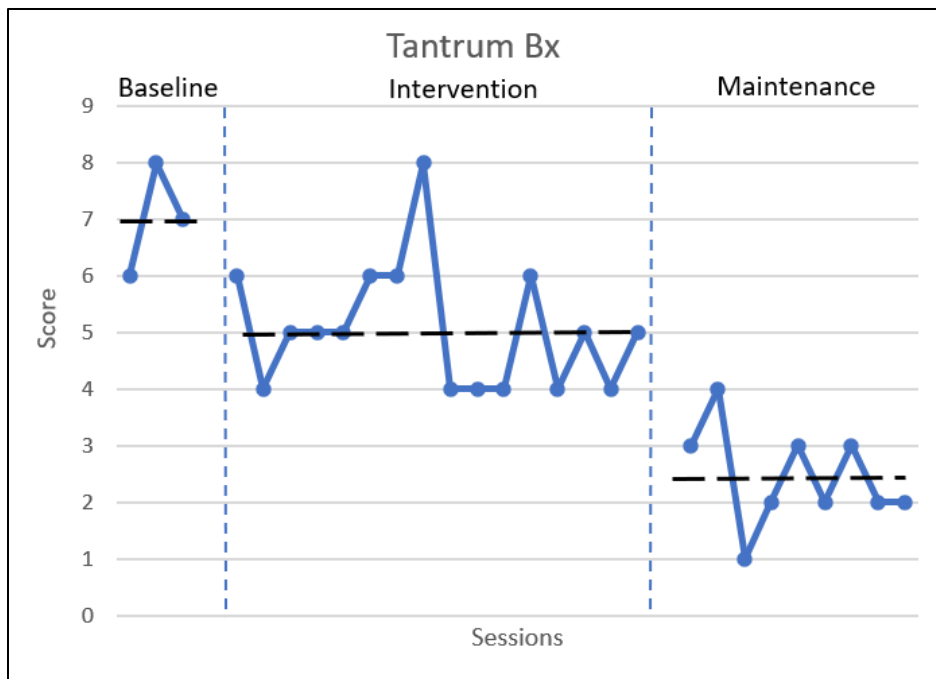
According to visual inspection of the baseline, data started high but seemed to trend downward and then level off. During intervention, the data became variable with a slightly downward trend. In the maintenance phase, data remained variable with an increasing trend.

Cohen's d is the difference between means divided by the pooled standard deviation (Cohen, 1988). The intervention phase of tantrum behaviors in the clinic had a mean of 7, the baseline phase of tantrum behaviors in the clinic had a mean of 5.06, and the pooled standard deviation of tantrum behaviors in the clinic was 1.67. Cohen's $d = (7-5.06) / \sqrt{1.16}$ with an effect size of 1.67. According to Matyas and Greenwood (1990), $d = .8$ or higher is identified as a large effect size. Therefore, the effect size was considered large during intervention.

When comparing the baseline phase mean of 7 with the maintenance phase mean of 2.44 for tantrum behaviors in the clinic, I determined that the pooled standard deviation was 1.42. Cohen's $d = (7-2.44) / \sqrt{1.42}$ with an effect size of 3.21. According to Matyas and Greenwood (1990), $d = .8$ or higher is identified as a large effect size. Therefore, the effect size was considered large (see Figure 3).

Figure 3

Client 1 Tantrum Behavior in Clinic Graphic Description



Tantrum Behavior in Home

I used PND to calculate the effect on in-home tantrum behavior measured by parents. The baseline was measured at 15 for the best score monthly. During the intervention phase, there were 2 out of 3 successful opportunities measured with a PND of 66.67%. During the maintenance phase, 2 out of 2 successful opportunities were measured with a PND of 100%. The null hypothesis was rejected.

