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Using Two Formats of a Social Story to Increase the Social-Communication Skills of Three Adolescents with Autism Spectrum Disorders

Nicole A. Anthony
Old Dominion University

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Running Head: SOCIAL STORIES

Using two formats of a social story to increase the social-communication skills of three
adolescents with autism spectrum disorders

by

Nicole A. Anthony
Bachelor of Arts, August 1999: Norfolk State University
Master of Science, February 2004: Touro College

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Approved by:

Robert A. Gable (Committee Chair)

Dr. Alisa Lowrey (Member)

Dr. Jonna Bobzien (Member)

SOCIAL STORIES

ABSTRACT

USING TWO FORMATS OF A SOCIAL STORY TO INCREASE THE SOCIAL- COMMUNICATION SKILLS OF THREE ADOLESCENTS WITH AUTISM SPECTRUM DISORDERS

Nicole A. Anthony

Old Dominion University, 2014

Chair: Dr. Robert A. Gable

An alternating treatment design was used to compare the effects of two interventions on the initiations and on-topic responses of three adolescents with autism spectrum disorders. The interventions were participant specific social stories on an iPad and in paper format, both of which occurred in an after-school setting. Results indicated two participants increased the number of initiations and on-topic responses during gaming sessions over baseline levels. In addition, all three children generalized targeted skills to another typical peer while playing the same game introduced during baseline. Implications for current educational practices are addressed and directions for future research are discussed.

Key Words

Autism, ASD, social-communication, social stories, technology

Dedication

My dissertation is dedicated to my son Miyka-EL Elijah William Anthony. If it were not for you, none of this would have come to fruition.

Acknowledgments

First, I would like to thank my committee for their editing, suggestions, and support throughout the dissertation process. I would also like to thank my family especially my mom. Mom, you taught me how to be persistent when faced with adversity and I truly thank you for that life lesson. Finally, thank you to all the families who participated in my study. I know your struggle, and I promise to continue my research in the area of autism because our children deserve the best possible life☺.

TABLE OF CONTENTS

	Page
LIST OF FIGURES.....	vii
CHAPTER 1: RESEARCH JOURNAL ARTICLE SUBMISSION DRAFT.....	1
CHAPTER 2: REVIEW OF THE LITERATURE	
Introduction.....	59
Literature Synthesis and Identification of Empirical Gaps.....	66
Studies that Used Social Stories in a Traditional Paper Format to Remediate Social Communication Deficits of Adolescents with ASD.....	66
Technology Use in the Delivery of Social Stories.....	71
CHAPTER 3: METHOD	
Participants.....	73
Setting.....	79
Materials.....	80
Experimental Design.....	81
Independent and Dependent Variable.....	82
Data Collection	83
Procedures.....	84
Inter-observer Agreement.....	88
Fidelity of implementation & Social Validity.....	89
Data Analysis.	90
CHAPTER 4: RESULTS	
Participant Data.....	90
Social Validity Data.....	96
Nonoverlap of All Pairs Data.....	97
CHAPTER 5: DISCUSSION	
Summary of Findings... ..	98
Limitations.....	104
Implications and Recommendations for Future Study.....	106
Conclusion.... ..	108
REFERENCES.....	109
APPENDIXES	
A. Social Story Format.....	119
B. Social Story Guidelines.....	120

C. Social Stories for Participants 1,2,&3.....121

D. Transcription of Initiation Topics, Responses, and Selected Phrases from
Gaming Sessions for Each
Participant.....124

E. Procedural fidelity checklist.....139

F. Parent Social Validity
Questionnaire.....141

G. Participant Social Validity
Questionnaire.....143

H. Peer Social Validity
Questionnaire.....143

VITA.....144

List of Figures

Figure	Page
1. Participant 1's percentage of verbal initiations during baseline, comparison (Electronic and Paper format), and follow-up phases.....	91
2. Participant 1's percentage of on-topic responses during baseline, comparison (Electronic and Paper format), and follow-up phases.....	92
3. Participant 2's percentage of verbal initiations during baseline, comparison (Electronic and Paper format), and follow-up phases.....	92
4. Participant 2's percentage of on-topic responses during baseline, comparison (Electronic and Paper format), and follow-up phases.....	94
5. Participant 3's percentage of verbal initiations during baseline, comparison (Electronic and Paper format), and follow-up phases.....	95
6. Participant 3's percentage of on-topic responses during baseline, comparison (Electronic and Paper format), and follow-up phases.....	96

CHAPTER I

RESEARCH JOURNAL ARTICLE SUBMISSION DRAFT

Introduction

Children with autism spectrum disorders (ASD) represent a heterogeneous group who differ in cognitive abilities, yet share core deficits to varying degrees, in interests, communication, and socialization (Kokina & Kern, 2010). Although they share these core deficit areas, poor social functioning is considered the defining characteristic of ASD (Hochdorfer-Hanley, Bray, Kehle, & Elinoff, 2010). Usually, social differences are evident during infancy. As infants and toddlers, individuals with ASD smile and vocalize less than their peers without ASD and often do not respond when their name is called (Fodstad, Matson, Hess, & Neal, 2009). In play situations, toddlers with ASD often play either beside another child or in isolation while fixating on a toy or object for an uncommonly long amount of time (Jones & Schwartz, 2008). Also, bids for responses during social interactions with parents or caregivers go unnoticed due to fleeting eye gaze or a lack of interest in presented stimuli (Jones & Schwartz, 2008). Indeed, Jones and Schwartz (2008), found that three-seven year old children with ASD initiated and responded less to familial bids for social interactions in comparison to their same age typical peers.

The lack of effective social-communication skills in early childhood can compromise social-communication patterns as children age and enter middle and high school settings (Koegel, Vernon, & Koegel, 2009; Orsmond, Shattuck, Cooper, Sterzing, & Anderson, 2013). When given the opportunity to socialize with classmates, individuals

with ASD may hesitate to enter conversations due to the inability to appropriately initiate contact with peers. For instance, when interviewing seven ten-14 year olds with ASD, Daniel and Billingsley (2010) asserted that the adolescents had a difficult time initiating contact with typical peers in school even though they wanted to build relationships with them.

While some symptoms of ASD may abate during adolescence, individuals with ASD will exhibit some problems with communicating in social situations throughout their entire life (Kouch & Mirenda, 2003; Levy & Perry, 2011; Orsmond et al., 2013). Whereas, neurotypical adolescents may instinctually distinguish what type of communication is suitable in different social settings, individuals with ASD often find social settings confusing and are unaware of how to respond to what is occurring around them (Kouch & Mirenda, 2003; Ozdemir, 2008; Quirembach, Lincoln, Feinberg-Gizzo, Ingersoll, & Andrews, 2008). Not being able to communicate appropriately in social situations can isolate adolescents with ASD from their neurotypical peers and hinder their chances of maintaining positive peer relationships in and outside of the classroom (Anderson, Shattuck, Cooper, Roux, & Wagner, 2013; Hochdorfer-Hanley et al., 2010; More, 2008). Moreover, the inability to socialize can compromise dating relationships and marginalize job opportunities (Levy & Perry, 2011). Because of the social-communication differences displayed by individuals with ASD, educators need more strategies to effectively prepare adolescents with ASD for social experiences within school and in their personal life. One intervention that has been used to address these social-communication deficits is social stories.

Social Stories

Social stories are inexpensive teaching tools that reflect an individual's perspective regarding different social situations (Gray, 2000; Gray, 2004; More, 2008). Social stories are short written narratives that provide the child with precise social information and language about an activity or event, a description of the possible reactions of others, and appropriate responses he or she could provide in a given social situation (Gray, 2004; Hochdorfer-Hanley et al., 2010; Reynhout & Carter, 2007). Social stories tend to be a positive intervention for individuals with ASD because it provides very specific examples of scripting. Scripting involves developing phrases an individual is expected to say in a given situation then, with prompts, the person is taught the script (Dotto-Fojut, Reeve, Townsend, & Progar, 2011; Ganz et al., 2012). Studies have shown that social stories can be used as a sole intervention or part of a treatment package to initially promote or increase the social-communication skills of young children with ASD (Delano & Snell, 2006; Sansosti & Powell-Smith 2008; Scattone, 2008; Scattone, Tingstrom, & Wilczynski, 2006; Scattone, Wilczynski, Edwards, & Rabian, 2002) For example, Delano and Snell (2006) conducted a study using a multiple-probe-across-participants design to evaluate the effect of social stories, as a sole intervention, on the frequency of verbal initiations and on-topic responses of two, six-year olds and one, nine-year old with ASD as they played with their neurotypical peers. During intervention, Delano and Snell (2006) read skill specific social stories to participants with ASD and their neurotypical play partners before scheduled play sessions. After 15 intervention sessions, researchers faded the social story to see if skills would be maintained above baseline levels. In addition, throughout the study, Delano and Snell (2006) probed to determine if participants with ASD generalized skills taught to novel peer play partners.

Results from the study suggested that the frequency of social initiations and the duration of social engagement were maintained above baseline levels for all participants and across neurotypical peers (Delano & Snell, 2006).

Social stories also have been used in combination with other interventions to address the social-communication skills of children with ASD. For instance, Kagohara and associates (2013) used a multiple baseline design to investigate the effectiveness of a social story and video model intervention package, delivered via an iPad, on the simple and complex greetings of two, ten year-olds with Asperger's Syndrome. Researchers operationally defined a simple greeting as, "Hello" or "Good morning" and a complex greeting as, "Hello, how are you?" In order for a greeting to be recorded, the student had to initiate the greeting within five seconds of a teacher or a member of the research staff entering the classroom (Kagohara et al., 2013). Observations of the targeted behavior occurred throughout the day. During baseline, neither participant initiated a greeting. When participants failed to initiate a greeting within five seconds, an adult greeted the participant in the appropriate way and prompted a response (Kagohara et al., 2013). For the video modeling phase, participants' watched cartoon depictions of two people meeting and greeting each other on the iPad. The social stories were also presented on the iPad. Once the social story intervention was introduced, the number of simple greetings made toward adults increased from zero to an average of eight per participant. When the video modeling phase was introduced, participants averaged nine simple greetings and 11 complex greetings per day. During the follow-up phase, participants averaged seven simple greetings and 14 complex greetings (Kagohara et al., 2013).

Likewise, Sansosti and Powell-Smith (2008) used a multiple-baseline across participants design to evaluate the effects of a combined social story and video model presented on an Apple iBook G4 laptop computer. Researchers wrote social stories targeting the ability to join in and maintain a conversation for three children, ages six-nine years old, with ASD. Before the participants went outside for recess, Sansosti and Powell-Smith (2008) had the participant's teachers implement the intervention once a day, five days a week for three weeks. Observations of the targeted behavior occurred during recess two times a week. Following the intervention phase, researchers faded the intervention package. Results from the study indicated that all three participants improved their ability to join in and maintain a conversation with neurotypical peers on the playground (Sansosti & Powell-Smith, 2008). During a two week follow-up, all three participants demonstrated maintenance of skills; however, only one participant was able to generalize skills taught to another play yard. Because many researchers have found social stories, as well as the use of scripting, to be effective in improving behaviors in children with ASD, these interventions have been classified as being evidence-based practices (National Professional Development Center on Autism Spectrum Disorders, 2014); however, current reviews of the social stories literature suggest that many of the studies reviewed contained flawed methodologies, lacked generalization probes, and used ineffective evaluation tools (e.g., Percentage of nonoverlapping data points (PND) vs. Nonoverlap of All Pairs (NAP) (Ali & Frederickson, 2006; Karkhaneh, Clark, Ospina, Seida, Smith, & Hartling, 2010; Kokina & Kern, 2010; Kuoch & Mirenda, 2003; Parker, Vannest, & Davis, 2011; Sansosti et al., 2004; Test, Richter, Knight, Fred & Spooner, 2011). Furthermore, the majority of the research reviewed has addressed deficits in

young children under the age of ten-years old resulting in a dearth of research on the use of using social stories for adolescents with ASD.

Technology Use in the Delivery of Social Stories

One way to fill an empirical gap in the literature in using social stories with adolescent aged students is to use technology as an intervention delivery model. For over ten years, there has been an upsurge in the use of computer-assisted technology to deliver therapeutic interventions to individuals with diverse needs (Mancil, Haydon, & Whitby, 2009; Wainer & Ingersoll, 2011). In the past, interventions using technology for students with ASD were limited to videotapes (Wainer & Ingersoll, 2011). Since video modeling is considered an evidence-based practice, current technological advances like the iPod, Kindle, and iPad have the potential to foster academic achievement, social understanding and effective social-communication skills of adolescents with ASD (Cihak, Kildare, Smith, McMahon, & Quinn-Brown, 2012; Hart, & Whalon, 2012).

Many researchers have suggested reasons why technology-based strategies may be particularly effective with adolescents with ASD. For instance, Mazurek, Shattuck, Wagner, and Cooper (2012) found that among a sample of 920 adolescents, ages 13-17 years, with ASD, 64.2% of the individuals surveyed spent most of their time engaging in screen-based activities (e.g., T.V., videos, and electronic or video games). Moreover, when compared to other disability categories (e.g., speech/language impairment, learning disabilities, intellectual disabilities), rates of nonsocial-media use were higher among the ASD group (Mazurek et al., 2012). In a similar study, Shane and Albert (2008) examined the usage patterns of screen-based media for 89 children, ages six-17 years, with ASD.

The results indicated that children with ASD spent most of their spare time engaged in screen-based activities (e.g., television, video, and computer games; Shane & Albert, 2008). Assuming these findings are representative, one can say that some individuals with ASD have a predilection for technology driven devices. This preference has lead researchers to develop technology-based strategies that address social-communication deficits; however, an exhaustive review of the published literature failed to uncover any studies that combined social stories and technology like the iPad to increase the social-communication skills of adolescents over the age of 11-years old with ASD. Based on the modest body of accumulated research, social stories delivered via traditional methods (e.g., paper) and electronic formats (e.g., computer) appear to hold promise as an effective intervention tool for individuals with ASD; however, the effectiveness of social stories delivered on an iPad for adolescents with ASD to improve their social-communication skills when interacting with neurotypical peers is essentially unknown. This study was designed to explore this identified gap in the literature.

Given the dearth of research on the adolescent level, the purpose of this study was to examine the efficacy of using social stories presented in two formats as an intervention to improve verbal initiations and on-topic responses in adolescents, ages 11-14 years, with ASD. Specifically, there were three research questions examined:

- 1) Will the use of a written, student-specific social story delivered on an iPad immediately preceding a 30-minute leisure activity with a participant selected game played with an a neurotypical peer increase the verbal initiations and on-topic responses of three adolescents with ASD?

- 2) Will the use of a written, student-specific social story delivered in a traditional paper format immediately preceding a 30-minute leisure activity with a participant selected game played with a neurotypical peer increase the verbal initiations and on-topic responses of three adolescents with ASD?
- 3) Will the effects of the intervention be maintained and generalized to another play partner while playing the same game?

METHOD

Participants

Three adolescents, with an existing diagnosis of an ASD, were selected from 2 local public schools in the southern region of the United States to participate in this study. Parental consent and participant assent were obtained for each participant. Participants were between the ages of 11 and 14-years old and were capable of communicating using speech. Two participants were members of self-contained classroom, while the other participant attended inclusion classes. All participants were recruited from the local branch of the Autism Society of America (ASA) during one of the monthly tween socials. As compensation for participation the study, participants with ASD received weekly gift cards that did not exceed \$100 in total. Gift cards were in increments of \$10, \$15, and \$20 and were given after each full week of participation. Parental permission was obtained prior to giving out gift cards.

The neurotypical peers chosen were heterozygous twin brother and sister, age 14-years old, who were in ninth grade at a local public high school. Peer 1 and Peer 2 participated as volunteer partners at ASA socials. Peer 1 and Peer 2 also have an older

brother with a diagnosis of ASD; therefore, they were familiar with the unique characteristics of adolescents with this disorder. Parental consent was obtained for each peer. Peer 1 interacted with participants during prebaseline activities, baseline, intervention, and maintenance phases and received \$50 weekly for his participation in the study. Peer 2 participated during generalization and received \$25 for her participation during the generalization phase.

Participant 1, was a 13-year old, eighth grade, African-American male and a member of a middle school self-contained special education classroom. Although Participant 1 was a part of a self-contained classroom, he did attend science, social studies, and physical education with his typical peers on a weekly basis. Triennial assessments dated within the past year indicated that Participant 1's composite intelligence index, as measured by the Reynolds Intelligence Assessment Scales (RIAS; Reynolds & Kamphaus, 2003), was 80. Participant 1 obtained a 70 on the verbal index and a score of 94 on the nonverbal index. His scores on the Woodcock-Johnson III Tests of Achievement (WJ-III; Woodcock, McGrew, & Mather, 2001) yielded a broad reading score of 63, a broad math score of 35, and a broad written language score of 69. Since Participant 1 was able to read and comprehend reading material above third grade level, he read his social story independently. In addition, during that time, Participant 1's mother completed the Autism Spectrum Ratings Scales (ASRS; Goldstein & Naglieri, 2010). On the ASRS assessment, Participant 1 obtained a T score of 69 and a percentile rank of 97 for meeting the DSM-IV diagnostic criteria for Autism. While completing the assessment, Participant 1's mother reported that he engaged in the use of atypical language and exhibited stereotypical behaviors. She also noted that Participant 1 was

sensitive to visual and auditory stimuli. SCQ-Current (Rutter, Bailey, & Lorde, 2003) results indicated that Participant 1 had difficulty with conversational skills and did not initiate or maintain conversations with others unless it related to a topic of interest. When a person would try to engage him in a conversation, Participant 1's mother reported, he would either say, "I don't know," shake his head, or give a one word response. To encourage socialization, Participant 1 attended monthly tween socials organized by a local ASD support group.

Participant 2, was an 11-year-old, fifth grade, Asian American male. He was a member of an elementary school self-contained special education classroom due to his academic functioning and comorbid diagnosis of Autism and ADHD; however, he did participate in physical education with neurotypical children during the school week. According to triennial assessments dated within the past three years, Participant 2's composite intelligence index, as measured by the Stanford Binet Intelligence Scales-Fifth Edition (Roid, 2003), was 50. Participant 2 obtained a score of 52 on the verbal index and a score of 53 on the nonverbal index. In contrast, during an independent evaluation at a local hospital, Participant 2 obtained a full-scale composite index of 72 for overall cognitive ability as measured by the Comprehensive test of Nonverbal Intelligence-Second Ed. (CTONI-2; Hammill, Pearson, & Wiederholt, 2009). This is a 21-point discrepancy between two nonverbal norm referenced indices which is very atypical. It could be that Participant 2's overall intelligence was underestimated during triennial testing. Participant 2's scores on the Kaufman Test of Achievement-2nd Edition (KTEA-II; Kaufman & Kaufman, 2004) yielded a reading composite score of 69, a mathematics composite score of 54, and a written language composite score of 65. Participant 2's

ADHD dual diagnosis impaired his ability to focus on reading the social story independently, so his was read to him by the primary researcher or research assistant. On the SCQ-Current (Rutter, Bailey, & Lorde, 2003), Participant 2's mother commented that he did not initiate conversations appropriately (e.g., would ask rapid repetitive questions and not wait for responses) nor maintain conversations with others unless it was relating to a perseverative interest (e.g., playing a tuba). When a person would try to engage Participant 2 in a conversation, Participant 2's parents' reported, he would either shrug his shoulders or shake his head "no" until someone explained the question to him. In an effort to improve academic performance and socialization, Participant 2 received Applied Behavior Analysis (ABA) therapy after school and engaged in several extracurricular activities like violin and piano lessons, as well as attending monthly tween socials organized by a local ASD support group.

Participant 3, was a 13-year-old, seventh grade, Caucasian male. Participant 3 attended the same middle school as Participant 1, but he participated in three inclusion classes (i.e. English, algebra, and reading) in addition to general education science, social studies, and physical education without assistance from a special education teacher.

Triennial psychological assessments indicated Participant 3's composite intelligence index, as measured by the Wechsler Intelligence Test for Children-Fourth Edition (WISC-IV; Wechsler, 2003), was 85. Participant 3 obtained a 70 on the verbal index and a score of 94 on the nonverbal index. His scores on the Woodcock-Johnson III Tests of Achievement (WJ-III; Woodcock, McGrew, & Mather, 2001) yielded a broad reading score of 92, a broad math score of 95, and a broad written language score of 103. Due to testing, it was determined that Participant 3 was able to read and comprehend

reading material on grade level, so he read his social story independently. During the time of testing, the Childhood Autism Ratings Scales (CARS; Schopler, Reichler, & Renner, 1986) was completed. On the CARS assessment, Participant 3 obtained a T score of 30 which placed him within the mildly-moderately autistic range. SCQ-Current results (Rutter, Bailey, & Lorde, 2003) revealed Participant 3 was very quiet and relied on scripted initiations when interacting with people. For example, during an interview with Participant 3's mother she commented that he would ask, "How was your day?" several times within an interaction even after receiving a response. She felt that he did not know what to say next in the conversational exchange. When a person attempted to engage Participant 3 in a conversation, Participant 3's mother reported, he would either shrug his shoulders or shake his head in the affirmative or negative. He participated in several after school activities such as bowling, gaming competitions, and church socials, as well as monthly tween socials organized by a local ASD support group.

Setting

Pre-baseline, baseline, intervention, maintenance, and generalization sessions were conducted on the campus of a local university in the Child Study Center. Within the Child Study Center (CSC) there is a Speech and Hearing Clinic, an Oral Preschool Program, and three general education preschool classrooms that service typical children, ages three-six years old, from the surrounding community.

The study was conducted on the first floor of the CSC. The conference room and multi-purpose room were used for the gaming sessions. An assistant professor office was where the participants read the social story intervention. Participants sat in chairs at long

rectangular tables, directly across from each other with the gaming activity placed between them. During prebaseline, baseline, intervention sessions, maintenance, and generalization sessions participants engaged in interactive game playing using Monopoly. A digital camera with tripod was used to record all gaming sessions.

Materials

Prior to the initiation of game play, the participants with ASD read a person-specific, individualized social story, developed according to Gray's (2004) format (See Appendix A), delivered either via an iPad format or book format. Each social story provided the participant with ASD several examples of appropriate social initiations and responses he was expected to make to his gaming partner during the game sessions. Although the method of delivery of the social story varied based on whether the participant was assigned to the paper or electronic condition, the structure of the social story was identical. There were two to five sentences with one to two pictures per page for a total of five pages. A social story checklist (Gray, 2004) was used to ensure that the specific guidelines for writing the social stories were followed (See Appendix B).

Electronic condition-iPad format. One iPad was used to introduce the social story during the electronic condition. The social story was presented via the iPad device using the StoryMaker™ application. Story Maker™ is an iPad application for creating and presenting social stories using pictures, text, and optional audio. The iPad was also used to take pictures of the participants while playing the game with the neurotypical peer during prebaseline. The pictures were then downloaded into the social story. There were two to five sentences with one to two pictures per page for a total of five pages.

Paper condition-book format. During the paper condition, participants read book bound social stories identical to the social stories presented in the electronic condition. The social stories that were created using the Story Maker™ application for each participant were sent via email to the primary researcher's. The social stories were then printed out on white paper using colored ink. After printing, each social story was compared to the electronic version for accuracy. Finally, each social story was laminated, and spiral bound to create a book.

