# Missouri State UNIVERSITY

## BearWorks

Spring 2017

# The Efficacy of Digital Comic Strip Conversations to Teach Empathetic Responding to Children with Autism

Khalifah Sami Aldughaysh
*Missouri State University*, SamiK321@live.missouristate.edu

Follow this and additional works at: https://bearworks.missouristate.edu/theses

Part of the Special Education and Teaching Commons

### Recommended Citation

**THE EFFICACY OF DIGITAL COMIC STRIP CONVERSATIONS TO TEACH**

**EMPATHETIC RESPONDING TO CHILDREN WITH AUTISM**

A Masters Thesis

Presented to

The Graduate College of

Missouri State University

In Partial Fulfillment

Of the Requirements for the Degree

Masters of Science in Education, Special Education

By

Khalifah Sami Aldughaysh

May 2017

# THE EFFICACY OF DIGITAL COMIC STRIP CONVERSATIONS TO TEACH EMPATHETIC RESPONDING TO CHILDREN WITH AUTISM

Department of Counseling, Leadership, and Special Education

Missouri State University, May 2017

Masters of Science in Education

Khalifah Sami Aldughaysh

## ABSTRACT

Recent research supports the idea that children with ASD express less empathetic responding than typically developed children. However, limited studies have focused on the utilization of evidence-based practices to teach these skills. In this study, a multiple baseline design across three participants diagnosed with autism was implemented to assess the efficacy of digital comic strip conversations, which include answering comprehension questions and engaging in role-play, to teach verbal and non-verbal empathetic responding. Digital comic strips conversations were developed specifically for the study to depict three emotional domains: happiness or excitement, sadness or pain, and fear in a variety of social contexts. Both verbal and non-verbal empathetic responding were assessed concurrently within the same sessions. Moreover, two different five level rating scales were utilized to code the behavioral response. Upon the introduction of treatments, an increase of empathetic responding was recorded across all three participants, maintaining highest score according to rating scale for the majority of the data points throughout the intervention phase. However, the generalization phase of both verbal and non-verbal response conveyed inconsistent results across participants. Further research is needed to assess complementary treatment modalities as well as evaluating factors underlying generalization difficulties of skills for individuals with autism that are acquired in clinical practice.


**KEYWORDS**:  autism, theory of mind, empathy, social story, comic strip conversations

This abstract is approved as to form and content

_____
Linda Garrison-Kane, PhD: Professor
Chairperson, Advisory Committee
Missouri State University

# THE EFFICACY OF DIGITAL COMIC STRIP CONVERSATIONS TO TEACH

# EMPATHETIC RESPONDING TO CHILDREN WITH AUTISM

By

Khalifah Sami Aldughaysh

A Masters Thesis
Submitted to the Graduate College
Of Missouri State University
In Partial Fulfillment of the Requirements
For the Degree of Master of Science in Education, Special Education

May 2017

Approved:

_____
Linda Garrison-Kane, PhD: Professor


_____
David Goodwin, PhD: Associate Professor


_____
Michael Goeringer, M.S: Clinical Instructor


_____
Julie Masterson, PhD: Dean, Graduate College

# ACKNOWLEDGEMENTS

I would first like to thank and praise God, for he is the most merciful above all else, for inspiring me to both seek and accomplish this research project, for strengthening me to get back when I encounter difficulty or doubt my ability, for leading me to the source of my happiness " working with/for children with autism".

In the process of pursuing my master degree, I had the privilege to work under the supervision of professor Linda Garrison-Kane. Therefore, I particularly would like to thank her for persevering with me during this journey. What I have learned from Dr. Garrison-Kane exceeded the academic knowledge to include research ethics, tolerance, righteousness, and career professionalism.

I also must acknowledge the support of my other thesis committee members, Dr. David Goodwin and Mr. Michael Goeringer for their assistance. They both generously spend time and efforts to provide me with the support needed. Moreover, I am deeply thankful to all my family members, and especially my parents for their unconditioned love, unlimited support, and patience.

I dedicate this thesis to my mother for her complete devotion to our family, to her appreciation for knowledge and learning, and for teaching me to dream without fear or limits.

# TABLE OF CONTENTS

# LIST OF TABLES

# LIST OF FIGURES

# CHAPTER I: OVERVIEW OF THE STUDY

Autism spectrum disorder (ASD) is considered a lifelong neurodevelopmental condition (Cotugno, 2009) that manifests in the early stages of a child's life, and it is characterized by social and communication deficit, stereotypic behaviors, and restricted interests (Wilkinson, 2017). According to the American Psychiatric Association (2013), autism affects the brain's functioning at different levels of severity, resulting in problems with thinking processes, verbal and nonverbal language, emotions, and relating to others. Deficits in ASD children can impact abilities to develop the skills needed for social competence, academic productivity, and daily life independence. After Kanner's (1943) discovery of autism, it was viewed as a low incidence disorder for many decades. However, recent epidemiological studies have reported a radical increase. For instance, in 2014 the Center for Diseases Control and Prevention (CDC) released a study finding that at least 1 in 68 children have been identified with ASD in the United States. There is no one particular explanation for this increase as numerous factors can account for the higher rate of autism (Fombonne, 2003).

Research suggests that variables such as an increase of public awareness, changing the diagnostic criteria, environmental and genetics factors (Wing & Potter, 2002) and the high survival rate of neurologically vulnerable children (Li, 2009) can all affect the prevalence of autism. For example, a longitudinal study published by Hansen, Schendel, and Parner (2015) examined the effects of changing the diagnostic criteria in Denmark on the increasing prevalence of autism. In this study, all Danish children born between the years 1980 and 1991 (677,915 children) were followed from their birth until

the time they received a diagnosis of autism, their death, or the conclusion of the study in December of 2011. Results from this study indicated that the increase in the number of children who received a diagnosis of autism could be referred to as a "non-etiologic factor," meaning that changes in the diagnostic criteria account for the highest percentage of ASD reported cases.

This increase demands specialists and researchers to effectively utilize and examine evidence-based practice strategies to ensure the best possible improvements for children with autism. Koegel, Koegel, Harrower, and Carter (1999), noted "whether this geometrically increasing rate is due to greater public awareness, increased sophistication among diagnosticians, or a true rise in the prevalence of the disability, the need for effective interventions that can be delivered in a time and cost efficient manner is crucial" (p. 174). This is particularly true when targeting social deficit, which researchers have identified as a critical domain for intervention (Lynch & Simpson 2010).

Research has reported that individuals with autism exhibit a desire to socially interact with others, but, due to failure to understand social cues and establish relationships with others, they might remain isolated and socially rejected (Chamberlain, Kasari, & Rotheram-Fuller, 2007). Additionally, specialists and researchers must keep in mind that social skills might not develop naturally, and there is a need for systematic interventions to address these deficits among children with autism (Causton-Theoharis, Ashby, & Cosier, 2009).

**Rationale of the Study**

Deficits in social or emotional reciprocity is one of the core diagnostic criteria for individuals with ASD, and It is characterized by "failure of normal back-and-forth conversation; to reduced sharing of interests, emotions, or affect; to failure to initiate or respond to social interactions" (American Psychiatric Association, 2013, p. 50). Since empathy is the foundation of social interactions and allows humans to communicate and relate to emotional experiences effectively, lack of empathy skills significantly impact social competence (Baron-Cohen & Wheelwright, 2004). Generally speaking, empathy is a very complex phenomenon, which includes two important aspects: cognitive and affective (Baron-Cohen & Wheelwright, 2004, Feshbach, 1978, Butean, Costescu, & Dobrean, 2014, El Kaliouby, Picard, & Baron-Cohen 2006).

Feshbach (1978) defined the cognitive aspect as the ability to both identify emotional states and be able to take others' perspective, whereas the affective aspect refers to an individual's ability to exhibit an emotional response that is appropriate to the situation. Developmentally, by the second year of age, typical children begin to understand others' distress (McDonald & Messinger, 2012). When children get older, they increasingly become more capable of demonstrating sophisticated empathetic skills including the consideration of another's perspective and exhibiting pro-social behaviors (Butean, Costescu, & Dobrean, 2014).

While it has been widely debated that empathy disorder is correlated to individuals with autism, research strongly supports the idea that children with ASD express less empathic responses than typically developed children (Corona, Dissanayake, Arbelle, Wellington, & Sigman, 1998, Sigman, Kasari, Kwon, & Yirmiya, 1992).

Multiple theories and experimental studies corroborate that cognitive and affective domains of empathy contribute to the deficit in individuals with ASD. These theories include, but are not limited to, mirror neuron dysfunction (Oberman, Hubbard, McCleery, Altschuler, Ramachandran, & Pineda, 2005), theory of mind deficit (Baron-Cohen, Leslie, & Frith, 1985), empathizing–systemizing theory (Baron-Cohen, 2009), alexithymia (Bird & Cook, 2013) and empathetic responsiveness deficit (Sigman, Kasari, Kwon, & Yirmiya, 1992, Schrandt, Townsend, & Poulson, 2009). Empathy deficits impair the development of social relationships due to the fact that people tend to interact less frequently with individuals who don't exhibit empathetic response (Schrandt, Townsend, & Poulson, 2009). Empathy skills are required and worthy sub-skills to target in order to enhance social competence among children with autism (El Kaliouby, Picard, & Baron-Cohen 2006, Schrandt, Townsend, & Poulson, 2009, Lynch & Simpson, 2010).

Upon review of the literature within this area, it was noted that much research has been conducted on investigating both the existence and causes of empathy deficit within the ASD population (Oberman, et al., 2005, Baron-Cohen, Leslie, & Frith, 1985, Baron-Cohen, 2009, Bird, & Cook, 2013). Additionally, studies on teaching empathy mainly targeted the possibility of enhancing cognitive aspect of empathy such as teaching emotion recognition (Golan & Baron-Cohen, 2006, Williams, Gray, & Tonge, 2012, Ryan & Charragáin, 2010, LaCava, Golan, Baron-Cohen, & Myles, 2007) or perspective taking (theory of mind) skills (LeBlanc, Coates, Daneshvar, Charlop-Christy, Morris, & Lancaster, 2003, Dodd, Ocampo, & Kennedy, 2011). However, fewer studies have examined the utilization of evidence-based practice strategies to enhance the behavioral aspect of empathy in children with ASD (Schrandt, Townsend, & Poulson, 2009).

**Purpose of the Study**

The primary aim of this study was to investigate the effectiveness of utilizing Digital Comic Strip Conversations, which include answering comprehension questions and engaging in role-play to enhance verbal and nonverbal empathetic response in three children with autism. Three different emotional categories and various social contexts were utilized when developing the digital comics in order to improve communicative competence. Also, an attempt was made to examine the likelihood of generalizing the empathetic behavioral change across a variety of contexts. The secondary aim of the study was to expand our understanding of children's experience regarding their understanding of empathy and teaching methods utilized in the study.

**Research Questions**

The study aimed to answer the following research questions listed below:

1. To what extent does the utilization of Digital Comic Strip Conversations, which include answering comprehension questions and engaging in role-play, increase appropriate verbal and nonverbal empathetic response?

2. To what extent does the utilization Digital Comic Strip Conversations, which includes answering comprehension questions, and engaging in role-play, teach verbal/nonverbal empathic response and promote generalization across environments?

3. To what extent do the participants report about the utilization of Digital Comic Strip Conversations in the study and their own understanding of empathy as a phenomenon?

**Research Hypothesis**

It is hypothesized that a systematic approach utilizing Digital Comic Strip Conversations, which include answering comprehension questions and engaging in role-play, will enhance verbal and nonverbal empathic responding and the outcomes will be generalized.

**Research Design**

Mixed research design was utilized in this study, which allows for the inclusion of both quantitative and qualitative methodology.  First, multiple baseline design across subjects (Cooper, Heron, & Heward, 1987) was utilized to evaluate the effectiveness of digital comic strips to enhance verbal nonverbal empathetic response. Multiple baseline design, in general, is one of the most utilized designs within the single-subject design and typically used to study the behavior change on a relatively small sample size (Kazdin, 2011). The participant's performance was measured during both treatment and non-treatment phase to evaluate the effect of the independent variable on the 1target behavior (Kazdin, 1982). For the qualitative aspect of the study, the researcher utilized a semi-structured interview (Bernard, 1988) with open-ended questions to gain an in- depth understanding of the participant' experience toward teaching methods and empathy phenomenon. Additional narrative reading about the research design used in the study and its applications will be further described under the methodology.

**Significance of the Study**

 The researcher of the study anticipates that the study may include four novel influences:

1. Contributing to the existing literature in the fields of education and mainly to research related to evidence-based strategies utilized in the field of autism.

2. Directing future studies to replicate the present study and examining the effectiveness of other teaching approaches to enhance empathetic responding in children with ASD.

3. Providing a detailed replicable guideline of the teaching procedures and methods utilized in the study.

4. Gaining insight into the experiences that participants with autism have regarding empathy and teaching methods utilized in the study.


**Definition of Terms**

1. Empathy: the ability of an individual to understand and recognize other's emotions as well as to react appropriately to these emotions (Butean, Costescu, & Dobrean, 2014).

2. Theory of mind: a high mental capacity that attributes mental states to one's self and others (Premack & Woodruff, 1978).

3. Social story:  a short story written to enhance interpersonal communication skills in children with autism and to enrich their understanding of appropriate social behaviors and social contexts (Gray & Garand, 1993).

4. Comic strip conversation: a modified form of a social story that includes illustrations and is utilized to increase a student's understanding of a social context by reviewing a situation and discussing alternative behaviors that will be beneficial to the student (Glaeser, Pierson, & Fritschmann, 2003, p. 179).

## CHAPTER II: ABBREVIATED REVIEW OF LITERATURE

The purpose of this chapter is to provide a review of the literature surrounding autism spectrum disorder as characterized by the initial discovery, contributors to the field of autism, and diagnostic criteria. Further discussion is focused on empathy as a phenomenon and how it is impaired in the ASD population. The implementation of Social Stories and Comic Strip Conversations that attempt to remediate social skill deficits in children with ASD are lastly reviewed.

### Initial Discovery of Autism

The term autism was initially derived from the Greek word autos meaning self or self-admiration (Vatanoglu-Lutz, Ataman, & Biçer, 2014). Swiss psychiatrist Eugen Blueler, in 1911, utilized the term for the first time to describe symptoms such as social withdrawal and the tendency to disconnect from the real world in schizophrenic patients (Achkova & Manolova, 2014). Years before the seminal paper on autism by Leo Kanner in 1943, cases of individuals who exhibited possible symptoms of autism were documented (Zager & Wehmeyer, 2012). One of the most notable cases within the fields of psychology and education is Victor, the wild boy of Aveyron.

During the early years of the 19th century, Jean-Marc-Gaspard Itard, a French physicist, recorded his account of Victor. It was presumed that Victor lived his early childhood years in the forest until he was captured at the age of twelve years. Itard conducted many behavioral interventions over the span of five years to teach Victor social, language, and daily life skills (Wolff, 2004). In clinical practice, Itard observed

Victor on a regular basis and found that he exhibited sensory hypo-reactivity to both loud noise and cold weather. Additional observations include a display of self-stimulatory behaviors, expressionless gaze, language impairments, and imitation difficulties (Wolff, 2004). Looking back at Victor's previous symptoms, it can be inferred that he exhibited autism-like behavior (Wing, 1997). In contrast, when Kanner analyzed Itard's work, he did not correlate Victor's symptoms with early infantile autism (Wolff, 2004). Several researchers believe that the deficits of social and emotional behaviors of wild children are caused by "isolation dementia" during early childhood development (Wolff, 2004).

Dr. Leo Kanner, a physician at Johns Hopkins University in 1943, first identified autism as published in his seminal paper "Autistic Disturbances of Affective Contact." This published work provided a detailed examination of eleven clients (eight boys and three girls) that were within the scope of his clinical practice. These children were described by their parents and observed directly by Kanner throughout their childhood. Kanner suggested that the symptoms exhibited by these children had not been identified in prior work (Wolff, 2004). Children observed by Kanner showed a range of similar impairments, yet they displayed "differences in the degree of their disturbances, the manifestation of specific features, the family constellation, and the step-by-step development in the course of years"(Kanner, 1943, p. 242). Some of these children were also previously diagnosed with schizophrenia or feeblemindedness. However, Kanner suggested that due to the overlapping symptoms of schizophrenia and infantile autism, they were falsely diagnosed.

Kanner examined medical records such as physician examinations, the history of the mother's pregnancy, the processes of developmental progress, his personal

observations and analyzed parental reports. Kanner proposed that a number of behavioral characteristics could be utilized to account for the symptoms of infantile autism, as he named it, and consequently discriminate the disorder from schizophrenia (Kanner, 1943).

One of the most significant features displayed among all children as described by Kanner was a tendency for "extreme autistic aloneness." For example, many parental reports described their children as 'isolated from the external world' or having 'stronger relationships with objects than human beings.' One of the parental reports stated that the child was "self-sufficient, happiest when left alone, acting as if people were not there" (p. 242). Kanner also considered the abnormal and solitary behavior in regards to social interaction as the "fundamental" characteristic of all eleven children.

Secondly, Kanner identified varieties of disturbances in communication skills such as a deficit in verbal and nonverbal language and delays in acquiring spoken language. Three of the eleven children had little to no use of spoken language and were considered mute.  The remainder of the children acquired spoken language at the appropriate developmental age or after some delay; however, they displayed difficulties in both understanding and utilizing non-verbal language. Additionally, echolalia and idiosyncratic use of verbal language were consistent in all observed children. Kanner described the deficits in the capacity to use language appropriately in case 2 of Frederick W. stating "between 2 and 3 years, he would say words that seemed to come as a surprise to himself. He would say them once and never repeat them" (p. 223). Inappropriate use of verbal and non-verbal language across multiple social situations was a significant feature of Kanner's cases.

Thirdly, a high desire to maintain sameness, stereotyped behaviors, and sensory processing abnormalities were all symptoms reported by Kanner and suggested that these symptoms originated as a result of the obsessiveness in the children's familial background. For example, in case 10 of Johan F., the father said "daily routine must be adhered to rigidly; any slightest change of the pattern called forth outbursts of panic" (p. 238). Common characteristics that were observed by Kanner are that children experienced sensations differently than typically developed children. For example, they showed a massively sensitive reaction toward loud noises or specific objects such as elevators, vacuum cleaners, gas burners, or the sound of wind. A stereotyped repetitive behavior was also observed and manifested in a variety of ways. One of the children observed by Kanner would roll a ball back and forth or place his father's razor in and out of the box. Behaviors such as these are fundamental features of ASD and are not limited to kinesthetic motion that is non-goal oriented but is evident in verbal activities. Kanner recognized that the eleven children in the study were normal in their physical and cognitive development and came from highly intelligent families.

**Additional Contributors to the Field of Autism**

Separately from Leo Kanner, the Austrian psychiatrist Hans Asperger published his paper about Asperger's syndrome in 1944, defining a similar disorder to the one that was described by Kanner (Wing, 1981). However, Asperger's efforts of identifying the syndrome "autistic psychopathy" were not recognized for many decades since it was written in the German language. Eventually, Asperger's work became internationally

recognized when Lorna Wing first translated and ultimately published his paper in 1981 (Achkova & Manolova, 2014).

Asperger's syndrome according to the article "Asperger's Syndrome: A Clinical Account" translated by Lorna Wing in 1981, characterize deficits in social interactions as a defining feature of children with AS. These individuals may exhibit an interest in communicating with people and attempt to build relationships with others, but they lack in understanding socially appropriate behaviors (Wing, 1981). Individuals with AS experience symptoms related to communication deficits that severely impact the initiation and growth of long-term relationships that are built on concepts of social reciprocity (Tsai & Ghaziuddin, 2014). Furthermore, Asperger mentioned that these individuals demonstrated stereotypic behaviors and a strong desire for sameness (Wing, 1981).