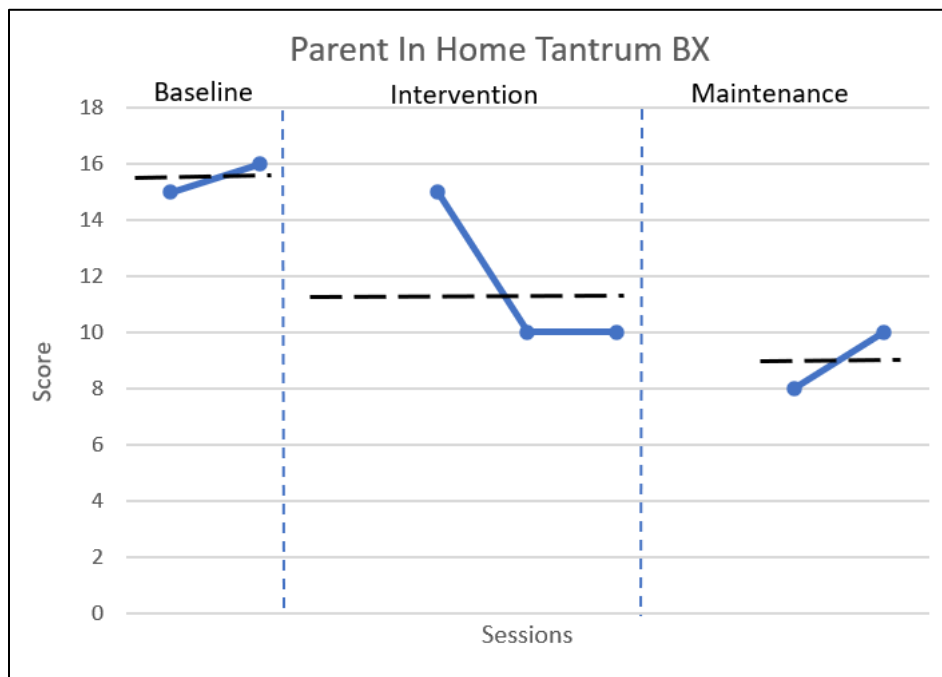
According to visual inspection of the baseline data, an increasing trend with 15 being the lowest number of tantrums was counted monthly in home. During the intervention phase, there were 2 out of 3 successful opportunities measured at the lowest

peak of baseline. In the maintenance phase, there was low variability and an increasing trend. All opportunities in the maintenance phase remained below the baseline.

Cohen's d is the difference between means divided by the pooled standard deviation (Cohen, 1988). The intervention phase of tantrum behavior in home had a mean of 11.67, the baseline phase of tantrum behaviors in home had a mean of 15.5, and the pooled standard deviation of tantrum behaviors in home was 2.83. Cohen's $d = (15.5 - 11.67) / \sqrt{2.83}$ with an effect size of 1.35. According to Matyas and Greenwood (1990), $d = .8$ or higher is identified as a large effect size; therefore, the effect size was considered large. When comparing the baseline phase mean of 15.5 with the maintenance phase mean of 9 of tantrum behaviors in home, I determined the pooled standard deviation was 2.91. Cohen's $d = (15.5 - 9) / \sqrt{2.91}$ with an effect size of 2.23. According to Matyas and Greenwood (1990), $d = .8$ or higher is identified as a large effect size. Therefore, the effect size was considered large.

Figure 4

Client 1 Tantrum Behavior in Home, Parent Measure Monthly Totals Graphic Description

**Client 2*****“WH” Questions to Peers***

In baseline client 2 was observed asking three “WH” question to peers while in the clinic. During the intervention phase this client was observed asking “WH” questions on 12 out of 15 opportunities that were better than the highest measure in baseline. The Percentage of Non-overlapping Data for the intervention phase of client two was 80%. The PDN for the maintenance phase was 100%. There were 13 out of 13 successful maintenance sessions. The null hypothesis was rejected.