Social-Communication Questionnaire Current. During pre-baseline, the Social-Communication Questionnaire Current (SCQ-Current; Rutter, Bailey, & Lorde, 2003) was completed by parents of participants with ASD. The SCQ-Current is a 40-item questionnaire developed to assess the behavior of individuals who are suspected of having an ASD (Schanding, Nowell, & Goin-Kochel, 2012). The SCQ-Current elicits information about reciprocal social interaction, language/communication, and repetitive and stereotyped behaviors that are currently present or have occurred within the past three months (Rutter, Bailey, & Lorde, 2003).

Experimental Design

A single subject, alternating treatment design (Gast, 2010), with maintenance and generalization probes, was used to complete this research study. Two social story conditions, paper and electronic, were alternated across participants with no more than two consecutive observations of the same condition (Gast, 2010). An alternating treatment design was most appropriate for this study because: (a) it provided a rapid method for evaluating two or more interventions or two variations of an intervention; (b) data patterns during the comparison phase can show which intervention is more effective

and, (c) differentiation in treatments can be accomplished with as little as five observations per condition (Gast, 2010). Counterbalancing the presentation of each condition across participants was arranged by using the coin flip method (Gast, 2010).

Independent variable. The independent variable was a five page, text and picture based social story uniquely tailored to each participant based on cognitive and communicative ability. Social stories were presented using two different methods, electronic and paper, to determine whether the use of either or both interventions positively impacted verbal initiations and on-topic responses of the participants with ASD. In this study, a social story was defined as a written short story that provided the participants with ASD precise social information and language about the game they played, including the possible reactions of others and examples of appropriate responses the participant could use in that social situation (Gray, 2004; Reynhout & Carter, 2007).

Dependent variables. There were two dependent variables in this study, verbal initiations and on-topic responses. Hochdorfer-Hanley and colleagues (2010) definition for verbal initiations was used in this study. *Participant verbal initiations* were defined as any unprompted question, comment or greeting made by the participant with ASD that was directed to the gaming partner (Hochdorfer-Hanley et al., 2010). Second, an *on-topic response* was defined as an appropriate response given immediately following the neurotypical peer's verbal comment, or initiation (e.g., "I like playing this game too!").

Data Collection Procedures

To reduce researcher bias, the primary researcher was not directly involved in the data coding procedure. Three masters' students were recruited from the local university

and trained as research assistants then tasked with coding pre-baseline, baseline, intervention, maintenance, and generalization sessions. To determine if social story conversational starters impacted participant's performance during gaming sessions, research assistants were also asked to transcribe the videos. They were tasked with identifying and writing down conversational topics, phrases, initiations, and on-topic responses made by participants while playing the game. The research assistants were also trained on individual participant verbal initiations and on-topic responses by observing each participant with ASD as they participated in prebaseline activities. Research assistants received a weekly stipend of \$100 for their services. Verbal initiations and on-topic responses demonstrated by each participant were summarized by the research assistants and summaries were compared for discrepancies. When the research assistants were able to demonstrate 90% agreement for two consecutive observation sessions, baseline sessions began.

Each session was recorded via a digital camera for the entire 30-minute scheduled gaming activity. The primary researcher and research assistants conducted videotaping once a day, four days a week for six weeks. The research assistants viewed and coded the first 15-minutes of the gaming sessions after the session concluded. Concerns during research meetings were raised regarding the neurotypical peers level of fatigue during gaming sessions overtime, so it was suggested that only the first 15-minutes of the gaming session were coded. An interval recording system was used to record the frequency of verbal initiations and on-topic responses for each participant. While watching the video of each gaming session, an audiotape cued the research assistants every ten seconds to record the occurrence of a targeted behavior. During each

observation of the video, observers marked each interval in which a verbal initiation or on-topic response occurred according to the aforementioned definitions. Data from the research was collected, graphed, and analyzed on a daily basis.

Procedures

Pre-baseline. Before baseline, participants with ASD and parents of participants with ASD, as well as neurotypical peers and their parents, signed assent and consent forms for the study. After signing all documentation, participants with ASD were told that at the end of each week, they would earn a gift card for participating in the study. Attrition was a concern due to the timing and duration of the study (between the hours of 4-7 pm for six weeks), so the primary researcher believed that participants with ASD would be more inclined to continue participation in the study if they earned a gift card at the end of each week. The gift cards were not used as a stimulus for communication; rather, they were used as a stimulus for participation.

Participants with ASD were assigned to time slots, between the hours of 4-7 pm, based upon parental preference. Once participants with ASD were assigned time slots, intervention order was determined by randomly using a coin flip method. If the coin landed with the head facing upward, Participants 1 and 3 read the social story via electronic format on the iPad while Participant 2 read the paper format. If the coin landed with the tails side facing upward, then the opposite schedule occurred with Participant 2 reading the social story via electronic format on the iPad and vice versa for Participant 1 and 3. Based on the results of the coin flip, Participant 1 and 3 read the social story via electronic format on the iPad first while; Participant 2 read the social story via paper

format in spiral book form. After the condition schedule was established, the participants with ASD were collectively asked to choose a game to play. All participants chose to play Monopoly® during the gaming sessions. Following the game selection, individual social stories were created based on the dependent variables, the communication level of the participant with ASD, and the game activity selected by participants.

To ensure that participants were familiar with the functions of an iPad, the primary researcher conducted a 10-minute training session on how to navigate the social story application. Research assistants also received training on how to navigate the social story on the iPad and on how to check comprehension during the first session of the intervention phase. Research assistants were told by the primary researcher that if a participant with ASD did not correctly answer the three comprehension questions on the first attempt, then the participant would be instructed to read the story again in order to answer the questions correctly. In addition, research assistants developed a schedule for checking reliability and data coding. Additionally, partners were placed in two gaming sessions each prior to baseline. The first set of sessions was reviewed by the primary researcher and research assistants in order to revise operational definitions and to determine if the duration of the interval was adequate. During the first set of sessions, pictures were also taken of the participants playing Monopoly® with the neurotypical gaming partner. The pictures were then included in the social stories. The second set of sessions was used for the research assistants to establish coding reliability. Baseline began once the research assistants reached 90% reliability for two consecutive observation sessions.

Baseline. Baseline data were collected concurrently for all participants for three days. Since sessions occurred in the evenings, if a participant was absent for a session, another session was scheduled during the designated make-up day. The study was conducted in two rooms, the conference room and the multi-purpose room, in the Child Study Center. Each room had one table, two chairs, and the game chosen by the participant with ASD. A digital camera was placed on a tripod at a diagonal to capture the interaction. The neurotypical peer was sitting at the table with the game when the participant with ASD entered the room. The primary researcher or research assistant said, “Time to play Monopoly[®] with Peer 1” (Name removed for confidentiality). Both the participants and the peer were told to play the game until the timer went off. The 30-minute gaming session was recorded, but only the first 15 minutes were coded at a later time by the research assistants. During coding, research assistants also transcribed conversational topics, verbal initiations, and on-topic responses. Baseline was conducted for three sessions. Once baseline data were graphed and stability was established, the intervention phase began.

Intervention. During intervention, the primary researcher or research assistant directed the participants, during their assigned hour, to an assistant professor office to read the social story. The primary researcher or research assistant said, “Time to read a story about playing Monopoly with Peer 1”. The primary researcher or research assistant had Participant 1 or Participant 3 read the social story silently for three-five minutes. Participant 2 was read his social story. The primary researcher or research assistant asked the participants three predetermined questions (See Appendix C) to assess the participants’ comprehension of the social story. The questions were written by the

primary researcher and given to the research assistant. All participants with ASD answered comprehension questions with 100% accuracy on the first attempt. The comprehension questions were asked only during the first intervention session. After all the questions were answered correctly, the primary researcher or research assistant led the participant to the conference room or copying room where Peer 1 was waiting with the Monopoly[®] game. Subsequent sessions involved the primary researcher or research assistant directing the participant with ASD to the assistant professor office and saying, “Time to read a story about playing Monopoly with Peer 1”. Then, after three to five minutes of reading the social story alone silently, or in the case of Participant 2, being read the social story, the primary researcher or research assistant said, “Time to play Monopoly[®] with Peer 1”, and immediately directed the participant to the conference room or multi-purpose room where Peer 1 was waiting with the game. Participants were told to play the game until the timer went off. The entire 30-minute gaming session was videotaped and the first 15 minutes was later coded by the research assistants. During coding, the research assistants also transcribed conversational topics, verbal initiations, and on-topic responses. After the first session, the participants were alternated between social story conditions based on the outcome of the random coin toss assignment conducted during pre-baseline. There were seven alternations between the electronic condition and paper condition.

Maintenance. Two weeks after the intervention concluded, two maintenance sessions were conducted. Guidelines for the maintenance sessions were identical to baseline procedures. Peer 1 sat at the table with the game. The primary researcher or research assistant said, “Time to play Monopoly[®] with Peer 1.” Both participants were

told to play the game until the timer went off. The entire 30-minute gaming session was videotaped and the first 15 minutes was coded at a later time by the research assistants. Research assistants coded the frequency of verbal initiations and on-topic responses that occurred during the first 15 minutes of the 30-minute gaming session. They also transcribed conversational topics, verbal initiations, and on-topic responses.

Generalization. Two generalization sessions were conducted in an attempt to monitor if targeted behaviors were used when participants with ASD played Monopoly[®] with another gaming partner. The probes were 30 minutes and like baseline, the primary researcher or research assistant said, "Time to play Monopoly[®] with Peer 2." The participant and the gaming partner played the game for 30 minutes. The entire 30-minute gaming session was videotaped and the first 15-minutes were coded at a later time. Research assistants coded the frequency of verbal initiations and on-topic responses that occur during the first 15minutes of the 30-minute gaming session. Again, research assistants transcribed conversational topics, verbal initiations, and on-topic responses. The probes occurred following the comparison phase.

Inter-observer Agreement

Thirty-eight percent of the videotaped sessions were randomly selected for independent analysis by two research assistants that resulted in 24 videos, eight per participant, across baseline, intervention, and follow-up phases. Inter-observer agreement (IOA) was determined by dividing the total number of agreements between the two observers by the total number of agreements plus disagreements between the two observers and the resulting quotient was multiplied by 100 (Gast, 2010). IOA ranged

from 90% to 99% ($M = 95%$) across all participants and all phases. Participant 1's IOA ranged from 95% to 99% ($M = 97%$), Participant 2's ranged from 90% to 98% ($M = 93%$), and Participant 3's ranged from 93% to 96% ($M = 95%$).

Fidelity of Implementation

The primary researcher and research assistant used a procedural checklist (See Appendix E) to determine if the study was implemented as outlined in the training protocol. The checklist delineated the procedural steps for each session (e.g., whether or not the student read the social story presentation completely before the gaming activity, or whether or not the primary researcher or research assistant sets the timer and turns on the camera prior to the gaming session). Procedural fidelity was calculated by dividing the total number of steps which followed the procedural checklist by the total number of steps following the procedural checklist plus the number of steps that did not follow the procedural checklist then the quotient was multiplied by 100 (Gast, 2010). Treatment fidelity was conducted on 50% of the sessions. Treatment fidelity was 100% for all three participants.

Social Validity

Acceptability of the social story intervention was measured by questionnaires developed by the primary researcher. Participants with ASD, their parents, and neurotypical peers (See Appendices F, G, and H) assessed the: (a) need, (b) acceptable relevance, and (c) impact of the social story intervention. The measure was composed of two types of questions: Likert and open ended questions. Specifically, the survey

included two open-ended questions and five questions with responses given via a 5-point Likert scale.

Data Analysis

Verbal initiations and on-topic responses during the gaming activity were graphed for each participant with ASD daily as a percentage of intervals. Changes in level, variability, and trend for data points were visually analyzed during baseline, intervention, maintenance, and generalization phases (Kennedy, 2005). In addition, the Nonoverlap of All Pairs (NAP; Parker et al., 2007) was calculated to determine the effectiveness of the intervention (Parker et al., 2007). NAP is a non-parametric index that calculates nonoverlap, or improvement in data points, between phases (Parker & Vannest, 2009). Parker and Vannest (2009) suggested guidelines for interpretation of NAP with, 0-65 % non-overlap indicating weak effects, 66–92% medium effects, and 93–100 % strong effects.

RESULTS

The effects of two formats of a social story on verbal initiations and on-topic responses were analyzed by graphing the percentage of intervals of target behaviors. The results are presented by participant. Each graph represents participants' verbal initiations and on-topic responses, for both paper and electronic conditions. In addition, maintenance, and generalization sessions with another partner were on the same graph as well.

Participant 1

Verbal initiations and on-topic responses (see Figures 1 and 2) for Participant 1 changed slightly after the introduction of the social story in both conditions. During baseline, Participant 1 did not make any initiations (0%) and his mean level of responses was 9% (range 3%-14%). After the introduction of the social story, in electronic format, his mean level of initiations was 1% of intervals (range = 0%–3%) and his mean level of responses was 13% (range = 6%–23%). Similar effects were observed during the introduction of the social story in paper format. Participant 1's mean level of initiations was 1% of intervals (range = 0%-6%) and his mean level of responses was 19% of intervals (range = 6%-28%). Two weeks after intervention sessions concluded, two maintenance and two generalization probes were conducted. During maintenance, Participant 1's mean level of initiations was 5% of intervals (range = 1%-8%) and his mean level of responses was 22% of intervals (range = 11%-31%). When a new gaming partner was introduced, Participant 1's mean level of initiations was 3% of intervals (1%-4%) and his mean level of responses was 37% of intervals (34%-39%).

Figure 1. Participant 1's percentage of verbal initiations during baseline, comparison (Electronic and Paper format), and follow-up phases

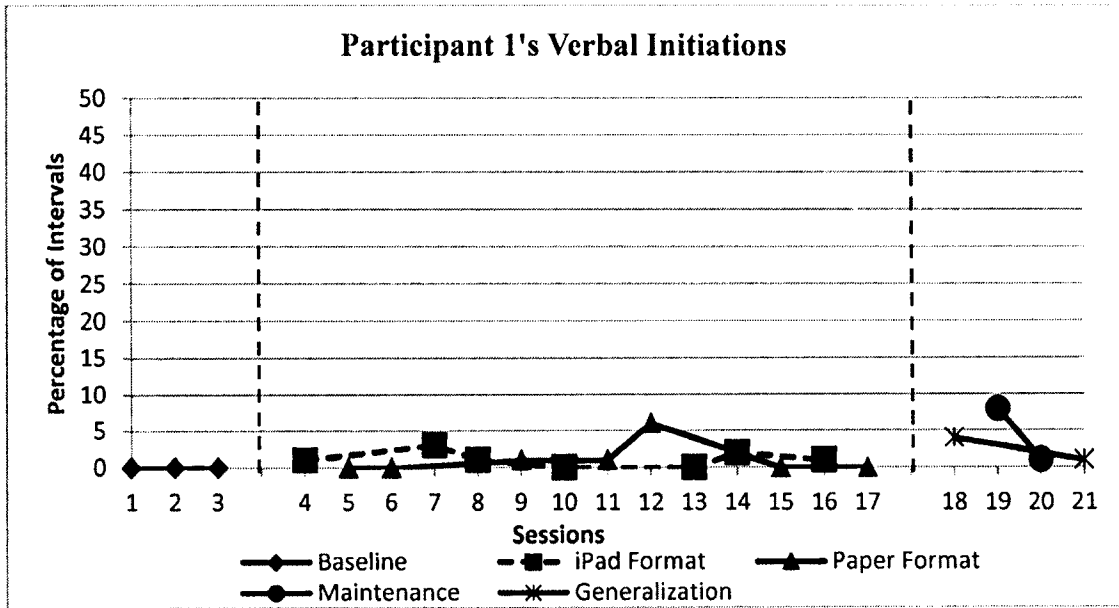
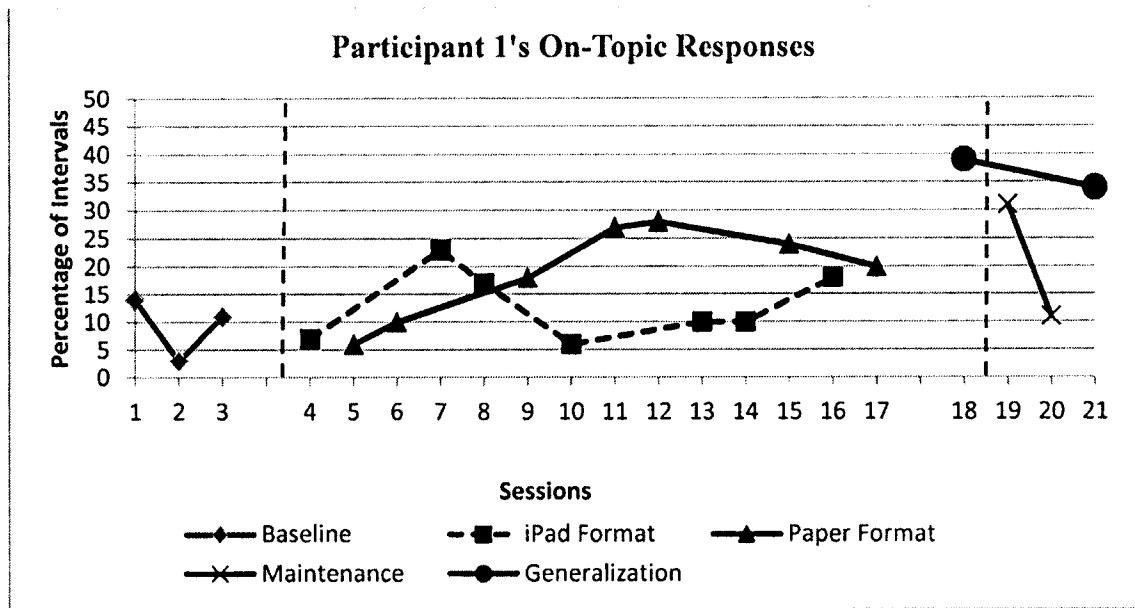


Figure 2. Participant 1's percentage of on-topic responses during baseline, comparison (Electronic and Paper format), and follow-up phases



Participant 2

Verbal initiations and on-topic responses (see Figures 3 and 4) for Participant 2 slightly decreased after the introduction of the social story in both formats. During baseline, Participant 2's mean level of initiations was 23% of intervals (range = 19%-27%) and his mean level of on-topic responses was 14% of intervals (range= 13%-17%). After the introduction of the social story, in book format, his mean level of initiations was 18% of intervals (range = 7%–32%) and his mean level of on-topic responses was 13% of intervals (range = 4%–32%). Similar effects were observed during the introduction of the social story in iPad format. Participant 2's mean level of initiations was 19% of intervals (range = 7%-37%) and his mean level of on-topic responses was 9% of intervals (range = 2%-28%). Two weeks after intervention sessions concluded, two maintenance and two generalization probes were conducted. During maintenance, Participant 2's mean level of initiations was 23% of intervals (range = 18%-27%) and his mean level of on-topic responses was 16% of intervals (range = 11%-21%). When a new gaming partner was introduced while playing the same game, Participant 2's mean level of initiations was 31% of intervals (27%-34%) and his mean level of on-topic responses was 8% of intervals (6%-10%).

Figure 3. Participant 2's percentage of verbal initiations during baseline, comparison (Electronic and Paper format), and follow-up phases

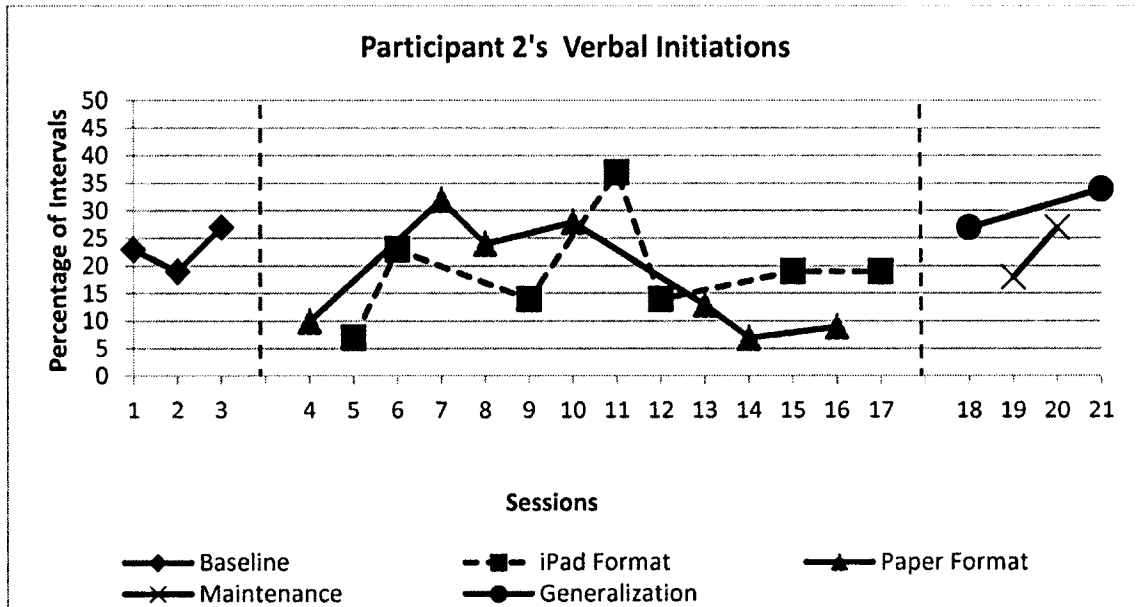
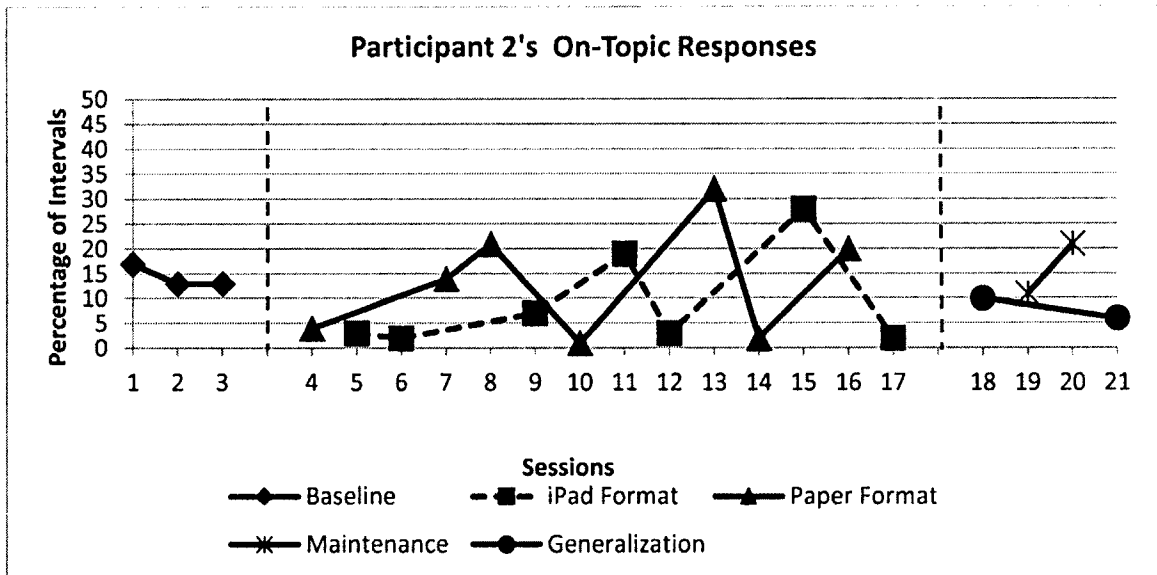


Figure 4. Participant 2's percentage of on-topic responses during baseline, comparison (Electronic and Paper format), and follow-up phases



Participant 3

Verbal initiations and on-topic responses (see Figures 5 and 6) for Participant 3 improved after the introduction of the social story in both formats. During baseline, Participant 3's mean level of initiations was 6% of intervals (range 4%-7%) and his mean level of on-topic responses was 11% of intervals (range 9%-14%). After the introduction of the social story, in iPad format, his mean level of initiations was 11% of intervals (range = 4%–18%) and his mean level of on-topic responses was 16% of intervals (range = 9%–24%). Similar effects were observed during the introduction of the social story in book format. Participant 3's mean level of initiations was 9% of intervals (range = 3%-13%) and his mean level of on-topic responses was 14% of intervals (range = 3%–26%). Two weeks after intervention sessions concluded, two maintenance and two generalization probes were conducted. During maintenance, Participant 3's mean level of initiations was 10% of intervals (range = 3%-13%) and his mean level of on-topic responses was 19% of intervals (range = 15%-22%). When a new gaming partner was introduced in the generalization phase, Participant 3's mean level of initiations was 14% of intervals (both sessions were 14%) and his mean level of on-topic responses was 24% of intervals (21%-27%).