Ninety-percent of the population sample was characterized as having impaired motor movements of body, limbs, and can present with a general weak effect of both gait and posture (Wing, 1981). Symptom manifestation may include high sensitivity to external stimuli and resistant to change (Wing, 1981). Moreover, Asperger indicated that due to the originality and fluency of cognitive processes, individuals with AS appear to have an extraordinary ability to be creative (Wolff, 2004). Equally, "it would be more true to say that their thought processes are confined to a narrow, pedantic, literal, but logical, chain of reasoning" (Wing, 1981, p. 118).

Kanner and Asperger's original publications were groundbreaking in the field of mental disorders since they identified the behavioral characteristics of autism and differentiated it from schizophrenia. Features such as deficits in social skills, impairments of understanding and use of both verbal and non-verbal speech, stereotypic and repetitive

behaviors, as well as atypical interests remain relevant to the formulation of the most recent diagnostic criteria for ASD (Koegel, Koegel, Ashbaugh, & Bradshaw, 2014).

Besides, professionals within the field also made significant contributions to the historical evolution of the understanding of autism by stepping away from the Freudian psychoanalytical approach and into that of neurodevelopmental pathology (Downing, 2007). For instance, Bernard Rimland, widely known for refuting the theory of the "refrigerator mother" as a causal factor in autism etiology, supported the then controversial utilization of applied behavior analysis as a technique to teach children with autism both behavioral and academic skills (Downing, 2007). Michael Rutter published numerous studies during the 1960's, discussing the features of autism and further proposed diagnostic frameworks for the clinical application of symptom detection in children with autism. Lastly, Lorna Wing, a British psychiatrist who first recognized AS through existing research that, once translated, provided the fundamental awareness that AS is a disorder where separate contributions of scientific inquiry as to the manifestation of symptomology are inherently different (Wolff, 2004). Lorna Wing also established the diagnostic criteria called "Triad of Impairment," which include impairments in social interaction, social communication, imagination skills in ASD population (Wing & Gould 1979).

Understanding the historical evolution of ASD and related disorders is of inherent value. It is through the span of time that the questionable becomes magnified and the best answers are better articulated. Contributions to the study of ASD from Kanner, Asperger, Rutter, and many others have synthesized decades of scientific inquiry that furthers ASD research and subsequent interventions.

**Diagnostic and Statistical Manual of Mental Disorders (DSM)**

The DSM is the standard classification of all mental disorders that are utilized by a wide variety of professionals around the world. The American Psychiatric Association released the first manual in 1952, which contained classification and diagnostic criteria for a variety of mental disorders. Neither the DSM-I nor the DSM-II mentioned autism as a separate disorder, yet it was placed under childhood schizophrenia (Achkova & Manolova, 2014). However, with the publication of the DSM-III in 1980, autism was recognized for the first time to be dissimilar to schizophrenia and given its own diagnostic criteria. The significance of the DSM-III and its revised counterpart is that it provided criteria that not only were characteristically different from schizophrenia but also can be adopted in clinical practice (Achkova & Manolova, 2014).

Sequentially, the publication of the DSM-IV (1994) incorporated multiple disorders and their respective subtypes under the umbrella of Pervasive Developmental Disorders (PDD). These included Autistic Disorder, Asperger Syndrome, Rett Syndrome, Childhood Disintegrative and Pervasive Developmental Disorder Not Otherwise Specified. Both the DSM-IV and the DSM-IV-R (2000) incorporated the symptoms of autistic disorder, which were classified using three main domains of symptoms that include a deficit in social interaction, communication, and the presence of limited interests and repetitive behavior (Achkova & Manolova, 2014).

The classification "Autism Spectrum Disorder" was published in the DSM-V to describe all PDD as a singular continuum of core deficit manifestations that are further classified based on the severity of required support. The three levels of severity are 'requiring support, requiring substantial support, and requiring very substantial support'

14

and are referred to as Level 1, Level 2, and Level 3, respectively. Symptoms can cause significant impairments across multiple contexts and are present in the early developmental period of children; however, "may not become fully manifest until social demands exceed limited capacities, or may be masked by learned strategies in later life" (American Psychiatric Association, 2013, p. 50). ASD may also present with comorbid conditions, including but not limited to intellectual disability, epilepsy, anxiety, and language impairment.

The DSM-V provides two domains when diagnosing individuals with ASD. The first domain requires there to be persistent deficits in social communication and social interaction and are symptomatically expressed by (a) deficits in social-emotional reciprocity, (b) nonverbal communicative behavior, (c) and developing, maintaining, and understanding relationships. Concurrent presentation of a restricted, repetitive pattern of behavior that significantly impairs important aspects of life where at least two of the following symptoms are manifested: (a) stereotyped or repetitive motor movements, (b) insistence on sameness or inflexible adherence to routines, (c) fixated narrowed interest of focus (d) and hyper- or hypo-reactivity to sensory input or unusual interest in sensory aspects of the environment (American Psychiatric Association, 2013).

**Social Skill Deficits in Children with Autism**

Social skills can be defined as behaviors that promote positive interaction with others and the environment. Some of these skills include "showing empathy, participation in group activities, generosity, helpfulness, communicating with others, negotiating, and problem-solving" (Lynch & Simpson, 2010, p. 3). The natural developmental progression

of individuals necessitates the acquirement of social skills in early stages of life through adulthood. However, individuals with ASD exhibit social communication deficits (American Psychiatric Association, 2013), which negatively impacts multiple aspects of daily living. Recent and on-going research in aim of understanding the core pathologies related to social skill deficits in ASD individuals may include important areas of broadening research interests, such as: impaired executive functioning (Happé, Booth, Charlton, & Hughes, 2006), weak central coherence (Frith & Happé, 1994), deficits in ToM (Baron-Cohen, Leslie, & Frith, 1985), impaired joint attention (Baron Cohen, 1995), and deficits in empathetic ability (Baron-Cohen & Wheelwright, 2004).

Cognitive theory has placed emphasis on meta-representational capacity, which is considered the crux of developing ToM understanding. Social cognitive impairments in individuals with autism are explained by the cognitive theory as a meta-representational deficit that affects pretend play and ToM ability (Leslie, 1987). Capacity to evaluate the mental states of other people and guess their beliefs, attention, desires, and goals are assumed to be one of many benefits gained from the adaptive nature of man, and it is considered a core feature that sets apart humans from other primates (Humphrey, 1984). It is conceptualized that having a ToM remains quintessential in enhancing "social understanding, behavioral prediction, social interaction and communication"(Baron-Cohen, 1995, p. 30).

**Theory of Mind in ASD Population**

Premack and Woodruff (1978) first introduced the concept of Theory of Mind (ToM) in their seminal paper where they questioned whether a chimpanzee could impute

mental states to self and others. ToM is defined as a high mental capacity to attribute

mental states to one's self and others  (Premack & Woodruff, 1978). Since the publication

of Premack and Woodruff's study, it has been widely debated whether nonhuman

primates have a ToM. Research with a chimpanzee demonstrated the potential of

attributing mental states for problem-solving but did not determine the ability of the

primates to be self-aware and have beliefs. Seyfarth and Cheney (2000) suggested that

although monkeys can predict behaviors of others due to the understanding of social

relationships and prior behavioral observations, they are not knowledgeable of the roots

of the behavior and have little understanding of the belief and motives that caused the

behavior. The ability to measure and make an inference on whether an individual exhibits

a ToM seems to be problematic when debating a ToM in nonhuman primates. Schlinger

(2009) stated, "the debate really boils down to what one means by 'imputing mental

states to oneself and others' and what evidence is necessary and sufficient to make such

an inference" (p. 436).

Dennett first introduced a psychoanalytic experiment, "False Belief Task," in

order to examine the ToM ability. In 1978 Dennett stated that successful attribution of

mental state is based on the capacity to predict actions based on false beliefs. In other

words, "it is not enough to demonstrate that individual A can predict the actions of

individual B.  In many cases, A can do so without an understanding of B's mental states,

but by simply observing the actual state of the world" (Bloom & German, 2000, p. B26).

Wimmer and Perner (1983) utilized the False-Belief Task to examine ToM in

typically developed children. Maxi's task, a classic False-Belief Test, was used to assess

the age of the onset of ToM in children by storytelling: Maxi brings home chocolate from

school, puts it into a green cupboard and goes outside to play. Then, his mother takes Maxi's chocolate from the green cupboard, breaks off a piece of chocolate for cooking and places it in a blue cupboard. Maxi comes back from playing to eat some of his chocolate. Where will Maxi look for his chocolate? Results from Wimmer and Perner's study indicated that while most 4-year-olds were able to correctly answer the question (saying that Maxi will look for his chocolate where he left it, which is in the green cupboard), unexpectedly, incorrect answers were dominantly represented by 3 year olds (saying that Maxi will look for his chocolate where his mother left it, which is in the blue cupboard) (Perner & Wimmer, 1983).

The emergence of pretend play is a fundamental characteristic that develops around the second year of a child's life and is described by Piaget as a form of assimilation. Assimilation requires the child to develop a symbol by creating a mental image of an object that is somewhat relatable to one that is absent and assimilate that mental image into the present object, thus resulting in pretend play (Piaget, 1962).

Both primary representation and meta-representation are two mechanisms vital to pretend play because they bypass representational abuse, which interferes with pretense due to literal knowledge. According to Leslie (1987), the opacity of meta-representation provides an explanation of how representational abuse is circumvented because "meta-representational context decouples the primary expression from its normal input- output relations" (p. 417). In other words, decoupling creates a copy of a primary representation but disregards its literal interpretation and results in the action of pretend play. However, a defect in the decoupler affects pretend play, which is considered a fundamental lack in

children diagnosed with autism. The decoupling model hypothesized by Leslie explains a meta-representational deficit, which effects pretense in children with autism.

Baron-Cohen, Leslie and Frith (1985) at the University College London conducted the first experimental study examining ToM in cases of autism. In this study, three different groups: (a) typically developed children, (b) children with Down Syndrome, and (c) children with autism were recruited to examine ToM ability through utilizing the Sally-Anne test. Results from the study revealed both typically developed children and children with Down syndrome were able to attribute mental states to Sally's false belief accurately, rates eighty-five percent and eighty-six percent, whereas most of the children with autism comparatively failed at a rate of twenty percent accurate. Intelligent Quotient (IQ) scoring was not significantly correlated with the poor performers.

Moreover, several studies suggested that individuals with ASD need a higher level of verbal ability compared to typical individuals to pass the ToM test. A study conducted by Happé (1995) aimed to explore the roles of age and verbal cognitive ability in False-Belief Task in individuals with ASD. Data from previous research, from three different developmental categories (autism, intellectual disability, typically developed), was utilized. The analysis provided by the author suggested that a positive relationship was found between verbal ability and representative mental state and there is a possibility that individuals with ASD pass both first and second order False-Belief Tasks. Peterson (2014) said that even though some individuals with autism do not develop ToM during the early developmental stage, ToM may emerge but at a slower rate.

Since the revolutionary results of the Baron-Cohen, Leslie and Frith (1985) study, researchers have designed various experimental studies to examine ToM in individuals with ASD. Results of these studies have obtained supporting results (Perner, Frith, Leslie, & Leekam, 1989, Holroyd & Baron-Cohen, 1993, Tager-Flusberg, 2007).

**Empathy in ASD Population**

The term empathy was first introduced in the early twentieth century by E. D. Titchener (Brothers, 1989). Empathy has evolved in Homo Sapiens through the motivation of direct altruism, in which altruism is caused by a "response to another's pain, need, or distress" (de Waal, 2008, p. 279). Empathy is a complex phenomenon that is comprised of cognitive and affective aspects. Cognitive empathy can be defined as "the ability to adopt another's point of view, and represent the other's thoughts, intentions, beliefs, and knowledge, which facilitate that observer to interpret and understand other's emotion"(Pouw, Rieffe, Oosterveld, Huskens, & Stockmann, 2013. p. 1257).

The first aspect of empathy represented in literature as synonymous to "role taking, switching attention" (Baron-Cohen & Wheelwright, 2004 p.164), ToM (Baron-Cohen, Leslie, & Frith, 1985), mindreading (Baron- Cohen, 1995), social acuity (Chapin, 1942), and perspective taking (Gould, Tarbox, O'Hora, Noone, & Bergstrom, 2011). While affective empathy (Baron-Cohen, 2011), or empathetic behavior (Peterson, 2014) is defined as " an observer emotional response to the affective state of another" (Baron-Cohen &Wheelwright, 2004, p. 164), which may manifest by prosocial behaviors such as comforting, helping, sharing, and considering the feelings of others under various emotional states (Pouw, Rieffe, Oosterveld, Huskens, & Stockmann, 2013).

Baron-Cohen and Wheelwright, 2004 posited that there are four types of empathy. First, the observer's emotional state must match the person he/she is interacting with, and as a result, a person would feel scared when seeing someone else scared. Second, the observer expresses an appropriate response to the other person's emotional state although his/her response may not match the person observed. For example, feeling pity may elicit an empathetic response to someone's hurt. The third type of empathetic response, coined "contrast empathy" is when someone may feel pleasure when others experience pain. Finally, a person may exhibit a concern or compassion to others' distress. Regarding the third type of empathy, the author stated that:

> Option 3 seems questionable. We argue that empathy should exclude inappropriate emotions triggered by someone else's emotional state (e.g., feeling pleasure at another's pain). Rather, the affective definition of empathy emphasises the appropriateness of the viewer's emotional response. Of course, defining what is an appropriate emotional response is not straightforward. For example, hearing of the death of a young friend who had been suffering from a painful, terminal illness might produce in you both relief (that their pain is over) and sadness (that their life has been cut short) (p. 164).

When investigating empathy among individuals with autism, mixed results were obtained. However, much research found that children with ASD express less empathic responses compared to typically developed children. In a study conducted by Yirmiya, Sigman, Kasari, and Mundy in (1992) examined the responses of children with autism and typically developing children across three domains: emotional labeling, perspective taking, and empathetic ability. Eighteen children with autism and fourteen typically developed children were presented with videotaped segments of various emotional categories such as anger, pride, happiness, sadness, and fear. Results from this experimental study indicate that children with autism were less able to accurately identify

21

emotional states and not successful in taking the perspective of others', nor responding empathetically to others.

Another study conducted by Sigman, Kasari, Kwon, and Yirmiya (1992), children from three different developmental categories were measured in responsiveness to the distress of others. Children with autism, children with intellectual disabilities, and typically developed children were all observed in multiple testing sessions where an adult would act out a distress situation so as to stimulate the child's response. Three domains of observation, attentiveness, facial affect, and behavioral responsiveness, were recorded during the testing session. Statistical analysis of the observational data across domains and developmental groups were significantly more attentive in both the intellectual disability and typically developed groups than children with autism. Children with ASD appeared to be preoccupied with their toys; however, children with autism do not show significant variation compared to other developmental groups in the domain of emphatic responding and facial affect.

Baron-Cohen (1995) posited a revolutionary theory named "mind-blindness". This theory was an attempt to provide a psychological explanation for social, communicative, and imaginative deficits in individuals with autism (Baron-Cohen, 1995). The cognitive model of mindreading as authored includes four separate mechanisms: Eye-direction detection (EDD), intentionality detection (ID), shared attention mechanism (SAM), and ToM (ToM). Baron-Cohen (1995) suggested that both EDD and ID function normally in individuals with ASD. However, it was hypothesized that individuals with ASD are impaired in joint attention behavior as well as ToM understanding (Baron-Cohen, 1995). The author believes individuals who suffer from mindblindness are similar

to individuals who are color-blind. That is, both may be quite functional within their respective function but may have a significant loss that is dimensional in nature. Therefore, mindblindness may account for many social and emotional differences of individuals in the ASD population, given that the ability to identify others' mental state is an essential component of eliciting behavioral empathy (Baron-Cohen, 1995).

Although mindblindness theory explains deficits in social and communicative behaviors, it fails to account for non-social behaviors such as highly restricted narrowed interests. Therefore, a new theory called the Empathizing-Systemizing theory was developed to explain empathy deficits, (ToM) deficits, and highlights strengths, specifically systemizing. The term systemizing is defined as the motivation to construct or analyze systems (Baron-Cohen, 2009). Children with autism obtain lower than average scores for affective empathy on the Empathy Quotient Assessment (EQA) and above average scores on the Systemizing Quotient Assessment (SQA). Similarly, Baron-Cohen, Richler, Bisarya, et al. (2003) found that individuals diagnosed with AS had significantly higher SQ scores than the general population.

In a recent study conducted by Peterson (2014), seventy-six children (37 with ASD and 39 typically developing children) who were between the ages of three and twelve years old were included. The aim of this study was to examine two main questions. Firstly, "Are children with ASD less empathetic than typically developing children?" Secondly, "Do individual differences in ToM understanding among children with ASD predict differences in their behavioral empathy?" (p.16). Statistical analysis of the data that was collected by each child's teacher indicated that children with ASD were significantly lower in their empathetic rate of response than were typically developing

children. However, results of this study indicated that ToM ability is not related to empathy skills.

Butean, Costescu, and Dobrean, (2014), compared the empathetic responses between typically developed children and children with autism. In this study, children were encouraged to play in a clinical setting freely, and an adult would act out that he/she was hurt. When the adult entered the room the child's attention was not called upon. In this study, four empathy-related dimensions were assessed including affective response, behavior activation, verbal empathetic initiation, and prosocial behavior. Results from this investigation indicated that children with ASD scored less than typically developing children, both in affective response and behavior activation. No other significant variations in the last two dimensions existed.

Even though empathy as a phenomenon in relation to ASD pathology provides evidence that deficits do exist, the data remains inconclusive regarding both cognitive and affective domains. Hudry and Slaughter (2009) stated "Just as autism is complex and exists along a spectrum of level of ability/impairment, so too is empathy complex and multifaceted, presenting along a spectrum of level of sophistication" (p.84). Further research is needed to better understand this complex relationship and its impact on social behavior as well as related attributes such as motivation, age, verbal ability, and prosocial tendencies.

**The Utilization of Social Stories and Comic Strip Conversations**

A Social Story is one positive behavioral support strategy that is used to teach both children and adolescents with ASD a variety of skills (Glaeser, Pierson, &

Fritschmann, 2003, Wong et al., 2015). As the name suggests, Social Stories "use a short story form (20–150 words) to inform and advise the child about a social situation" (Smith, 2001, p. 338). Similarly, Comic Strip Conversations as described by Hutchins and Prelock (2006) are "built upon pictures rather than text, and can be used to review and discuss alternatives to a social situation" (p. 460). First introduced by Gray and Garand (1993), Social Stories were used as an intervention approach to teach social skills and social situation comprehension to individuals with autism. Similarly, Gray and Garand (1993) suggested a specific writing guideline when developing Social Stories; these included four main sentence types: descriptive, directive, perspective, and affirmative.

Descriptive sentences provide information in regard to activities, settings, and people, while directive sentences assist in describing the desired behavior or possible response. Perspective sentences are utilized to describe others' reactions, thoughts, and feelings towards a particular event or situation. Concepts such a variety of values and cultural rules are best explained by the last developed sentence type, affirmative sentences. In addition to the writing guidelines, the Social Story should be clear and concise so that it does not limit a child's comprehension. For example, appropriate vocabulary; positive language and readable font size are critical when developing Social Stories for children with autism (Gray & Garand 1993).