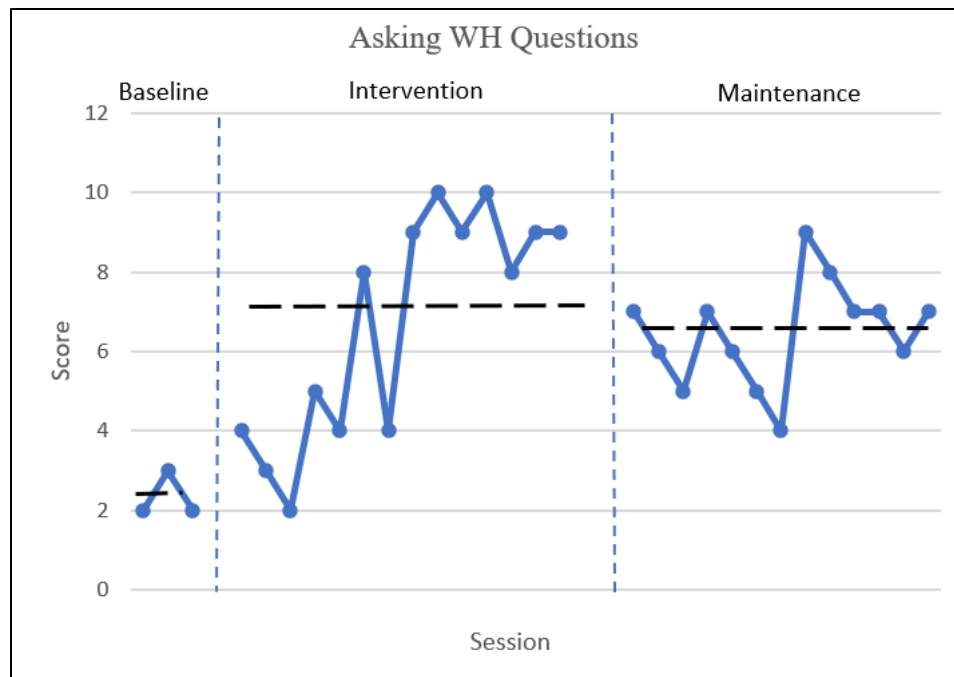
Using visual inspection to evaluate the data for Client 2, during baseline data remained relatively stable with minimal variability. During intervention there was a

pattern of increased performance from sessions 3 to 8 with behavior plateauing with minor variability for the remainder of the phase. In the maintenance phase gains made during intervention were maintained with some variability and a slightly lower performance from the peak of intervention.

Cohen's d is the difference between means divided by the pooled standard deviation (Cohen, 1988). The intervention phase of Wh questions had a mean of 6.714, the baseline phase of Wh questions had a mean of 2.33 and the pooled standard deviation of Wh questions was 2.686. Cohen's $d = (2.33 - 6.714) / \sqrt{2.686}$ and an effect size of 1.632. When comparing the baseline phase mean 2.33, with the maintenance phase mean 6.462, of Wh questions and the pooled standard deviation was 1.473. Cohen's $d = (2.33 - 6.462) / \sqrt{1.473}$ and an effect size of 2.805. According to Matyas and Greenwood (1990), $d=.2$ is typically classified as a small effect size, $d=.5$ is a medium effect size, and $d=.8$ or higher is identified as a large effect size. Therefore, all of these effect sizes are considered large.