Figure 5. Participant 3's percentage of verbal initiations during baseline, comparison (Electronic and Paper format), and follow-up phases

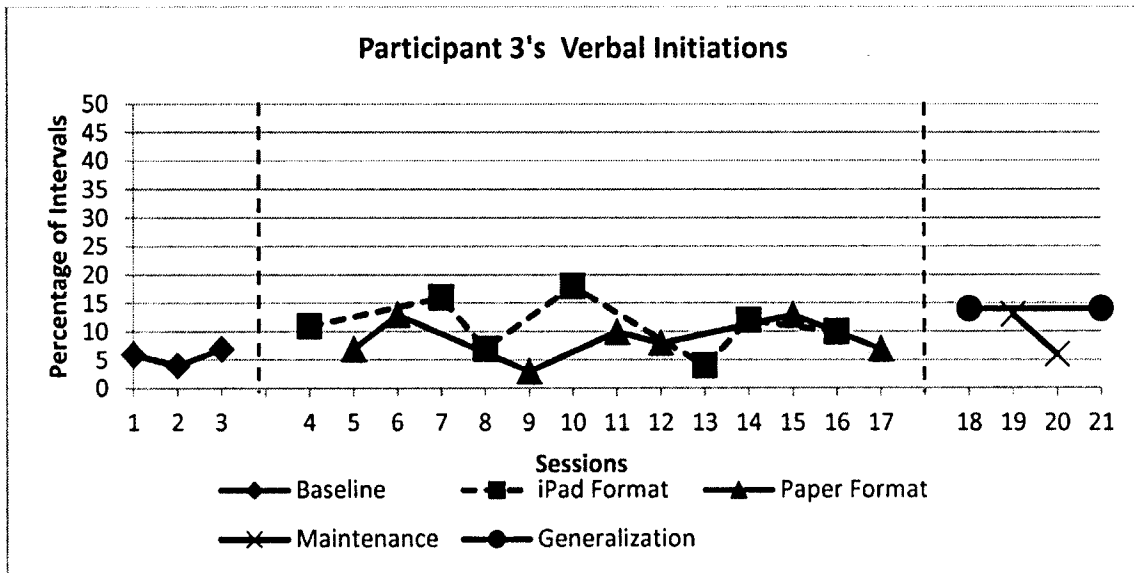
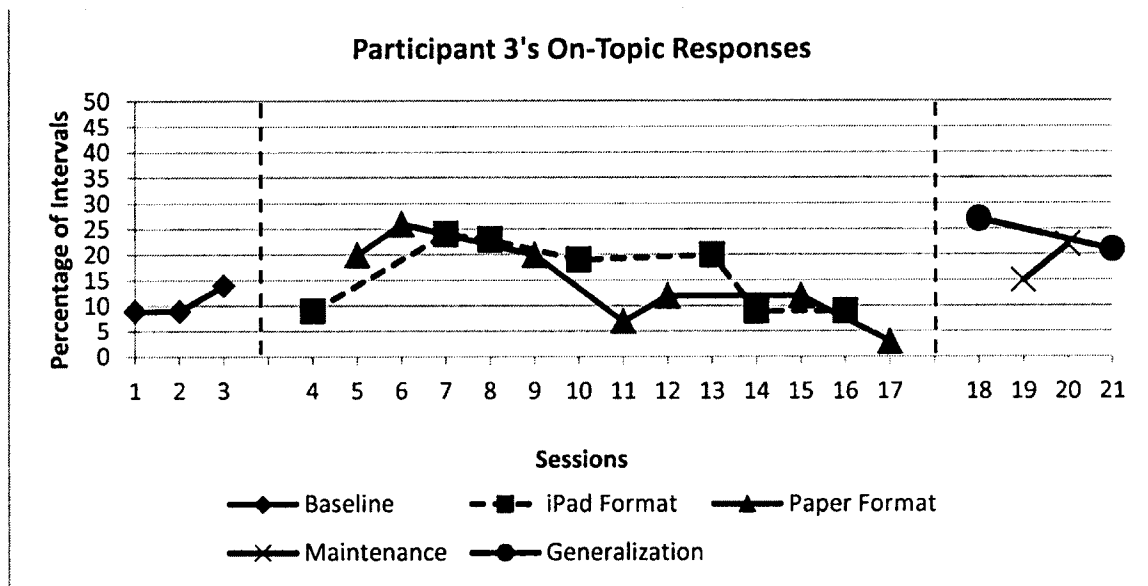


Figure 6. Participant 3's percentage of on-topic responses during baseline, comparison (Electronic and Paper format), and follow-up phases



Social Validity

Acceptability of the social story intervention was measured by means of questionnaires developed by the primary researcher including two open-ended questions and five questions using a 5-point Likert scale (See Appendices F, G, and H). Specifically, the questionnaires inquired about the usefulness of the intervention presentation and whether the parents perceived participation in this study as having helped their child socialize more. Participant 3's mother commented that he was "more communicative than ever". In addition, she said people in their family also commented on his ability to engage in and maintain conversations more frequently. Participant 2's parents reported that he was "socializing more at the tween socials" sponsored by the local ASD support group. Before the study, Participant 2 was "reserved, sat by himself and rarely socialized." They also noted that as the study progressed, Participant 2 was more likely to sit next to Participant 3 to converse during the social events sponsored by the local ASD group. All parents rated the intervention presentation highly stating the iPad was age appropriate. They also indicated that they would participate in another study like this if an opportunity became available. Participants with ASD noted that they enjoyed the gaming sessions and reading the social stories on the iPad. Typical peers said they enjoyed participating in the majority of the gaming and enjoyed talking to their partners.

Nonoverlap of All Pairs (NAP)

To assess intervention effectiveness, Nonoverlap of All Pairs (NAP; Parker et al., 2007) for participants' verbal initiations and on-topic responses in both conditions was

calculated. NAP results for Participant 1 during the electronic condition were 85% non-overlap of initiations showing medium effects and 61% of non-overlap of on-topic responses, indicating weak effects. In the paper condition, Participant 1's NAP results were 71% of non-overlap of initiations and 81% of non-overlap of responses both indicating medium effects. No further analysis was conducted with Participant 2's data because a large majority of his data points in the comparison phase were overlapped by baseline data suggesting weak effects due to a high number of overlapping points. Participant 3's NAP results were 91% of non-overlap of verbal initiations illustrating medium effects in the higher range and 76% of non-overlap of on-topic responses, demonstrating low-medium effects in the electronic condition. For the paper condition, Participant 3's NAP results were 81% of non-overlap of verbal initiations and 62% of non-overlap on-topic responses indicating medium and weak effects respectively.

DISCUSSION

Summary of findings

The purpose of this study was to determine if a social story delivered in two formats, paper and electronic (iPad), could be used to increase the mean level of verbal initiations and on-topic responses of three adolescents, ages 11-14-years old, with ASD. The study results, regarding the overall efficacy of the social stories, indicated that Participant 1 and Participant 3 slightly improved their verbal initiations and on-topic responses above baseline levels. Both participants evidenced more improvements in verbal initiations during the electronic condition, while Participant 1's mean level of on-topic responses was greater in the paper condition. Both Participant 3 and Participant 1 also maintained targeted skills above baseline levels and generalized these skills to

another gaming partner two weeks after the intervention phase concluded. Conversely, Participant 2's average number of intervals of verbal initiations and on-topic responses decreased during the intervention phase across both formats. However, Participant 2's mean level of verbal initiations and on-topic responses presented at slightly above baseline levels respectively during maintenance which occurred two weeks after the intervention concluded. Likewise, during the generalization phase with Peer 2, Participant 2 experienced his highest mean of initiations (31%) despite displaying a decrease in his responses to below baseline levels.

Initially, Participant 1 did not make any initiations during baseline; however, after the introduction of the social story in the electronic format, his mean level of initiations increased variably between conditions with his highest level of initiations occurring during the paper condition. Even though Participant 1 was able to increase his level of initiations across both conditions, he still maintained a low average (1% of intervals) of initiations. In fact, during several gaming sessions in the intervention phase, Participant 1 did not make a single initiation (sessions 5, 6, 10, 16, 15, and 17). Participant 1's display of the core symptoms associated with ASD (e.g., absence of social or emotional reciprocity; Orsmond et al., 2013) affected social interactions during gaming sessions. In addition, Participant 1 presented a mostly flat affect, his voice had a monotone quality to it, and he rarely showed emotion even after winning a game. As such, it was difficult to discern if he enjoyed playing the game or if he was just playing because he was instructed to do so by the researcher. The lack of initiations coupled with the lack of emotional displays by Participant 1 resulted in the neurotypical gaming partner becoming bored and inattentive in the gaming sessions potentially leading to a

decrease in conversational engagement. Despite the potentially limited number of conversational opportunities, Participant 1 did demonstrate improvement in the use of on-topic responses during the paper condition. According to parent report prior to the start of the study, Participant 1 used single word responses to answer questions (e.g., yes, no) or said “I don’t know”; however, as the study progressed, he was able to increase the number of his on-topic responses. At times, it appeared that as a way to compensate for Participant 1’s lack of initiations, Peer 1 made more of an effort to engage Participant 1 by probing for deeper answers to his questions. More often than not, Participant 1’s gaming partner did not settle for a one word answer (See Appendix E). Peer 1 either asked Participant 1 to explain his answers in more detail or asked a follow-up question to maintain the conversation. The probing for deeper responses seemed to impact Participant 1’s mean level of on-topic responses.

Unlike Participant 1, Participant 2 displayed a higher level of verbal initiations from the beginning of the study. Although participant 2 demonstrated the ability to initiate a conversation during baseline, it was the quality and/or appropriateness of his interactions with his peers that was unacceptable. Participant 2’s attempts to initiate conversations were more perseverative in nature and did not take the feelings of the conversational partner’s into consideration. Participant 2’s lack of progression of the targeted skills during the study was likely due to him perseverating on his topics of interest in conversation. For example, in session 5, Participant 2 told Peer 1 about his day at school and how his class celebrated St. Patrick’s Day. He then asked his partner about how he had celebrated the holiday to which Peer 1 responded that he had not celebrated in school. Despite a lack of interest by Peer 1, Participant 2 continued to talk about the St.

Patrick's Day holiday celebration for almost the entire gaming session. In addition to Participant 2's perseverations, he displayed some inappropriate behaviors during the gaming sessions which may have inhibited his ability to engage in the targeted skills.

Graduate students who observed the recorded videos of the gaming sessions reported that the neurotypical gaming partner had to redirect Participant 2 to play the game several times throughout the study. Occasionally, Participant 2 would crawl under the table, make inappropriate comments, or stand up to walk around. These behaviors disrupted the flow of the game and conversation which led to the demonstration of frustration by Peer 1. Participant 2's lack of inhibition while playing the game discouraged his gaming partner from responding to initiations. Moreover, when the gaming partner did not reward Participant 2's bids for responses, he decreased the number of his initiations. Even when his gaming partner did attempt to initiate conversations, some of Participant 2's responses were slightly tangential which also made it difficult for a response. Participant 2's perseveration on topics of interest, lack of inhibition and challenging behaviors may have substantially hindered his ability to engage in meaningful conversation during gaming sessions.

Overall, it was Participant 3 that demonstrated the most gains during the intervention sessions. During the electronic condition, Participant 3 made the slight gains in verbal initiations and on- topic responses. In addition, after transcripts from the gaming sessions were reviewed, it was found that Participant 3 used several conversational topics specifically listed in the social story. Participant 3's mother stated that he mainly relied on scripted initiations during conversations, so it appeared that giving Participant 3 a list of scripted conversational starters made it easier for him to communicate during the

gaming sessions with his neurotypical peers. These findings support the research by Dotto-Fojut and associates (2011) which indicated that scripting has been used to effectively mitigate the social and communication deficits experienced by adolescents with ASD. Typically, individuals with ASD who use scripts practice or have others model the phrases many times before engaging in an activity; however, Participant 3 did not need the repetitive training. This quick acquisition of the targeted skill may be due to his higher level of cognitive functioning (full scale I.Q. 85). While Gray and Garand's (1993) research suggested that social stories would benefit students with ASD who are higher functioning, it is not known how Participant 3's cognition played a role in the results of the study as individuals with lower intellectual quotients have experienced success with the use of social stories (Scattone et al., 2002). During the generalization phase, Participant 3 used the conversational starters from the social story as evidenced by the transcripts; furthermore, his mother reported that he experienced generalized treatment effects such as increased initiations and responses during conversations with peers and family members. The generalization of targeted skills to other environments and people could be due to the additional scripted language he added to his conversational repertoire. Although studies are limited in regard to the effectiveness of social stories when used to address the social-communication deficits of adolescents with ASD, Participant 3's results are consistent with Scattone and colleagues (2006) who found that adolescents who were able to use social stories as scripts and incorporate various conversational topics during discussions with peers were more likely to respond and maintain a conversation if they were motivated to interact. Participant 3's use of conversational starters and motivation to interact were unmatched in gaming sessions

when compared to the other two participants. The neurotypical gaming peer commented on numerous occasions that playing with Participant 3 was a challenge because he had to stay completely engaged in order to compete with Participant 3. The neurotypical peer also stated that he derived the most enjoyment during Participant 3's gaming sessions because of the higher level of conversational involvement demonstrated by Participant 3.

In the current study, each participant's individual performance influenced study outcomes, however, so did the neurotypical peer's behavior. Like Participant 1's low level of initiations, Peer 1's sometimes bored and uninterested behavior during gaming sessions was unexpected. It was reported that he was very sociable, had numerous friends, and attended the ASA socials as a peer volunteer on a regular basis; however, it could not be determined how he would function as a gaming partner for three different participants over a six week period. Despite Peer 1's willingness to participate in the study, he experienced bouts of inattentiveness, boredom, and frustration which, in turn, may have led to a decreased level of communication and lower targeted skills demonstration by the participants.

Limitations

Although results of the present study may be promising, a few limitations must be noted. First, only three adolescents, ages 11-14-years old, with ASD participated in this study. While participants represented multiple ethnic groups, results cannot be generalized to a larger population of individuals due to the small sample size. To increase the external validity of this study, replication across a larger number of adolescents is required.

Second, the primary researcher chose to use an interval recording system to record the frequency of verbal initiations and on-topic responses for each participant. When calculating the frequency of targeted behaviors, results are reported in percentages. Percentage of intervals is only an estimation of a participant's initiations and responses during gaming sessions. An interval recording system cannot be used to record the exact number of initiations made by each participant like a traditional event recording system. These results must be viewed with caution and the transcripts need to be compared to assess how the reading of the social stories affected participants' verbal initiations and on-topic responses because the results could be an underestimation of actual performance.

Third, the primary researcher opted to have only one gaming partner to interact with all three participants with ASD during prebaseline activities, baseline, comparison, and maintenance sessions. The purpose of having one gaming partner was to eliminate the variability of communicative patterns among possible gaming partners. The primary researcher also took great care to choose a willing gaming partner who had appropriate communication skills and previous interactions with children with ASD. Even though these considerations were taken into account, the behaviors displayed by the neurotypical peer were unexpected. The research study was relatively short; however, the neurotypical peer became bored quickly since he was asked to play the same game three times a day for six weeks. In addition, there was not a peer training component to the study, so many of the issues faced by the neurotypical peer were not adequately addressed prior to the onset of the study. A peer training component on how to generate conversational

topics and how to respond to the difficult behaviors associated with ASD might have been beneficial.

Future Areas of Research

The present study indicates that a social story intervention has the potential to be implemented successfully using an electronic device like an iPad. In the future, researchers should utilize the constantly changing landscape of technological devices to deliver evidence-based practices to individuals with ASD (Shattuck et al., 2011). While traditional social stories in book format are viable intervention delivery options, as children with ASD age into adolescence, the books can become cumbersome and less age appropriate. Current iPad applications are versatile, age appropriate, and can mirror several computer programs that support individualized learning for individuals with disabilities (Shane & Albert, 2008). Many of these applications emulate video games by providing visual and auditory stimuli. Additionally, graphical depictions of life like game scenery have been shown to increase attentiveness and engagement for individuals with ASD (Mazuek et al., 2012; Shane & Albert, 2008). Therefore, future researchers should explore and employ current technological applications based on individuals with ASD predilection for electronic devices.

Secondly, this study adds to the current body of literature regarding the potential usefulness of social stories when used to address the social-communication deficits experienced by adolescents with ASD. In furthering the literature, more research is needed with older students. When compared to peers with other types of disabilities (e.g., learning disabilities, speech language impairment, intellectual disability), adolescents

with ASD are less likely to have many close friendships or to engage in social activities outside of the home (Shattuck et al., 2011). Moreover, as this group ages into adulthood, many individuals with ASD live at home with parents or caregivers, do not experience gainful employment, and/or engage in social activities with the opposite sex (Mazurek, 2014). As such, it is critical to address social-communication deficits in early adolescence so that improvements can be witnessed in future social outcomes. Positive social interaction skills are vital to success in post-secondary settings, such as institutions of higher learning, vocational fields, and community activities (Orsmond et al., 2013). Although research is being conducted for adolescents and adults with ASD, most of it focuses on remediating academic skills or providing vocational training (Mazurek, 2014). There is a dearth of research that addresses the social-communication deficits of adolescents and adults with ASD (Daniel & Billingsley, 2010). Accordingly, this field of research should be expanded to include more individuals with ASD, specifically adolescents and young adults.

CONCLUSION

As newly reported cases of individuals diagnosed with ASD proliferate, so must the use of evidence-based practices that help mitigate the deficits associated with the disorder. The outcomes of this research add to the empirical basis for further investigations regarding the effectiveness of social story interventions delivered in electronic and paper formats to address the social-communication deficits of adolescents with ASD. Results from the study indicated two participants evidenced more of an improvement in verbal initiations and on-topic responses during the electronic condition, from baseline to the intervention phase, and maintained targeted skills two weeks after the intervention phase

concluded. Research capitalizing on adolescents with ASD preference for technological devices is nascent; however, most focuses on improving academic or vocational skills. While results from this study are promising, yet much is unknown about interventions that use technology-driven devices to address the social-communication deficits experienced by adolescents and young adults with ASD.

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APPENDIX A

Social Story Format

The Social Story format suggests using a combination of seven sentence types with an emphasis on description:

1. Descriptive sentences describe a given situation objectively by defining where the situation occurs, when it will take place, who is involved, what they are doing, and why they are doing it.
2. Perspective sentences state what another individual, usually someone other than the child with autism spectrum disorder, may think or feel.
3. Cooperative sentences can be used to remind adults how they can assist the student to learn a new skill.
4. Directive sentences are sentences that define the response the individual is expected to provide and generally begin with “I will try” or “I will work on” rather than “I will” to allow for some flexibility.
5. Affirmative sentences generally stress the directive in the Social Story.
6. Control sentences are written by the student and help him or her remember the directive.
7. Partial sentences are fill-in-the-blank sentences that require the student to provide the correct response.

From Gray (2004). *Social Stories™ 10.1: The new defining criteria and guidelines*

APPENDIX B

Social Story Guidelines

1. Shares social information in a reassuring manner; at least 50% of the stories should praise achievements.
2. Has an introduction, body, and conclusion.
3. Answers “wh” questions.
4. Is written from the student’s perspective (i.e., first-person or third-person format).
5. States behaviors positively.
6. Contains descriptive sentences and some or all of the other types of sentences.
7. Describes actions and events rather than directs.
8. Is geared to the individual’s abilities and incorporates her or his interests.
9. May use visual supports and illustrations.
10. Has a title that is consistent with applicable criteria above.

From Gray (2004). *Social Stories™ 10.1: The new defining criteria and guidelines*

*Appendix C**Social Stories for Participant 1, Participant 2, and Participant 3*Playing Monopoly[®] with Peer 1-Participant 1's social story

There are lots of children who play Monopoly[®]. Some of the children play Monopoly[®] with their family. Some children play Monopoly[®] with a gaming partner. My gaming partner's name is Peer 1. Peer 1 likes to play Monopoly[®]. It's good to talk to Peer 1 when playing Monopoly[®]. He will like it if I talk to him! He will respond to my questions!

There are lots of things I can talk to Peer 1 about:

I can tell him about what happened at school today. I can tell him about what I watched on TV yesterday. I can ask him about shows he likes to watch on TV. I can ask him what he likes to do after school. I can tell him about my favorite video games. Peer 1 may have something he wants to talk about too. I can listen to what Peer 1 has to say. I may want to talk about those other things too.

Sometimes, I will win when we play Monopoly[®]. Sometimes, Peer 1 will win when we play Monopoly[®]. If Peer 1 wins, I will say good job and shake his hand. If I win, he will say good job and shake my hand. When the game is over, I will try to say "See you tomorrow" to Peer 1. Then I will help him put the game away.

Comprehension Questions

1. What is your partner's name?
2. What can you talk about with your partner?
3. What do you do when you finish playing Monopoly[®]?

Playing Monopoly® with Peer 1-Participant 2's social story

Peer 1 is my gaming partner. We play Monopoly®. It's good to talk to Peer 1 when we play Monopoly. He will like it if I talk to him! There are lots of things I can talk to Peer 1 about:

I can tell him about what happened at school today. I can tell him about things I like to do. I can ask him what he likes to do. Peer 1 may have something he wants to talk about too. I can listen to what Peer 1 has to say. I may want to talk about those other things too. When we finish playing Monopoly®, I will try to say "See you tomorrow" to Peer 1.