Specific guidelines for creating and implementing Social Stories are carefully reviewed, published, and governed by The National Professional Development Center on Autism Spectrum Disorders (2010). Successive guidelines for effective implementation of Social Stories are as follows: (1) identify the social situation or setting to be taught, (2)

identify the target behavior to teach and define it operationally for data collection, (3) collect data to decide the baseline of the target behavior, (4) write a social narrative based on the child's needs and functioning levels and then decide the length of the narrative, including the number of sentences, phrases, level of vocabulary and so on, (5) incorporate visual cues such as pictures, photos, and symbols, considering the child's interests and levels, (6) read the social narrative to the child and model the desired behavior, (7) collect data on the target behavior, (8) review the data and results of the intervention, (9) consider and address the maintenance and generalization of the target behavior. In addition to these guidelines, Social Stories are considered to be an evidence-based practice, with various studies demonstrating the efficacy of social narratives in individuals diagnosed with autism.

A large body of research examined the utilization of Social Stories and Comic Strip Conversations to provide an efficient intervention for a wide range of targeted skills such as teaching social skills (Delano & Snell 2006, Norris & Dattilo 1999, Sansosti, Powell-Smith, & Kincaidm, 2004, Pierson & Glaeser, 2007), decrease disruptive behavior (Kuoch & Mirenda, 2003, Scattone, Wilczynski, Edwards, & Rabian, 2002, Crozier & Tincani, 2005, Kuttler, Myles, & Carlson, 1998). Social stories have been witnessed to be an affective strategy for ASD population; this is especially true when considering the flexibility of social stories (Gray & Garand 1993). To illustrate, ASD is a wide range of disorders and manifestation of such a deficit may vary across individuals. Gray empathized that when creating Social Stories "consideration and respect to be given to the perspective of the person with ASD" (Lal & Ganesan, 2011, p.38). Another rationale to utilize social stories is the potential to remediate social cognition deficit in

ASD population. Social Stories can assist individuals with ASD to accurately read and understand social situations and respond appropriately (Gray & Garand, 1993, Gray, 2004).

Norris and Dattilo (1999) analyzed the efficacy of Social Story interventions utilizing AB design. This study included only one subject, an eight-year-old girl diagnosed with autism that presented with inappropriate social behaviors. During the study, the subject was systematically observed, and inappropriate social behaviors were recorded throughout lunchtime. Baseline behavior was identified, and the use of Social Stories as an intervention was implemented. The independent variable of this study included both the appropriate and inappropriate change in social behavior. Statistical analysis of the data showed a significant decrease in the inappropriate behavior. Inconsistencies in methodology adherence when recording observational data during the intervention implementation phase of the study were of conclusive note.

A qualitative study was completed by Bock, Rogers, and Myles (2001) to examine the effectiveness of both Social Stories and Comic Strip Conversation with Tom, a child diagnosed with AS.  Tom exhibited difficulties in both social and learning tasks and inappropriate behavior during the school day. Intervention methods of the study include discussion sessions, Social Stories, and Comic Strip Conversation. Each method of intervention was delivered to Tom in sequential order. The resource room teacher tried to assist Tom in solving his behavioral issues in five discussion sessions; however, no significant change was observed in Tom's behavior. The teacher introduced social Stories to Tom after the discussion phase of the study was completed. Social Story intervention duration was confined to a five-day interval where the teacher worked with Tom to both

read and explain social behavioral problems that previously occurred. At the conclusion of the Social Stories phase of the study, the teacher introduced Comic Strip Conversation. Tom was encouraged by the teacher to illustrate social problems that were previously identified. Resulting data from this study suggests that Social Stories and Comic Strip Conversations significantly decreased inappropriate social behaviors. The author provided insight into Tom's willingness to utilize the Comic Strip Conversation by stating, " that he enjoyed using Comic Strip Conversation and began to request their use from others at school and home" (Rogers & Myles, 2001, p.313).

Prior research contributions that exposed methodological pitfalls directed Thiemann and Goldstein (2001) to emphasize data collection consistency and as a result, a multimodal intervention design that focused on the integration of Social Stories was conducted. Baseline behaviors were observed, recorded, and calculated from a pool of five participants diagnosed with autism. The baseline data across behavior was used to examine the effectiveness of written text combined with picture and video feedback to teach social communication skills. All participant in this study significantly increased in target social communication skills. Some participant were able to generalize the acquired skills across contexts.

In a study conducted by Delano and Snell (2006), a multimodal design across participant examined the effectiveness of Social Story based interventions in peer social engagement. The independent variables of the study included reading Social Stories, answering questions, and participating in observed play sessions. All three participant of the study significantly demonstrated an increase in social interaction during the training phase. However, only two of the three participants were able to generalize the acquired

skills across contexts. Chan and O'Reilly (2008) contributed research where multimodal intervention design comprised of Social Stories, discussion questions, and role-play aimed to increase social engagement in students with ASD. Statistical analysis of the data showed significant desirable outcomes in two participant where social appropriate behavior increased and socially inappropriate behavior decreased. Both participant positively maintained target behavior for significantly long periods of time. The authors concluded that the use of Social Stories was of marked outcome reliability when implemented in an inclusive environment.

Pierson and Glaeser (2007) studied the effectiveness of Comic Strip Conversation to reduce loneliness tendencies in children with autism. Three elementary school students, who were diagnosed with high functioning autism, were recruited. Anecdotal data on the social skill deficits of the three participant were collected prior to the intervention in order to determine baseline levels of loneliness and specific social deficits where remediation could be of high impact on desirable results. Direct observation was conducted to establish baseline levels of loneliness by measuring three domains of social behavior, verbalizations of loneliness, initiation quantities of conversations, and overall social interaction with peers.

The first subject's dependent variable was to increase psychomotor and general coordination of hands and feet when playing games with peers on the playground. The second subject's dependent variable was to improve social greetings utilizing eye contact and appropriate tone of voice. The third subject's dependent variable was to be able to accept responsibility for inappropriate social behavior. An example of this would be to apologize for a mistake made.

The study resulted in an increase of the frequency of appropriate social interaction across all participants and was accomplish by utilizing Comic Strip Conversation. Whenever the target participant experience a negative social experience, he was encouraged by the teacher to create simple drew about what just happened, and the teacher guided him to solve the social problem and provide an appropriate social behavior. The study found that after presenting Comic Strip Conversations to the first student, the participant was able to appropriately use his/ her hands and feet during playground games by 75%.  The second student improved eye contact and voice volume during greeting others by 50%. And the third student increased his acceptance and responsibility for his/ her actions and apologize, if necessary, by 66%.  Results of the study were encouraging in the use of Comic Strip Conversations to increase appropriate behaviors and decrease inappropriate behavior.

A meta-analysis conducted by Kokina and Kern's (2010) examined eighteen studies with a total of forty-seven participants that utilized Social Stories to teach social skills and decrease inappropriate behaviors. Findings of this review may include: (1) Social Stories were more effective in reducing inappropriate behaviors than teaching social skills, (2) interventions were successful in education settings when tested against other settings, (3) interventions that utilized Social Story paired with functional behavioral assessment were more successful to achieves intervention's goals. The authors recommended that when utilizing Social Stories: (1) specialists or parents must identify pre-requisite skills to ensure the success of intervention programs, (2) teach children how to apply the acquired skills, and (3) use visual cues to assist children in understanding the written script. Studies from this meta-analysis conclude, that fifty-one percent of the

reviewed studies were effective, while forty-four percent were ineffective in achieving the intervention's goal.

A research synthesis of Social Stories, completed by Sansosti, Powell-Smith, and Kincaid (2004), concluded that Social Stories interventions provided optimism of effective use but warranted that there is "a lack of experimental control, weak treatment effects, or confounding treatment variables in the reviewed studies" (p. 200). On a final note, utilization of Social Stories and Comic Strip Conversations hold an overall promise as techniques to teach a variety of social skills to the ASD population. Yet, accurate and generalized findings that support the previous claim necessitate further research to consider related attributes such as age, disability, setting and other critical components of the application.

# CHAPTER III: METHODOLOGY

This study examined the efficacy of digital comic strips on improving verbal and non-verbal empathetic responding in three children diagnosed with ASD. Empathetic responding was remediated in participant by teaching these children to read Digital Comic Strip conversations, answer comprehensive questions, and engage in role-plays.

## Ethical Considerations

Prior to the implementation of this study, a Human Subject Institutional Review Board application was submitted to the Office Research Administration at Missouri State University and received approval on September 28th, 2016 (See Appendix A for research approval). The primary researcher and assistants fully reviewed all principles related to conducting research with humans such as respecting the person, protecting them from harm, and ensuring beneficial outcomes for individuals. Such principles are fundamental in the ethical approach of both the design of this research and its implementation. Privacy of all subject' personal information, such as academic performance, family history, and medical records were safeguarded. Pseudonyms were given to all participants to ensure confidentiality.

Prior to conducting the study, required consent from legal guardians of the participant was obtained (See Appendix B for parent permission form). Upon committee member approval of this study, consenting parents or consenting legal guardians were invited to attend a meeting to discuss goals and procedures of this study. In accordance with federal guidelines, legal guardians were regularly given updates as to their child's

progress and reassured that all participants maintained the right to withdrawal from the study at any time.

**Site of the Study**

In a clinical setting, the study was conducted in a single room located within the College of Education at Missouri State University. The dimensions of the conference room measured 2.5m x 4.0m. The room contained one large conference table and eight chairs. All procedures of this study were conducted within the same room, including pre-intervention assessments, the establishment of baselines, and treatment sessions. A small video camera was installed one meter directly in front of the subject to record observational data. Moreover, the primary researcher used a single laptop to present Digital Comic Strip Conversations and other pre-baseline assessments. Each subject individually participated in two to three sessions per week that were forty-five minutes in duration. Notably, the generalization phase was conducted outside of the clinic such as the participant's home.

**Inclusion Criteria**

All participant recruited in this study previously received a diagnosis of ASD from a board certified clinical psychologist. The participant were selected based on initial observations, parents' reports, and formal assessments. Subject of this study were further required to meet the following criteria: (1) vision and hearing acuity within the normal range or corrected, (2) reading fluency, (3) basic level of emotional recognition, (4) first order False-Belief Task ability, and (5) scored lower than average in empathy

skills in the Empathy Quotient and Systemizing Quotient (EQ-SQ). All pre-intervention

assessments were obtained prior to the baseline phase, and more details about the

previous assessments will be further described in this chapter.


**Participants**

  The first child was a ten year old Caucasian female and given the pseudonym

Nora.  Nora received a diagnosis of autism spectrum disorder by a licensed clinical

psychiatrist. At the time of the study she was in the fourth grade and, due to struggling in

a school environment, she continued education through homeschooling with the

exception of weekly gifted services held at a public school. Also, she fell within the

normal range for hearing and vision acuity as well as mastered both fine and gross motor

skills. Through initial observation, she demonstrated high interests in socializing with

others. However, she struggled to maintain long-term relationships and engage in age

appropriate friendship activities with same-age peers. Nora was characterized as having

social-emotional deficit, sensitivity to noise, problems with emotional regulation and

adjusting to transitions, as well as having a narrow range of interests.

  The second child, given the pseudonym Adam, is a Caucasian, twelve-year-old

male that was enrolled in the sixth grade at the time of the study. Adam received a

diagnosis of autism spectrum disorder by a licensed clinical psychiatrist and was also

diagnosed with encopresis. Through parent reports, he was off-task, often misinterpreted

the intentions of others, failed to read cues to terminate conversations and commonly

made inappropriate comments.  David also displayed sensitivity to loud noises and

specific smells.

The third child, given the pseudonym David, was a nine-year-old Caucasian male. He received a diagnosis of autism spectrum disorder by a licensed clinical psychiatrist and was also identified as having anxiety, ADHD, and OCD traits. David fell within the normal range for hearing and vision acuity, and there was no concern for the areas of gross and fine motor skills. As reported by the homeroom teacher, David had difficulties focusing, controlling behaviors, was often off- task and lacked self-regulating skills. David also received 18- months of speech therapy between the ages of four and five and a half years. In addition, parent also reported that he has difficulties in reading as well as expressing a broad range of nonverbal cues. From previous assessment, which evaluated social/ emotional behavior, David scored overall below average with a mean score on receptive social awareness and a low score on expressive social awareness.

**Role of the Researcher**

The primary researcher held multiple responsibilities prior, during, and after the completion of this study. These responsibilities included (1) relational establishment of parents, legal guardians, and participant, (2) facilitated the development of Digital Comic Strip Conversations and acting scenarios, (3) designed the rating scale (4) administered required assessments to qualify participant for research inclusion, (5) targeted verbal and non-verbal responses for remediation, (6) trained two assistants to act out prior developed empathy scenarios in baseline phase, (7) and observationally recorded, analyzed, and synthesized resulting data of this study.

**Dependent Variables and Operational Definitions**

Two dependent variables of empathetic responding were defined, observed, and analyzed across three domains of emotion. Verbal and non-verbal dependent variables were of measurable focus across all phases of this study. However, the antecedent stimuli presented to evoke targeted behavior was procedurally different respective to each phase. Antecedent stimulus within both baseline and generalization phases were presented as acting scenarios while Digital Comic Strip Conversations that were the major focus of this study were not introduced until the establishment of intervention phase. The operational definitions of empathetic responding across both dependent variables were carefully developed to maintain consistency of both observation and analysis between observers and across phases of this study. Operational definitions of verbal and nonverbal empathetic response are listed below:

**The First Target Behavior**. Verbal empathetic response was defined as any verbal articulation that is socially appropriate to the situation in order to display concern during the empathy-evoking situation or role-play. For example, the subject may respond to his friend whose dog is very sick: "Oh no, Sam. I'm so sorry to hear about your dog. Is there anything I can do to help?

**The Second Target Behavior**. Non-verbal empathetic response was defined as any utilization of non-verbal cues (three attributes) that is socially appropriate to the situation in order to display concern during the empathy-evoking situation or role-play. Three attributes of the nonverbal empathetic response include facial expression, tone of voice, and gesture are also operationally defined underneath:

1. Facial expressions: the subject exhibits a concern that is appropriate to the social context through utilizing facial movement such as sorrowful eyes, pouting out of

36

the lower lip, and brow furrowing, smiling, and raise eyebrows to display a particular emotional state.

2. Tone of voice: the subject exhibits a concern that is appropriate to the social context through utilizing vocal cords to produce certain volume, word emphasis, high, natural, or low pitch to display a particular emotional state.

3. Gesture: the subject exhibits a concern that is appropriate to the social context through utilizing movement of certain part of the body such as raising the arms, waving, giving high five, lowering head down, collapsing shoulder and giving thumps up to display a particular emotional state.

**Independent Variables**

This study examined the effectiveness of digital comic strips on improving verbal and non-verbal empathetic responding in three children diagnosed with ASD. Social situations where participant may have encountered social or emotional difficulties were remediated by teaching these children to read Digital Comic Strip conversations, answer comprehensive questions, and engage in role-plays. Digital Comic Strip Conversations were developed specifically for the study to depict three emotional domains using observational data and parental interview. Emotional domains include: happiness or excitement, sadness or pain, and fear. Prior to the intervention, a professional artist was employed to develop comic strip conversations in a black and white, four-block layout. Each panel presented characters (images) and word bubbles (See Appendix C for examples of the Comic Strip Conversations).

The professional artist was prompted to depict the social situation where characters presented with strong facial expressions. Final work from the artist was scanned and later presented to each subject using a laptop. A total of eight multi-use teaching and ten single-use testing Digital Comic Strip Conversations were reviewed by

the primary researcher for subject specific remediation across targeted emotional domains and verified for strict inter-comic attachment. That is, each subject-specific set of teaching and testing Digital Comic Strip Conversations were matched to 'teach to the test.' Similar in design; however, slight variations of end design in testing comics, such as questions and empty bubbles, measured the effectiveness of treatment.

The primary researcher utilized the Digital Comic Strip Conversations by reading them to the subject while concurrently expressing each panel's social situation in terms of intended tone and by directing attention to facial expressions of characters. In the context of a social situation of each panel, the primary researcher presented the subject with questions to check for understanding in regard to key social skills, such as: emotional recognition, perspective taking, the social context.

Upon successful mastery of comprehensive questions, the researcher transitioned the session into the role-play phase of the treatment. Interactively, the primary researcher and the subject interchanged empathetic response as presented within the digital comic strip conversation. Treatments guidelines are outlined within the treatment section.


**Inter-observer Agreement (IOA)**

When human beings are involved in the data collection process, even in the simplest form of observational data, errors are bound to occur (Alberto & Troutman, 2013). To ensure reliable data, it is imperative to include a second observer to record target behavior independently. A trained undergraduate student who was enrolled in the Accelerated Masters program in Autism, at the time of this study, was recruited to observe both verbal and non-verbal empathetic responding utilizing behavioral

observation sheet (See Appendix D for data collection sheet). During all phases of the study, the reliability partner was not present in the actual sessions. However, the second observer utilized video recording of the session to code verbal and non-verbal empathetic responding.

**Research Design**

      This study examined the effectiveness of digital comic strips on improving verbal and non-verbal empathetic responding in three children diagnosed with ASD. This study assessed behavior change and intervention effectiveness using single subject experimental design (Kazdin, 2011). In this type of research design, each subject in the study serves as his or her own control and the performance of the subject is compared to both the treatment and the non-treatment phase. Smith (2012) stated, "participant in single subject experiment research provide their own control data for the purpose of comparison in a within-subject, rather than a between-participant" (p. 510). The primary goal of the single subject experimental design is to determine whether there is a causal relationship between the independent variable and the target behavior (Kazdin, 1982).

      One of the shared features of all types of single-subject is the inclusion of baseline as the first phase. The collection of the baseline data is very significant to determine the level of behavior or skills before the introduction of the independent variable (Alberto &Troutman, 2013). Verbal and non-verbal empathetic responses were observed and analyzed in scope of prior established operational definitions as the first phase of this study. The researcher predicted subject performance, selected a reinforcement schedule and systematically revised treatment using baseline data of each subject (Kazdin, 1982;

Alberto &Troutman, 2013). The researcher introduced the independent variable after baseline data stabilized.  Baseline data is stable when at least two points of data are consecutively obtained and were significantly similar in trend (Kasdin, 1982). Alberto and Troutman (2013) explained baseline stability as having two key characteristics. These characteristics exist where data is both minimal in variation and the trend of successive data is predictable. Alberto and Troutman (2013) defined the trend of data as "…a distinctive direction in the performance of the behavior" (p.121). Once baseline data points are determined to be stable, researchers then introduced the independent variable. Following the first phase of baseline stabilization was treatment initiation. That is, the independent variable was introduced to assess the effectiveness of treatment.

Multiple baseline design across subjects (Cooper, Heron, & Heward, 1987) was implemented to teach effective verbal and nonverbal empathetic responding within this study. Multiple baseline design across subjects when two or more participant are targeted with the same treatment (independent variable), and the setting of treatment administration is held constant (Cooper, Heron, & Heward, 1987). This type of design was first introduced in the field of applied behavior analysis (ABA) during the sixties of last century (Cooper, Heron, & Heward, 1987) and is one of the most utilized research methods within single subject experimental design.

In this study, both the number and heterogeneity of participant were taking into account before the establishment of the baseline procedures. When utilizing multiple baseline design  across subjects, it is suggested that similar problems are exhibited by the targeted sample and it is expected that participant will benefit from the independent variable. Another issue that must be addressed is the number of participant that

participate in the study, "the generally accepted minimum of subject required by single subject approach is three to five" (Center & Leach, 1984, p. 233). Moreover, intervention was introduced to one subject upon stabilization of baseline data and baseline activities were continued for all other participant (Kazdin, 1982). Initial treatment administration to the first baseline stable subject was expected to significantly increase desirable outcomes in behavior modification. All other participant were expected to significantly maintain baseline data. The researcher administered initial treatments to each successive subject, pending prior subject attainment of desirable outcomes (Cooper, Heron & Heward, 2007).