Figure 5

Client 2 Asking “WH” Questions Graphic Description



Back-and-Forth Conversations

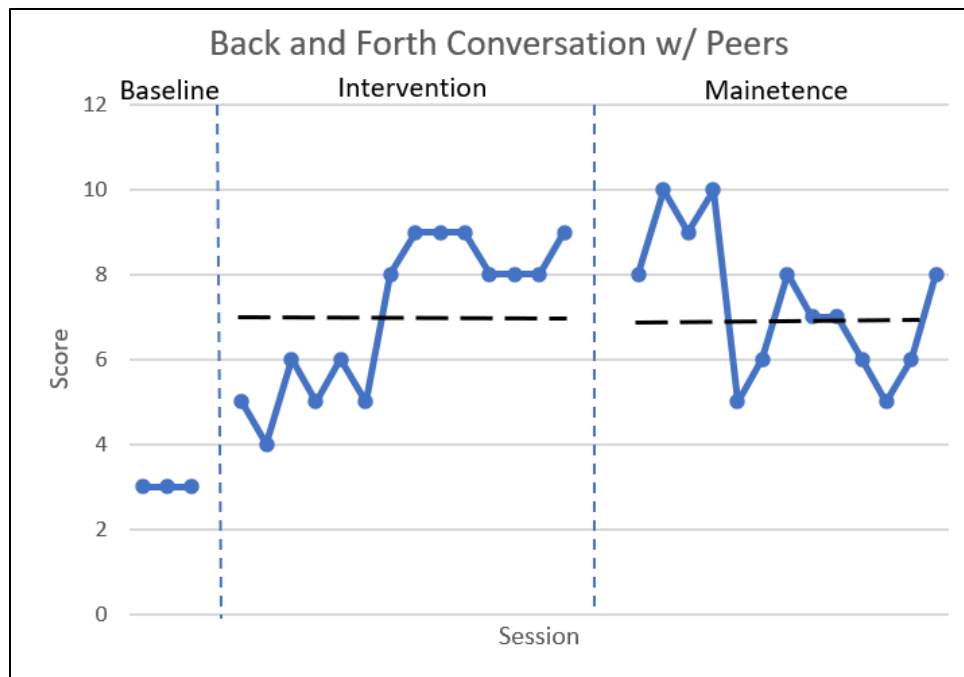
In baseline, back and forth conversations with peers were measured across sessions. Each session the client was able to successfully participate in 3 back and forth exchanges while in clinic. During intervention, 14 opportunities were observed and during each observation the client was able to participate in back-and-forth exchanges better than in baseline. The PDN for intervention of client two was 100%. There were 13 out of 13 successful maintenance sessions. The null hypothesis was rejected.

Using visual inspection in baseline the client was able to have three back and forth exchanges with peers. The data has a flat trend with no variability. During the intervention phase the client was able to increase back and forth conversations with peers with an increasing trend and slight variability. During the maintenance phase, the client

was able to maintain conversation skills above baseline. The trend is decreasing with slight variability.

Cohen's d is the difference between means divided by the pooled standard deviation (Cohen, 1988). The intervention phase of back-and-forth conversations had a mean of 7.071, the baseline phase of back-and-forth conversations had a mean of 3 and the pooled standard deviation of back-and-forth conversations was 0.4. Cohen's $d = (3 - 7.071) / \sqrt{.4}$ and an effect size of .002. According to Matyas and Greenwood (1990), $d=.2$ is typically classified as a small effect size, $d=.5$ is a medium effect size, and $d=.8$ or higher is identified as a large effect size. Therefore, this would not be classified as having a significant effect size.

When comparing the baseline phase mean 3, with the maintenance phase mean 7.308, of back-and-forth conversations and the pooled standard deviation was 2.021. Cohen's $d = (3 - 7.308) / \sqrt{(2.021)}$ and an effect size of 2. According to Matyas and Greenwood (1990), $d=.2$ is typically classified as a small effect size, $d=.5$ is a medium effect size, and $d=.8$ or higher is identified as a large effect size. Therefore, the effect size was considered large.

Figure 6*Client 2 Back-and-Forth Conversations Graphic Description****Tantrum Behavior in Clinic***

In the baseline phase for tantrum behavior in the clinic, the client had an average of 7.5 behaviors per session. The best session was measured at 7 behaviors per session during baseline. During the intervention phase client two had 11 out of 14 sessions better than baseline. The PDN for intervention was 78.5%. There were 9 out of 13 successful maintenance sessions with a PDN of 69.2%. The null hypothesis was rejected.