Comprehension Questions

1. What is your partner's name?
2. What can you talk about with Peer 1?
3. What do you say when you finish playing Monopoly®?

Playing Monopoly® with Peer 1-Participant 3's social story

Some people play Monopoly® with their family. Some people play Monopoly® with a friend. Peer 1 is my gaming partner. Peer 1 enjoys playing Monopoly® with me. It's good to talk to Peer 1 when we play Monopoly®. I will try to talk to Peer 1 when we play Monopoly®. He will like it if I talk to him and ask him questions! He will answer my questions! There are lots of things I can talk to Peer 1 about.

I can tell him about what happened at school today. I can tell him about what I watched on TV yesterday. I can ask him about shows he likes to watch on TV and if they were interesting or boring. I can tell him about things I like to do. I can tell him about my hobbies or my favorite places to visit. I can even tell him about my friend! I can ask him what he likes to do after school. Peer 1 may have something he wants to talk about too. I can listen to what Peer 1 has to say. I may want to talk about those other things too.

Sometimes, I will win when we play Monopoly®. Sometimes, Peer 1 will win when we play Monopoly®. If Peer 1 wins, I will say good job and shake his hand. If I win, he will say good job and shake my hand. When the game is over, I will try to say, “See you tomorrow” to Peer 1.

Comprehension Questions

1. What are some things you can talk to Peer 1 about?
2. How does it make Peer 1 feel when you talk to him?
3. What can you say to Peer 1 after the game is over?

Appendix E

Procedural fidelity checklist

Directions: Place a check in the box to indicate if the following procedures are completed.

Step 3 is only completed during the first day of intervention for each student.

Protocol Steps	Present	Not Present	Comments
1. Primary researcher or research assistant ensures that the game is in place and that the video camera is positioned prior to participant interaction.			
2. Primary researcher or research assistant leads the participant with ASD to the designated assistant professor office to read the social story.			
3. Primary researcher says, "Time to read a story about playing Monopoly® with Peer 1".			
4. Participants read the social story on the iPad or paper alone for 3-5 minutes.			
5. The primary researcher assesses comprehension			

<p>based upon predetermined questions only during the first intervention session.</p>			
<p>6. The primary researcher says, "Time to play Monopoly® with Peer 1".</p>			
<p>7. Participant immediately goes to play the game with the neurotypical peer in the conference room or multipurpose room.</p>			
<p>8. The primary researcher sets the timer and turns on the camera. The primary researcher ensures that dyads play the selected game until the time goes off.</p>			

Appendix F

Parent Social Validity Questionnaire

Please answer each question to the best of your ability.

Survey Question	-1- Strongly Disagree	-2- Disagree	-3- Neither Disagree Or Agree	-4- Agree	-5- Strongly Agree
I believe the social story helped my child communicate more with his peers.	1	2	3	4	5
I believe the social story helped my child socialize more with his peers.	1	2	3	4	5
I feel the presentation of the social story was age appropriate.	1	2	3	4	5
I believe a social story on the iPad is an efficient way to deliver an intervention.	1	2	3	4	5
I would use a social story again with my child.	1	2	3	4	5

1. In your opinion, do you believe that participating in this study helped your child socialize more? If so, why?
2. In your opinion, do you believe that this study and its procedures interfered with your child's afternoon activities? If so, what part and how?

Appendix G

Participant Social Validity Questionnaire

Survey Question	-1- Strongly Disagree	-2- Disagree	-3- Do Not Agree or Disagree	-4- Agree	-5-Strongly Agree
I liked reading the social story.	1	2	3	4	5
I believe the social story helped me make more friends.	1	2	3	4	5
I would like to read another social story like this one on the iPad.	1	2	3	4	5
I believe other children would like to read social stories on iPad's.	1	2	3	4	5
I enjoyed being a part of the study.	1	2	3	4	5

1. In your opinion, what part of the social story helped you the most? Why?
2. Is there any part of the study that you would change in order to help you socialize more?

Appendix H

Neurotypical Peer Social Validity Questionnaire

Survey Question	-1- Strongly Disagree	-2- Disagree	-3- Do Not Agree or Disagree	-4- Agree	-5-Strongly Agree
My partner greeted me before we played the game.	1	2	3	4	5
My partner stayed on topic when we talked.	1	2	3	4	5
I believe my partner enjoyed our conversation during the game.	1	2	3	4	5
I enjoyed talking with my partner.	1	2	3	4	5
I enjoyed playing the game with my partner.	1	2	3	4	5

1. In your opinion, what part of the study did you enjoy the most? Why?
2. Is there any part of the study that you would change to help you gaming partner socialize more?

CHAPTER II

REVIEW OF THE LITERATURE

Introduction

According to the Center for Disease Control, autism spectrum disorders (ASD) affect 1 in 68 children in the United States (Center for Disease Control, 2014). This represents a dramatic difference from previous prevalence estimates of 4 to 5 per 10,000 children just ten years ago (Simpson, 2008). These prevalence statistics represent more than a 170% increase in the number of children diagnosed with ASD (Cotugno, 2009). While the reason for the dramatic increase in prevalence estimates may be contributed to early detection and increased societal awareness of ASD indicators, it is the resulting idiosyncratic behaviors, socialization and communication deficits associated with ASD that remain an enigma for medical and educational professionals (Simpson, 2008).

Children with ASD represent a heterogeneous group who differ in cognitive abilities, yet share core, varying degrees of deficits in interests, communication, and socialization (Kokina & Kern, 2010). Although they share these core deficit areas, poor social functioning is considered the defining characteristic of ASD (Hochdorfer-Hanley, Bray, Kehle, & Elinoff, 2010). Usually, social differences are evident during infancy. As infants and toddlers, individuals with ASD smile and vocalize less than their peers without ASD and often do not respond when their name is called (Fodstad, Matson, Hess, & Neal, 2009). In play situations, toddlers with ASD often play either beside another child or in isolation, fixated on a toy or object for an uncommonly long amount of time. Also, bids for responses during social interactions with parents or caregivers go

unnoticed due to fleeting eye gaze or a lack of interest in presented stimuli (Jones & Schwartz, 2008). For example, in an examination of initiations and responses of young children with ASD, Jones and Schwartz (2008), found that 3-7 year old children with ASD initiated and responded less to familial bids for social interactions in comparison to their same age typical peers. The lack of effective social and communication skills in early childhood can compromise social-communication patterns as children age and enter middle and high school settings (Koegel, Vernon, & Koegel, 2009). When approached with an opportunity to socialize with classmates, individuals with ASD may hesitate to enter conversations due to the inability to appropriately initiate contact with peers. For instance, when interviewing seven 10-14 year olds with ASD, Daniel and Billingsley (2010) asserted that all adolescents had a difficult time with initiating contact with typical peers in school even though they wanted to build relationships with them.

Although some symptoms of ASD may abate during adolescence, individuals with ASD will exhibit some problems with communicating in social situations throughout their lives (Kouch & Mirenda, 2003; Levy & Perry, 2011). While neurotypical adolescents may instinctually distinguish what type of communication is suitable in different social settings, individuals with ASD often find social settings confusing and are unaware of how to respond to what is occurring around them (Kouch & Mirenda, 2003; Ozdemir, 2008; Quirembach, Lincoln, Feinberg-Gizzo, Ingersoll, & Andrews, 2008). These social deficits may be the result of not comprehending the implicit and multifaceted rules governing social pragmatics (Scattone, 2008). Not being able to communicate appropriately in social situations can isolate adolescents with ASD from their neurotypical peers and hinder their chances of maintaining positive peer

relationships in and outside of the classroom (Hochdorfer-Hanley et al., 2010; More, 2008). Moreover, the inability to socialize can compromise dating relationships and marginalize job opportunities (Levy & Perry, 2011). Because of the social-communication differences in children with ASD, educators need more strategies to effectively prepare them for social experiences within school and in their personal lives. One intervention that has been used to address these social-communication deficits is social stories.

Social Stories

Social stories are inexpensive teaching tools that reflect a child's perspective regarding different social situations (Gray, 2000; Gray, 2004; More, 2008). Social stories are short written narratives that provide the child with precise social information and language about an activity or event, a description of possible reactions of others, and appropriate responses he or she could provide in a given social situation (Gray, 2004; Hochdorfer-Hanley et al., 2010; Reynhout & Carter, 2007). Carol Gray, the creator of social stories, delineated specific guidelines for writing social stories. First, each social story should encompass six different types of sentences (Gray, 2000; Gray, 2004). Each social story should incorporate descriptive, perspective, directive, cooperative, assist, affirmative, and control sentences (Gray 2000; Gray, 2004). Second, the ratio for sentence writing should be one directive sentence for every two or more other sentence types (Gray 2000; Gray, 2004). Third, depending upon the age of the child and cognitive ability, social stories should be written from a first- or third-person point of view (Gray, 2004). First person is recommended for younger children and third person for adolescents. It is important to avoid terms that may create confusion for the reader

(Kokina & Kern, 2010). Terms such as “always” or “never” should be avoided because individuals with ASD may take the direction literally and apply it to all social situations. More suitable words like “occasionally” and “usually” are suggested to maintain the story’s plasticity (Kokina & Kern, 2010). Following the reading of the social story, Gray (2004) recommended that the individual with ASD be asked questions to assess comprehension of the story either orally or in written form. Social Stories can be delivered, as an intervention, via paper or computer format. In addition, the agents of delivery can be the students themselves or adults (Gray, 2000; Gray, 2004).

Since the inception of social stories, researchers have investigated the effectiveness of the intervention when addressing social-communication deficits in children with diverse disabilities. For instance, Raver, Bobzien, Richels, Hester, and Anthony (2013) used a social story treatment package which included verbal prompts and reinforcements to increase the verbal initiations, responses, and play turns of four preschoolers with hearing loss. Raver et al. (2013) used an alternating treatment design to assess the level of targeted behaviors of four preschoolers with hearing loss across an oral preschool and an inclusive classroom setting. Results from the study suggested that three out of four participants showed improvement in targeted skills in both settings and generalized some vocabulary from their social story into play situations (Raver et al., 2013). In another example, Soenken and Alpher (2006) used a social story to increase the verbal initiations of a 5-year old with hyperlexia. Their results indicated that the child increased his ability to gain the attention of typical peers while decreasing inappropriate behavior in an inclusive classroom (Soenksen & Alper, 2006).

Although researchers have used social stories to remediate the social-communication deficits of children with other disabilities, the instructional strategy has been primarily used with individuals with ASD. In building a rationale for social stories, Gray and Garand (1993) stated that social stories can address some of the social cognition deficits displayed by individuals with ASD. First, individuals with ASD can be rigid when adhering to schedules or routines. The use of directive sentences in social stories is supposed to address this issue by guiding the individual's behavior, while giving an example of appropriate responses. In addition, individuals with ASD may not be able to comprehend the perspectives of others. Perspective sentences in social stories allow individuals with ASD an opportunity to "step into another person's shoes" to understand the feelings, and reactions of others.

Studies have indicated that social stories could be used as a sole intervention or part of a treatment package to acquire or increase the social-communication skills of young children with ASD (Delano & Snell, 2006; Sansosti & Powell-Smith 2008; Scattone, 2008). For example, Delano and Snell (2006) conducted a study using a multiple-probe-across-participants design to evaluate the effect of social stories, as a sole intervention, on the duration of appropriate social engagement and the frequency of verbal initiations, verbal request, and on-topic responses of two 6-year olds and one 9-year old with ASD while playing with their neurotypical peers. During intervention, Delano and Snell (2006) read skill specific social stories to participants with ASD and their neurotypical play partners before scheduled play sessions. After 15 intervention sessions, researchers faded the social story to see if skills would be maintained above baseline levels. In addition, throughout the study, Delano and Snell (2006) probed to see

if participants with ASD generalized skills taught to novel peer play partners. Results from the study suggested that the duration of social engagement and the frequency of social skills maintained above baseline levels for all participants across neurotypical peers (Delano & Snell, 2006).

Social stories also have been used in combination with other interventions to address the social-communication skills of children with ASD. For instance, Kagohara and associates (2013) used a multiple baseline design to investigate the effectiveness of a social story and video model intervention package, delivered via an iPad, on the simple and complex greetings of two 10 year-olds with Asperger's Syndrome. Researchers operationally defined a simple greeting as, "Hello" or "Good morning" and a complex greeting as, "Hello, how are you?" In order for a greeting to be recorded, the student had to initiate the greeting within five seconds of a teacher or a member of the research staff entering the classroom (Kagohara et al., 2013). Observations of the targeted behavior occurred throughout the day. During the baseline phase, neither participant initiated a greeting. When participants failed to initiate a greeting within five seconds, an adult greeted the participant in the appropriate way and prompted a response (Kagohara et al., 2013). For the video modeling phase, participants' watched cartoon depictions of two people meeting and greeting each other on the iPad. The social stories were also presented on the iPad. Once the social story intervention was introduced, the number of simple greetings made toward adults increased from zero to an average of eight per participant. When the video modeling phase was introduced, participants averaged nine simple greetings and 11 complex greetings per day. During the follow-up phase,

participants averaged seven simple greetings and 14 complex greetings (Kagohara et al., 2013).

Likewise, Sansosti and Powell-Smith (2008) used a multiple-baseline across participants design to evaluate the effects of a combined social story and video model presented on an Apple iBook G4 laptop computer. Researchers wrote social stories targeting the ability to join into and maintain a conversation for three children, ages 6-9 years old, with ASD. Before the participants went outside for recess, Sansosti and Powell-Smith (2008) had the participant's teachers implement the intervention once a day, five days a week for three weeks. Observations of the targeted behavior occurred during recess two times a week. Following the intervention phase, researchers faded the intervention package. Results from the study indicated that all three participants improved their ability to join into and maintain a conversation with neurotypical peers on the playground (Sansosti & Powell-Smith, 2008). During a two week follow-up, all three participants demonstrated maintenance of skills; however, only one participant was able to generalize skills taught to another play yard. Although the aforementioned studies met with success, the empirical evidence validating social stories as an evidence-based practice is variable at best (Kokina & Kern, 2010; Sansosti et al., 2004). Furthermore, the majority of the research has addressed deficits in young children resulting in a dearth of research on the utility of using social stories for adolescents with ASD. Moreover, there is a scant amount of research that targets the social-communication skills of adolescents with ASD through the use of a traditional social story format as a sole intervention (Hochdorfer-Hanley et al., 2010; Reichow & Sabornie, 2009 Scattone et al., 2006). To validate these initial findings, a literature review was conducted.

LITERATURE SYNTHESIS AND IDENTIFICATION OF EMPIRICAL GAPS

Studies included in this integrative literature review were located by conducting a search of peer reviewed journal articles published between 2004 to 2014 utilizing ERIC, EBSCO Host, PsycINFO, and Education Research Complete databases. Search terms included *autism, social stories, autism spectrum disorder, Asperger's Syndrome, ASD, visual supports, social skills, communication, computer technology, and adolescents* were used singly and in various combinations to produce articles for the review. Then, using the reference lists of each study located through ERIC, EBSCO Host, PsychINFO, and Education Research Complete a hand search was conducted to find additional studies. Afterward, a hand search was conducted on the journals *Focus on Autism and Other Developmental Disabilities, Journal of Autism and Developmental Disabilities, and Autism*. In addition, six reviews of the literature were identified and cross referenced to identify common themes and articles. Once the electronic and hand searches were completed, the abstract for each identified article was examined to determine whether the article met inclusionary criteria.

There were six inclusionary criteria utilized to determine whether an article was included in this literature review. First, participants must have been identified as having ASD. Second, the study must have contained independent variables that targeted social skills or language development. Third, studies must have assessed the effectiveness of social stories as a sole intervention for at least one adolescent age 11-14 years old with ASD. Fourth, the study must have employed a single subject design that demonstrated experimental control, such as multiple base line, reversal/withdrawal, or alternate

treatment. Fifth, all studies must have been published in peer reviewed journals. Sixth, only studies conducted in the United States were included. Excluded from the review were: (a) studies that used group designs; (b) studies that joined social stories with another intervention; (c) studies that involved participants with disabilities other than ASD, and (d) studies that did not use social stories to promote social communication or the acquisition of social skills. This search generated three studies that focused on remediating the social-communication skills of adolescents between the ages of 11-14 with ASD using a traditional paper format social story.

Studies that Used Social Stories in a Traditional Paper Format to Remediate Social-Communication Deficits of Adolescents with ASD

There are only four studies identified that used social stories, as a sole intervention, in a traditional paper format to address the social-communication skills of adolescents with ASD. Scattone and her colleagues (2006) promoted appropriate social interactions in two 8-year olds and one 13-year old with the use of social stories. This study operationally defined social interaction as a verbal, physical, or gestural initiation or response to a peer (Scattone et al., 2006). A multiple baseline design across participants was used to assess changes in social interactions at school. The study did not produce any major changes in the number of appropriate interactions for both 8-year olds; however, for the 13-year old, the number of appropriate social interactions increased. Baseline appropriate interactions ranged from 0%-18% and during intervention from 17% to 57% of intervals for the 13-year old. The social story made a difference in social behavior in only the 13-year old. Nevertheless, Scattone and associates (2006) noted that other factors could have influenced the acquisition of the social-

communication skills addressed by the social stories. For example, the adolescent indicated a desire to appropriately socialize with his peers. In addition, verbal prompts were not a planned part of the research design but the examiners observed two of the teachers' verbally prompting the 13-year old participant to remember the directions from the social story (Scattone et al., 2006). Researchers could not determine if those verbal prompts had a noticeable effect on the outcome of the study. Scattone and colleagues (2006) stated that social stories, as a sole intervention, must be evaluated further in order to determine its effectiveness.

Reichow and Sabornie (2009) used a social story to increase the number of appropriate verbal greeting initiations made by an 11-year old with ASD. A verbal greeting initiation was considered acceptable if "Hi", "Hello", or "Good Morning" was used with an adult, or "Hi," "Hello," "Good Morning," or "What's up?" was used with a peer (Reichow & Sabornie, 2009). A withdrawal design with a cue fading phase was utilized to evaluate the effectiveness of the social story on verbal greeting initiations. During both baseline phases, no acceptable verbal greeting initiations were noted; however, in the intervention phases, there was an increase in appropriate verbal greeting initiations (Reichow & Sabornie, 2009). Reichow and Sabornie (2009) stated that they did not believe the research design was the most appropriate for the study, but the introduction of the social story did appear to increase the number of verbal greeting initiations for the participant.

Hochdorfer-Hanley, Bray, Kehle, and Elinoff (2010) used social stories to increase the verbal initiations and appropriate responses of one 6-year old, one 9-year old, and a 12-year old with ASD. A multiple baseline design across participants was used

to assess the effects of a social story on each participant's frequency of verbal initiations and contingent responses to peers in a clinical setting. Upon the introduction of the social stories, Hochdorfer-Hanley and colleagues (2010) reported that there was little to no change in targeted behaviors once the social story was introduced. Furthermore, Hochdorfer-Hanley and colleagues (2010) attributed the lack of increased verbal initiations and responsiveness to a deficient amount of stimulus features that were similar to the lunchroom (e.g., food choices and preferential seating). Thus, stimulus features presented in the intervention did not serve as an antecedent, so the social story was relatively useless.

Hudock, Kashima-Ellington, and Bellini (2011) compared the effects of two types of interventions, a traditional social story and a generic story, on the responses to verbal greetings of four participants, ages 8-13 years, with ASD. An A-B-A-B changing conditions design was used to determine the effectiveness of the two stories. Participants attended two 20-minute sessions which consisted of one 10-minute interval of play-based activity and two 5-minute data collection periods per week over a four week period. At the conclusion of the study, Hudock and colleagues (2011) found that one type of intervention was not more successful in increasing participants' responses to verbal greetings. These findings could be due to the fact that there were only eight data points collected during the study. Based on limited data, a determination could not be made about the effectiveness of either intervention. As the results of these four studies indicate, the success of traditional social story interventions on increasing the social-communicative abilities of adolescents with ASD is inconsistent; therefore, efforts should be made to create and implement more effective and appropriate ways to employ social

stories with this older group of learners. Also, due to the methodological flaws found all four of the studies (Hochdorfer-Hanley et al., 2010; Hudock, Kashima-Ellington, & Bellini, 2011; Reichow & Sabornie, 2009; Scattone et al., 2006) the need exists for a more rigorous, methodologically sound single subject study.

To further substantiate the need for methodologically sound research regarding the use of social stories as a sole intervention for adolescents with ASD, six meta-analyses (Ali & Frederickson, 2006; Karkhaneh, Clark, Ospina, Seida, Smith, & Hartling, 2010; Kokina & Kern, 2010; Kuoch & Mirenda, 2003; Sansosti et al., 2004; Test, Richter, Knight, & Spooner, 2011) conducted between 2003 and 2011, were reviewed to delineate common themes. First, although many authors (Karkhaneh et al., 2010; Kokina & Kern, 2010; Kuoch & Mirenda, 2003; Sansosti et al., 2004; Test et al., 2011) agreed that social stories are a promising intervention, they also noted that several studies lacked robust or appropriate experimental designs (Reichow & Sabornie, 2009, had weak treatment effects (Hochdorfer-Hanley et al., 2010; Hudock et al., 2011), lacked maintenance and generalization data (Scattone et al., 2006), and had problems with the implementation of the intervention (Hochdorfer-Hanley et al., 2010; Scattone et al., 2006). Second, the majority of the studies focused on remediating preschool and elementary aged students with ASD in the areas of decreasing inappropriate/compulsive behaviors and promoting social skills. Based on these findings, the proposed study will center upon adolescents, defined specifically as 11-14 year old students (Cihak, Kildare, Smith, McMahon, & Quinn-Brown, 2012; MacMahon, Lerner, & Britton, 2013; Scattone, 2008).

Technology Use in the Delivery of Social Stories

One way to fill an empirical gap in the literature in using social stories with adolescent aged students is to use technology as an intervention delivery model. For over ten years, there has been an upsurge in the use of computer-assisted technology to deliver therapeutic interventions to individuals with diverse needs (Cihak et al., 2012; Mancil, Haydon & Whitby, 2009; Wainer & Ingersoll, 2011). In the past, interventions using technology for students with ASD were limited to videotapes (Wainer & Ingersoll, 2011). Since video modeling is considered an evidence-based practice, current technological advances like the iPod, Kindle, and iPad have the potential to foster academic achievement, social understanding and effective social-communication skills of adolescents with ASD (Cihak et al., 2012; Hart, & Whalon, 2012). Many researchers have suggested reasons why technology-based strategies may be particularly effective. For instance, Mazurek, Shattuck, Wagner, and Cooper (2012) found that among a sample of 920 adolescents, ages 13-17 years old, with ASD, 64.2% of the individuals surveyed spent most of their time engaging in screen-based activities (e.g., T.V, videos, and electronic or video games). Moreover, when compared to other disability categories (e.g., speech/language impairment, learning disabilities, intellectual disabilities), rates of nonsocial-media use were higher among the ASD group (Mazurek et al., 2012). In a similar study, Shane and Albert (2008) examined the usage patterns of screen-based media for 89 children, ages 6-17 years old, with ASD. The results indicated that children with ASD spent most of their spare time engaged in screen-based activities (e.g., television, video, and computer games; Shane & Albert, 2008). Based on these findings, one can say that some individuals with ASD have a predilection for technology driven devices. This preference has lead researchers to develop technology-based strategies that

address social-communication deficits; however, an exhaustive review of the published literature failed to recover any studies that combined social stories and technology like iPad to increase the social-communication skills of adolescents over the age 11-years old with ASD. Based on this modest body of accumulated research, social stories delivered via traditional methods (e.g., paper) and electronic formats (e.g., computer) appear to hold promise as an effective intervention tool for individuals with ASD; however, little is known about the effectiveness of social stories delivered on an iPad for adolescents with ASD to improve their social-communication skills when interacting with neurotypical peers. The proposed study would like to explore this identified need in the literature.