Quantitative analysis was primarily used in this study; however, qualitative data as defined by Gay, Mills, and Airasian, (2014) is the collective description using narrative, visual, non-numerical insights of interest into the phenomena (p. 333) and is of inherent value in this study's exploration of empathy as phenomena and the utilization of Digital Comic Strip conversations with children with ASD. Upon termination of this study, the primary researcher formally conducted a semi-structured interview. The interview was similar to all other subject sessions. The general progression of events within the clinical setting was held constant. Participant were asked an array of divergent questions in an effort to better understand their own subjective experiences of the study. The interview was videotaped. The primary researcher presented the subject's baseline video to the subject and asked open-ended questions to examine the subject's attitudes, interests, and feelings about the baseline video. The subject's response to the baseline video and questions were not time delimited. Intuitively, as dialogue of the subject is sufficiently expressed, the primary researcher presented an example digital comic strip

conversation. The researcher asked participant about their experience surrounding the use of Digital Comic Strip conversations.

**Pre-baseline Assessments**

Standardized assessments were administered to assess cognitive, academic, and social emotional abilities preceding the intervention to qualify each subject in regard to inclusion criteria. First, the Mind Reading: Interactive Guide to Emotions software was administered to assess emotional recognition ability of facial expression and tone of voice (Baron-Cohen, Golan, Wheelwright, & Hill, 2004). Four sections within the software, quizzes, emotion library, learning center, and game zone were available for use; however, only the quizzes section was utilized to assess each subject's ability of basic emotion recognition across domains, such as: happiness or excitement, sadness or anger, and fear.

Secondly, the False-Belief Task (Wimmer & Perner, 1983) as commonly administered in testing for ToM ability, was proctored to each subject. The primary researcher utilized the Sally-Anne test, (Baron-Cohen, Leslie, & Frith, 1985) to test ToM abilities. Procedures of the Sally-Anne test are graphically depicted as two dolls, one named Sally and the other named Anne, and presented to the subject as follows: Sally has a basket and Anne has a box. Sally has a marble. She puts the marble into her basket. Sally goes for a walk. Anne takes the marble out of the basket and puts it into the box. Now Sally comes back. She wants to play with her marble.

The primary researcher asked the potential participant of this study a total of three questions. The first two questions serve to check for both reality and memory understanding, "Where is the marble now?" and "Where was the marble in the

beginning?" respectively. The last question was the belief question, "Where will Sally look for her marble?" The subject will pass the first-order False-Belief Task if able to attribute other's mental states correctly by answering that "Sally will look for her marble in her basket where she left it."

In addition, Curriculum-Based Measurements (Easy CBM, 2015, University of Oregon) was administered with all participants to assess the current level of performance in the area of reading. Digital Comic Strip conversations contain a written script where dialogue between two or more characters depicts social situations where reading is a prerequisite to fully benefit from this type of intervention.

The Reinforcement Assessment for Individuals with Severe Disabilities (RAISD), as published for clinical use by Fisher, Piazza, Bowman, and Amari (1996), was implemented in a formal interview between the primary researcher and the parents of the subject. The assessment gathered each child's parent-reported stimuli preferences, both objects and activities, across a variety of sensory categories and environmental contexts.

Parents were asked about their child's preferences across various categories of stimuli and subsequent probe questions were asked by the primary researcher to gather further information (i.e. Some children really enjoy different sounds such as listening to music, car sounds, whistles, beep, sirens, clapping, people singing, etc. What are the things you think _____ most likes to listen to?"). Data from this interview was combined with direct observational data to determine the subject's most preferred objects and activities (See Appendix E for RAISD assessment). The primary researcher designed each subject's reinforcement system using available data.

The Parent Interview of Social Functioning by S. Bellini (2008) was utilized to gather parent-reported observations regarding their child's social skills. Parents were asked questions that assessed child behaviors and abilities across key areas of social interaction, both functional and communicative. This assessment was structured in design and concluded with treatment guiding questions that were strength focused, goal-oriented, and allowed for additional parent observations to be expressed (See Appendix F for parent interview of social functioning questionnaire).

The *Children's Empathy Quotient and Systemizing Quotient Questionnaire* (CEQSQQ) assessed each subject's empathizing and systemizing skills (Auyeung, Wheelwright, Allison, Atkinson, Samarawickrema, & Baron-Cohen, 2009). A parent-report questionnaire, comprised of fifty-five questions that were divided into 27 EQ-C questions and 28 SQ-C questions, assessed each subject's cognitive and affective empathy. Parents were presented with four different options per question: 'definitely agree', 'slightly agree', 'slightly disagree', and 'definitely disagree' (See Appendix G for the children's empathy quotient and systemizing quotient Form). Data obtained from *The Children's Empathy Quotient and Systemizing Quotient Questionnaire* (CEQSQQ) assessed participant' relative ability to empathize or systemize. Raw Empathizing Quotient (EQ-C) and Systemizing Quotient (SQ-C) scores were normalized to the mean of typical developing children using data obtained from Auyeung et al., (2009). Normalization of data was calculated using the original study's referenced formula as suggested by Goldenfeld, Baron-Cohen, & Wheelwright, S. (2005):

$$E_{norm} = \frac{EQ{-}C \; observed \, - \; EQ{-}C \; mean \; for \; typical \; population}{maximum \; possible \; score \; for \; S}$$

$$S_{norm} = \frac{SQ\text{--}Cobserved - SQ\text{--}C \ mean \ for \ typical \ population}{maximum \ possible \ score \ for \ S}$$

Mean scores of the typically developing population were: EQ-C (37.70) and SQ-C (M = 24.11). Maximum possible scores of CEQSQQ: EQ-C (54) and SQ-C (56). The normalized E and S variables were then used to produce a difference score (D):

$$D = \frac{S_{norm} - E_{norm}}{2}$$

**Data Collection and Procedures**

A multiple baseline design across subjects was used to examine the effectiveness of Digital Comic Strip conversations. Comprehension questions and role-playing were utilized to teach verbal and nonverbal empathic response to three children with autism. Upon completion of all pre-assessments, each subject individually participated in two to three sessions per week that were forty-five minutes in duration. Throughout the study, sessions utilized a digital camera to record verbal and nonverbal empathetic responding. Practice guidelines of both the baseline and treatment phases, including methods employed to analyze data, are further detailed in the preceding paragraphs.

**Baseline Phase**

During the baseline session, an empathy-evoking situation (Scheeren, Koot, Mundy, Mous, & Begeer, 2013) was presented to the subject by one of three actors, comprised of the primary researcher and two confederates. The acting empathy-evoking situation was used to assess empathetic responsiveness relating to three emotional domains: happiness or excitement, sadness or anger, and fear. During each baseline

session, an actor performed one of the twelve scenarios as modified by the primary researcher (Scheeren, Koot, Mundy, Mous, & Begeer, 2013). Actors and scenarios were randomized, matched, and defined as single-use. One actor was assigned to one specific scenario and kept constant across all participants per chronological session. For example, randomized matching of an actor, Actor One, to scenario three, "Spilled Coffee" was presented to all three participants in the first session of baseline (See Appendix H for examples of the baseline acting scenarios).

All sessions during the baseline phase were free play conditioned and the presentation of the empathy-evoking scenario, the antecedent stimuli, was not time specific. Subject response was observed with latency of three seconds post termination of the antecedent stimuli. If the subject elicited an empathetic response, then the actor delivered a conversational exchange, such as "thank you"; however, if there was no response, or if the response was inappropriate, no feedback was delivered. Behavior-specific praise was given randomly to participant during the baseline phase for appropriate sitting and attending sessions (Schrandt, Townsend, & Poulson, 2009).

**Intervention Phase**

In this study, multiple examples were presented to each subject in the form of Digital Comic Strips that visually depicted a variety of emotional domains: happiness or excitement, sadness or anger, and fear. As a part of the teaching sessions, answering comprehension questions and role-play of the target behavior followed each Digital Comic Strip conversation. Treatment procedures, which were the practice guidelines

46

utilized in this study, are presented in a systematic manner indicative of replication

standards. Steps for reading Digital Comic Strip conversations were the following:

1. The subject was directed to sit properly in their chair and to face the laptop directly. The primary researcher placed their chair on the left side and slightly behind the subject's chair.

2. Digital Comic Strip conversations were introduced by describing the following contextual details: setting, characters, relationships, and events

3. Digital Comic Strip conversations were read; appropriate tone as presented within each panel was utilized (emotion state and facial expression)

4. Preferred reading method (reading out loud or silently) of the digital comic strip was encouraged from the instructor to the subject

Questions posited to assess the participant understanding were the following:

1. What was the comic strip about?

2. How did the characters feel in each panel?

3. How do you know that the character feels this way?

4. What would you feel if you were in the character's place?

5. Why would you feel this way if you were in the character's place?

6. What was the character's response in this panel? (Point out the panel with the character's empathetic or inappropriate response)

7. Was the response appropriate or inappropriate? If the response was inappropriate, the instructor suggested the empathetic response.

Advancement, to either the next question or to the next phase of the teaching

session was contingent upon the subject's ability to answer each question correctly. If the

subject answered incorrectly or did not verbally respond, the question was re-posited. If

the question was not correct or not given, the correct answer was provided. The question

was posited once more. The session was terminated if answered incorrectly or if the

subject did not verbally respond. The subject was required to accurately answer all comprehension questions, before or after corrective action, with one hundred percent accuracy. The same Digital Comic Strip conversation, if insufficiently answered by the subject after all guided attempts, were used in the following session. Steps for role-playing empathetic response were the following:

1. The instructor verbally described the role-play to the subject by clarifying the acting situation, roles, the target behaviors and criteria for acceptable acquisition.

2. The primary researcher only role- played the empathetic response that was presented within the Digital Comic Strip conversation, whereas the subject acted out the character that received the empathetic response.

3. The primary researcher and the subject switched roles, and the subject acted out the empathetic response. The primary researcher role-played the verbal empathetic response for a maximum of two times if the subject did not acquire the target behavior; the subject was provided with a script of the verbal empathetic response.

Mastery criterion of the target behavior during role-play was based on the verbal empathetic response (the subject must exhibit the highest level of the verbal empathetic response described on the rating scale). Teaching the nonverbal empathetic response within each session was equally of significance in observation as the verbal empathetic response.

The delivery of the token was paired with behavior specific praise during the intervention phase. Through parental reports and subject interviews, token symbols and backup reinforcements were chosen based on the subject's favorite items, activities, or characters. Prior to the first intervention session, the primary researcher explained to the subject the token reinforcement system, which included the following: (1) mastery criteria required to earn a token, (2) the number of tokens needed to trade for backup

reinforcer (10 tokens), and (3) when the tokens can be traded for backup reinforcers. The

subject received tokens for sitting appropriately as well as for the following unprompted

correct response:

1. Sitting appropriately and following instructions

2. Reading the Digital Comic Strips

3. Answering the comprehension question

4. Engaging in the role-play

5. Modeling the verbal empathetic response

6. Utilizing an appropriate tone, facial expression and gesture

**Testing Sessions**

Each subject set of teaching and testing of s were matched to a specific emotional

domain. For example, if the teaching session utilized Digital Comic Strip conversations

in the domain of happy, then the testing session also consisted of scenarios in the

category happy. Slight variations of end design of testing comics, such as questions and

empty bubbles, measured the effectiveness of treatment. During the testing session, the

subject was first instructed to read a single-use Digital Comic Strip conversation. When

the subject confronted an empty bubble or question, the primary researcher requested the

subject to role- play the empathetic response by utilizing verbal and nonverbal

components that are appropriate to the presented scenario. The primary researcher did not

prompt the subject during testing session. However, upon the completion of role- play,

the primary researcher provided the subject with feedback.

**Generalization Phase**

The final phase of this study collected data to measure generalization of treatment effects across three emotional domains. Parents were sent instructions to act out assigned scenarios and to utilize the rating scale, similar to baseline procedures, to successively capture and code the behavioral response of their child (See Appendix I for parent latter for generalization probe). Generalization procedures were conducted three weeks to one month after each subject's final training session.

**Treatment Integrity**

Research highly encourages the inclusion of treatment integrity procedures because in the absence of such protocol it would be "difficult to determine whether or not the intervention actually produce the changes in student outcomes" (Lane, Bocian, MacMillan, & Gresham, 2004, p. 41). Treatment integrity is defined as the extent in which an agent follows the originally developed treatment components when delivering intervention to a client (Mowbray, Holter, Teague, & Bybee, 2003, p. 315). In this study, self-monitoring, a treatment integrity method (Lane, Bocian, MacMillan, & Gresham, 2004) was utilized by the treatment agents (the primary researcher) during all treatment sessions across three participants. The primary researcher first developed a checklist of all treatment components (step needed within the procedural teaching session) in a form of task analysis that was listed in a successive manner (See Appendix J for treatment integrity checklist).

The treatment integrity checklist consists of fifteen distinctive components and necessitates the primary researcher to record whether each component of treatment was

completed. Treatment integrity was then calculated to determine if the treatment was implemented as intended. Integrity of treatment was calculated by dividing the number of completed steps by the total number of steps required and multiplied by one- hundred to provide an accurate percent (Fiske, 2008).

**Data Analysis Methods**

The independent variables, including verbal and non-verbal empathetic response, were coded using two different rating scales, each one consisting of a five-level rating system. First, the modified verbal empathetic responding rating scale (Scheeren, Koot, Mundy, Mous, & Begeer, 2013) was utilized to code verbal response exhibited by the subject in the empathy evoking situation or role play. All verbal empathetic responses were classified into five consistent levels scored from zero to four from the least to the most sufficient response (See Appendix K-1 for rating system of verbal empathetic response). The modified non-verbal empathetic responding rating scale (McDonald & Messinger, 2012) was also classified into five distinctive levels (See Appendix K- 2 for rating system of non-verbal empathetic response). In addition, a modified behavioral rating scale was specifically developed to adequately fit with the study's goals, participant and procedures.

Prism software was use to generate two graphs, which represent the verbal and non-verbal empathetic responses across three participant. The y- axis represents five levels of quality response based on the rating scale, while the x- axis signifies each testing session. Once all data was collected, coded and transferred to visual graphs, the data was interpreted via visual inspection method. Visual inspection was utilized to

analyze data gathered of the empathetic responding during baseline, intervention, and generalization phases. The logic of using visual inspection is to "determine the extent to which a meaningful change in the behavior occurred and the extent to which this change can be attributed to the independent variable" (Kahng, Chung, Gutshall, Pitts, Kao, & Girolami, 2010, p. 35). In this study, criterion of visual inspection implementation was taken into account. This may include changes in the average performance between phases, level of performance within the same phase, trend of the data points, the rate as well as the latency of behavioral change (Kazdin, 1982).

Qualitative data, obtained from the children's interview, was collected via video recording and sequentially transcribed for examination. Qualitative data analysis used a thematic analysis approach to code and transfer data into an understandable form. Applying thematic analysis to qualitative data is a preferred qualitative analytic method because it identifies, analyzes and reports patterns within the data (Braun & Clark, 2006). The qualitative analytic process of this study utilized five essential elements. These elements included the following: (a) labels and categories, (b) defining the characteristics of each theme, (c) a description which includes how to identify when a specific theme occurs, (d) a description of the qualifications as well as exclusions for identifying a specific them, and lastly (e) both positive and negative examples that aid in searching for themes (Boyatzis, 1998).

## CHAPTER IV: RESULTS

This chapter reports results obtained for all three participant during pre-baseline, baseline, treatment, and generalization phases. Visual inspection was utilized to assess treatment efficacy of both verbal and non-verbal empathetic responding for each subject. Additionally, qualitative data obtained from the child interview was examined using thematic analysis approach.

**Pre-baseline Phase**

A series of assessments and interviewing tools were utilized for the verification of subject inclusion and this study's research design and procedures: *Reinforcement Assessment for Individuals with Severe Disabilities* (RAISD), *The Mind Reading: Interactive Guide to Emotions* (MR-IGTE), *Sally Anne False-Belief Task* (SAFBT), *Parent Interview of Social Functioning* (PISF), *Easy Curriculum Based Measurement-Reading* (ECBM-R), and the *Empathizing Quotient and Systemizing Quotient Child Assessment* (CEQSQQ).

Each subject's preferred items and activities for use in reinforcer design was obtained using the RAISD assessment. Results of the assessment were utilized to design each subject's reinforcement system and are presented in Table 1.

Table 1. Reinforcement Assessment for Individuals with Severe Disabilities (RAISD)

| Participant | Preferred Activity Stimuli | Preferred Tangible Stimuli] |
|---|---|---|
| Nora | Writing, reading, and listening to music | Writing materials, My Little Pony©, and jewelry |
| David | Collecting things, listening to loud music, and experiencing cold/hot sensations' | Legos©, computers, and music instruments' |
| Adam | High-fives, jumping, and climbing | Legos©, computers, and video games |

Basic emotion recognition ability was assessed across six emotional domains (happy, excited, sad, angry, afraid, hurt) using the *quizzes* section of the MR-IGTE software. Emotional domains were scored, averaged for each subject, and promising results were observed. Both Nora and Adam scored 95.8% whereas David scored 85.7%. Each emotional domain scores as well as averaged scores are presented in Table 2.

Table 2. Mind -reading Results

| Participant | Level | Average Score |
|---|---|---|
| Nora | 2 | 95.8% |
| Davis | 2 | 89.0% |
| Adam | 3 | 95.8% |

ToM ability was assessed using the SAFBT (memory, reality, belief). All participants within this study passed the first order false belief task. Moreover, parent-reported observations of their child's functional and communicative social skills, strengths, and treatment goals were gathered using the PISF. Eye contact, back-and- forth conversation, transitioning between tasks and finishing tasks as well as maintaining friendships were noted to be of an observable delay by parents across all participant.

Nora was reported by her parent(s) to have the fewest friends outside of school when compared to other participant.  Even though Nora is described by her parents as being talkative and playful, she displays a narrow range of interests and exhibits a deficit in emotional regulation skills which effects her ability to establish and maintain relationships. David was reported by his parent(s) to have the most friends when compared to the other participant. Further probing questions found that David's friends were younger than himself, he was more passive than active in play, and had idiosyncratic eye movement. Adam was reported by his parent(s) to have an average amount of friends.   However, his friendships were mostly interactive through online games and rarely in person. Play interactions, either alone or with others, describes Adam to 'be in his own world'.

Reading performance was measured using the ECBM-R assessment. Passage Reading Fluency (PRF) and Reading Comprehension (RC) were scored using the ECBM-R assessment to measure reading performance. Each subject's score was then expressed as percentile to grade level. Nora's results indicated 90th (PRF) and 85th (RC). David's results indicated 85th (PRF) and 78th (RC). Adam's results indicated 93rd (PRF) and 76th (RC). Both the raw scores and percentile of each of the participants are listed in Table 4.

Table 3. Easy Curriculum Based Measurement-Reading (Easy CBM-R)

| Subject & Grade Level | | PRF | | RC | | |
|---|---|---|---|---|---|---|
| *Subject* | *Grade* | *CWPM* | *Percentile* | *Raw Score* | *Score (Percent)* | *Percentile* |
| Nora | 4th | 157 | 90 | 17/20 | 85.0% | 85 |
| David | 4th | 146 | 85 | 16/20 | 80.0% | 78 |
| Adam | 6th | 210 | 95 | 17/20 | 85.0% | 76 |

The Children's Empathy Quotient and Systemizing Quotient Questionnaire (CEQSQQ) assessed each subject's empathizing and systemizing skills (Auyeung et al., 2009). Data obtained from this questionnaire was scored for each subject and results are expressed in three measures, Empathy Quotient (EQ), Systemizing Quotient (SQ), Normalized Difference (D). Brain types' of each subject were obtained from a 'D' scale. Nora's results indicated -0.1984 ($E_{norm}$), -0.1448 ($S_{norm}$), 0.0268 (D), and *Extreme Type S* (BT). David's results indicated -0.1627 ($E_{norm}$), 0.0873 ($S_{norm}$), 0.1250 (D), and *Extreme Type S* (BT). Adam's results indicated -0.2163 ($E_{norm}$), -0.0555 ($S_{norm}$), 0.0804 (D), and *Extreme Type S* (BT). Based on the previous obtained results, all three subject scored significantly higher on the SQ, and significantly lower on the EQ then average population. Scores of each subject are listed in Table 5.