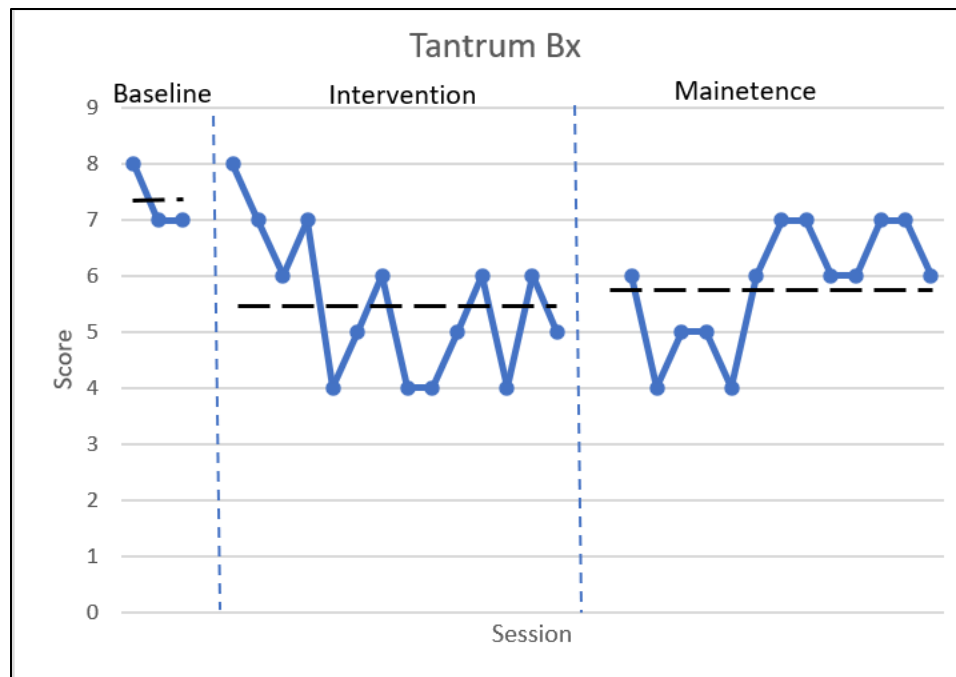
Using visual inspection in baseline, data starts high but seems to be trending downward and then levels off. During intervention, the data becomes variable with a slight downward trend. In the maintenance phase, data stays variable with an increasing trend.

Cohen's d is the difference between means divided by the pooled standard deviation (Cohen, 1988). The intervention phase of tantrum bx in the clinic had a mean of 5.5, the baseline phase of tantrum behaviors in clinic had a mean of 7.33 and the pooled standard deviation of tantrum behaviors in the clinic was 1.23. Cohen's $d = (5.5 - 7.33) / \sqrt{1.23}$ and an effect size of 1.49. According to Matyas and Greenwood (1990), $d=.2$ is typically classified as a small effect size, $d=.5$ is a medium effect size, and $d=.8$ or higher is identified as a large effect size. Therefore, the effect size was considered large.

When comparing the baseline phase mean of 5.5, with the maintenance phase mean of 5.85, of tantrum behaviors in clinic and the pooled standard deviation was 1.13. Cohen's $d = (5.5 - 5.85) / \sqrt{1.13}$ and an effect size of 0.31. According to Matyas and Greenwood (1990), $d=.2$ is typically classified as a small effect size, $d=.5$ is a medium effect size, and $d=.8$ or higher is identified as a large effect size. Therefore, the effect size was considered small.

Figure 7

Client 2 Tantrum Behavior in Clinic Graphic Description



Tantrum Behavior in Home

Using PDN to calculate the effect on in-home tantrum behavior measured by parents, baseline was measured at 20 for the best score monthly. During the intervention phase, there were 3 out of 3 successful opportunities measured with a PDN of 100%. During the maintenance phase 2 out of 2 successful opportunities were measured with a PDN of 100%. The null hypothesis was rejected.

Using visual inspection in baseline data has an increasing trend with 20 being the lowest number of tantrums counted monthly in-home. During the intervention phase, data show low variability with a decreasing trend, with all sessions lower than baseline. In the