Therefore, the purpose of the study was to examine the efficacy of using social stories in two formats as an intervention for adolescents, ages 11-14 years old, with ASD. This study aimed to improve their verbal initiations and on-topic responses. There were three research questions:

1. Will the use of a written, student-specific social story delivered on an iPad immediately preceding a 30-minute leisure activity with a participant selected game played with a neurotypical peer increase the verbal initiations and on-topic responses of three adolescents with ASD?
2. Will the use of a written, student-specific social story delivered in a traditional book format immediately preceding a 30-minute leisure activity with a participant selected game played with a neurotypical peer increase the verbal initiations and on-topic responses of three adolescents with ASD?

3. Will the effects of the intervention be maintained and generalized to another play partner?

It is hypothesized that both social story formats, iPad and paper, will increase the social communicative abilities of participants over baseline levels; however, it is anticipated that more positive treatment effects will be observed during the iPad phase. This study will add to the current body of literature in this area by (a) demonstrating how social stories as a sole intervention can be used to increase the social and communication skills of adolescents with ASD; (b) being the first study to incorporate technology such as the iPad to deliver a social story intervention to address the social-communication deficits of adolescents with ASD in an unstructured setting (e.g., after-school); and (c) addressing some of the methodological concerns raised by Sansosti and colleagues (2004), as well as by Test and associates (2011). This will be accomplished by implementing a robust research design which includes maintenance and generalization probes, and social validity surveys.

CHAPTER III

METHOD

Participants

Three children, with an existing diagnosis of an Autism Spectrum Disorder, were selected from an elementary school and a middle school in the southern region of the United States to participate in this study. Parental consent and participant assent were obtained for each participant. Participants were between the ages of 11 and 14 years and were capable of communicating using speech. Two participants were members of a self-

contained classroom while the other participant attended inclusion classes. All participants were recruited from the local branch of the Autism Society of America (ASA) during one of the monthly tween socials. As compensation for participation the study, participants with ASD received weekly gift cards that did not exceed \$100 in total. Gift cards were in increments of \$10, \$15, and \$20 and were given after a full week of participation. Parental permission was obtained before giving out the gift cards.

In order to be included in this study, all participants met the following criteria; (a) previous diagnosis of ASD, (b) chronological age between 11-14 years old (c) participation in a full-time inclusive classroom or a self-contained classroom but included in at least one general education class, (d) inability to initiate conversations or to respond appropriately when age-appropriate peers attempted to converse with them as indicated by parent report on the Social-Communication Questionnaire-Current, (e) exhibit limited expressive and receptive skills as indicated by parent report or speech language pathology assessments (f) previous psychological assessments obtained from school records within the past 3 years indicates an I.Q. score between 60-90, (g) signed consent from the parents of each participant, and (h) signed assent from the student to be a part of the research. In addition, one neurotypical peer was selected to participate in the study as the gaming partner for all three participants with ASD. To eliminate possible variability in communication patterns, one neurotypical was chosen to interact with all three participants during prebaseline activities, baseline, intervention, and maintenance phases. In addition, one neurotypical peer was chosen to participate during generalization probes. The neurotypical peers met inclusionary criteria for the study if; (a) the parents reported no previous diagnosis of a disability, (b) their chronological age was between 11-14 years

old (c) they participated in an general education classroom, (d) they have been observed by parents to initiate conversations and respond appropriately when interacting with age-appropriate peers, and (g) there was signed consent from the parents of each participant.

The neurotypical peers chosen were twin, 14-year old, ninth grade, high school students. Peer 1 and Peer 2 participated as play partners at ASA socials. They also have an older brother who is diagnosed with Autism. Peer 1 interacted with the participants with ASD during prebaseline activities, baseline, intervention, and maintenance sessions. Peer 2 participated during generalization sessions. Peer 1 received \$50 weekly for his participation the study, and Peer 2 received \$25 for participating during the generalization phase.

Participant 1, was a 13-year old, eighth grade, African-American male. Participant 1 was a member of a middle school self-contained special education classroom. The self-contained classroom was designed to accommodate 10 children with mild to moderate Autism. Although Participant 1 was a part of a self-contained classroom, he did attend science, social studies, and physical education with his typical peers weekly.

Triennial assessments dated within the past year indicated that Participant 1's composite intelligence index, as measured by the Reynolds Intelligence Assessment Scales (RIAS; Reynolds & Kamphaus, 2003), was 80. Participant 1 obtained a 70 on the verbal index and a score of 94 on the nonverbal index. His scores on the Woodcock-Johnson III Tests of Achievement (WJ-III; Woodcock, McGrew, & Mather, 2001) yielded a broad reading score of 63, a broad math score of 35, and a broad written language score of 69. In addition, during that time, Participant 1's mother completed the

Autism Spectrum Ratings Scales (ASRS; Goldstein & Naglieri, 2010). On the ASRS assessment, Participant 1 obtained a T score of 69 and a percentile rank of 97 for meeting the DSM-IV diagnostic criteria for Autism. While completing the assessment, Participant 1's mother reported that he engaged in the use of atypical language and exhibited stereotypical behaviors. She also noted that Participant 1 was sensitive to visual and auditory stimuli. SCQ-Current (Rutter, Bailey, & Lorde, 2003) results indicated that Participant 1 had difficulty with conversational skills and did not initiate or maintain conversations with others unless it was relating to a topic of interest. When a person would try to engage him in a conversation, Participant 1's mother reported, he would either say, "I don't know", shake his head, or give a one word response.

Participant 1 was an only child who lived with his mother in a lower middle class neighborhood. He participated in several after school activities like baseball, swimming, and piano lessons. Participant 1 also attended monthly tween socials organized by ASA. Since Participant 1 was able to read and comprehend reading material above third grade level, he read his social story independently.

Participant 2, was an 11-year old, fifth grade, Asian American male. He was a member of an elementary school self-contained special education classroom. In his classroom, there was one special education teacher, one paraprofessional, and eight children with varying disabilities. Participant 2 was a part of a self-contained classroom due to his academic functioning and comorbid diagnosis of Autism and ADHD; however, he did participate in physical education with neurotypical children on a weekly basis.

According to triennial assessments dated within the past three years, Participant 2's composite intelligence index, as measured by the Stanford Binet Intelligence Scales-Fifth Edition (Roid, 2003), was 50. Participant 2 obtained a score of 52 on the verbal index and a score of 53 on the nonverbal index. In contrast, during an independent evaluation at a local hospital Participant 2 obtained a full scale composite index of 72 for overall cognitive ability as measured by the Comprehensive test of Nonverbal Intelligence-Second Ed. (CTONI-2; Hammill, Pearson, & Wiederholt, 2009). This is a 21-point discrepancy between two nonverbal norm referenced indices which is very atypical. It may be gathered that Participant 2's overall intelligence was underestimated during triennial testing. Participant 2's scores on the Kaufman Test of Achievement-2nd Edition (KTEA-II; Kaufman & Kaufman, 2004) yielded a reading composite score of 69, a mathematics composite score of 54, and a written language composite score of 65. On the SCQ-Current (Rutter, Bailey, & Lorde, 2003), Participant 2's mother commented that he did not initiate conversations appropriately (e.g., would ask rapid repetitive questions and not wait for responses) nor maintain conversations with others unless it was relating to a perseverative interest (e.g., playing a tuba). When a person would try to engage Participant 2 in a conversation, Participant 2's parents' reported, he would either shrug his shoulders or shake his head "no" at first until someone explained the question to him.

Participant 2 was an only child who lived with his mother and father in an area where many military families lived. After school, Participant 2 received ABA instruction to address his academic deficits and attended several extracurricular activities like violin and piano. Participant 2 also attended monthly tween socials organized by the Autism

Society of America. Participant 2's ADHD dual diagnosis impaired his ability to focus on reading the story independently, so his social story was read to him.

Participant 3, Participant 3, was a 13-year old, seventh grade, Caucasian male. Participant 3 attended the same middle school as Participant 1, but he participated in three inclusion classes and three general education classes. Each class he attended had between 20-25 students. Participant 3 participated in science, social studies, physical education in the general education setting without assistance from a special education teacher. English, algebra, and reading were in inclusion classes. In addition, he did not receive any supplemental services like speech or occupational therapy.

Triennial psychological assessments indicated Participant 3's composite intelligence index, as measured by the Wechsler Intelligence Test for Children-Fourth Edition (WISC-IV; Wechsler, 2003), was 85. Participant 3 obtained a 70 on the verbal index and a score of 94 on the nonverbal index. His scores on the Woodcock-Johnson III Tests of Achievement (WJ-III; Woodcock, McGrew, & Mather, 2001) yielded a broad reading score of 92, a broad math score of 95, and a broad written language score of 103. During the time of testing, the Childhood Autism Ratings Scales (CARS; Schopler, Reichler, & Renner, 1986) was completed. On the CARS assessment, Participant 3 obtained a T score of 30 which places him within the mildly-moderately autistic range. SCQ-Current results (Rutter, Bailey, & Lorde, 2003) revealed Participant 3 was very quiet and relied on scripted initiations when interacting with people. For example, Participant 3's mother commented that he would ask, "How was your day?" several times within an interaction even after receiving a response. She felt that he did not know what to say next in the conversational exchange. When a person attempted to engage

Participant 3 in a conversation, Participant 3's mother reported, he would either shrug his shoulders or shake his head in the affirmative or negative.

Participant 3 is the middle child in his family and has an older sister and a younger brother. His mother and father live in a lower middle class neighborhood. He participated in several after school activities such as: bowling, gaming competitions, and church socials. Participant 3 also attended monthly tween socials organized by ASA. Participant 3 was able to read and comprehend reading material on grade level, so he read his social story independently.

Setting

Pre-baseline, baseline, intervention, maintenance, and generalization sessions were conducted on the campus of Old Dominion University in the Child Study Center. Within the Child Study Center there is a Speech and Hearing Clinic which provides diagnostic and therapeutic services to adults and children with speech, language, and/or hearing disorders. In addition, there is an Oral Preschool Program which offers services for 3-6 year olds with hearing loss. Finally, the Child Study Center has three general education preschool classrooms that serviced typical children, ages 3-6 years old, from the surrounding community.

The study was conducted on the first floor of the CSC. The conference room and multi-purpose room were used for the gaming sessions. An assistant professor office was where the participants read the social story intervention. Participants sat in chairs at long rectangular tables, directly across from each other with the gaming activity placed between them. During prebaseline, baseline, intervention sessions, maintenance, and

generalization sessions participants engaged in interactive game playing using Monopoly. A digital camera with tripod was used to record all gaming sessions.

Materials

Prior to the initiation of game play, the participants with ASD read a person-specific, individualized social story, developed according to Gray's (2004) format (See Appendix A), delivered either via an iPad format or traditional book format. Each social story provided the participant with ASD several examples of appropriate social initiations and responses he was expected to make to his gaming partner during the game sessions. Although the method of delivery of the social story varied based on whether the participant was assigned to the paper or electronic format condition, the structure of the social story was identical. There were two to five sentences with one to two pictures per page for a total of five pages. A social story checklist (Gray, 2004) was used to ensure that the specific guidelines for writing the social stories were followed (See Appendix B).

Electronic condition-iPad format. One iPad was used to introduce the social story during the electronic condition. The social story was presented via the iPad device using the StoryMaker™ application. Story Maker™ is an iPad application for creating and presenting social stories using pictures, text, and optional audio. The iPad was also used to take pictures of the participants while playing the game with the neurotypical peer during prebaseline. The pictures were then downloaded into the social story. There were two to five sentences with one to two pictures per page for a total of five pages.

Paper condition-book format. During the paper condition, participants read book bound social stories identical to the social stories presented in the electronic

condition. The social stories that were created using the Story Maker™ application for each participant were sent via email to the primary researcher's. The social stories were then printed out on white paper using colored ink. After printing, each social story was compared to the electronic version for accuracy. Finally, each social story was laminated, and spiral bound to create a book.

Social-Communication Questionnaire Current. The Social-Communication Questionnaire-Current (SCQ-Current; Rutter, Bailey, & Lorde, 2003) was completed by parents of participants with ASD. The SCQ-Current is a 40-item questionnaire developed to assess the behavior of individuals who are suspected of having an ASD (Schanding, Nowell, & Goin-Kochel, 2012). The questionnaire is used to examine present behavior specifically during the past 3 months. The SCQ-Current elicits information about reciprocal social interaction, language/communication, and repetitive and stereotyped behaviors (Rutter, Bailey, & Lorde, 2003). Although there is not a cut off score to indicate further testing, according to the administration manual, the SCQ-Current produces results that can be helpful in treatment planning, educational intervention, and measurement of change in symptoms over time (Schanding et al., 2012). Even though the SCQ-Current parent report can be used to screen for symptoms associated with ASD, for the purposes of this study, it was used to establish participant eligibility. Internal reliability of the SCQ-Current was explored using Chronbach's alpha (Schanding et al., 2012). The reliability coefficient for the total scale was .90 suggesting excellent internal consistency.

Experimental Design

A single subject, alternating treatment design (Gast, 2010), with maintenance and generalization probes, was used to complete this research study. Two social stories conditions, paper and electronic, were alternated across participants with no more than two consecutive observations of the same condition (Gast, 2010). An alternating treatment design was the most appropriate for this study because (a) it provided a rapid method for evaluating two or more interventions or two variations of an intervention; (b) data patterns during the comparison phase can show which intervention is more effective and; (c) differentiation in treatments can be accomplished with as little as five observations per condition (Gast, 2010). Each condition was counterbalanced across participants by using the coin-flip method.

Independent variable. The independent variable was a five page social story uniquely tailored to each participant based on cognitive and communicative ability. Social stories were presented using two different methods, electronic and paper, to determine whether the use of either or both interventions positively impacted verbal initiations and on-topic responses of the participants with ASD. In this study, a social story was defined as a written short story that provided the participants with ASD precise social information and language about the game they played, including the possible reactions of others and examples of appropriate responses the participant could use in that social situation (Gray, 2004; Reynhout & Carter, 2007).

Dependent variables. There were two dependent variables in this study, verbal initiations and on-topic responses. Hochdorfer-Hanley and colleagues (2010) definition for verbal initiations was used in this study. *Participant verbal initiations* were defined as any unprompted question, comment or greeting made by the participant with ASD that is

directed to the gaming partner (Hochdorfer-Hanley et al., 2010). Second, an *on-topic response* was defined as an appropriate response given immediately following the neurotypical peer's verbal comment or initiation (e.g., "I like playing this game too!").

Data collection procedures

To reduce researcher bias, the primary researcher was not directly involved in the data coding procedure. Three masters' students were recruited from Old Dominion University, and trained as research assistants then tasked with coding pre-baseline, baseline, intervention, maintenance, and generalization sessions. To improve the study, research assistants were also directed to transcribe the videos. They were tasked with identifying and writing down conversational topics, phrases, initiations, and on-topic responses made by participants while playing the game. The research assistants were also trained on individual participant verbal initiations and on-topic responses by observing each participant with ASD as they participated in prebaseline activities. Research assistants received a weekly stipend of \$100 for their services. Verbal initiations and on-topic responses demonstrated by each participant were summarized by the research assistants and summaries were compared for discrepancies. When the research assistants were able to demonstrate 90% agreement for two consecutive observation sessions, baseline sessions began.

Each session was recorded via digital camera for the entire 30-minute scheduled gaming activity. The primary researcher and research assistants conducted videotaping once a day, four days a week for six weeks. The research assistants viewed and coded the first 15-minutes of the gaming sessions at a later time. An interval recording system was

used to record the frequency of verbal initiations and on-topic responses for each participant. While watching the video of each gaming session, an audiotape cued the research assistants every ten seconds to record the occurrence of a targeted behavior. During each observation of the video, observers marked each interval in which a verbal initiation or on-topic response occurred according to the aforementioned definitions. Data from the research was collected, graphed, and analyzed on a daily basis.

Procedures

Pre-baseline. Before baseline, participants with ASD and parents of participants with ASD signed assent and consent forms for the study. After signing all documentation, participants with ASD were informed that they would be participating in a gaming competition and would be assigned a partner. Participants with ASD were also told that at the end of each week, they would earn a weekly gift card for participating in the competition. Attrition was a concern due to the timing and duration of the study (between the hours of 4-7pm for six weeks), so the primary researcher believed that participants with ASD would be more inclined to continue participation in the research study if they earned a gift card at the end of each week. The competition was not used as a stimulus for communication; rather, it was used as a stimulus for participation. After the rules for the competition were explained, participants with ASD were assigned to time slots, between the hours of 4-7pm, based upon parental preference. Once participants with ASD were assigned to time slots, intervention order was determined by randomly using a coin flip method. If the coin landed with the head facing upward, participant one and three read the social story on the iPad while participant two read the paper format. If the coin landed with the tails side facing upward, then the opposite schedule occurred with participant

two reading the social story on the iPad and vice versa for participant one and three. Based on the coin flip, participant one and three read the social story on the iPad first while, participant two read the social story in book format. Once the condition schedule was established, the participants with ASD were collectively asked to choose a game to play. All participants chose to play Monopoly during the gaming sessions. Following the game selection, individual social stories were created based on the dependent variables, the communication level of the participant with ASD, and the game activity selected by participants.

To ensure participants were familiar with the functions of an iPad, the primary researcher conducted a 10 minute training session on how to navigate the social story application. Research assistants also received training on how to navigate the social story on the iPad in the event the participants with ASD encountered technical difficulties and how to check comprehension during the first session of intervention. Research assistants also developed a schedule for checking reliability and data coding. Additionally, partners were placed in two gaming sessions each prior to baseline. The first set of sessions was reviewed by the primary researcher and research assistants in order to revise operational definitions and to determine if the duration of the interval was adequate. During the first set of sessions, pictures were also taken with the iPad of the participants playing Monopoly with the neurotypical gaming partner. The pictures were then downloaded into the social stories. The second set of sessions was used for the research assistants to establish coding reliability. Baseline began once the research assistants reached 90% reliability for two consecutive observation sessions.

Baseline. Baseline data were collected concurrently for all participants for three days. Since sessions occurred in the evenings, if a participant was absent for a session, another session was scheduled during the designated make-up day. The study was conducted in two rooms, the conference room and the multipurpose room, in the Child Study Center. Each room had one table, two chairs, and the game chosen by the participant with ASD. A digital camera was placed on a tripod at a diagonal to capture the interaction. The neurotypical peer was sitting at the table with the game when the participant with ASD entered the room. The primary researcher or research assistant said, "Time to play a game with Ian". Both participants were told to play the game until the timer went off. The 30-minute gaming session was recorded, but only the first 15 minutes was coded at a later time by the research assistants. The research assistants also transcribed conversational topics, verbal initiations, and on-topic responses. Baseline was conducted for three sessions. Once baseline data were graphed and stability was established, the intervention phase began.

Intervention. During intervention, the primary researcher or research assistant directed the participants, during their assigned hour, to the designated assistant professor office to read their social story. The primary researcher or research assistant said, "Time to read a story about playing Monopoly with Ian". The primary researcher or research assistant had Participant 1 or Participant 3 read the social story silently for three-five minutes. Participant 2 was read his social story. The primary researcher or research assistant asked the participants three predetermined questions to assess the participants' comprehension of the social story. The questions were written by the primary researcher and given to the research assistant. All participants with ASD answer comprehension

questions with 100% accuracy. The comprehension questions were asked only during the first intervention session. After all the questions were answered correctly, the primary researcher or research assistant led the participant to the conference room or copying room where the neurotypical gaming partner was waiting with Monopoly. Subsequent sessions involved the primary researcher or research assistant directing the participant with ASD to the assistant professor office and saying, "Time to read a story about playing Monopoly with Ian". Then, after 3-5 minutes of reading the social story alone silently, or in Participant 2's case, being read the social story, the primary researcher or research assistant said, "Time to play the Monopoly with Ian", and immediately directed the participant to the conference room or copy room where Peer 1 was waiting with the game. Participants were told to play the game until the timer went off. The entire 30 minute gaming session was videotaped and the first 15 minutes was later coded by the research assistants. The research assistants also transcribed conversational topics, verbal initiations, and on-topic responses during the time of coding. After the first session, the participants were alternated between social story conditions based on the outcome of the random coin toss assignment. There were seven alternations between the electronic condition and paper condition.

Maintenance. Two weeks after the intervention concluded, two maintenance probes were conducted. Guidelines for the maintenance probes were identical to baseline procedures. Peer 1 sat at the table with the game. The primary researcher or research assistant said, "Time to play Monopoly with Ian". Both participants were told to play the game until the timer went off. The entire 30 minute gaming session was videotaped and the first 15 minutes was coded at a later time by the research assistants. Research

assistants coded the frequency of verbal initiations and on-topic responses that occur during the first 15 minutes of the 30-minute gaming session. They also transcribed conversational topics, verbal initiations, and on-topic responses.

Generalization. Two generalization probes were conducted in an attempt to determine if targeted behaviors were used when participants with ASD played Monopoly with another gaming partner. The probes were 30 minutes and like baseline, the primary researcher or research assistant said, "Time to play Monopoly with Peer 2". The participant and the gaming partner played the game for 30 minutes. The entire 30 minute gaming session was videotaped and the first 15 minutes was coded at a later time. Research assistants coded the frequency of verbal initiations and on-topic responses that occur during the first 15 minutes of the 30-minute gaming session. They also transcribed conversational topics, verbal initiations, and on-topic responses. The probes occurred following the intervention phase.

Inter-observer Agreement

Thirty-eight percent of the videotaped sessions were selected for independent analysis by two research assistants that resulted in 24 videos, eight per participant, across baseline, intervention, and follow-up phases. Inter-observer agreement was determined by dividing the total number of agreements between the two observers by the total number of agreements plus disagreements between the two observers and the resulting quotient will be multiplied by 100 (Gast, 2010). The percentage IOA ranged from 90% to 99% ($M = 95%$) across all participants and all phases. Participant 1s's IOA ranged from

95% to 99% ($M = 97\%$), Participant 2's ranged from 90% to 98% ($M = 93\%$), and Participant 3's ranged from 93% to 96% ($M = 95\%$).

Fidelity of Implementation

The primary researcher and research assistant used a procedural checklist (see appendix F) to determine if the study was implemented as outlined in the training protocol. The checklist delineated the procedural steps for each session (e.g., whether or not the student read the social story presentation completely before the gaming activity, or whether or not the primary researcher or research assistant sets the timer and turns on the camera prior to the gaming session). Procedural fidelity was calculated by dividing the total number of steps which followed the procedural checklist by the total number of steps following the procedural checklist plus the number of steps that did not follow the procedural checklist. Then, the quotient was multiplied by 100 (Gast, 2010). Treatment fidelity was conducted on 50% of the sessions. Treatment fidelity was 100% for Participant 1, Participant 2, and Participant 3.