Table 4. The Children's Empathy Quotient and Systemizing Quotient Questionnaire (CEQSQQ)

| Subject | EQ-C | SQ-C | EQ normalized | SQ normalized | D | Brain Type |
|---------|------|------|---------------|---------------|---|------------|
| Nora | 13 | 16 | -0.1984 | -0.1448 | 0.0268 | Extreme S |
| David | 15 | 29 | -0.1627 | 0.0873 | 0.1250 | Extreme S |
| Adam | 12 | 21 | -0.2163 | -0.0555 | 0.0804 | Extreme S |

**Visual Inspection of both Verbal and Non-Verbal Empathetic Responding**

Empathetic responding of both verbal and non-verbal were observed simultaneously within the same sessions, however they were coded using two different five-level rating scales and graphed separately. Results obtained across baseline,

treatment, and generalization phases are presented in two graphs according to verbal or non-verbal empathetic response.  All *probe sessions* are depicted along the x-axis, meanwhile *rating scale scores* are depicted along the y-axis (Figure 1, Figure 2).
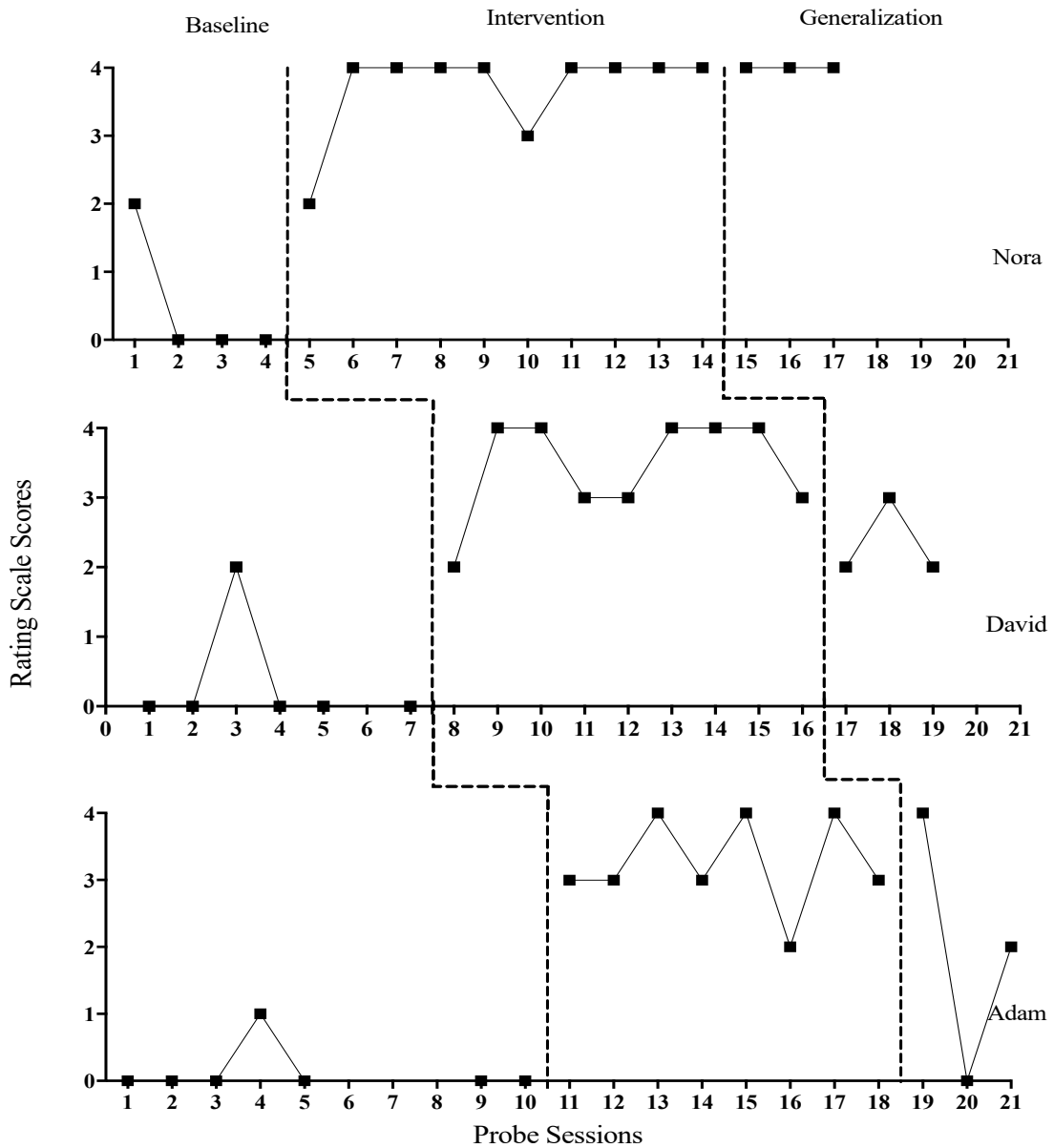


Figure 1. Verbal Empathetic Response
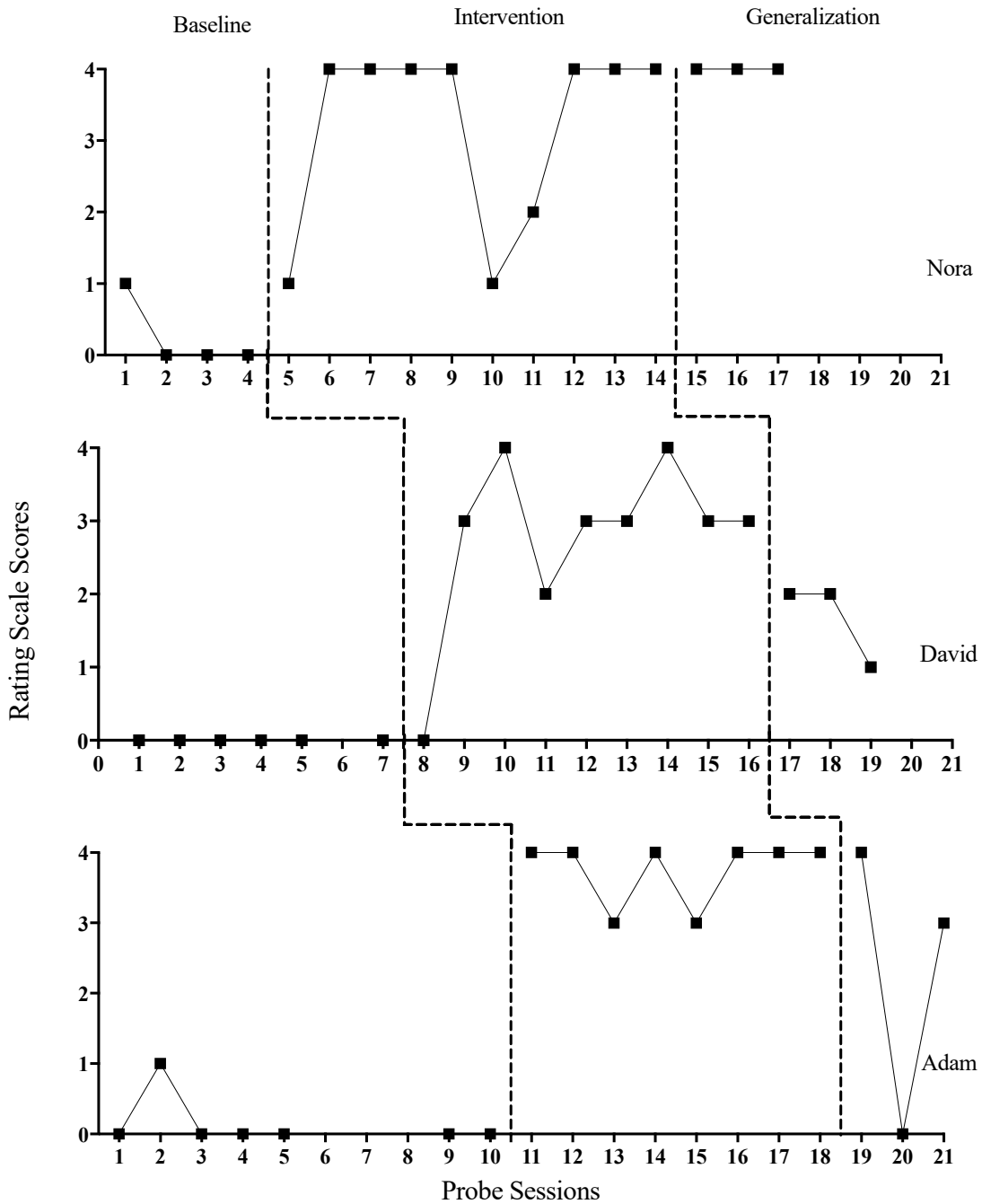
Figure 2. Non-verbal Empathetic Response

**Verbal Empathetic Responding Across Phases**

Participant' verbal empathetic responding across all phases was measured using the following numerical values: *0 = Absence of the verbal empathetic response, 1 = verbal confirmatory response, 2 = relevant verbal response, 3 = verbal empathetic response or pro-social behavior, 4 = verbal empathetic response associated with other component(s).* During the baseline phase, participant' scores varied from *0* to *2* (Figure 1). Baseline phase scores maintained a stable trend at *0* according to the rating scale for all participants with the exception one baseline probe session that deviated from *0* and ranged up to *2*. After a stable baseline was achieved, treatment was introduced successively to each subject. All participants attained a high level of performance in verbal empathetic response and maintained a score of *3* to *4* for the majority of the data points throughout the intervention phase. Generalization scores varied for each subject, with the lowest data point obtained at *0* and the highest at *4*.

**Nora**

Nora scored *2* on the verbal empathetic response rating scale in the first baseline probe session and was followed by three probe sessions where trend stabilized at *0*. Once a stable baseline was established, intervention was introduced to the subject while other participant remained in the baseline condition. Throughout the treatment probe session, Nora scored a *4* in eight out of the ten treatment probe sessions and demonstrated positive treatment efficacy. Generalization of the acquired verbal empathetic responding was maintained at highest levels of performance (score of 4) across the three probe sessions.

A total of seventeen verbal empathetic responding probe sessions were conducted with Nora across baseline, treatment, and generalization phases.

**David**

David scored *0* on the verbal empathetic response rating scale during probe sessions one, two, four, five, and seven. Notably, a score of *2* was observed during probe session three and no data was collected for baseline probe session six. A total of six baseline probe sessions were administered. Following Nora's desirable treatment outcome and David's stable baseline, treatment was introduced during probe session eight. Following the initial treatment probe session, David scored a 2 on the first treatment probe session, and was succeeded by eight data points that varied between *3* and *4*.   David's score of *2* during the generalization phase was observed during probe sessions seventeen and nineteen; however, a score of *3* was reported during probe session eighteen. A total of eighteen verbal empathetic responding probe sessions were conducted with David across baseline, treatment, and generalization phases.

**Adam**

During baseline phase, Adam exhibited the target behavior at *0* in six out of seven data points, whereas a score of *1* was observed during probe session four. Notably, no data was collected for baseline phase probe sessions six, seven, and eight.  Treatment was introduced to Adam during verbal empathetic responding probe session eleven after the previous subject established a desirable treatment outcome trend. Following the initial treatment probe session, Adam showed a high level of performance in verbal empathetic

response with scores fluctuating between *3* and *4* throughout probe treatment sessions; a score of *2* during probe session sixteen was observed. Highly variable scores (*4*, *0* and *2*) were recorded during the generalization phase of verbal empathetic responding.  A total of eighteen verbal empathetic responding probe sessions were conducted with Adam across baseline, treatment, and generalization phases.

**Non-Verbal Empathetic Responding Across Phases**

Participant' non-verbal empathetic responding across all phases was measured using the following numerical values: *0 = Absence of the non-verbal empathetic response, 1 = non-verbal confirmatory response, 2 = mild concern, 3 = moderate concern, 4 = strong concern.*

**Nora**

Nora scored *1* on the non-verbal empathetic response rating scale following three baseline probe sessions where trend stabilized at *0*. Upon establishing a stable baseline trend, the initial treatment probe session was introduced. Initially, Nora exhibited the target skill at *1* in the first treatment probe session. Following the first treatment session, Nora demonstrated a dramatic increase in level of performance.  A desirable treatment outcome trend in non-verbal empathetic responding was observed during treatment probe sessions six through nine and then again during treatment probe sessions twelve through fourteen. Relatively low scores were observed in session 10 and 11. Generalization of the non-verbal empathetic responding was maintained at high performance levels (score of *4*) across the three generalization probe sessions.  A total of seventeen non-verbal

empathetic responding probe sessions were conducted with Nora across baseline, treatment, and generalization phases.

**David**

During the baseline phase, David scored *0* on the non-verbal empathetic response rating scale across all probe sessions; no data was collected for session six. Following Nora's desirable treatment outcome and the subject's stable baseline, treatment was introduced during probe session eight.  A low level of performance was observed during the first treatment probe session. However, in the following probe session, David demonstrated an increase in performance with a score of *3* and maintained a level of performance fluctuating between scores *3* and *4*. Throughout the generalization probe sessions, David's level of performance decreased compared to the performance exhibited during the intervention phase. David scored *2* in the first two generalization probe sessions, but dropped to *1* in the last session. A total of eighteen non-verbal empathetic responding probe sessions were conducted with David across baseline, treatment, and generalization phases.

**Adam**

Adam scored *0* on the non-verbal empathetic response rating scale during six out of seven baseline probe sessions with the exception of a score of *1* in session two. Data for baseline probe sessions six, seven, and eight, were not collected. Treatment was introduced to Adam during verbal empathetic responding probe session eleven after David had established a desirable treatment outcome trend. Following the initial

treatment probe session, Adam scored *4* during most probe sessions with fluctuating data points between *3* and *4*. In addition, greater performance was observed in the initial generalization probe session compared with the following probe sessions. Scores of *4, 0,* and *3* were observed during the generalization phase of non-verbal empathetic responding. A total of eighteen non- verbal empathetic responding probe sessions were conducted with Adam across baseline, treatment, and generalization phases.

The results of this study indicate that both verbal and non-verbal empathetic response scoring improved dramatically when participant were successively introduced to treatments. That is, a relative causal effect between treatments and target behaviors was found across all participant. However, the generalization phase contains data that may warrant further research of complementary treatment modalities, such as *in situ*, which may be complementary to this study's treatments.

**Inter-Observer Agreement**

To calculate Inter- Observer Agreement (IOA), both the primary and secondary observers divided the total number of agreements by the total number of disagreements and multiplied by one hundred. The IOA was calculated for 100% of the verbal and non-verbal response across all participants. Results of the IOA are presented in Table 6 and 7.

Table 5. Percentage of Inter- Observer Agreement (IOA) of the Verbal Empathetic Response

| Subject | Baseline (IOA percent) | Intervention (IOA percent) |
|---------|------------------------|----------------------------|
| Nora    | 100.0%                 | 100.0%                     |
| David   | 83.3%                  | 88.8%                      |
| Adam    | 85.7%                  | 87.5%                      |

Table 6. Percentage of Inter- Observer Agreement (IOA) of the Non- Verbal Empathetic

| Subject | Baseline (IOA percent) | Intervention (IOA percent) |
|---------|------------------------|----------------------------|
| Nora    | 100.0%                 | 80.0%                      |
| David   | 100.0%                 | 88.8%                      |
| Adam    | 100.0%                 | 75.0%                      |

## Treatment Integrity

Treatment integrity checklist was completed for 100% of the teaching sessions across all targeted participant. Results of treatment integrity were calculated by dividing the number of steps completed by the total number of the actual steps multiplied by one hundred. Averaged results of all treatment sessions across participant are represented in Table 8.

Table 7. Treatment Integrity

| Subject | Total Treatment Sessions completed | Average Percentage of Treatment Integrity Across all session |
|---------|------------------------------------|-------------------------------------------------------------|
| Nora    | 11                                 | 93.8                                                        |
| David   | 13                                 | 96.9                                                        |
| Adam    | 12                                 | 95.5                                                        |

## Child Interview

Qualitative data obtained from the child interview was analyzed using a thematic analysis approach. Participant' experiences of this study's utilization of Digital Comic Strip conversations and their own understanding of empathy were video recorded and

transcribed. The commonality between subject responses is further explored as part of this study's discussion chapter.

**Nora**

Nora expressed recognition of prior latency in empathetic responding; however, she reported positive growth and felt 'proud' of her social improvements. Nora described her difficulties regarding social situations as improving and that she is 'more easily able to talk to people'. Nora reported that it was easier to react appropriately to others' happiness than it was to others' distress. When asked if there was anything she would change about the teaching sessions she reported that 'like(d) the entire session'.

Further questions regarding improvement of Digital Comic Strip conversations yielded initial agreeableness; however, further probing uncovered that adding color to Digital Comic Strip conversations might help. Nora stated that sometimes other kids are visual learners so they would learn the lessons better if they were able to color in a picture. Nora believed that it would be a good idea to use the comics on other kids by concluding, 'I think it will help other kids who are on the autism spectrum a lot, too.'

**David**

David unexpectedly yielded little to no answers when interviewed. David attributed his social difficulties regarding social situations to 'not knowing what to say' and to 'being busy'. David reported that he usually responds to others' sadness by 'Say(ing) sorry' and that he responds only 'sometimes'. David expressed that the teaching sessions and the Digital Comic Strip conversations were enjoyable. David

reported that the reason he liked the Digital Comic Strip conversations was because of
'… the emotions'.

**Adam**

Adam expressed that he gets 'stressed out' in difficult social situations because
his thoughts regarding his interests supersede his actions, and that he is usually 'thinking
of what to say'. Further probing revealed that he often helps in response to others'
happiness and others' sadness when '… the same feeling that has happened in my life
occurs' and that he helps by using these experiences.

When asked if the teaching sessions and the Digital Comics Strip conversations
helped him improve his social conversation skills, Adam believed that they had 'helped
some' because he is better able to recognize when others are not interested 'about
elephants' and that 'it's okay now I have to go back and stop talking about elephants.'
Adam suggested that Digital Comic Strip conversations might help other kids.

Notably, Adam suggested that adding color 'gives more depth to it and it's like
more realistic' and that he would like to create Digital Comic Strip conversations. Adam
believed that it would be a good idea to use the Digital Comic Strip Conversations on
other kids by concluding, 'Depends on the person really…. I am a kinesthetic learner'.

**CHAPTER V: DISCUSSION**

Social-emotional reciprocity deficit is a core feature of ASD, and this may include deficits such as conversational skills, emotional understanding, joint attention, and empathy skills (American Psychiatric Association, 2013). Numerous studies have correlated empathy deficit with individuals with ASD and such a deficit may be considered a barrier for social competence development (Sigman, Kasari, Kwon, & Yirmiya, 1992, Baron-Cohen, 2009, Peterson, 2014, Butean, Costescu, & Dobrean, 2014). In this study, an attempt was made to remediated empathetic responding deficit through the utilization of Digital Comic Strip Conversations, which include answering comprehension questions and role-playing. Discussion and further details about research findings, implication, limitations, and recommendations for future research are presented within this chapter to answer the following research questions:

1. To what extent does the utilization of Digital Comic Strip Conversations, which include answering comprehension questions and engaging in role-play, increase appropriate verbal and nonverbal empathetic response?