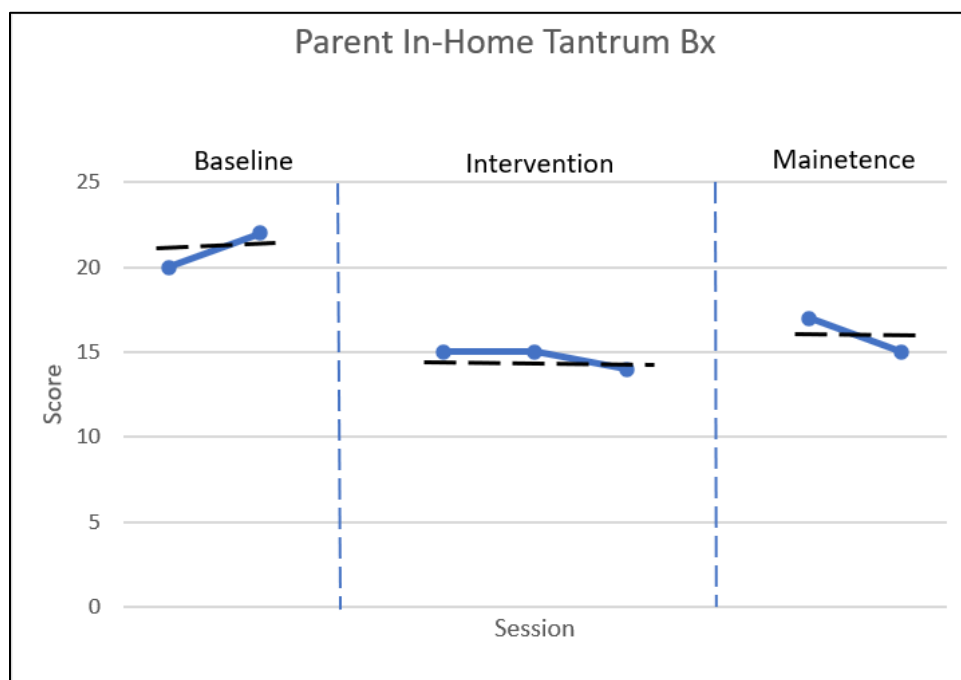
maintenance phase, there is low variability and a decreasing trend. All opportunities in the maintenance phase remain below that in baseline.

Cohen's d is the difference between means divided by the pooled standard deviation (Cohen, 1988). The intervention phase of tantrum bx in home had a mean of 14.67, the baseline phase of tantrum behaviors in home had a mean of 21 and the pooled standard deviation of tantrum behaviors in home were 2.11. Cohen's $d = (21 - 14.67) / \sqrt{(2.11)}$ and an effect size of 3 According to Matyas and Greenwood (1990), $d=.2$ is typically classified as a small effect size, $d=.5$ is a medium effect size, and $d=.8$ or higher is identified as a large effect size. Therefore, the effect size was considered large.

When comparing the baseline phase mean 21, with the maintenance phase mean 16, of tantrum behaviors in home and the pooled standard deviation was 2.42. Cohen's $d = (21 - 16) / \sqrt{(2.42)}$ and an effect size of 2.07. According to Matyas and Greenwood (1990), $d=.2$ is typically classified as a small effect size, $d=.5$ is a medium effect size, and $d=.8$ or higher is identified as a large effect size. Therefore, the effect size was considered large.

Figure 8

Client 2 Tantrum Behavior in Home, Parent Measure Monthly Totals Graphic Description



Summary

During this chapter data was reviewed based on the following research questions and hypotheses. Research question 1 – Will Superflex increase back and forth conversations with peers in a clinical setting? H_1 – Based on the research, the back-and-forth conversations with peers will increase by 15% halfway through the lessons. H_{01} – Superflex will not increase back and forth conversations with peers in a clinical setting. The data across both clients allows for the rejection of the null hypothesis.

Research question 2 – Can the conversation skills gained during the lessons generalize into novel settings without training? H_1 – Back and Forth conversation skills will generalize into novel settings without further training. H_{01} – Back and Forth

conversation skills will not generalize into novel settings without further training. This will be measured using data collect in-home, collected by parents on the provided data sheet. The data for both clients allows for the rejection of the null hypothesis.

Research question 3 – Will Superflex decrease crying/screaming (Any instance in which a participant engages in a vocalization louder than is used for communication for longer than 3 seconds during which time he may or may not produce tears). H_1 – Superflex will decrease crying/screaming in a clinical setting as measured by 50% or less crying/screaming in the setting across 5 consecutive sessions. H_{01} – Superflex will not decrease crying/screaming in a clinical setting. The data for both clients allows for the rejection of the null hypothesis.

Research question 4 – Can the decrease in crying/screaming generalize into novel settings without formal training? H_1 – Superflex will decrease crying/screaming behaviors in novel settings without formal training as measured by 50% or less crying/screaming in the setting across 5 consecutive sessions. H_{01} – Superflex will not decrease crying/screaming behaviors in novel settings without formal training. Both client's showed improvement greater than 50% which rejects the null hypothesis.