Social Validity

Acceptability of the social story intervention was measured by means of questionnaires developed by the primary researcher. Participants with ASD, their parents, and neurotypical peers (See Appendices G, H and I) assessed the effectiveness of the social story intervention. The measure was composed of two types of questions: Likert and open ended questions. The survey included two open-ended questions and five questions using a 5-point Likert scale.

Data Analysis

Verbal initiations and on-topic responses during the gaming activity were graphed for each participant with ASD daily as a percentage of intervals. Changes in level, variability, and trend for data points were visually analyzed during baseline, intervention, maintenance, and generalization phases (Kennedy, 2005). In addition, the Nonoverlap of All Pairs (NAP; Parker et al., 2007) was calculated to determine the effectiveness of the intervention (Parker et al., 2007). NAP is a non-parametric index that calculates nonoverlap, or improvement in data points, between phases (Parker & Vannest, 2009). Parker and Vannest (2009) suggested guidelines for interpretation of NAP with 0-65 % non-overlap indicating weak effects, 66–92% medium effects, and 93–100 % strong effects.

CHAPTER IV

RESULTS

The effects of two formats of a social story on verbal initiations and on-topic responses were analyzed by graphing the percentage of intervals of target behaviors. The results are presented by participant. Each graph represents participants' verbal initiations and on-topic responses, for both paper and electronic conditions. In addition, maintenance, and generalization probes with another partner were on the same graph as well.

Participant 1

Initiations and responses (see Figures 1 and 2) for Participant 1 changed after the introduction of the social story in both formats. During baseline, Participant 1 did not make any initiations (0%) and his mean level of on-topic responses was 9% (range 3%-

14%). After the introduction of the social story, in iPad format, his mean level of initiations was 1% of intervals (range = 0%–3%) and his mean level of on-topic responses was 13% (range = 6%–23%). Similar effects were observed during the introduction of the social story in paper format. Participant 1’s mean level of initiations was 1% of intervals (range = 0%-6%) and his mean level of on-topic responses was 19% of intervals (range = 6%-28%). Two weeks after intervention sessions concluded, two maintenance and two generalization probes were conducted. During maintenance, Participant 1’s mean level of initiations was 5% of intervals (range = 1%-8%) and his mean level of on-topic responses was 22% of intervals (range = 11%-31%). When a new gaming partner was introduced, Participant 1’s mean level of initiations was 3% of intervals (1%-4%) and his mean level of on-topic responses was 37% of intervals (34%-39%).

Figure 1. Participant 1’s percentage of verbal initiations during baseline, comparison (Electronic and Paper format), and follow-up phases

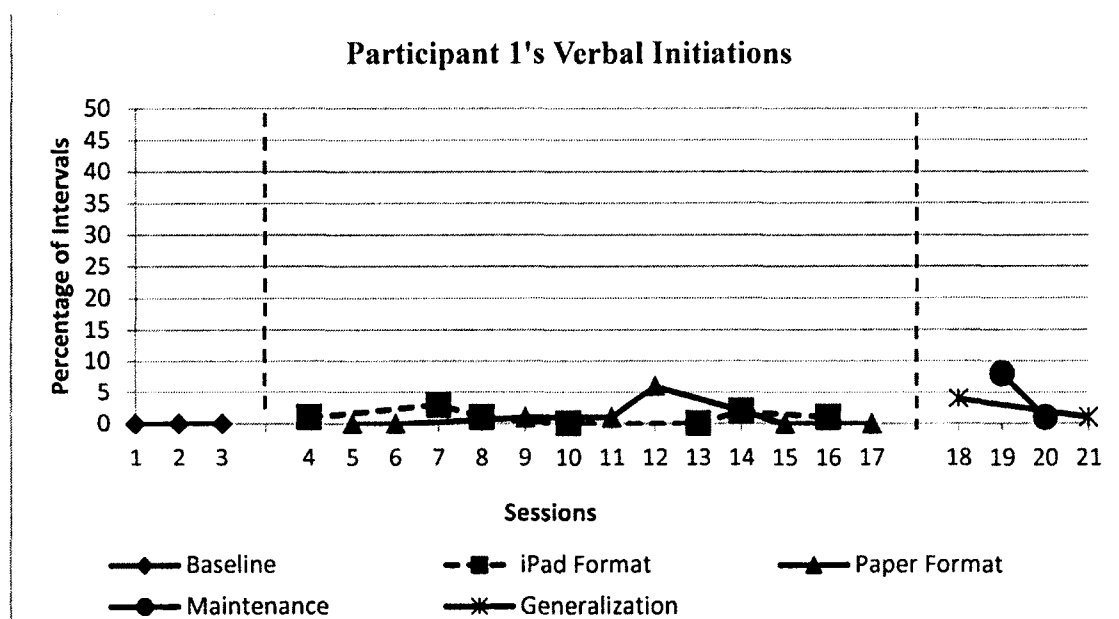
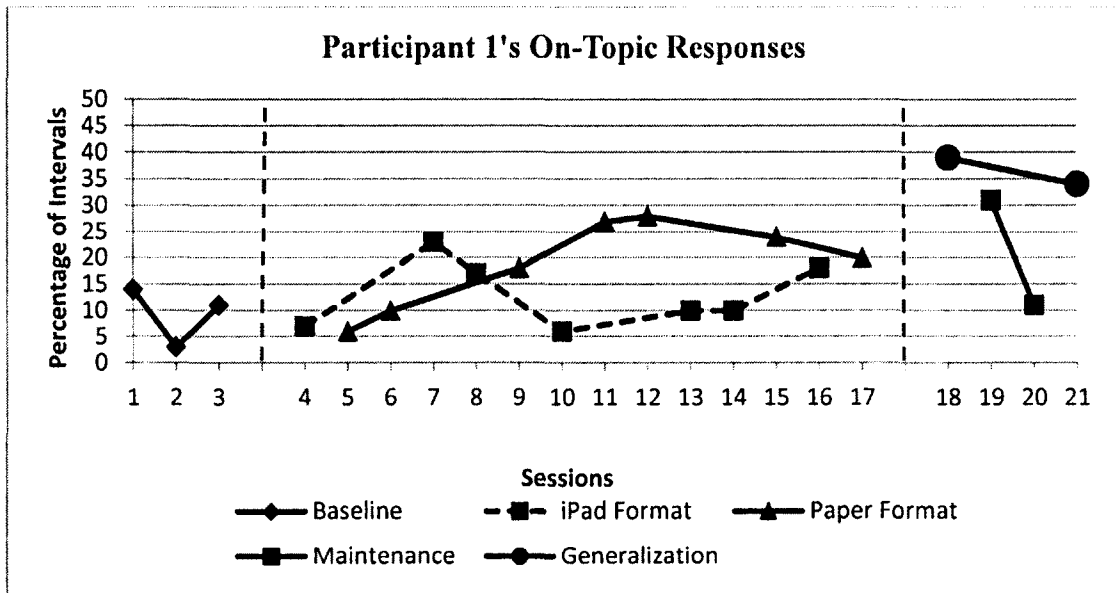


Figure 2. Participant 1's percentage of on-topic responses during baseline, comparison (Electronic and Paper format), and follow-up phases



Participant 2

Initiations and on-topic responses (see Figures 3 and 4) for Participant 2 slightly decreased after the introduction of the social story in both formats. During baseline, Participant 2's mean level of initiations was 23% (range = 19%-27%) and his mean level of on-topic responses was 14% (range= 13%-17%). After the introduction of the social story, in paper format, his mean level of initiations was 18% of intervals (range = 7%–32%) and his mean level of on-topic responses was 13% of intervals (range = 4%–32%). Similar effects were observed during the introduction of the social story in iPad format. Participant 2's mean level of initiations was 19% of intervals (range = 7%-37%) and his

mean level of on-topic responses was 9% of intervals (range = 2%-28%). Two weeks after intervention sessions concluded, two maintenance and two generalization probes were conducted. During maintenance, Participant 2's mean level of initiations was 23% of intervals (range = 18%-27%) and his mean level of on-topic responses was 16% of intervals (range = 11%-21%). When a new gaming partner was introduced while playing the same game, Participant 2's mean level of initiations was 31% of intervals (27%-34%) and his mean level of on-topic responses was 8% of intervals (6%-10%).

Figure 3. Participant 2's percentage of verbal initiations during baseline, comparison (Electronic and Paper format), and follow-up phases

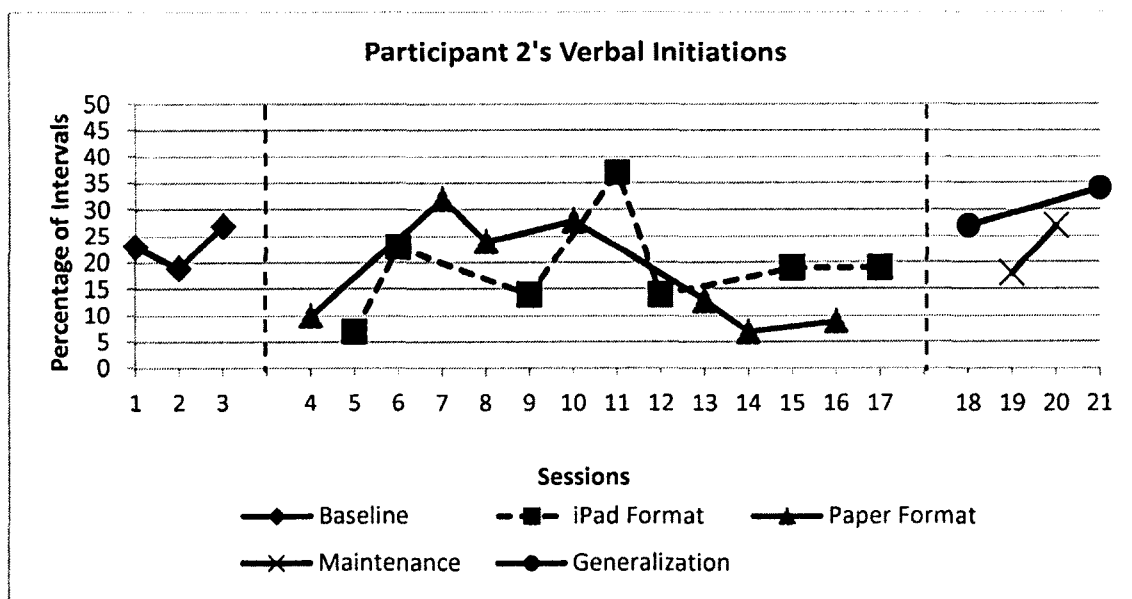
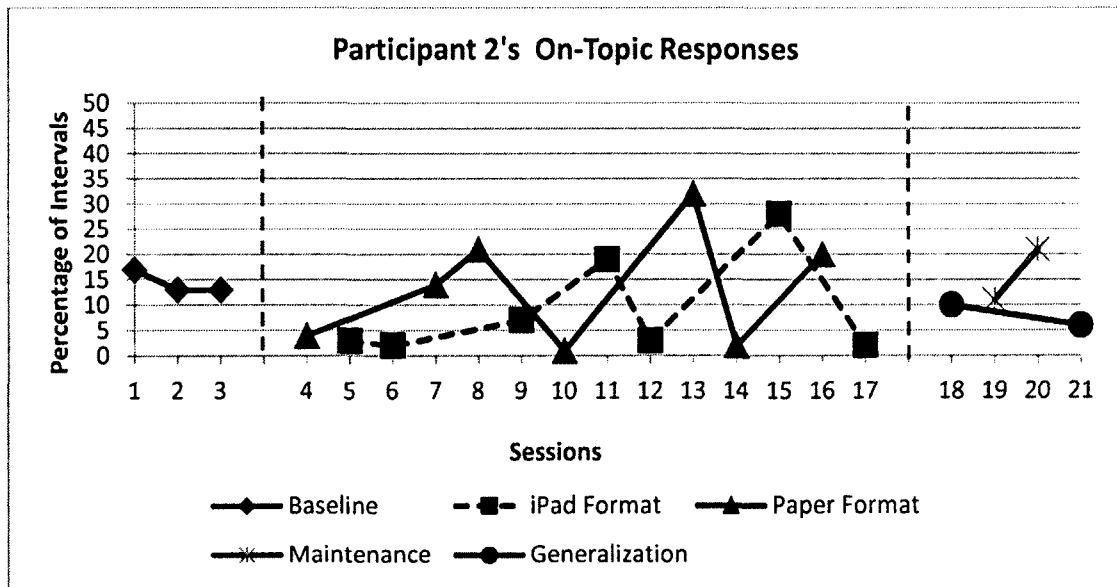


Figure 4. Participant 2's percentage of on-topic responses during baseline, comparison (Electronic and Paper format), and follow-up phases



Participant 3

Verbal initiations and on-topic responses (see Figures 5 and 6) for Participant 3 slightly improved after the introduction of the social story in both formats. During baseline, Participant 3's mean level of initiations was 6% of intervals (range 4%-7%) and his mean level of responses was 11% of intervals (range 9%-14%). After the introduction of the social story, in the iPad format, his mean level of initiations was 11% of intervals (range = 4%–18%) and his mean level of on-topic responses was 16% of intervals (range = 9%–24%). Similar effects were observed during the introduction of the social story in paper format. Participant 3's mean level of initiations was 9% of intervals (range = 3%–13%) and his mean level of on-topic responses was 14% of intervals (range = 3%–26%). Two weeks after intervention sessions concluded, two maintenance and two generalization probes were conducted. During maintenance, Participant 3's mean level of

initiations was 10% of intervals (range = 3%-13%) and his mean level of on-topic responses was 19% of intervals (range = 15%-22%). When a new gaming partner was introduced in the generalization phase, Participant 3's mean level of initiations was 14% of intervals (both sessions were 14%) and his mean level of on-topic responses was 24% of intervals (21%-27%).

Figure 5. Participant 3's percentage of initiations and responses during baseline, comparison (Electronic and Paper format), and follow-up phases

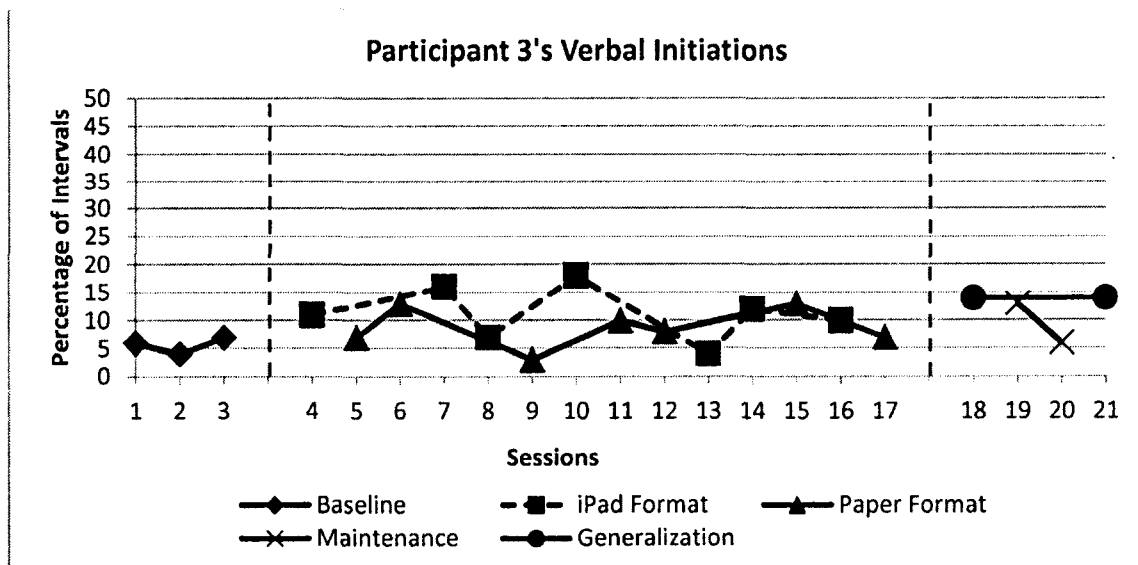
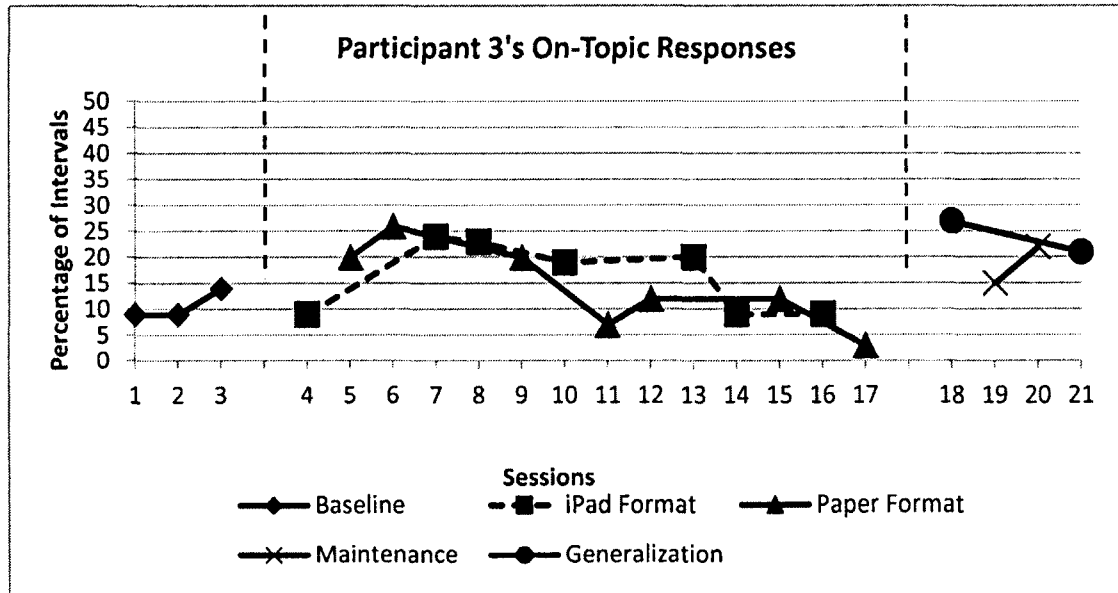


Figure 6. Participant 3's percentage of on-topic responses during baseline, comparison (Electronic and Paper format), and follow-up phases



Social Validity

Acceptability of the social story intervention was measured by means of questionnaires developed by the primary researcher. Participants with ASD, their parents, and neurotypical peers (See Appendices G, H, and I) assessed the effectiveness of the social story intervention. The measures were composed of two types of questions: Likert and open ended questions. The survey included two open-ended questions and five questions using a 5-point Likert scale. The questionnaires contained questions about the usefulness of the intervention presentation and if parents believed participation in this study helped their child socialize more. Participant 3's mother commented that he was more communicative than ever. In addition, she said people in their family also commented on his ability to engage in and maintain conversations more frequently.

Participant 2's parents reported that he is socializing more at the tween socials sponsored by ASA. Before the study, Participant 2 was reserved and sat by himself and didn't socialize most of the time. As the study progressed, Participant 2 was more likely to sit next to Participant 3 to converse during social events. All parents rated highly the intervention presentation stating the iPad is age appropriate and indicated that they would participate in another study like this if an opportunity became available. Participants with ASD noted that they enjoyed the gaming sessions and reading the social stories on the iPad. Typical peers said they enjoyed participating in the gaming sessions for the most part, and enjoyed talking to their partners.

Nonoverlap of All Pairs (NAP)

To assess intervention effectiveness, Nonoverlap of All Pairs (NAP; Parker et al., 2007) for participants' verbal initiations and on-topic responses in both conditions was calculated. NAP results for Participant 1 during the electronic condition were 85% non-overlap of initiations showing medium effects and 61% of non-overlap of on-topic responses indicating weak effects. In the paper condition, Participant 1's NAP results were 71% of non-overlap of initiations and 81% of non-overlap of responses both indicating medium effects. No further analysis was conducted with Participant 2's data because a large majority of his data points in the intervention phase were overlapped by baseline data suggesting weak affects due to a high number of overlapping points. Participant 3's NAP results were 91% of non-overlap of verbal initiations illustrating medium effects in the higher range and 76% of non-overlap of on-topic responses demonstrating low-medium effects in the electronic condition. For the paper condition,

Participant 3's NAP results were 81% of non-overlap of verbal initiations and 62% of non-overlap on-topic responses indicating medium and weak effects respectively.

CHAPTER V

DISCUSSION

Summary of findings

The purpose of this study was to determine if a social story delivered in two formats, paper and electronic (iPad), could increase the mean level of verbal initiations and on-topic responses of three adolescents, ages 11-14-years old, with ASD. It was hypothesized that the electronic condition (iPad) would be the preferred method of delivery since individuals with ASD have a predilection for technology-driven devices. The study results, regarding the efficacy of the social stories, indicated that two participants, Participant 3 and Participant 1, improved their verbal initiations and on-topic responses above baseline levels. Both participants evidenced more improvements in initiations during the electronic condition, while Participant 1's mean level of on-topic responses was greater in the paper condition. Participant 3 and Participant 1 also maintained skills taught over baseline levels and generalized targeted skills to another partner two weeks after the intervention phase concluded. On the other hand, Participant 2's average number of intervals of verbal initiations and on-topic responses decreased after the introduction the social story in both formats. Participant 2's mean level of initiations and response were still at and slightly above baseline levels respectively two weeks after the intervention concluded; however, during the generalization phase with

another neurotypical peer, Participant 2 experienced his highest mean of initiations (31%), but his responses were still below baseline levels.

Initially, Participant 1 did not make any initiations during baseline; however, after the introduction of the social story in the electronic format, Participant 1 was able to make his first initiation which increased his mean level of initiations to 1% of intervals as the study progressed. Participant 1's initiations were variable between conditions his highest level of initiations in the paper condition session 12 (6% of intervals). Even though Participant 1 was able to increase his level of initiations, in both conditions, he still only averaged 1% of intervals. Participant 1's low levels of initiations were not expected since he had a relationship with the neurotypical gaming partners prior to the study. He spent the night over at their house on one occasion and went on outings with them. Participant 1 considered the siblings his friends, so it was perplexing to see that his level of initiations was so low. At the onset of intervention, Participant 1 was able to answer the comprehension questions with 100% accuracy, on the first attempt, which indicated that he understood the story; however, during some gaming sessions in the intervention phase, Participant 1 did not make one initiation (sessions 5, 6, 10, 16, 15, and 17). That is almost half of all intervention sessions. In addition, Participant 1 presented a flat affect and his voice had a monotone quality to it. Participant 1 rarely showed emotion even after he won a game. It was difficult to discern if he enjoyed playing the game or if he was just a willing participant. Participant 1's display of the core symptoms associated with ASD (e.g., absence of social or emotional reciprocity; Orsmond et al., 2013) affected social interactions during gaming sessions. The lack of initiations coupled with the lack of emotional displays by Participant 1 resulted in the

neurotypical gaming partner becoming bored and inattentive in the gaming sessions; therefore, there was a decrease in conversational engagement. Although Participant 1 made minimal initiations, he was able to improve and expand his on-topic responses in the paper condition.