2. To what extent does the utilization Digital Comic Strip Conversations, which includes answering comprehension questions, and engaging in role-play, teach verbal/nonverbal empathic response and promote generalization across environments?

3. To what extent do the participants report about the utilization of Digital Comic Strip Conversations in the study and their own understanding of empathy as a phenomenon?

**Findings of the Study**

In the present study, results indicate that the utilization of Digital Comic Strip Conversations, which include answering comprehension questions and engaging in role-play, increase appropriate verbal and nonverbal empathetic response across participant.

For the first participant, Nora, she achieved a stable baseline after four data points in both verbal and nonverbal empathetic response. Each of the data points represented one of the three emotional domains, which were previously randomized. In the first empathy-evoking situation, the confederate acted out a sad scenario and Nora unexpectedly expressed concern by verbally relating to the actor and nodding her head. Notably, Nora displayed an empathetic response on the third probe session but was delayed by a 10- seconds period. For the last remaining data points, the subject did not exhibit an empathetic response but was attentive to the actor throughout all baseline probe sessions.

During the intervention phase, Nora demonstrated a dramatic increase in both verbal and nonverbal responding. Nora had a total of eleven teaching sessions that covered all three emotional domains. Throughout all teaching sessions, Nora was able to transfer to the subsequent testing session with the exception of the eighth, where the primary researcher had to reteach the session. Although she performed well in the verbal treatment session, she had more difficulties with the non-verbal component during the intervention phase. Even though she did display facial expression, tone and gesture, they were unnatural in most of the teaching sessions. In addition, Nora was eager and optimistic during all teaching sessions due to her passion towards reading and drawing, which is the foundation of the Digital Comic Strip Conversations. Nora was also

motivated to gain tokens, social praise and free time where she could talk about her preferred subject, Little Pony.

For the second subject, David, he demonstrated a stable baseline after six data points in both the verbal and nonverbal empathetic response. In verbal responding, the majority of the data points demonstrated little to no empathetic responding with the exception of session three, which he responded to the confederate spilling coffee on himself by stating "at least you didn't spill it on the computer." According to the rating scale, this comment, although not considered appropriate, was an attempt to relate to the situation. In addition, the non-verbal component of the baseline probe sessions exhibited a flat effect throughout all data points obtained within the baseline phase. However, he was attentive to actors during the empathy evoking situations.

During the intervention phase, David exhibited a low level of empathetic response in the first session, but successively increased and remained stable throughout the remaining teaching sessions. David had to repeat a total of four sessions. Notably, David was highly motivated throughout all teaching sessions due to his fascination with computers of all generations, particular the Mac laptops. In addition, David utilized his tokens to gain access to computers available after teaching sessions.

For the third participant, Adam, he achieved a stable baseline after session ten in both verbal and non-verbal empathetic response. During the second empathy-evoking situation, Adam non-verbally responded to the sad scenario by facing the actor and pouting his bottom lip in a display of sadness. In most of the baseline sessions, whether Adam responded to the actor by giving an incomprehensible vocalization or speaking about something unrelated, he was still attentive to the acting scenario.

During the intervention phase, Adam showed an increase in both verbal and nonverbal responding. Adam had a total of twelve teaching sessions that covered all three emotional domains. Throughout the intervention phase, he scored relatively high on both verbal and non-verbal response and the data points remained stable. In addition, four sessions needed to be retaught due to Adam's difficulties in mastering targeted behavior during the teaching sessions. Even though the first couple of teaching sessions needed to be repeated, he was easily taught and showed an increase in comprehension of both appropriate verbal and nonverbal responding.

Throughout generalization phase, all three participants displayed varying results in verbal and nonverbal empathetic responding. All generalization probe sessions were conducted outside a clinical setting. Parents were assigned to act out and code empathetic responding in regards to the three emotional domains (happiness or excitement, sadness or pain, and fear). The data obtained for the generalization phase also consisted of parent reports to describe their child's empathetic responding during various social events. The first subject, Nora, showed concern in all acted scenarios and maintained a high level of verbal and nonverbal performance. Nora's parents reported that she was always listening to what was going on in their conversations, even when she appeared to be doing other things. For example, when the parents acted out a sad scenario, she response by stating "I'm sorry. Is there anything I can do to make you feel better?" In addition, upon the completion of the intervention phase, Nora's family experienced the death of a relative. Her parents reported that she was more mature in her empathetic responding and was even comforting people during the funeral service.

The second subject, David, exhibited a moderate concern in all acted scenarios and maintained an average level of verbal and nonverbal performance. However, the nonverbal response was lower than the verbal responding average. David's parents stated that he was attentive to all acted scenarios, but after he responded David would abruptly end the conversation and return to his previous activities. For example, when David's father acted out the pain scenario by stubbing his toe on a bookcase, David asked what was wrong with a flat effect and did not utilize nonverbal cues. When his father explained what had happened, David immediately directed his attention back to his prior activity and paid his father no attention.

Lastly, Adam exhibited the most fluctuating verbal and nonverbal performance in the generalization phase. Adam received an extremely low score in verbal and nonverbal responding in the in the acted pain scenarios. For example, the parents reported that Adam prioritized his own desire to be left alone and appeared not to notice his parent's painful remarks. In contrast, in the happy scenario, he achieved a high level of performance in both the verbal and nonverbal responding.

Moreover, qualitative data obtained from the child interview was analyzed using a thematic analysis approach to identify commonality between some or all participant. The purpose of the interview was to collect qualitative data that could give insight into the subjective experiences of participants included in this study.

All participant stated that they enjoyed the Digital Comic Strip Conversations. Nora and Adam shared many common themes of data. Further probing found that both participant expressed a strong desire to be a part of the Digital Comic Strip Conversation creation process by coloring or designing the comics themselves. Adam furthered this

idea by suggesting that he would like to illustrate them and then look at how other kids had colored similar comics. In addition, the cognitive capacity to understand oneself, by expressing personal learning style proclivity and by acknowledging deficits in social skills, was a common theme shared between both Nora and Adam.

Moreover, Nora and Adam also suggested that adding color to the Digital Comic Strip Conversations would be an improvement and that other students may benefit from the use of comics. All three participants reported that difficult social situations were usually related to not knowing what to say. For example, David reported that even though he had a desire to respond, he lacked the repertoire.

**Implications of the Study**

During the baseline phase, participants were presented with scenarios to evoke an empathetic response in regards to the three emotional domains: happiness or excitement, sadness or pain, and fear. The primary researcher and two confederates acted out scenarios that depicted an emotional state to assess empathetic responsiveness. Measuring empathetic behavior in individuals with ASD through the empathy-evoking situation (Butean, Costescu, & Dobrean 2014) was previously utilized in various studies and presented in the literature in a very similar way to this current study. For example, in a study conducted by Sigman, Kasari, Kwon and Yirmiya (1992), evaluated the responsiveness to the distress of others and was measured across three behavioral domains. Testing sessions were completed through acting out a distressful situation in front of the child.

Moreover, data gathered during baseline condition indicate that all participants maintained a stable trend of low scores across baseline probe sessions. The empathetic responding deficit was observed across all participants during baseline phase. In a study conducted by Schrandt, Townsend, and Poulson (2009), the researchers utilized single subject design to teach vocal and motor empathetic response. Data obtained during baseline conditions showed that all four participants did not frequently respond to antecedent stimuli displayed by the dolls and puppets. Available evidence obtained from several experimental group design studies support the claim that children with ASD exhibit less empathic responses when compared to typically developed children (Sigman, Kasari, Kwon, & Yirmiya, 1992, Baron-Cohen, 2009, 2014, Butean, Costescu, & Dobrean, 2014).

Various assessments such as Mind Reading, False- belief task and reading assessments, were conducted as a part of the subject inclusion criteria; all targeted participants qualified for the study. Results from pre-baseline to assess cognitive empathy suggested that participants within the study obtained a high score regarding emotion recognition ability and passed first order False-belief task. However, all participants did not display appropriate verbal and non-verbal empathetic response throughout the baseline probe sessions. This phenomenon has been examined in several studies, which have placed emphasis on analyzing the relationship between cognitive and affective empathy.

In a comparative study conducted by Peterson (2014), the author recruited seventy-six children (37 with ASD and 39 typically developing children) to examine if children with ASD are less empathetic than typically developing children; the study also

aimed to investigate the relationship between Theory of Mind ability and behavioral empathy. While results of the study indicated that children with ASD expressed less empathic responses than typically developed children, ToM ability was not statically correlated to empathy skills. In other words, data obtained from participants within this study support the idea that cognitive empathy is significant but not sufficient to display affective empathy.

The results of the current study indicate that the utilization of Digital Comic Strip Conversations was successful in increasing both verbal and nonverbal empathetic response across all participants. The overall outcomes of this current study demonstrate results regarding the possibility of teaching empathy skill aligned with previous studies. A study conducted by Schrandt, Townsend and Poulson (2009), utilized a multiple baseline design to teach vocal and motor empathetic responding to four children diagnosed with autism.  The purpose of the study was to assess the effectiveness of utilizing a package intervention, which included vignettes paired with dolls and puppets, in a pretend play setting. Once the intervention phase was introduced, the results yielded a systematic increase of pretend play empathetic responding across all participants.

A considerable amount of research conducted on the utilization of Social Stories and Comic Strip Conversation to teach social and communication skills indicated a significant improvement in children's behavior (Delano & Snell, 2006, Norris & Dattilo, 1999, Sansosti, Powell-Smith, & Kincaidm, 2004, & Kokina & Kern's, 2010). For example, in a study conducted by Bock, Rogers and Myles (2001), both Social Stories and Comic Strip Conversation were utilized to teach appropriate social behaviors to one child diagnosed with AS.  Qualitative analysis of the data suggested that there was a

significant decrease of inappropriate behaviors from the first few sessions of the intervention.  It was also reported that the child enjoyed the Comic Strip Conversations and asked both the teacher and parents to utilize drawing to learn multiple social skills.

Likewise, Pierson and Glaeser (2007) studied the effectiveness of Comic Strip Conversations to reduce loneliness in children with ASD as well as increase the frequency of appropriate social behaviors. Promising results were obtained from all children, indicating that Comic Strip Conversation intervention was successful in enhancing social behaviors, non-verbal communication, and social responsibility. The author concluded by stating the "educators found significant improvements in social skills and desired classroom outcomes using Comic Strip Conversations for students with ASD" (p.465).

This present study utilized package intervention to teach empathetic responding. The idea of using package intervention to teach multiple social skills has been widely used in literature. For example, Chan and O'Reilly (2008) utilized a package intervention design and included the reading of Social Stories, answering questions, and role-play to teach two children with ASD appropriate social behaviors. Data obtained from the intervention phase demonstrated an increase in appropriate social behaviors was maintained. In addition, Delano and Snell (2006) found that a package intervention similar to the previous study was also successful in enhancing social interaction skills of three children with autism. However, only two of the three participants were able to generalize the acquired skills across contexts.

**Limitations of the Study**

Several limitations exist within this study. These limitations are defined and expanded upon so that future research may yield the most contributive result. The primary limitation of this study is that while consistent data was obtained during the intervention phase, which indicated that all participants demonstrated relatively high performance in both verbal and non-verbal empathetic responding, generalization data from two participants illustrated a decrease in the rate of empathetic responding that was either below intervention condition or at baseline levels.

Another limitation of this study is that resource and time constraints impacted multiple aspects of both procedural design and measurement of treatment efficacy. All sessions took place in a clinical setting, thereby limiting the scope of learning opportunity in natural settings. Time constraints further limited the number of generalization probe sessions and ultimately did not allow for maintenance measurement.

Moreover, treatment efficacy of Digital Comic Strip Conversations in this study cannot solely be generalized due to the natural limitations of single-subject experimental design. In other words, the existence of a functional relationship between a specific treatment (independent variable) and a targeted behavior (dependent variable) cannot be confirmed until a repeatedly studied phenomenon produces similar results. Furthermore, a component analysis, which is the statistical method for separately evaluating potential effects of intervention components, was not conducted to analyze treatment efficacy on teaching verbal and non-verbal empathetic responding. The critical component of this package intervention was the utilization of Digital Comic Strip Conversations; other

intervention components, such as comprehensions questions, role-play, and a reinforcement system, may have contributed in effecting targeted behaviors.

In addition, the use of self-monitoring as the treatment integrity method is valid as a strategy implemented in the study (Lane, Bocian, MacMillan, & Gresham, 2004). However, the provision of human resources to allow for a second observer to ensure the reliability of treatment integrity data was not an attribute of this study.

A final limitation is that both verbal and non-verbal empathetic responding was taught simultaneously within the same session. Participants within the study encountered difficulties to master the nonverbal empathetic response in most of the teaching sessions and were continuously prompted. This was problematic since mastering the nonverbal component was more time consuming.

**Future Research**

This study builds on prior research that was utilized to teach children with ASD social skills and, as such, calls on the present and future researchers to critically examine all aspects of this contribution. Collaborative inquiry is the key to improve services in the field of autism. For this reason, this study aimed to investigate Digital Comic Strip Conversations as a potentially effective treatment in improving verbal and non-verbal empathetic responding in children with autism.

Further research is needed where the treatment effects of the primary component of this package intervention, Digital Comic Strip Conversations, are held constant. That is, secondary components, such as role-play and reinforcement system, are either removed from future research or are statistically examined using component analysis.

Sansosti, Powell-Smith and Kincaid (2004) suggested that, "future research should strive to isolate Social Stories as the sole independent variable" (p. 201).

Another future direction for researchers regarding the implementation of both Social Stories and Comic Strip Conversations should include examination of the intervention length, sample size, environmental setting and the expansion of qualitative data obtainment, across all phases, particularly the generalization phase. Two meta-analysis studies (Sansosti, Powell-Smith & Kincaid, 2004, Kokina & Kern, 2010) suggested that future studies must promote the inclusion of generalization and maintenance data.

Researchers are suggested to examine other attributes such inclusion of technology, coloring, and visual cues for both Social Stories and Digital Comic Strip Conversations. This may include comparing Digital Comic Strip Conversation to written-based Social Stories to determine treatment efficacy. Qualitative data obtained from two participants within the current study conveyed a desire to color or design. Future research should be directed toward identifying vital features of Digital Comic Strip Conversations that facilitate implementation with children with autism.

Moreover, many researchers (Sansosti, Powell-Smith & Kincaid, 2004, Kokina & Kern, 2010) suggested implementing functional behavioral assessment (FBA) before the introduction of Social Stories intervention. This is important so that researchers can identify behavioral antecedents and consequences as well as Social Stories contest. Further research should examine the significance of FBA in the effective implantation of Social stories and Comic Strip Conversations.

Finally, singularity of evidence dissemination and the assurance of evidence quality is of particular interest in further development of additional studies. Replication of the current study utilizing Single subject design may further support the current study findings. Alberto and Troutman (2013) stated "the more frequently an intervention proves effective, the more confidence is gained about the generality of the results of the intervention" (p. 119). Furthermore, Kokina and Kern's (2010) proposed that there is paucity in the literature examining Social Stories thorough the utilization of group design and more research is needed.

The analysis of confirmed findings of previous studies indicate the effectiveness of Social Stories and Comic Strip Conversations. However, results are varied in impact. Overall, this study was successful in increasing appropriate verbal and nonverbal empathetic responding across all participants, establishing a replicable guideline of teaching and assessments procedures, and providing insight into the participants' own experience regarding Digital Comic Strip Conversation and empathetic responding.

# REFERENCES

Achkova, M., & Manolova, H. (2014). Diagnosis "Autism"–from Kanner and Asperger to DSM-5. *Journal of Intellectual Disability-Diagnosis and Treatment*, *2*(2), 112–118.

Alberto, P., & Troutman, A. C. (2013). *Applied behavior analysis for teachers* (9th ed). Boston: Pearson.

American Psychiatric Association (2013). *Diagnostic and statistical manual of mental disorders (Revised 5$^{th}$ ed.).* Washington, D.C: American Psychiatric Association.

Auyeung, B., Wheelwright, S., Allison, C., Atkinson, M., Samarawickrema, N., & Baron-Cohen, S. (2009). The children's empathy quotient and systemizing quotient: Sex differences in typical development and in autism spectrum conditions. *Journal of Autism and Developmental Disorders*, *39*(11), 1509–1521. https://doi.org/10.1007/s10803-009-0772-x

Baron-Cohen, S., Leslie, A. M., & Frith, U. (1985). Does the autistic child have a "theory of mind"? *Cognition*, *21*(1), 37–46.

Baron-Cohen, S., Richler, J., Bisarya, D., Gurunathan, N., & Wheelwright, S. (2003). The systemizing quotient: An investigation of adults with Asperger syndrome or high-functioning autism, and normal sex differences. *Philosophical Transactions of the Royal Society B: Biological Sciences*, *358*(1430), 361–374. https://doi.org/10.1098/rstb.2002.1206

Baron-Cohen, S. (1995). *Mindblindness: An essay on autism and theory of mind*. Cambridge, Mass: MIT Press.

Baron-Cohen, S., Golan, O., Wheelwright, S., & Hill, J. J. (2004). *Mind reading: The interactive guide to emotions.* London: Jessica Kingsley

Baron-Cohen, S. (2009). Autism: The empathizing-systemizing (E-S) theory. *Annals of the New York Academy of Sciences*, *1156*(1), 68–80. https://doi.org/10.1111/j.1749-6632.2009.04467.x

Baron-Cohen, S. (2011). *Zero degrees of empathy: A new theory of human cruelty*. London ; New York, N.Y: Allen Lane.

Baron-Cohen, S, & Wheelwright, S. (2004). The empathy quotient: An investigation of adults with Asperger syndrome or high functioning autism, and normal sex differences. *Journal of Autism and Developmental Disorders*, *34*(2), 163–175.

Bellini, S. (2008). *Building social relationships textbook edition: A systematic approach to teaching social interaction skills to children and adolescents with autism spectrum disorders and other social difficulties.* Shawnee Mission, Kansas: Autism Asperger Publishing Company.

Bernard, H. R. (1988). *Research methods in cultural anthropology* (p. 117). Newbury Park, CA: Sage.

Bird, G., & Cook, R. (2013). Mixed emotions: The contribution of alexithymia to the emotional symptoms of autism. *Translational Psychiatry*, *3*, e285. https://doi.org/10.1038/tp.2013.61

Bloom, P., & German, T. P. (2000). Two reasons to abandon the false belief task as a test of theory of mind. *Cognition*, *77*(1), B25-31.

Bock, M., Rogers, M. F., & Myles, B. S. (2001). Using social stories and comic strip conversations to interpret social situations for an adolescent with Asperger syndrome. *Intervention in School and Clinic*, *36*(5), 310–313.

Boyatzis, R. E. (1998). *Transforming qualitative information: Thematic analysis and code development*. Thousand Oaks, CA: Sage Publications.

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, *3*(2), 77–101.

Brothers, L. (1989). A biological perspective on empathy. *American Journal of Psychiatry*, *146*(1), 10-19.

Butean, I., Costescu, C., & Dobrean, A. (2014). Differences between empathic responses in children with autism spectrum disorder and typically developing children. *Journal of Evidence-Based Psychotherapies*, *14*(2), 197.

Causton-Theoharis, J., Ashby, C., & Cosier, M. (2009). Islands of loneliness: Exploring social interaction through the autobiographies of individuals with autism. *Intellectual and Developmental Disabilities*, *47*(2), 84–96. https://doi.org/10.1352/1934-9556-47.2.84

Center, D. B., & Leach, R. A. (1984). The multiple baseline across participant design: Proposed use in research. *J Manipulative Physiol Ther*, *7*(4), 231-236.