Research question 5 – Will Superflex increase the use of “Wh” questions to gain knowledge of the environment and people around? H_1 – Superflex will increase the use of “Wh” questions to gain knowledge of the environment and people around as measured by 80% or better responding across 5 consecutive sessions. H_{01} – Superflex will not increase the use of “Wh” questions to gain knowledge of the environment and people around. Both client's data showed an increase across intervention and maintenance which allows

for a rejected null hypothesis. In the next chapter interpretations of findings, limitations, and recommendations will be discussed.

Chapter 5: Discussion, Conclusions, and Recommendations

The purpose of this study was to examine the effectiveness of Superflex, a superhero social thinking curriculum, on social skills and maladaptive behavior in children 7 to 10 years of age diagnosed with ASD (Level 1 or 2) in a clinical setting. The following research questions were assessed: Will Superflex increase back-and-forth conversations with peers in a clinical setting? Can the conversation skills gained during the lessons generalize into novel settings without training? Will Superflex decrease crying/screaming in a clinical setting? Can the decrease in crying/screaming generalize into novel settings without formal training? Will Superflex increase the use of “wh” questions to gain knowledge of the environment and people nearby? Interpretations, limitations, and recommendations are discussed in this chapter.

Interpretation of the Findings

When comparing data across baseline, intervention, and maintenance, I found that Client 1 was able to increase the use of “wh” questions in conversations. Client 2 was also able to increase the use of “wh” questions in conversations with peers. There were gains made in maintenance for both Client 1 and Client 2 that showed generalization of skills across environments without formal training. When comparing data across baseline, intervention, and maintenance, I found that Client 1 was able to increase back-and-forth conversation skills. Client 2 was also able to increase back-and-forth conversation skills in clinic. The gains made in maintenance showed generalization without formal training. However, Client 1 and Client 2 data showed regression in the skill toward the end of the data set. Overall, data collected on Client 1 and Client 2 showed slight improvements.

When comparing data across phases, I found that Client 1 started with a high number of tantrum behaviors ($M = 7$). During intervention, tantrum type behaviors decreased minimally to a mean of 5. Finally, during the maintenance phase, gains continued to be made ($M = 2.5$). Using Cohen's d to calculate effect size for baseline to maintenance comparison the effect size was ($M = 3.21$). The comparison for baseline to intervention showed a large effect size ($M = 1.67$). Client 2 started with a high number of tantrum type behaviors ($M = 7.5$) during baseline. During the intervention phase, behaviors decreased ($M = 5.5$). During the maintenance phase, behaviors were slightly higher ($M = 5.75$) than in the intervention phase. Cohen's d showed a large effect size ($M = 1.49$) when comparing intervention to baseline ($M = 0.31$). When comparing baseline to maintenance, I found that Client 2 had a medium effect size. Overall, data collected on Client 1 and Client 2 showed improvements across baseline, intervention, and maintenance.

When comparing data collected by parents across baseline, intervention, and maintenance phases for tantrum behaviors, Client 1 showed a mean of 16 tantrums per month, and Client 2 showed a mean of 22 tantrums per month. In comparing baseline to intervention phases, I found that Client 1 and Client 2 showed improvement by decreasing home tantrum behaviors (5 for Client 2 and 6 for Client 1). Once interventions were removed and maintenance begun, tantrum type behaviors in Client 1 dropped slightly below that of the recorded intervention level ($M = 11$). Client 2 was able to maintain about the same number of tantrum behaviors in the home as seen during the intervention phase ($M = 9$). Cohen's d showed a large effect size across phases for both

Client 1 ($M = 1.35$) and Client 2 ($M = 3.00$) and between baseline and intervention and baseline and maintenance phases for Client 1 ($M = 1.35$) and Client 2 ($M = 2.07$). Data analysis using both visual inspection and Cohen's d indicated that improvements in behavior were made.