Participant 1's improvement in mean level of on-topic responses during the paper condition is consistent with NAP results (81% of non-overlap indicating medium effects). Prior to the start of the study, Participant 1 used single word responses to answer questions (e.g., yes, no) or said "I don't know"; however, as the study progressed, he was able to increase the number of his on-topic responses. At times, to compensate for Participant 1's lack of initiations, the neurotypical peer made more of an effort to engage Participant 1 by probing for deeper answers to his questions. More often than not, the neurotypical peer did not settle for a one word answer (See Appendix E). He either asked Participant 1 to explain or asked a follow-up question to maintain the conversation. The probing for deeper responses seemed to impact Participant 1's mean level of on-topic responses.

Unlike Participant 1, Participant 2 displayed a higher level of verbal initiations from the beginning of the study. He was not chosen to participate due to his inability to initiate a conversation; it was more due to the quality or appropriateness of his interactions with his peers. Participant 2 attempted to initiate conversations, but his initiations were more perseverative in nature and did not take his conversational partner's feelings into consideration. Unfortunately, his communicative patterns did not change in gaming sessions. Participant 2's lack of progression during the study was due to him perseverating on his topics of interest in conversation. For example, in session 5,

Participant 2 told the gaming partner about his day at school and how his class celebrated St. Patrick's Day. He then asked the neurotypical peer did he celebrate St. Patrick's Day. His gaming partner informed him that he did not, but Participant 2 continued the conversation without regard for his gaming partner's lack of interest for almost the entire session. In that session, Participant 2's mean level of on-topic responses was only 3% of intervals. Participant 2 not only had an issue with perseverating on topics of interest during gaming sessions, but with inhibiting inappropriate behaviors as well.

Graduate observers of the videos reported that the neurotypical gaming partner had to redirect Participant 2 to play the game several times throughout the study. Occasionally, Participant 2 crawled up under the table, made inappropriate comments, or stood up to walk around. These behaviors disrupted the flow of the game and conversation which led to frustration on the part of the neurotypical peer. Participant 2's lack of inhibition while playing the game discouraged his gaming partner from responding to initiations. Moreover, when his gaming partner did not reward Participant 2's bids for responses, he decreased the number of his initiations. Even when his gaming partner did attempt to initiate conversations, some of Participant 2's responses were slightly tangential which also made it difficult for a response. Participant 2's perseveration on topics of interest, lack of inhibition and challenging behaviors (e.g., rolling the dice of the board on purpose, crawling under the table, saying inappropriate words) hindered his ability to engage in meaningful conversation during gaming sessions.

Participant 2 is not unlike many adolescents with ASD who exhibit challenging behaviors. As demands for social interactions increase, behaviors not viewed as appropriate can negatively impact relationships with peers (Matson et al., 2013). For

example, in a recent study of 109 children and adolescents ages 3 through 16 years, Matson, Hess, and Mahan (2013) found that those with good verbal communication skills and who exhibited high rates of challenging behaviors had poor social skills. These poor social-communication skills isolated them from their neurotypical peers in school and community settings.

Overall, Participant 3 made the most gains in verbal initiations and on- topic responses as indicated by a visual analysis of the graphs and calculation of NAP results (91% of non-overlap of initiations and 76% of non-overlap of responses). In addition, after transcripts from the gaming sessions were reviewed, it was found that Participant 3 used conversational topics listed in the social story. Participant 3's mother stated that he mainly relied on scripted initiations during conversations, so it appeared as if giving Participant 3 a list of scripted conversational starters made it easier for him to communicate during the gaming sessions.

Scripting recently has been identified as an evidence-based practice for individuals with ASD due to the accumulated research regarding its effectiveness (National Professional Development Center on Autism Spectrum Disorders, 2014). Scripting has been used to effectively mitigate the social and communication deficits experienced by adolescents with ASD (Dotto-Fojut et al., 2011). Scripting involves developing phrases an individual is expected to say in a given situation then, with prompts, the person is taught the script (Ganz et al., 2012). Usually, individuals with ASD who use scripts practice or have others model the phrases many times before engaging in an activity; however, Participant 3 did not need the repetitive training. This may be due to his higher level of cognitive functioning (full scale I.Q. 85). While Gray

and Garand's (1993) research suggested that social stories would benefit students with ASD who are higher functioning, it is not known how Participant 3's cognition played a role in the results of the study as individuals with lower I'Q's have experienced success with the use of social stories (Scattone et al., 2002). Even in the generalization phase, Participant 3 still used the conversational starters from the social story as evidenced in transcripts. Furthermore, in conversations with peers and family members, Participant 3's mother reported that he experienced generalized treatment effects such as increased initiations and responses. The generalization of targeted skills to other environments and people could be due to the additional scripted language he added to his conversational repertoire. Although studies are limited in regard to the effectiveness of social stories when used to address the social-communication deficits of adolescents with ASD, Participant 3's results are consistent with Scattone et al.'s (2006) findings. Scattone et al. (2006) found that adolescents who were able to use social stories as scripts and incorporate various conversational topics during discussions with peers were more likely to respond and maintain a conversation especially if they were motivated to interact. Participant 3's use of conversational starters and motivation to interact were unmatched in gaming sessions. The neurotypical gaming partner even commented on numerous occasions that Participant 3 was a challenge and he had to stay engaged in order to compete. The neurotypical peer also stated that he derived more enjoyment during Participant 3's gaming sessions because he had a higher level of conversational involvement which was in stark contrast to Participant 1's performance.

In the current study, each participant's individual performance influenced study outcomes, however, so did the neurotypical peer's behavior. It was reported that he was very sociable, had numerous friends, and attended ASA socials on a regular basis; however, it could not be determined how the neurotypical peer would function as a gaming partner for three different participants over a six week period. Despite the neurotypical peer's willingness to participate in the study, as mentioned earlier, he experienced bouts of inattentiveness, boredom, and frustration, in turn, led to participants decreased level of communication. A peer training component attached to the intervention could have positively affected study results.

Limitations

Although results of the present study may be promising, a few limitations should be noted. First, only three adolescents, ages 11-14-years old, with ASD participated in this study. While participants represented multiple ethnic groups which was a positive, results cannot be generalized to a larger population of individuals due to the small sample size. This study requires replication across a larger number of adolescents. Replication of results across multiple participants would add to the external validity of an intervention.

Second, the primary researcher chose to use an interval recording system to record the frequency of verbal initiations and on-topic responses for each participant. When calculating the frequency of targeted behaviors, results are reported in percentages. Percentage of intervals is only an estimation of a participant's verbal initiations and on-topic responses during gaming sessions. An interval recording system cannot be used to record the exact number of initiations made by each participant like a traditional event

recording system. These results must be viewed with caution and the transcripts need to be compared to assess how the reading of the social stories affected participants' initiations and responses because the results could be an underestimation of actual performance.

Third, the primary researcher opted to have only one gaming partner to interact with all three participants with ASD during prebaseline activities, baseline, intervention, and maintenance phases. The purpose of having one gaming partner was to eliminate the variability of communicative patterns among possible gaming partners. The primary researcher also took great care to choose a willing gaming partner who had appropriate communication skills and previous interactions with children with ASD. Even though these considerations were taken into account, the behaviors displayed by neurotypical peer were unexpected. The research study was relatively short; however, boredom quickly set in since he played the game three times a day for six weeks while dealing with some difficult behaviors. There was not a peer training component to the study, so many of the issues the neurotypical peer faced could not be adequately addressed. A peer training component on how to generate conversational topics and how to respond to the difficult behaviors associated with ASD might have been beneficial.

Future Areas of Research

Individuals with autism spectrum disorder (ASD) can face a lifetime of pervasive social-communication deficits that can impair peer interactions in structured and unstructured settings (Anderson et al., 2014; Shattuck et al., 2011). To address these deficits, future researchers should utilize robust single subject designs with detailed

methodology sections that encompass multiple generalization and maintenance probes and social validity surveys. If this is done, researchers who wish to replicate the studies have a more precise model to follow. Concise, yet vivid, descriptions of the target populations' settings, accurate narratives of cognitive functioning, and examples of social-communication skills integrated into the intervention increase the possibility of other researchers replicating a study with 100% procedural fidelity. Moreover, incorporating pictures of real life examples of participants interacting with age-appropriate peers in non-structured environments increases the possibility of transferring targeted skills to different environments and individuals. Conducting generalization and maintenance probes after an intervention concludes at different intervals (e.g., three months, six months, and a year) is also important, as they allow researchers to determine if participants are able to generalize skills across settings, novel situations, and peers over an extended period of time. Future researchers should continue to use robust research designs while ensuring that methodology sections are explicit in order to ensure the possibility of replicating a study successfully.

Additionally, the present study indicates that a social story intervention can be implemented successfully using an electronic device like an iPad. In the future, researchers should utilize the constantly changing landscape of technological devices to deliver evidence-based practices to individuals with ASD (Shattuck et al., 2011). While traditional social stories in book format are viable intervention delivery options, as children with ASD age into adolescence, the books can become cumbersome and not age appropriate. Current iPad applications are versatile, age appropriate, and can mirror several computer programs that support individualized learning for individuals with

disabilities (Shane & Albert, 2008). Many of these applications emulate video games by providing stimulating visual and auditory stimuli. Additionally, graphical depictions of life like game scenery have been shown to increase attentiveness and engagement for individuals with ASD (Mazuek et al., 2012; Shane & Albert, 2008). Therefore, future researchers should explore and employ current technological applications based on individuals with ASD predilection for electronic devices.

Finally, this study adds to the current body of literature regarding the usefulness of social stories when used to address the social-communication deficits experienced by adolescents with ASD. In furthering the literature, more research is needed with older students. When compared to peers with other types of disabilities (e.g., LD, SLI, ID), adolescents with ASD are more likely to not have many close friendships or to engage in social activities outside of the home (Shattuck et al., 2011). For instance, when Shattuck et al. (2011) researched the social participation rates of over 800 adolescents (ages 13-17 years) with ASD, they found that 43% of adolescence with ASD never saw friends and 50% never got called by friends. Likewise, 50% of the sample reported that they did not receive invitations to outside social activities, which was significantly higher than adolescents in other disability categories (Shattuck et al., 2011). Moreover, as this group ages into adulthood, more often than not, individuals with ASD live at home with parents or caregivers, do not experience gainful employment, or engage in social activities with the opposite sex (Mazurek, 2014). This is why it is critical to address social-communication deficits in early adolescents so that improvements can be witnessed in future social outcomes. Positive social interaction skills are vital to success in post-secondary settings such as institutions of higher learning, vocational fields, and

community activities (Orsmond et al., 2013). Although research is being conducted for adolescents and adults with ASD, most of it focuses on remediating academic skills or providing vocational training (Mazurek, 2014). There is a dearth of research that addresses the social-communication deficits of adolescents and adults with ASD (Daniel & Billingsley, 2010). Accordingly, this line of investigation should be expanded to include more individuals with ASD specifically adolescents and young adults.

CONCLUSION

As newly reported cases of individuals diagnosed with ASD proliferate, so must the use of evidence-based practices that help mitigate the deficits associated with the disorder. The outcomes of this research provide an empirical base for further investigations regarding the effectiveness of social story interventions delivered in electronic and paper formats to address the social-communication deficits of adolescents with ASD. Results from the study indicated two participants evidenced more of an improvement in verbal initiations and on-topic responses during the electronic condition, from baseline to the intervention phase, and maintained targeted skills two weeks after the intervention phase concluded. Research capitalizing on adolescents with ASD preference for technological devices is nascent; however, most focuses on improving academic or vocational skills. While results from this study are promising, much is yet unknown about interventions that use technology-driven devices to address social-communication deficits experienced by adolescents and young adults with ASD.

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APPENDIX A

Social Story Format

The Social Story format suggests using a combination of six sentence types with an emphasis on description:

1. Descriptive sentences describe a given situation objectively by defining where the situation occurs, when it will take place, who is involved, what they are doing, and why they are doing it.
2. Perspective sentences state what another individual, usually someone other than the child with autism spectrum disorder, may think or feel.
3. Cooperative sentences can be used to remind adults how they can assist the student to learn a new skill.
4. Directive sentences are sentences that define the response the individual is expected to provide and generally begin with “I will try” or “I will work on” rather than “I will” to allow for some flexibility.
5. Affirmative sentences generally stress the directive in the Social Story.
6. Control sentences are written by the student and help him or her remember the directive.
7. Partial sentences are fill-in-the-blank sentences that require the student to provide the correct response.

From Gray (2004). *Social Stories™ 10.1: The new defining criteria and guidelines*

APPENDIX B

Social Story Guidelines

1. Shares social information in a reassuring manner; at least 50% of the stories should praise achievements.
2. Has an introduction, body, and conclusion.
3. Answers “wh” questions.
4. Is written from the student’s perspective (i.e., first-person or third-person format).
5. States behaviors positively.
6. Contains descriptive sentences and some or all of the other types of sentences.
7. Describes actions and events rather than directs.
8. Is geared to the individual’s abilities and incorporates her or his interests.
9. May use visual supports and illustrations.
10. Has a title that is consistent with applicable criteria above.

From Gray (2004). *Social Stories™ 10.1: The new defining criteria and guidelines*

*Appendix C**Social Stories for Participant 1, Participant 2, and Participant 3*Playing Monopoly with Ian-Participant 1's social story

There are lots of children who play Monopoly. Some of the children play Monopoly with their family. Some children play Monopoly with a gaming partner. My gaming partner's name is Ian. Peer 1 likes to play Monopoly. It's good to talk to Peer 1 when playing Monopoly. He will like it if I talk to him! He will respond to my questions!

There are lots of things I can talk to Peer 1 about:

I can tell him about what happened at school today. I can tell him about what I watched on TV yesterday. I can ask him about shows he likes to watch on TV. I can ask him what he likes to do after school. I can tell him about my favorite video games. Peer 1 may have something he wants to talk about too. I can listen to what Peer 1 has to say. I may want to talk about those other things too.

Sometimes, I will win we play Monopoly. Sometimes, Peer 1 will win when we play Monopoly. If Peer 1 wins, I will say good job and shake his hand. If I win, he will say good job and shake my hand. When the game is over, I will try to say "See you tomorrow" to Ian. Then I will help him put the game away.

Comprehension Questions

4. What is your partner's name?
5. What can you talk about with your partner?
6. What do you do when you finish playing Monopoly?

Playing Monopoly with Ian-Participant 2's social story

Peer 1 is my gaming partner. We play Monopoly. It's good to talk to Peer 1 when play Monopoly. He will like it if I talk to him! There are lots of things I can talk to Peer 1 about:

I can tell him about what happened at school today. I can tell him about things I like to do. I can ask him what he likes to do. Peer 1 may have something he wants to talk about too. I can listen to what Peer 1 has to say. I may want to talk about those other things too. When we finish playing Monopoly, I will try to say "See you tomorrow" to Ian.

Comprehension Questions

1. What is your partner's name?
2. What can you talk about with Ian?
3. What do you say when you finish playing Monopoly?

Playing Monopoly with Ian-Participant 3's social story

Some people play Monopoly with their family. Some people play Monopoly with a friend. Peer 1 is my gaming partner. Peer 1 enjoys playing Monopoly with me. It's good to talk to Peer 1 when we play Monopoly. I will try to talk to Peer 1 when we play Monopoly. He will like it if I talk to him and ask him questions! He will answer my questions! There are lots of things I can talk to Peer 1 about.

I can tell him about what happened at school today. I can tell him about what I watched on TV yesterday. I can ask him about shows he likes to watch on TV and if they were interesting or boring. I can tell him about things I like to do. I can tell him about my hobbies or my favorite places to visit. I can even tell him about my friend Nathan! I can ask him what he likes to do after school. Peer 1 may have something he wants to talk about too. I can listen to what Peer 1 has to say. I may want to talk about those other things too.

Sometimes, I will win we play Monopoly. Sometimes, Peer 1 will win when we play Monopoly. If Peer 1 wins, I will say good job and shake his hand. If I win, he will say good job and shake my hand. When the game is over, I will try to say, "See you tomorrow" to Ian.

Comprehension Questions

4. What are some things you can talk to Peer 1 about?
5. How does it make Peer 1 feel when you talk to him?
6. What can you say to Peer 1 after the game is over?

Appendix D

Transcription of Initiation Topics, Responses, and Selected Phrases from Gaming Sessions for Each Participant:

Participant 1- Participant 1:***Initiation Topics and selected phrases:***

Baseline 1: Session 1: No verbal initiations

Baseline 2: Session 2: No verbal initiations

Baseline 3: Session 3: No verbal initiations

Intervention: iPad: Session 4: First Initiation: "Would you like to buy this?"

Intervention: Paper: Session 5: No verbal initiations

Intervention: Paper: Session 6: No verbal initiations

Intervention: iPad: Session 7: Wishing a mutual friend a happy birthday

Intervention: iPad: Session 8: Being rich in the monopoly game

Intervention: Paper: Session 9: Bad news, rain prevented a trip

Intervention: iPad: Session 10: No verbal initiations

Intervention: Paper: Session 11: "I would like to buy that"

Intervention: Paper: Session 12: Today was also someone else's birthday; he can't wait to see his cousin again; told Peer 1 to tell mutual friend he said "Hi"; he thinks he will open presents on Saturday

Intervention: iPad: Session 13: No verbal initiations

Intervention: iPad: Session 14: She is a little fussy; she barks to wake us up; I play that game

Intervention: Paper: Session 15: No verbal initiations

Intervention: iPad: Session 16: "So today might be the last day"

Intervention Paper: Session 17: No verbal initiations

Generalization Session 18: "You have to get double to get out of jail. "Once you get out, you go home."; "I might buy that one."; "When Peer 1 plays, sometimes he goes to jail."

Maintenance: Session 19: "Happy Earth day!"; "Who's Participant 3 & Participant 2?"; "Guess what? I saw Mrs. X at Mcdonalds."; "What's your other brother? How old is he?"; "Tell D and E hi and I miss you."

Maintenance: Session 20: Do they cut Dexter's hair? (In reference to a conversation about a dog)

Generalization: Session 21: "Sometimes my mom embarrasses me. Talking about I have a girlfriend."

Response Topics:

Baseline 1: Session 1: my day was good (was asked about school day); not going anywhere this week (asked about weekend plans)

Baseline 2: Session 2: no, yes, "I don't know"; my dog is fine

Baseline 3: Session 3: no, I don't want to buy that property; I don't know about the party (Response about his upcoming birthday party)

Intervention: iPad: Session 4: Upcoming zoo party

Intervention: Paper: Session 5: Favorite teacher from school, upcoming birthday party, had a good day

Intervention: Paper: Session 6: Saturday plans; mom being sick and watching tv; school

Intervention: iPad: Session 7: Conversations about family in Norfolk and his dog

Intervention: iPad: Session 8: Friday activities, discussion on how mom was feeling and how Princess was doing

Intervention: Paper: Session 9: “What you say” (in response to most questions); “Good” (in response to “how was your day?”); “No” (in response to “Do you think she’s cute?” from Ian);

Intervention: iPad: Session 10: birthday party, weekend plans, speech “what’d you say?”

Intervention: Paper: Session 11: “What you say” “Yeah”; how old are you turning? I’m turning 14; mention of Mr. Davis, relaxed yesterday; response to how Princess is doing; took pre-test at school

Intervention: Paper: Session 12: Discussed plans to go to golden corral that evening, Richmond next weekend, and seeing family members. Z often responded yes or no to questions. “I don’t know what we’re going to do in Richmond, my mom is still trying to figure it out.”

Intervention: iPad: Session 13: What you say? Yes. Kentucky? Princess is doing fine. She barks a lot.

Intervention: iPad: Session 14: “Good” (in response to how was school); “I liked Sweeters” “Laser tag wasn’t so bad” (in response to questions about the weekend they spent together; “Game Stop” “Yes” “I don’t know” (in response to questions about upcoming weekend plans); “yeah, but it wasn’t so bad” (in response to facing laser tag fear); “last day?” (in response to Peer 1 saying that this is the last day of monopoly before break)

Intervention: Paper: Session 15: “Good” (in response to the following: How was your day?, How is Princess?); “Fine” (in response to how is your mom?); “I don’t know” (Peer

I asked, “Are you going to win today?”); “gamestop and aquarium” (when asked about weekend plans); “I was going to basketball, but I couldn’t make it because of traffic”; “I take medicines, then I take more and I have to be better by tomorrow” (in response to questions about how he’s feeling)

Intervention: iPad: Session 16: Advance to St. Charles, Huh? Nothing, no, nope, What? Oh, just allergies. I don’t know. I like to play games (in response to what will you do this weekend?), Ms. Kelsey? (discussion about a teacher), yeah, don’t know

Generalization: Session 18: “No thanks”; “Yes”; “I don’t know”; “Nothing, just worked, reading something” (about school today); “She’s doing something bad like going to the bathroom” (about princess); “I’m kinda nervous to say” (after being asked what games he plays at home”; “Movies tomorrow. With Ms. Kelsy. She has class today, so I have to go home with you and your mom” (about weekend plans); “Roller coasters are scary and mean”; “I like the circus and viewing the animals. They have horses there, some elephants.”; “Yes, they are all still there.. Mr. Hunter, (names more teachers” (in regards to a question about which teachers are still at the school); “Probably go to the Georgia aquarium. I think it’s far away. And probably visit my grandma. Sleep over and visit her for a while.” (about summer plans).

Maintenance: Session 19: “Yes, it was born in 1970” (in response to Earth day); “Nothing” (In response to questions about Easter presents); “Went to the zoo with Mrs. M, church for Easter” (about spring break)

Maintenance: Session 20: Huh? Just vocabulary words and science; No, it is? She did? It’s okay, you are welcome

Generalization: Session 21: “Yes/No” (do you want to buy that?); “Good. Yeah.” (how was school?); “Yeah” (did you make friends this year?); “Nothing. Sometimes my mom needs me to help at home.” (plans for tonight); “Who me? Why? Miss L is my girlfriend. That’s why my mom says that.” (I heard you have a girlfriend from my mom); “No, I’ll save it.” (Do you want to use your get out of jail free card?); “Oh! No, I got it.” (about dropping money and picking it up.); “Sea animals and sometimes they have land animals too. A komoto dragon looks like a lizard with claws like an owl.” (about the aquarium). “6:30. Sometimes I have to get up that early for school.”

Participant 2- R

Initiation topics and selected phrases:

Baseline 1: Session 1: Do you like tubas? I hear a band playing. Do you see them outside? Can I stand up to roll the dice? Where is your mom? I think she is coming back. Will you let me stand up if I be quiet?

Baseline 2: Session 2: Why are the shades closed today? Where is the band? Who do you play the game with at home? Is this your game? I think the timer is going to go off. I don’t want to roll, you roll.

Baseline 3: Session 3: tuba, band, asking the whereabouts of the previous peer interaction partner, general rules of the game, if tennis shoes with wheels are allowed at the school of the peer interaction partner, when he would receive his gift card, bicycle tire pumps

Intervention: Paper: Session 4: What did you do at school? Where are your brothers and sister? Can I roll now? I want the get out of jail free card.