Chamberlain, B., Kasari, C., & Rotheram-Fuller, E. (2007). Involvement or isolation? The social networks of children with autism in regular classrooms. *Journal of Autism and Developmental Disorders*, *37*(2), 230–242. https://doi.org/10.1007/s10803-006-0164-4

Chan, J. M., & O'Reilly, M. F. (2008). A Social Stories™ intervention package for students with autism in inclusive classroom settings. *Journal of Applied Behavior*

*Analysis*, *41*(3), 405–409. https://doi.org/10.1901/jaba.2008.41-405

Chapin, F. S. (1942). Preliminary standardization of a social insight scale. *American Sociological Review, 7,* 214–225.

Cooper, J. O., Heron, T. E., & Heward, W. L. (1987). *Applied behavior analysis*. Upper Saddle River, N.J: Pearson/Merrill-Prentice Hall.

Corona, R., Dissanayake, C., Arbelle, S., Wellington, P., & Sigman, M. (1998). Is affect aversive to young children with autism? Behavioral and cardiac responses to experimenter distress. *Child Development*, *69*(6), 1494–1502.

Cotugno, A. J. (2009). Social competence and social skills training and intervention for children with autism spectrum disorders. *Journal of Autism and Developmental Disorders*, *39*(9), 1268–1277. https://doi.org/10.1007/s10803-009-0741-4

Crozier, S., & Tincani, M. J. (2005). Using a modified social story to decrease disruptive behavior of a child with autism. *Focus on Autism and Other Developmental Disabilities*, *20*(3), 150-157.

de Waal, F. B. M. (2008). Putting the altruism back into altruism: The evolution of empathy. *Annual Review of Psychology*, *59*, 279–300. https://doi.org/10.1146/annurev.psych.59.103006.093625

Delano, M., & Snell, M. E. (2006). The effects of social stories on the social engagement of children with autism. *Journal of Positive Behavior Interventions*, *8*(1), 29–42. https://doi.org/10.1177/10983007060080010501

Developmental Disabilities Monitoring Network Surveillance Year 2010 Principal Investigators, & Centers for Disease Control and Prevention (CDC). (2014). Prevalence of autism spectrum disorder among children aged 8 years - autism and developmental disabilities monitoring network, 11 sites, United States, 2010. *Morbidity and Mortality Weekly Report. Surveillance Summaries (Washington, D.C.: 2002)*, *63*(2), 1–21.

Dodd, J. L., Ocampo, A., & Kennedy, K. S. (2011). Perspective taking through narratives: An intervention for students with ASD. *Communication Disorders Quarterly*, *33*(1), 23–33. https://doi.org/10.1177/1525740110395014

Downing, D. (2007). Autism: Are we entering the final straight? In memory of Bernard Rimland. *Journal of Nutritional & Environmental Medicine*, *16*(3–4), 173–180. https://doi.org/10.1080/13590840701804377

El Kaliouby, R., Picard, R., & Baron-Cohen, S. (2006). Affective computing and autism. *Annals of the New York Academy of Sciences*, *1093*, 228–248. https://doi.org/10.1196/annals.1382.016

Feshbach, N. D. (1978). Studies of empathic behavior in children. *Progress in Experimental Personality Research*, *8*, 1–47.

Fisher, W. W., Piazza, C. C., Bowman, L. G., & Amari, A. (1996). Integrating caregiver report with systematic choice assessment to enhance reinforcer identification. *American Journal of Mental Retardation: AJMR*, *101*(1), 15–25.

Fiske, K. E. (2008). Treatment integrity of school-based behavior analytic interventions: A review of the research. *Behavior Analysis in Practice*, *1*(2), 19–25.

Fombonne, E. (2003). Epidemiological surveys of autism and other pervasive developmental disorders: An update. *Journal of Autism and Developmental Disorders*, *33*(4), 365–382.

Frith, U., & Happé, F. (1994). Autism: beyond "theory of mind." *Cognition*, *50*(1–3), 115–132.

Gay, L. R., Mills, G. E., & Airasian, P. W. (2014). *Educational research: Competencies for analysis and applications* (10th ed). Boston: Pearson.

Glaeser, B. C., Pierson, M. R., & Fritschmann, N. (2003). Comic strip conversations: A positive behavioral support strategy. *Teaching Exceptional Children*, *36*(2), 14–19. https://doi.org/10.1177/004005990303600202

Golan, O., & Baron-Cohen, S. (2006). Systemizing empathy: Teaching adults with Asperger syndrome or high-functioning autism to recognize complex emotions using interactive multimedia. *Development and Psychopathology*, *18*(2), 591–617. https://doi.org/10.1017/S0954579406060305

Goldenfeld, N., Baron-Cohen, S., & Wheelwright, S. (2005). Empathizing and systemizing in males, females and autism. *Clinical Neuropsychiatry*, *2*(6), 338-345.

Gould, E., Tarbox, J., O'Hora, D., Noone, S., & Bergstrom, R. (2011). Teaching children with autism a basic component skill of perspective- taking. *Behavioral Interventions*, *26*(1), 50-66.

Gray, C. (2004). Social stories 10.0: The new defining criteria and guidelines. *Jenison Autism Journal*, *15*(4), 2–21.

Gray, C. A., & Garand, J. D. (1993). Social Stories: Improving responses of students with autism with accurate social information. *Focus on Autism and Other Developmental Disabilities*, *8*(1), 1–10. https://doi.org/10.1177/108835769300800101

Hansen, S. N., Schendel, D. E., & Parner, E. T. (2015). Explaining the increase in the prevalence of autism spectrum disorders: The proportion attributable to changes in reporting practices. *JAMA Pediatrics*, *169*(1), 56–62. https://doi.org/10.1001/jamapediatrics.2014.1893

Happé, F. G. (1995). The role of age and verbal ability in the theory of mind task performance of participant with autism. *Child Development*, *66*(3), 843-855.

Happé, F., Booth, R., Charlton, R., & Hughes, C. (2006). Executive function deficits in autism spectrum disorders and attention-deficit/hyperactivity disorder: Examining profiles across domains and ages. *Brain and Cognition*, *61*(1), 25–39. https://doi.org/10.1016/j.bandc.2006.03.004

Holroyd, S., & Baron-Cohen, S. (1993). Brief report: How far can people with autism go in developing a theory of mind? *Journal of Autism and Developmental Disorders*, *23*(2), 379–385.

Hudry, K., & Slaughter, V. (2009). Agent familiarity and emotional context influence the everyday empathic responding of young children with autism. *Research in Autism Spectrum Disorders*, *3*(1), 74–85.

Humphrey, N. (1984). *Consciousness regained: Chapters in the development of mind*. Nicholas Humphrey.

Hutchins, T. L., & Prelock, P. A. (2006). Using social stories and comic strip conversations to promote socially valid outcomes for children with ASD. *Seminars in Speech and Language,27*(1), 47–59.

Kahng, S. W., Chung, K. M., Gutshall, K., Pitts, S. C., Kao, J., & Girolami, K. (2010). Consistent visual analyses of intrasubject data. *Journal of Applied Behavior Analysis, 43*(1), 35-45.

Kanner, L. (1943). Autistic disturbances of affective contact. *Nervous Child, 2*, 217-250.

Kazdin A. E. (1982). *Single-case research designs: Methods for clinical and applied settings*. New York: Oxford University Press

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

Koegel, L. K., Koegel, R. L., Ashbaugh, K., & Bradshaw, J. (2014). The importance of early identification and intervention for children with or at risk for autism spectrum disorders. *International Journal of Speech-Language Pathology*, *16*(1), 50–56. https://doi.org/10.3109/17549507.2013.861511

Koegel, L. K., Koegel, R. L., Harrower, J. K., & Carter, C. M. (1999). Pivotal response

intervention I: Overview of approach. *Research and Practice for Persons with Severe Disabilities*, *24*(3), 174–185. https://doi.org/10.2511/rpsd.24.3.174

Kokina, A., & Kern, L. (2010). Social Story interventions for students with autism spectrum disorders: A meta-analysis. *Journal of Autism and Developmental Disorders*, *40*(7), 812–826. https://doi.org/10.1007/s10803-009-0931-0

Kuoch, H., & Mirenda, P. (2003). Social Story™ interventions for young children with autism spectrum disorders. *Focus on Autism and Other Developmental Disabilities*, *18*(4), 219-227.

Kuttler, S., Myles, B. S., & Carlson, J. K. (1998). The use of social stories to reduce precursors to tantrum behavior in a student with autism. *Focus on Autism and Other Developmental Disabilities*, *13*(3), 176-182.

Lacava, P. G., Golan, O., Baron-Cohen, S., & Smith Myles, B. (2007). Using assistive technology to teach emotion recognition to students with Asperger syndrome: A pilot study. *Remedial and Special Education*, *28*(3), 174–181. https://doi.org/10.1177/07419325070280030601

Lal, R., & Ganesan, K. (2011). Children with autism spectrum disorders: Social Stories and self management of behaviour. *British Journal of Educational Research*, *1*(1), 36–48.

Lane, K. L., Bocian, K. M., MacMillan, D. L., & Gresham, F. M. (2004). Treatment integrity: An essential—but often forgotten—component of school-based interventions. *Preventing School Failure: Alternative Education for Children and Youth*, *48*(3), 36–43.

LeBlanc, L. A., Coates, A. M., Daneshvar, S., Charlop-Christy, M. H., Morris, C., & Lancaster, B. M. (2003). Using video modeling and reinforcement to teach perspective-taking skills to children with autism. *Journal of Applied Behavior Analysis*, *36*(2), 253–257. https://doi.org/10.1901/jaba.2003.36-253

Leslie, A. M. (1987). Pretense and representation: The origins of "theory of mind." *Psychological Review*, *94*(4), 412–426. https://doi.org/10.1037/0033-295X.94.4.412

Li, A. (2009). Identification and intervention for students who are visually impaired and who have autism spectrum disorders. *Teaching Exceptional Children*, *41*(4), 22–32. https://doi.org/10.1177/004005990904100403

Lynch, S. A., & Simpson, C. G. (2010). Social skills: Laying the foundation for success. *Dimensions of Early Childhood*, *38*(2), 3–12.

McDonald, N. M., & Messinger, D. S. (2012). Empathic responding in toddlers at risk for

an autism spectrum disorder. *Journal of Autism and Developmental Disorders*, *42*(8), 1566–1573. https://doi.org/10.1007/s10803-011-1390-y

Mowbray, C. T., Holter, M. C., Teague, G. B., & Bybee, D. (2003). Fidelity criteria: Development, measurement, and validation. *American Journal of Evaluation*, *24*(3), 315–340. https://doi.org/10.1177/109821400302400303

Norris, C., & Dattilo, J. (1999). Evaluating effects of a social story intervention on a young girl with autism. *Focus on Autism and Other Developmental Disabilities*, *14*(3), 180–186. https://doi.org/10.1177/108835769901400307

Oberman, L. M., Hubbard, E. M., McCleery, J. P., Altschuler, E. L., Ramachandran, V. S., & Pineda, J. A. (2005). EEG evidence for mirror neuron dysfunction in autism spectrum disorders. *Brain Research. Cognitive Brain Research*, *24*(2), 190–198. https://doi.org/10.1016/j.cogbrainres.2005.01.014

Perner, J., Frith, U., Leslie, A. M., & Leekam, S. R. (1989). Exploration of the autistic child's theory of mind: knowledge, belief, and communication. *Child Development*, *60*(3), 688–700.

Peterson, C. (2014). Theory of mind understanding and empathic behavior in children with autism spectrum disorders. *International Journal of Developmental Neuroscience*, *39*, 16–21. https://doi.org/10.1016/j.ijdevneu.2014.05.002

Piaget, J. (1962). *Play, dreams and imitation in childhood.* London: Routledge & Kegan Paul.

Pierson, M. R., & Glaeser, B. C. (2007). Using comic strip conversations to increase social satisfaction and decrease loneliness in students with autism spectrum disorder. *Education and Training in Developmental Disabilities*, *42*(4), 460–466.

Pouw, L. B. C., Rieffe, C., Oosterveld, P., Huskens, B., & Stockmann, L. (2013). Reactive/proactive aggression and affective/cognitive empathy in children with ASD. *Research in Developmental Disabilities*, *34*(4), 1256–1266. https://doi.org/10.1016/j.ridd.2012.12.022

Premack, D., & Woodruff, G. (1978). Does the chimpanzee have a theory of mind? *Behavioral and Brain Sciences*, *1*(04), 515. https://doi.org/10.1017/S0140525X00076512

Rogers, M. F., & Myles, B. S. (2001). Using social stories and comic strip conversations to interpret social situations for an adolescent with Asperger's Syndrome. *Intervention in School and Clinic, 36,* 310 –313.

Ryan, C., & Charragáin, C. N. (2010). Teaching emotion recognition skills to children with autism. *Journal of Autism and Developmental Disorders*, *40*(12), 1505–

1511. https://doi.org/10.1007/s10803-010-1009-8

Sansosti, F. J., Powell-Smith, K. A., & Kincaid, D. (2004). A research synthesis of social story interventions for children with autism spectrum disorders. *Focus on Autism and Other Developmental Disabilities*, *19*(4), 194–204.

Scattone, D., Wilczynski, S. M., Edwards, R. P., & Rabian, B. (2002). Decreasing disruptive behaviors of children with autism using social stories. *Journal of Autism and Developmental Disorders*, *32*(6), 535-543.

Scheeren, A. M., Koot, H. M., Mundy, P. C., Mous, L., & Begeer, S. (2013). Empathic responsiveness of children and adolescents with high- functioning autism spectrum disorder. *Autism Research*, *6*(5), 362-371.

Schlinger, H. D. (2009). Theory of mind: An overview and behavioral perspective. *The Psychological Record*, *59*(3), 435.

Schrandt, J. A., Townsend, D. B., & Poulson, C. L. (2009). Teaching empathy skills to children with autism. *Journal of Applied Behavior Analysis*, *42*(1), 17–32. https://doi.org/10.1901/jaba.2009.42-17

Seyfarth, R. M., & Cheney, D. L. (2000). Social awareness in monkeys. *American Zoologist*, *40*(6), 902–909. https://doi.org/10.1093/icb/40.6.902

Sigman, M. D., Kasari, C., Kwon, J. H., & Yirmiya, N. (1992). Responses to the negative emotions of others by autistic, mentally retarded, and normal children. *Child Development*, *63*(4), 796–807.

Smith, C. (2001). Using social stories to enhance behaviour in children with autistic spectrum difficulties. *Educational Psychology in Practice*, *17*(4), 337–345. https://doi.org/10.1080/02667360120096688

Smith, J. D. (2012). Single-case experimental designs: A systematic review of published research and current standards. *Psychological Methods*, *17*(4), 510.

Sullivan, L. & Bogin, J. (2010). *Steps for implementation: Extinction*. Sacramento, CA: The National Professional Development Center on Autism Spectrum Disorders, M.I.N.D Institute, University of California at Davis School of Medicine.

Tager-Flusberg, H. (2007). Evaluating the theory-of-mind hypothesis of autism. *Current Directions in Psychological Science*, *16*(6), 311–315. https://doi.org/10.1111/j.1467-8721.2007.00527.x

Thiemann, K. S., & Goldstein, H. (2001). Social stories, written text cues, and video feedback: effects on social communication of children with autism. *Journal of*

*Applied Behavior Analysis*, *34*(4), 425–446.
https://doi.org/10.1901/jaba.2001.34-    425

Tsai, L. Y., & Ghaziuddin, M. (2014). DSM-5 ASD moves forward into the past. *Journal of Autism and Developmental Disorders*, *44*(2), 321–330. https://doi.org/10.1007/s10803-013-1870-3

Vatanoglu-Lutz, E. E., ATAMAN, A. D., & Bicer, S. (2014). Medicine in stamps: History of autism spectrum disorder (ASD) through philately. *Journal of Neurological Sciences (Turkish), 31*(2).

Wilkinson, L. A. (2017). *A best practice guide to assessment and intervention for autism and Asperger syndrome in schools*. London: Jessica Kingsley.

Williams, B. T., Gray, K. M., & Tonge, B. J. (2012). Teaching emotion recognition skills to young children with autism: A randomised controlled trial of an emotion training programme. *Journal of Child Psychology and Psychiatry, and Allied Disciplines*, *53*(12), 1268–1276. https://doi.org/10.1111/j.1469-7610.2012.02593.x

Wimmer, H., & Perner, J. (1983). Beliefs about beliefs: Representation and constraining function of wrong beliefs in young children's understanding of deception. *Cognition*, *13*(1), 103–128.

Wing, L. (1981). Asperger's syndrome: A clinical account. *Psychological Medicine*, *11*(1), 115–129.

Wing, L. (1997). The history of ideas on autism: Legends, myths and reality. *Autism*, *1*(1), 13-23.

Wing, L., & Gould, J. (1979). Severe impairments of social interaction and associated abnormalities in children: Epidemiology and classification. *Journal of Autism and Developmental Disorders*, *9*(1), 11–29.

Wing, L, & Potter, D. (2002). The epidemiology of autistic spectrum disorders: Is the prevalence rising? *Mental Retardation and Developmental Disabilities Research Reviews*, *8*(3), 151–161. https://doi.org/10.1002/mrdd.10029

Wolff, S. (2004). The history of autism. *European Child & Adolescent Psychiatry*, *13*(4), 201–208. https://doi.org/10.1007/s00787-004-0363-5

Wong, C., Odom, S. L., Hume, K. A., Cox, A. W., Fettig, A., Kucharczyk, S., … Schultz, T. R. (2015). Evidence-based practices for children, youth, and young adults with autism spectrum disorder: A comprehensive review. *Journal of Autism and Developmental Disorders*, *45*(7), 1951–1966. https://doi.org/10.1007/s10803-014-    2351-z

Yirmiya, N., Sigman, M. D., Kasari, C., & Mundy, P. (1992). Empathy and cognition in high-functioning children with autism. *Child Development*, *63*(1), 150–160.

Zager, D. B., & Wehmeyer, M. L. (2012). *Educating students with autism spectrum disorders: Research-based principles and practices*. New York: Routledge.

# APPENDICES

## Appendix A. Research Approval

**Missouri State University**

OFFICE OF RESEARCH COMPLIANCE

(417) 836-4132
Web site: http://orc.missouristate.edu
Federalwide Assurance (FWA) #4733

Date: 3-19-2017

**IRB #:** IRB-FY2017-214
**Title:** The effectiveness of digital comic strips to increase verbal empathetic response in children with autism spectrum disorder
**Creation Date:** 9-20-2016
**End Date:** 9-28-2017
**Status:** Approved
**Principal Investigator:** Linda Garrison-Kane
**Review Board:** MSU
**Sponsor:**

**Appendix B. Parent Permission Form**

## <u>PARENTAL CONSENT</u>

I give permission for my child, _____ ,
to participate in the thesis project conducted by Missouri State University graduate
student, Khalifah Aldughaysh.  I understand that the purpose of this experience is to
provide information to support research and professional training efforts.  I understand
that the graduate student will access and review educational records that include testing
information, grade reports, and educational progress records and that this data, and my
family and child's identity, will be protected.

I understand that information shared in interviews, educational, and developmental
activities may be included in the graduate student's observation and project.  I further
understand that audiotaping and/or videotaping of activities that include my child may be
conducted, and that these materials will only be used to assist the graduate student in
completing their thesis project.  I understand that I have the right to withdraw my child
from this experience at any time, and the participation in this project will not affect my
child's grade for this class.