Compared to previous research, the current results are consistent with what has been seen in school settings. In a study completed in the school setting, interventions were used to teach children social perspective and self-control (Yadlosky, 2012). Teachers were asked to rate each child's behaviors. The teachers using Superflex found that progress was made in teaching children with ASD and attention deficit hyperactivity disorder in ways to cope with social settings while in school. I found the same results found when looking at back-and-forth conversations and a decrease in maladaptive behaviors. Rachmah et al. (2018) described bigger gains across multiple populations and settings, in comparison to the current study that had a smaller population in a clinical setting. Client 1 was able to increase "wh" questions and maintain the use of conversational skills across settings. An increase in "wh" questions led to longer back-and-forth conversation skills, which further increased overall conversational language. Finally, tantrum type behaviors decreased in the clinical setting as well as the home setting.

As suggested by Hansen et al. (2017), teaching social skills using peers and videos can help teach advanced social skills. The current study showed an increase in conversation skills and a decrease in maladaptive behaviors. Clay et al. (2018) suggested that the use of reinforcement such as edibles could help increase social skills. In the

current study, reinforcement was used to increase the likelihood of responding. ABA uses reinforcement to increase responsiveness in children, which also increases the likelihood of learning (Clay et al., 2018; Lovaas, 1987). The same results were found with Client 2; however, maintenance of conversational skills was at a lower rate. Maladaptive behaviors in the clinic and in the home decreased during intervention but slowly increased closer to baseline during the maintenance phase. These findings were similar between Client 1 and Client 2 but left room for more research with a larger population (see Rachmah et al., 2018). Overall, the curriculum increased conversational skills and decreased maladaptive behaviors in Client 1 and Client 2.

Limitations of the Study

One limitation to the study was the need for a standardized instrument sensitive enough to measure social skills at baseline and then a short amount of time (6 months) later. A Behavior Assessment System for Children-Second Edition form and a questionnaire were given to each family. However, data on these forms were not completed in full.

The second limitation to the study was the need for observation and measurement of each skill to be taken by a skilled RBT and BCBA for each child to create a baseline and then periodically throughout the study to track progress and interobserver agreement. The number of staff needed was not an issue for this study but could have been if a larger number of participants had been able to participate. Finally, the data for this study were not collected simultaneously due to the number of excluded participants. The small

sample size ($N = 2$) allowed for some conclusions to be made, but a larger sample size ($N = 3-5$) would have allowed better conclusions to be drawn.

Recommendations

Based on the information gained in this study and the information gathered from other research, further investigation into social curricula is needed. A larger participant pool is recommended to increase generalization and validity. Better data collection procedures could improve outcome measures and would allow for better insight into social skill deficits. Finally, completing entrance and exit interviews with parents could increase knowledge on skill generalization across settings and over time.

Implications

The potential impact for positive social change at the individual level and family level could be seen with an increase of social skills and a decrease in maladaptive behaviors. Positive social change could also be seen across the child's life as they continue to develop and enter different areas of life. Each child develops differently and hits milestones at different times in life but is still expected to behave in a responsible manner by society. Teaching social skills to children when they are younger can help them be more successful in grade school, junior high school, and high school. This success can lead to a more successful adult life, which may increase the likelihood of success in the workforce. If a person is successful in the workforce, they are less likely to need state assistance and state funding to live. Increasing social awareness could be a great way to build confidence in people diagnosed with autism and many other disabilities impacting social interactions. Using techniques found in ABA, such as

positive reinforcement and differential reinforcement, could help some learners gain interest in a topic that would typically be seen as less reinforcing.

Conclusion

Social skills curricula have been a topic of little research in ABA. The use of Superflex as a curriculum to increase socially acceptable behaviors while decreasing socially maladaptive behaviors could help bridge the gap. With the use of fun learning materials, silly names for serious topics, and the right reinforcement schedule, children on the spectrum could increase awareness in social settings. With the number of children on the spectrum increasing, leaders should be given the appropriate tools for success. In the current study, the Superflex curriculum was shown to increase social skills and decrease maladaptive behaviors in a clinical setting, adding to the research on the efficacy of this program in teaching social skills and social thinking behaviors. Skills taught while using the materials were maintained across people and settings for a brief time. The Superflex social thinking curriculum appears to be an effective intervention program for clients with ASD when implemented in small groups in the clinical setting. Intervention curricula such as Superflex should be included in clinical settings for children age 7 to 10 to increase their likelihood of social skill success.

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