Intervention: iPad: Session 5: Get out of jail free card; Saint Patrick's day discussion
"Did you get pinched?"

Intervention: iPad: Session 6: Can you roll the dice? Is there a birthday card in here? I might poop my pants. Do you wear that (Ian's hoodie?) at school? Do you have any teachers? What are their names? Do students graduate at the stadium? Are you joking me? Are you pranking me? Can I land here?

Intervention: Paper: Session 7: being the car and naming it peanut; Ilesha and the free space; getting a gift card; coming to play monopoly on Saturday; getting invited to birthday parties

Intervention: Paper: Session 8: Winning the game/questions related to the game; drawing on the whiteboard; the Banana Bus song on Youtube; Ian's telephone/playing games; Getting gift cards, School; Zavon and birthday parties

Intervention: iPad: Session 9: Did you know that is a book? Was the cat mean to you (Peer 1 knocked over a piece in the game)? What is it's name? Do you play minecraft? Do you have a dog? Is it a Shiztu? Is a car type a Suzukie? Do you go to church? Can you jump over the money? Can I roll a double?

Intervention: Paper: Session 10: Do you play the tuba? Do you play minecraft? Do you know the characters? Can I have that bracelet? Can I have coffee? Will the ceiling break if I jump up? Can you scrape it all up? I watched Frozen. Do you have a pregnant teacher? Can I lay on the floor? Say hi to your friend (Participant 2 was behind the camera). Can I call the police?

Intervention: iPad: Session 11: I didn't see you yesterday; got in trouble at school; what are Participant 3 and Participant 1 doing? Proximity to mall

Intervention: iPad: Session 12: Roll again? Again? Can you do it? Can you put those on top? Can I get a band-aid? Do you get paper cuts? It feels warm in here.

Intervention: Paper: Session 13: "Is that Micky on your shirt?"; "What is Zavon doing?"; "Is that Participant 1's sister?"; "Where is Iesha?"; "Are you going to kiss Zavon's sister?" (in reference to his babysitter); "Do you know the box guy? Samson? The black and white stripe? the name of a tiger?" (Peer 1 thought he knew what Participant 2 meant, but couldn't think of the name); "What is the surprise? Is it money? Is it a gift card? Did Zavon get money? You're lying!"; "Does it smell like fart?" (after passing gas); "Who got in trouble?" (after hearing a fire truck)

Intervention: Paper: Session 14: Did she say maybe? Look at all this money. That looks good, right? Can we play the spelling game? Can we keep it right there? Can it stand?

Intervention: iPad: Session 15: "Did you play an April fool's joke?"; "Look! There's a dog chasing you! April fools!"; "Will you ask me how Jamestown was?"; "Say _____ (e.g. no, yes). Say it!"; "Can I have that?" (Ian's drink); "Can you put \$100 there for me so that I won't" (putting money under the free space in monopoly); "Are you gonna ask me?"; "Can I pick a card?"; Explains a different version of monopoly

Intervention: Paper: Session 16: "Is that your mom? Who is that in the hallway?" (asking about keshia); "How old are you?"; "No you didn't, you're lying, you April Fooled me!"; "What's tomorrow? Is it a field trip? Are you going to see muskets?"; "Who's gonna get mad?"; "Can I close it?" (I think he's referring to the blinds)

Intervention: iPad: Session 17: I can go first, wait I have something in my eye, Is there a chuck-e-cheese near ODU? When is friend day? Is this the last one? Can I roll for you? Where is Zavon? Are you going to church? Are you going to prepare for church, homework, sleep? *singing* Pull my finger, that wasn't a double, 'What the'- is that a bad word?

Generalization: Session 18: Can we play the game differently today? Can we put the money over here? Do you play monopoly at home? Have you seen the monopoly with different colors (in reference to themed Monopoly games)? Do you go to ODU? Where is the gym? She (Nicole) should buy it (themed monopoly games) as a prize. Will you be in school Friday? Do you play the violin? Is it warm? Do you have a dog? Do you have a cat? Is it mean? Are you in the 9th grade? Did you have a field trip?

Maintenance: Session 19: I want to start at the question mark. Do you want to pay that? You were sick yesterday? What you had? Did you puke? Can I put houses in the middle? Did you know today is Earth Day? What's that greens sign? The one about throwing trash away (recycling)? If you don't take your trash out, the cops will come take you to jail. Can I have it (hand sanitizer)? Is it nice outside? Ice cream trucks come when it's nice.

Maintenance: Session 20: Discussion on Easter basket, basket had no chocolate in it, asked if Peer 1 was at a movie event, Does your back hurt? (Peer 1 was grimacing while moving his shoulder), what happened? Did someone say the f word? (Peer 1 appeared to be looking at a phone and laughing). Have you been to McDonalds? Do you have monopoly at home? Where were you sitting at the movie event?

Generalization: Session 21: “What did Peer 1 say?” ; “Is he coming with his mom?”; “That looks like Ian. They’re coming. That looks like a redskins fan.”; “Can I buy it for Ian. If I buy it for Ian, then Peer 1 will come.”; “Ian’s mom can just park right there.”; “Does Peer 1 have a new friend Derek? I haven’t met him before. Is he in school?”; “Peer 1 is waiting at home for his mom to get the car keys. He could just ride a bike here.”; “How can you put 2-seaters in a corner? Is that a 2-seater? For you? Not for him? For Derek to ride here?” (about bikes I think); “Is Participant 3 coming?”; “Do you go to church?”; “I just kissed her. That’s Ian’s girlfriend”; “I stopped doing karate.”

Response Topics and selected phrases:

Baseline 1: Session 1: I don’t want to sit down. It’s not my turn (In response to Peer 1 saying roll the dice). No, I don’t want to buy that property.

Baseline 2: Session 2: I like class. My teacher is nice. Oh, why can’t you open the shades (in response to Peer 1 saying no he cannot open the shades.

Baseline 3: Session 3: I hear the band, don’t you? (In response to Peer 1 saying he doesn’t hear a band. No, I don’t want that property

Intervention: Paper: Session 4: who? Not me (Response after Peer 1 asked him if he passed gas). I like being under the table (Response after Peer 1 asked him to get up and sit at the table)

Intervention: iPad: Session 5: Rules of the game/get out of jail free

Intervention: iPad: Session 6: Oh yeah, that’s good, I know.

Intervention: Paper: Session 7: I will roll the dice don’t call anybody; no it’s my turn

Intervention: Paper: Session 8: No it's my turn. Can't roll the dice (In response to Peer 1 asking him to roll the dice)

Intervention: iPad: Session 9: But isn't "shit" a bad word? Why did she say that? No, one of my other friends says that.

Intervention: Paper: Session 10: Yeah

Intervention: iPad: Session 11: Size of ODU, field trip

Intervention: iPad: Session 12: Why? You just do? Oh, at home? You aren't looking, I can look under my belt, Do you know what a choo-choo is (in response to buying railroad).

Intervention: Paper: Session 13: Field trip for Peer 1 and Participant 2's classes and what days they will miss; The "surprise" for the week

Intervention: Paper: Session 14: Huh? But didn't you say you would?

Intervention: iPad: Session 15: "I want to stand" (when asked to sit down); "but I'm pranking you" (when asked to put his arms back in his shirt)

Intervention: Paper: Session 16: "Are you gonna tell?" (after cursing and being told not to by Ian); "I can't because I smashed my fingers" (when asked to roll the dice)

Intervention: iPad 17: No, I didn't use my card. But when I get home can I use it?

Generalization: Session 18: Rolling with the red dice means it goes fast; what prize? No

Maintenance: Session 19: No, I like my feet up here (in response to putting foot up on desk); yes, no. I don't want to put my foot down. Okay, Okay

Maintenance: Session 19: I didn't see you there (at movie event)

Generalization: Session 21: When will Peer 1 be back (In response to Peer 2 saying, I'm playing with you today)

Participant 3- Participant 3:***Initiation topics and selected phrases:***

Baseline 1: Session 1: Did you go to Lafayette Winona? I think I saw you there. Do you play games a lot? I think it's your turn to play

Baseline 2: Session 2: I am going to a gaming tournament. No I don't want to buy that property. I think it's my turn.

Baseline 3: Session 3: Highlights from video game competition/tournament;

Intervention: iPad: Session 4: participant initiated discussion on favorite topic in school, what sports the peer interaction partner played and how the day was for the peer interaction partner

Intervention: Paper: Session 5: Weekend plans

Intervention: Paper: Session 6: Asked how school was for the day, upcoming college visits to Richmond

Intervention: iPad: Session 7: Asked about school and tutoring; a fight that he witnessed at school; video games for the Xbox; first day of spring/end of winter; make up school days

Intervention: iPad: Session 8: Plans for the weekend; Movies; Brother playing outside

Intervention: Paper: Session 9: Phone died after a long day, what did you do today?

Intervention: iPad: Session 10: "I'd like to buy this"; "Wait, do you own this property?"; "What are your spring break or summer plans?"; "I think we're confused by this game"

Intervention: Paper: Session 11: How was your day?

Intervention: Paper: Session 12: Wait, you owe me \$50; Did I roll? Happy Birthday (regarding a game card); Do you own this property? Do you own a railroad?

Intervention: iPad: Session 13: “How was your day today?”; “I’d like to buy this”; “Wait, do you own that property?”

Intervention: iPad: Session 14: Anything happen at school today? Let’s try to not get confused this time with the game pieces. Was it an arcade? Do you own a railroad? I will not be buying that. What does it say? Do you hear me? I saw my sister in a yearbook. Where were you? Did you pay for that?

Intervention: Paper: Session 15: “Did you have a nice April fools?”; “I played an April fools joke on my friend and said I lost my tooth”; “Are you feeling better”; “I have to pay \$50 right?”; “Do you have Reading Railroad?”; “No, I don’t have St. Charles”; “You didn’t pass go.”; “We need to move this table”; Tells story about his younger brother being upset and throwing his phone down after minecraft wouldn’t load.

Intervention: Paper: Session iPad: “So how was your day?”; “I had a dentist appointment today and I don’t have any cavities.”; “I lost my baby tooth last week.”; “You’re doing a good job so far”; “Do you have _____ (St. James, Pennsylvania Ave)?”; “I’m gonna buy_____”;

Intervention: Paper: Session 17: I passed go so I need \$200, can you put them on your properties so that I know? Which one? Did you pay? You rolled 8? I bought this one so give me that one. Do you own that?

Generalization: Session 18: What did you do for Spring Break? Well I spent the night at my grandma’s. What is your favorite TV show? Have you ever played King of Hearts? I’ll tell you if I want to buy it. Do you want to buy that?

Maintenance: Session 19: How was your day? Did you have a nice spring break? I went to Busch Gardens. It was an interesting game yesterday with Peer 2. I had a good day at school too. I had a nice Easter. I'm gonna buy _____. Do you have _____?

Maintenance: Session 20: I think the timer stopped, you owe me \$40, Whoops, This is one really interesting game.

Generalization: Session 21: "At lunch, people were pushing and shoving in the lunch line. I had to go to the back of the line even though I wasn't pushing or shoving."; "There was another fight that happened with 2 girls and 1 guy. I got so close that my shoe got knocked off."; "Do you remember the pepper spray event last year? The dean blocked the area around it. I was eating lunch and it tasted like fire crackers in my mouth. They had to evacuate everyone and some people had to go to the nurses office because they were coughing. It was on the news and everything. It was chaos." "Sometimes when the lunch table is full, I sit at another table with my friend."; "You know how Lafayette is closing down? I'm going to Norview next year."

Response Topics and selected phrases:

Baseline 1: Session 1: I'm in seventh grade. I like to play video games. Mario cart and Sonic Generations

Baseline 2: Session 2: Yeah, I think it will be fun. Nope I don't have that property

Baseline 3: Session 3: I lost the tournament (In response to Peer 1 asking how he did).

Intervention: iPad: Session 4: I had a good day in school. No home work today.

Intervention: Paper: Session 5: Bowling trip and plans to visit Busch Gardens

Intervention: Paper: Session 6: Discussion on upcoming Jamestown field trip

Intervention: iPad: Session 7: Cleopatra; school; video games

Intervention: iPad: Session 8: Birthdays

Intervention: Paper: Session 9: Richmond tour/trip; Red Robin, bowling

Intervention: iPad: Session 10: “Good”; “Yes, it’s your turn”; “I own that and you have to pay me \$”

Intervention: Paper: Session 11: I’m not going to do much today. I think I bought that property already?.yes, it is my turn.

Intervention: Paper: Session 12: Good, what? Nothing much, done with bowling, latin teacher was upset with students, yup, nope, I did roll but I didn’t move my character

Intervention: Paper: Session iPad: “I don’t have bowling this weekend”; “School is good”; “I think I’ll play outside and play video games”

Intervention: iPad: Session 14: Same here, new course (language arts), Last weekend? Same stuff, slept in. I went to one similar; usually those things aren’t at big parks (amusement theme parks). She is turning 21.

Intervention: Paper: Session 15: “Oh, yeah, you didn’t roll doubles”; “yes”; “It’s \$x” (said several times in response to Peer 1 clarifying how much properties cost/ what had to be paid)

Intervention: iPad: Session 16: “I got into an argument with a friend at school today” (describes argument); “I used to have a retainer, but it broke”; “I don’t drink soda or eat candy”;

Intervention: Paper: Session 17: Sweet, yeah, yep- that’s over there

Generalization: Session 18: I rode a roller-coaster; just preparing for the SOL's; I want to go to Blair middle school; did an Easter egg hunt; little brother stresses me out

Maintenance: Session 19: My family bowls on Sundays, so we had Easter dinner on

Maintenance: Session 20: Saturday and ate leftovers. Oh dang! I already had Baltic Ave!"

Generalization: Session 21: "Good. Not really. Just the usual. Learning stuff in science. I learned how to balance equations in science." (about how school was) ; "7th" (question about grade); "Just the usual. My mom plans to sleep in. Then we'll clean the house."

(about weekend plans); "I don't know. Lafayette is closing so I just ended up at Norview.

I don't think it's in my district." (about why going to Norview next year as opposed to another school)

Appendix E

Procedural fidelity checklist

Directions: Place a check in the box to indicate if the following procedures are completed.

Step 3 is only completed during the first day of intervention for each student.

Protocol Steps	Present	Not Present	Comments
3. Primary researcher or research assistant ensures that the game is in place and that the video camera is positioned prior to participant interaction.			
4. Primary researcher or research assistant leads the participant with ASD to one of the two designated assistant professor offices to read the social story.			
5. Primary researcher or research assistant says, "Time to read your story about playing games".			
6. Participants read the social story on the iPad or paper alone for five minutes.			
7. The primary researcher or research assistant			

<p>assesses comprehension based upon predetermined questions only during the first intervention session.</p>			
<p>8. The primary researcher or research assistant says, "Time to play the game with ("insert name here").</p>			
<p>9. Participant immediately goes to play the game with the neurotypical peer in the conference room or multipurpose room.</p>			
<p>10. The primary researcher or research assistant sets the timer and turns on the camera. The primary researcher or research assistant ensures that dyads play the selected game until the time goes off.</p>			

Appendix F

Parent Social Validity Questionnaire

Please answer each question to the best of your ability.

Survey Question	-1- Strongly Disagree	-2- Disagree	-3- Do Not Agree or Disagree	-4- Agree	-5- Strongly Agree
I believe the social story helped my child communicate more with his typical peers.	1	2	3	4	5
I believe the social story helped my child socialize more with his typical peers.	1	2	3	4	5
I feel the presentation of the social story was age appropriate.	1	2	3	4	5
I believe a social story on the iPad is an efficient way to deliver an intervention	1	2	3	4	5
I would use a social story again with my child.	1	2	3	4	5

1. In your opinion, do you believe that participating in this study helped your child socialize more? If so, why?
2. In your opinion, do you believe that this study and its procedures interfered with your child's camping experience? If so, what part and how?

Appendix G

Participant Social Validity Questionnaire

Survey Question	-1- Strongly Disagree	-2- Disagree	-3- Do Not Agree or Disagree	-4- Agree	-5-Strongly Agree
I liked reading the social story.	1	2	3	4	5
I believe the social story helped me make more friends.	1	2	3	4	5
I would like to read another social story like this one on the iPad.	1	2	3	4	5
I believe other children would like to read social stories on iPads.	1	2	3	4	5
I enjoy being a part of the intervention.	1	2	3	4	5

1. In your opinion, what part of the social story helped you the most? Why?
2. Is there any part of the study that you would change in order to help you socialize more?

Appendix H

Neurotypical Peer Social Validity Questionnaire

Survey Question	-1- Strongly Disagree	-2- Disagree	-3- Do Not Agree or Disagree	-4- Agree	-5-Strongly Agree
My partner greeted me before we played the game.	1	2	3	4	5
My partner stayed on topic when we talked.	1	2	3	4	5
I believe my partner enjoyed our conversation during the game.	1	2	3	4	5
I enjoyed talking with my partner.	1	2	3	4	5
I enjoyed playing the game with my partner.	1	2	3	4	5

1. In your opinion, what part of the study did you enjoy the most? Why?
2. Is there any part of the study that you would change to help you gaming partner socialize more?

VITA

Nicole Anthony, Ed.S.
 242 W.26th St
 Norfolk, Va 23517
 W (757) 333-3421
 H (757) 556-6848
 Email: Nanthony@odu.edu

EDUCATION:

2014	Ph.D.	Old Dominion University; Norfolk, Virginia; Special Education with emphasis on Autism
2009	Ed.S.	Cambridge College; Chesapeake, Virginia; Educational Supervision and Administration
2004	M.S.Ed.	Touro College; New York, New York; Special Education and General Education (K-12)
1999	B.A.	Norfolk State University; Norfolk, Virginia; Political Science

EXPERIENCE:**Academic Experience:**

July, 2009 – May, 2010 Lecturer, Darden College of Education; Old Dominion University; Norfolk, Virginia

Non-academic Experience:

July, 2011 – Present: Positive Behavior Intervention and Supports Specialist, Students with Emotional Disabilities; PBIS Program: Blair Middle School; Norfolk, Virginia

July, 2007 – June, 2009: Special Education Teacher, Students with High Incidence Disabilities; Tidewater Park Elementary; St. Norfolk Public Schools; Norfolk, Virginia

June, 2004- July, 2009 Applied Behavior Analysis Specialist/ Special Instructor; TheraCare, Brooklyn, New York
 (Job responsibilities: Uses ABA Methodology to maximize potential of every child. Broke down goals into smallest

components necessary and taught in hierarchy of steps. Utilized principles of reinforcement to motivate and guide children to successful learning)

July, 2000– June, 2007: Teacher, 5th Grade; P.S. 298: New York City Department of Education; Brooklyn, New York

PUBLICATIONS:

Raver, S.A., Bobzien, J., Richels, C., Hester, P., & Anthony, N. (2013). Using dyad-specific social stories to increase communicative and interactional skills of preschoolers with hearing loss in self-contained and inclusive settings. *International Journal of Inclusive Education*, 2(4), 122-135.

Raver, S. A., Hester, P., Michalek, A., Cho, D. & Anthony, N. D. (2013). Impact of an activity mini-schedule on the attention of preschoolers with cochlear implants during a group activity. *Education and Treatment of Children*, 1(2), 215-230.

Raver, S.A., Bobzien, J., Richels, C., Hester, P., Michalek, A., & Anthony, N. (2012). Effects of parallel talk on the language and interactional skills of preschoolers with cochlear implants and hearing aids. *Literacy Information and Computer Education Journal*, 3(1), 530-538.

NON-PEER REFERRED PUBLICATIONS:

Raver, S., Bobzien, S., Richels, C., Hester, P., & Anthony, N. (2012). Increasing communicative and social skills in preschoolers with hearing loss in self-contained and inclusive settings with social stories. *International Journal of the Arts and Sciences Conference Proceedings*, Gottenheim, Germany.

Raver, S.A., Bobzien, J., Richels, C., Hester, P., Michalek, A., & Anthony, N. (2012). Parallel talk: Effects on the language and interactional skills of preschoolers with deafness. *Proceedings from the Ireland International Conference on Education*, Dublin, Ireland, pp.89-96.

PAPERS PRESENTED AT PROFESSIONAL MEETINGS:

Hammond, D., Riley, J., Lowery, A., & Anthony, N. (2013). "Systematic Planning and Transition of students with Autism Spectrum Disorders". Presentation presented at Council for Exceptional Children: San Antonio, Texas.

Anthony, N., & Bobzien, J. (2013). "Promoting Social Competence in Adolescents and Adults with Autism Spectrum Disorders". Paper presented at the Virginia Transition Forum: Richmond, VA.

Raver, S.A., Bobzien, J., Richels, C., Hester, P., Michalek, A., & Anthony, N. (2012). "Effects of parallel talk on the language and interactional skills of preschoolers with cochlear implants and hearing aids." Poster presented at the DEC International Conference on Young Children with Special Needs and Their Families: Minneapolis, Minnesota.

Raver, S., Bobzien, J., & Anthony, N. (2012). "Effects of Parallel Talk on the Language and Interactional Skills of Preschoolers with Hearing Loss." Poster presented at the Annual Conference for the Council for Exceptional Children: Denver, CO.

Bobzien, J., Maydosz, A., & Anthony, N. (2011). "College Attendance for Students with Autism: Current Research." Paper presented at the Virginia Transition Forum: Norfolk, VA.

Anthony, N. (2008). "Successful Writing Strategies for 5th Grade Students with Disabilities." Presentation at Norfolk Public Schools Principals Conference: Norfolk, VA,

COURSES TAUGHT:

Foundations of Special Education: Legal Aspects and Characteristics
Students with Diverse Learning Needs: General Education Classrooms
Instructional Design I: Learner Characteristics/ Assessments

HONORS AND AWARDS:

2010 Shining Star Award for Teaching Excellence, Old Dominion University;
Norfolk, Virginia

CERTIFICATION AND LICENSURE:

K-12 Special Education, General Curriculum
Highly Qualified Educator (per Virginia Department of Education) to teach the core content areas of Reading, Math, Science, and History

PROFESSIONAL SERVICE:

Membership in Professional Societies/Organizations

2011-present	Member, Autism Society of America
2009-2011	Member, Student Council for Exceptional Children, Old Dominion University; Norfolk, Virginia
2006-present	Member, Council for Exceptional Children

1996-present Member, National Association of Special Education Teachers

Editorships/Reviewing:

2012 Guest Reviewer for Focus on Autism and Other Developmental Disabilities

2010 Text Reviewer for SAGE Publications

Community Service:

2011-present Social's Organizer, Autism Society of America; Norfolk, Virginia

2009-present Mentor, Tidewater Park Elementary, Norfolk Public Schools; Norfolk, Virginia

ACADEMIC SERVICE:

1/2011-5/2011 Data Manager and Data Coder, Child Study Research Team, Old Dominion University; Norfolk, Virginia
(Job responsibilities: coded observable independent variables and created graphs to represent data points)

8/2010-12/2010 Data Coder, Child Study Research Team, Old Dominion University; Norfolk, Virginia

10/2009-12/2009 Data Coder, Child Study Research Team, Old Dominion University; Norfolk, Virginia