Parental/primary caregiver signature indicates consent for his/her child to participate in
the aforementioned Missouri State University project.
Parent/Guardian signature:

_____

Date: _____
If you have any questions or comments regarding the Missouri State University student's
project, please contact

Dr. Garrison-Kane
Professor, Counseling Leadership & Special Education
LGKane@MissouriState.edu

Khalifah Aldughaysh
Graduate Student
SamiK321@live.missouristate.edu

**Appendix C. Examples of The Comic Strip Conversations**

<u>**Comic Strip Conversation 1**</u>



<u>**Written Scenario 1**</u>

| | |
|---|---|
| **John**: Kyle, we are going to have so much fun playing my new game, Kingdom of Hearts 3!<br><br>**Kyle**: (sad facial expression and quiet) | **John**: We will take turns.  I will go first. (John begins to play his video game)<br><br>**Kyle**: (sitting on the couch, quiet and gloomy)<br><br>**John**: This is my favorite world! (Not paying attention to his friend's mood) |
| **John**: It's your turn to play<br><br>**Kyle**: I am sorry John, but I don't feel like playing today…<br><br>**John**: Why? You love playing video games!<br><br>**Kyle**: My dog just died… | **John**: He is thinking, "what should I say to comfort him?" |

## Comic Strip Conversation 2



## Written scenario 2

| | |
|---|---|
| **Lizzie**: Daddy, can I visit my friend in the hospital?<br><br>**Dad**: Of course, I will take you today! | **Dad**: What happened your friend?<br><br>**Lizzie**: He got into an accident playing basketball.<br><br>**Dad**: Oh no! I am happy you are visiting him. Good friends support their friends, especially in a time of need. |
| **Nurse**: you can come in now<br><br>**Lizzie**: Hi Charles! How are you feeling?? | **Lizzie**: I am so sorry this happened to you. I hope you feel better.<br><br>**Charles**: I am feeling fine… I just have a little bit of pain. |

**Appendix D: Data Collection Sheet**

| Verbal Empathetic Response | | | | | | |
|---|---|---|---|---|---|---|
| **Rating:** | **0**<br>No Attention or Absence of the verbal Response | **1**<br>Verbal Confirmatory Response | **2**<br>Relevant Response | **3**<br>Empathetic Response | **4**<br>Empathetic expression associated with pro-social response, or relevant response. | **Score:** |
| | | | | | | |
| Non-verbal empathetic response | | | | | | |
| **Rating:** | **0**<br>No Attention or flat affect | **1**<br>Nonverbal Confirmatory Response | **2**<br>Mild Concern (1 Attribute) | **3**<br>Moderate Concern (2 Attributes) | **4**<br>Strong Concern (3 Attributes) | **Score:** |
| | | | | | | |
| Attribute displayed | | | | | | |
| **Rating:** | **Gesture** | **Facial Expression** | **Tone of Voice** | **Score:** | | |
| | | | | | | |

**Appendix E. RAISD Assessment**


**<u>Reinforcement Assessment for Individuals with Severe Disabilities (RAISD)</u>**

*The purpose of this structured interview is to get as much specific information as possible from the informants (e.g., teacher, parent, caregiver) as to what they believe would be useful reinforcers for the student. Therefore, this survey asks about categories of stimuli (e.g., visual, auditory, etc.). After the informant has generated a list of preferred stimuli, ask additional probe questions to get more specific information on the student's preferences and the stimulus conditions under which the object or activity is most preferred (e.g., What specific TV shows are his favorite? What does she do when she plays with a mirror? Does she prefer to do this alone or with another person?)*

We would like to get some information on _____ preferences for different items and

1. Some children really enjoy looking at things such as a mirror, bright lights, shiny objects, spinning objects, TV, etc. What are the things you think _____ most likes to watch?

   _____

   Response(s) to probe questions:

   _____


2. Some children really enjoy different sounds such as listening to music, car sounds, whistles, beeps, sirens, clapping, people singing, etc. What are the things you think _____ most likes to listen to?

   _____

   Response(s) to probe questions:

   _____


3. Some children really enjoy different smells such as perfume, flowers, coffee, pine trees, etc. What are the things you think _____ most likes to smell?

   _____

   Response(s) to probe questions:

   _____


4. Some children really enjoy certain food or snacks such as ice cream, pizza, juice, graham crackers, McDonald's hamburgers, etc. What are the things you think _____ most likes to eat?

   _____

   Response(s) to probe questions:

   _____

activities.

5.  Some children really enjoy physical play or movement such as being tickled, wrestling, running, dancing, swinging, being pulled on a scooter board, etc. What activities like this do you think _____ most enjoys?

    _____

    Response(s) to probe questions:

    _____

6.  Some children really enjoy touching things of different temperatures, cold things like snow or an ice pack, or warm things like a hand warmer or a cup containing hot tea or coffee. What activities like this do you think _____ most enjoys?

    _____

    Response(s) to probe questions:

    _____

7.  Some children really enjoy feeling different sensations such as splashing water in a sink, a vibrator against the skin, or the feel of air blown on the face from a fan. What activities like this do you think _____ most enjoys?

    _____

    Response(s) to probe questions:

    _____

8.  Some children really enjoy it when others give them attention such as a hug, a pat on the back, clapping, saying "Good job", etc. What forms of attention do you think _____ most enjoys?

    _____

    Response(s) to probe questions:

    _____

9.  Some children really enjoy certain toys or objects such as puzzles, toy cars, balloons, comic books, flashlight, bubbles, etc. What are _____'s favorite toys or objects?

    _____

    Response(s) to probe questions:

    _____

10. What are some other items or activities that _____ really enjoys?

    _____

Response(s) to probe questions:

After completion of the survey, select all the stimuli that could be presented or withdrawn contingent on target behaviors during a session or classroom activity (e.g., a toy could be presented or withdrawn, a walk in the park could not). Write down all of the specific information about each selected stimulus on a 3" x 5" index card (e.g., likes a female adult to read him the 'Three Little Pigs' story.) Then have the informant(s) select the 16 stimuli and rank order them using the cards. Finally, list the ranked stimuli below.

1. _____    9. _____

2. _____    10. _____

3. _____

4. _____

5. _____

6. _____

7. _____

8. _____

Notes:

**Appendix F. Parent Interview of Social Functioning Questionnaire**

# Parent Interview of Social Functioning

## Social Functioning

1. How many friends does your child have? If none, does he express an interest in having friends? Has he ever had friends?

   a. How many close friends?

   b. Describe their relationship

   c. Does he prefer playing with younger children rather than peers?

   d. Does he appear more comfortable interacting with adults rather than peers?

2. How does your child play with other children?

   a. Does he join in games with other children?

   b. Does he ask others to join him?

   c. Does he have trouble taking turns?

3. How does your child typically display his emotions?

   a. Are they appropriate to the situation?

   b. Does your child exhibit fear or distress regarding social interactions?

   c. Does he avoid social situations?

4. Describe his eye contact during social interactions. Does he maintain eye contact? If not, what does he look at?

5. Does your child appear argumentative when disagreeing with others?

6. Does he often say things that are "taken the wrong way" by others?

## Social Communication

1. Does your child ask many questions?

   a. To request something (tangible item)?

   b. To request assistance?

c. To request information about a topic?

d. To request information about a person?

2. How would you describe the tone of your child's voice?

a. Different from that of other children?

3. How would you describe your child's ability to engage in conversations?

a. Are they one-sided or do they involve give and take?

b. Does he have difficulty shifting topics in conversations?

c. Does he initiate interactions? What do these initiations look like?

## *Interests*

1. What are your child's interests?

a. How often does he talk about or engage in these interests?

2. Does your child have difficulty transitioning from one activity to another?

a. Difficulty starting a task?

b. Difficulty finishing?

3. Does your child have any play behaviors that are different from those of other children his age? Describe.

4. Does your child have any repetitive behaviors (hand flapping, rocking, spinning, etc.)?

5. Does your child have any sensory sensitivities that interfere with social interactions (sounds, visual, tactile, smells, taste)?

## *Other Important Questions*

1. What are your child's strengths?

2. What are your goals (short and long term) for your child?

3. What do you see as the biggest obstacle to your child establishing social relationships?

# Appendix G. The Children's Empathy Quotient and Systemizing Quotient Form

## Child EQ-SQ Questionnaire

*Please complete by ticking the appropriate box for each statement*

| | | Definitely Agree | Slightly Agree | Slightly Disagree | Definitely Disagree |
|---|---|---|---|---|---|
| 1. | My child likes to look after other people. | | | | |
| 2. | My child often doesn't understand why some things upset other people so much. | | | | |
| 3. | My child doesn't mind if things in the house are not in their proper place. | | | | |
| 4. | My child would not cry or get upset if a character in a film died. | | | | |
| 5. | My child enjoys arranging things precisely (e.g. flowers, books, music collections). | | | | |
| 6. | My child is quick to notice when people are joking. | | | | |
| 7. | My child enjoys cutting up worms, or pulling the legs off insects. | | | | |
| 8. | My child is interested in the different members of a specific animal category (e.g. dinosaurs, insects, etc). | | | | |
| 9. | My child has stolen something they wanted from their sibling or friend. | | | | |
| 10. | My child is interested in different types of vehicles (e.g. types of trains, cars, planes, etc). | | | | |
| 11. | My child does not spend large amounts of time lining things up in a particular order (e.g. toy soldiers, animals, cars). | | | | |
| 12. | If they had to build a Lego or Meccano model, my child would follow an instruction sheet rather than "ploughing straight in". | | | | |
| 13. | My child has trouble forming friendships. | | | | |
| 14. | When playing with other children, my child spontaneously takes turns and shares toys. | | | | |
| 15. | My child prefers to read or listen to fiction rather than non-fiction. | | | | |
| 16. | My child's bedroom is usually messy rather than organised. | | | | |
| 17. | My child can be blunt giving their opinions, even when these may upset someone. | | | | |
| 18. | My child would enjoy looking after a pet. | | | | |
| 19. | My child likes to collect things (e.g. stickers, trading cards, etc). | | | | |
| 20. | My child is often rude or impolite without realising it. | | | | |

| | | Definitely Agree | Slightly Agree | Slightly Disagree | Definitely Disagree |
|---|---|---|---|---|---|
| 21. | My child knows how to mix paints to produce different colours. | | | | |
| 22. | My child would not notice if something in the house had been moved or changed. | | | | |
| 23. | My child has been in trouble for physical bullying. | | | | |
| 24. | My child enjoys physical activities with set rules (e.g. martial arts, gymnastics, ballet, etc). | | | | |
| 25. | My child can easily figure out the controls of the video or DVD player. | | | | |
| 26. | At school, when my child understands something they can easily explain it clearly to others. | | | | |
| 27. | My child would find it difficult to list their top 5 songs or films in order. | | | | |
| 28. | My child has one or two close friends, as well as several other friends. | | | | |
| 29. | My child quickly grasps patterns in numbers in maths. | | | | |
| 30. | My child listens to others' opinions, even when different from their own. | | | | |
| 31. | My child shows concern when others are upset. | | | | |
| 32. | My child is not interested in understanding the workings of machines (e.g. cameras, traffic lights, the TV, etc). | | | | |
| 33. | My child can seem so preoccupied with their own thoughts that they don't notice others getting bored. | | | | |
| 34. | My child enjoys games that have strict rules (e.g. chess, dominos, etc). | | | | |
| 35. | My child gets annoyed when things aren't done on time. | | | | |
| 36. | My child blames other children for things that they themselves have done. | | | | |
| 37. | My child gets very upset if they see an animal in pain. | | | | |
| 38. | My child knows the differences between the latest models of games-consoles (e.g. X-box, Playstation, etc.,) or other gadgets. | | | | |
| 39. | My child remembers large amounts of information about a topic that interests them (e.g. flags of the world, football teams, pop groups, etc). | | | | |
| 40. | My child sometimes pushes or pinches someone if they are annoying them. | | | | |

| | | Definitely Agree | Slightly Agree | Slightly Disagree | Definitely Disagree |
|---|---|---|---|---|---|
| 41. | My child is interested in following the route on a map on a journey. | | | | |
| 42. | My child can easily tell when another person wants to enter into conversation with them. | | | | |
| 43. | My child is good at negotiating for what they want. | | | | |
| 44. | My child likes to create lists of things (e.g. favourite toys, TV programmes, etc). | | | | |
| 45. | My child would worry about how another child would feel if they weren't invited to a party. | | | | |
| 46. | My child likes to spend time mastering particular aspects of their favourite activities (e.g. skate-board or yo-yo tricks, football or ballet moves). | | | | |
| 47. | My child finds using computers difficult. | | | | |
| 48. | My child gets upset at seeing others crying or in pain. | | | | |
| 49. | If they had a sticker album, my child would not be satisfied until it was completed. | | | | |
| 50. | My child enjoys events with organised routines (e.g. brownies, cubs, beavers, etc). | | | | |
| 51. | My child is not bothered about knowing the exact timings of the day's plans. | | | | |
| 52. | My child likes to help new children integrate in class. | | | | |
| 53. | My child has been in trouble for name-calling or teasing. | | | | |
| 54. | My child would not enjoy working to complete a puzzle (e.g. crossword, jigsaw, word-search). | | | | |
| 55. | My child tends to resort to physical aggression to get what they want. | | | | |

References:
B. Auyeung, S. Wheelwright, C. Allison, M. Atkinson, N. Samarawickrema, S. Baron-Cohen, (2009)
**The Children's Empathy Quotient and Systemizing Quotient: Sex Differences in Typical Development and in Autism Spectrum Conditions**
Journal of Autism and Developmental Disorders Online: 17 June 2009

**Appendix H. Examples of the Baseline Acting Scenarios**

| Emotional Domain | Scenario Description |
|---|---|
| 1. Happiness | You walk into the room with a birthday present in your hands. You are very excited and sit down next to the participant and place the gift on the table. You exclaim, "today is my birthday and I just received a gift from my mom!" You open the present rapidly in excitement and state, "Wow, she got me a new video game!" with an excited facial expression and tone. |
| 2. Sadness | When you first enter the room, you state that you are expecting a text message from one of your friends. During playtime, you receive a negative text message and you state "oh that's a shame, I won't be able to play video games with my friends tonight" along with a sad facial expression and tone. |
| 3. Pain | When you are passing the table to go play with the participant, you hit your leg against the table or chair and fall. You complain that you are in pain ("Ouch") and how you are feeling by describing pain and grabbing your leg ("my leg hurts"+ holding/ massaging leg) and having a facial expression indicating pain. |

**Appendix I. Parent Letter For Generalization Probe**

<u>**Generalization Scenarios**</u>

Dear Parents,

We are trying to capture your child's response to social situations that evoke an empathetic response outside of the clinical setting. Below are three different scenarios that we would like for you to act out in front of your child then rank your child's response to each scenario. Upon completion, please send the ranking forms back to us so we can assess your child's responses.

Three different situations are explained below. Please act out the situations and describe how your child responded to each given situation. Assessment of the child's response will be based on the attached rating scales, which contain five distinctive levels of verbal and non-verbal responses. In addition to rating the child's behavior, please write down the verbal response displayed by your child and latency (the amount of time between the end of the acting situation and the child's response).

1. You tell your child disappointedly that you will not be able do your favorite activity, attend an event or meet somebody. Your child knows that missing this event or activity will be hard on you. Also, during this exercise, you can explain how you feel ("I feel sad/ disappointed that…").

2. You tell your child excitingly that you received something special, that you are going to do your favorite activity, attend a special event, or meet somebody. Your child knows that receiving this special item or doing this event/ activity will be very exciting for you. During this exercise, you can also explain how you feel ("I feel happy/ excited that…").

3. You are putting up decorations for the holiday (a Christmas tree, hanging garland, etc) and you hit your hand/head and exclaim in pain that you are hurt. When the "pretend" accident occurs, explain to the child how you feel ("That hurts, my hand is in pain", etc.).

In all situations, sad, happy and pain please have your husband and/or wife observe the scenario then rate your child's response(s) to the situations. Please try to act out one scenario situation per day. For example, Happiness scenario on Friday, Sad scenario on Saturday and Pain scenario on Sunday then save each ranking form and send it back to us as attachment LGKane@MissouriState.edu and SamiK321@live.MissouriState.edu

Thank you so much for providing this opportunity to work with your child.
It has been our pleasure!!

All the best,
Dr. Garrison-Kane and Khalifah Aldughaysh

**Appendix J.  Treatment Integrity Checklist**

(Treatment Integrity Checklist)

Participant:                              Session  #:                          Date:

| | |
|---|---|
| Direct the participant to sit properly in his/her chair | Yes/No |
| Instructor sits to the left of the child, slightly behind the participant | Yes/No |
| Deliver token and behavior specific praise for sitting appropriately | Yes/No |
| Introduce the comic strip with brief overview | Yes/No |
| Read the comic strip with appropriate tone, reflecting various emotional states | Yes/No |
| Read the comic strip pointing out the facial expressions within the comic | Yes/No |
| Deliver token and behavior specific praise for good listening | Yes/No |
| Instruct the child to read the comic with their preferred reading method | Yes/No |
| Deliver token and behavior specific praise for reading | Yes/No |
| Assessed the participant comprehension and understanding of the comic strip with a variety of questions | Yes/No |
| Deliver token and behavior specific praise for answering comprehension questions | Yes/No |
| Role play (act) the comic strip with the child (instructor is the one displaying empathetic response) | Yes/No |
| Deliver token and behavior specific praise for engaging in role play | Yes/No |
| Role play (act) the comic strip with the child (participant is the one displaying empathetic response) | Yes/No |
| Provided the student with token and specific praise for engaging in role, modeling empathetic response, and using appropriate tone, facial expression, and gestures | Yes/No |
| Total number of completed steps | / |
| Percentage | |

**Appendix K-1. The Modified Verbal Empathetic Responding Rating Scale**

| Scale Point | Response Label | Topography of Behavioral Response |
|---|---|---|
| 0 | Absence of the verbal empathetic response | Participant pays no attention, pays attention but remains silent or gives an irrelevant verbal response ("asking when he/she will have access to toys") and/ or inappropriate verbal response (" I don't care"). |
| 1 | Verbal confirmatory response | Participant says a simple word or any vocalization to indicate that he/she receives or possibly understands the situation ("Oh", "Okay", " Really"). |
| 2 | Relevant verbal response | The participant says a response that seeks to relate to the situation such as ("My dog died last year as well") or wondering ("How could this happen"), or questioning the social event ("What happened"). However, the verbal response lacks an empathetic reference, which reflect others' emotional state. |
| 3 | Verbal empathetic response or pro-social behavior | Participant verbally articulates whether the empathetic expression or pro-social response that is socially appropriate to the situation to display concern. |
| 4 | Verbal empathetic response associate with other components | The participant not only exhibits the empathetic expression but also extends the verbal response to include one or more of the following a pro-social behavior, relatedness, and relevant verbal response. |

**Appendix K-2. The Modified Non-Verbal Empathetic Responding Rating Scale**

| Scale Point | Response Label | Topography of Behavioral Response |
| --- | --- | --- |
| 0 | Absence of the nonverbal empathetic response | Participant pays no attention, pays attention but displays flat affect, or displays inappropriate nonverbal response ("smile when someone is hurt"). |
| 1 | Non-verbal confirmatory response | Participant might nod to indicate that he/she receives or possibly understands the situation. |
| 2 | Mild concern | Participant displays one out of three-targeted nonverbal attributes (facial expression, tone of voice, and gesture) at any moment of the response period. |
| 3 | Moderate concern | Participant displays two out of the three-targeted nonverbal attributes at any moment of the response period. |
| 4 | Strong concern | Participant displays three out of the three-targeted nonverbal attributes throughout the entire response period. |