THE EFFECTS OF VERBAL AND MUSICAL SOCIAL STORIES ON CLASSROOM BEHAVIOR IN CHILDREN WITH AUTISM

By

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Abstract

One of the defining characteristics of children with autism is difficulty with social behavior. Most of the environments of a child's daily life, and especially the school setting, require appropriate social skills. Numerous studies have shown that social stories are an effective method of teaching appropriate behaviors to children with autism and increasing these behaviors in a variety of settings. Several studies have also shown that children with autism show a preference for musical versus verbal stimuli. This study explores the effects of using social stories set to music on the classroom behavior of two elementary age children with severe autism. A single subject design was used to measure the effectiveness of three treatment conditions: a no treatment control condition, traditional verbal social stories, and social stories set to a familiar tune. Results for the first participant were assessed on a percentage of audible attempts to communicate. Results for the second student were assessed on the frequency of out-of-seat behavior. The results showed the verbal social story to be a moderately effective intervention, while the musical story did not prove to be effective.

Keywords: autism, social stories, music

Chapter One

The rate of Autism Spectrum Disorder (ASD) over the past two decades has become the subject of a significant debate. Research at the time the Diagnostic and Statistical Manual of Mental Disorders (4th ed.) was published in 1994 indicated that autism affected between two and 20 individuals per 10,000, and the authors speculated that the range of these results might have been due to an increasing rate of the disorder at that time (American Psychiatric Association-APA, 2000, p. 73). The most recent prevalence estimates of children affected are between 1 in 91 (Kogan et al., 2009) and 1 in 110 (Department of Health and Human Services, Centers for Disease Control and Prevention-CDC, 2009). While these figures do not allow for direct comparison, they do lead one to believe that the incidence of autism is increasing dramatically.

According to the Diagnostic and Statistical Manual-IV (DSM-IV), people with autism have difficulty in three primary areas. These are qualitative impairment in social interaction, qualitative impairments in communication, and restricted, repetitive and stereotyped patterns of behavior (APA, 1994, p. 75). All three of these deficits impact a child's ability to participate and make gains in educational environments. In the area of social skills deficits, these children typically have difficulty assimilating and interpreting cues from the environment and ascertaining what behavior is called for in a given social situation. The resulting aberrant behavior causes the child to be unsuccessful in interacting in various social settings, including the classroom. This often causes the child to be rejected by his peers and, consequently, limits his ability to form friendships.

In addition to an increased need for educational staff that are trained to work with children with ASD, there is a strong need for knowledge of effective methods for teaching these children, particularly in light of the current policy directives suggesting greater inclusion of these students

in general education classrooms. Currently, eleven teaching methods have been endorsed by the National Autism Center as “established treatments” or evidence-based instructional practices for students with ASD. Story-based methods are one of these (National Autism Center, 2009, p. 11). One story-based method in particular, the social story, addresses the social skills deficits of children with autism. The purpose of this study was to add to existing knowledge and to determine if the addition of music to the text of a social story can enhance its effectiveness.

Literature Review

A social story is a behavioral intervention in which a student is presented with an individually customized story with words and images that depict themselves acting appropriately in a specific social situation. “The social story provides a type of task analysis—breaking down complex information into distinct parts—written at the learner’s level of comprehension and from the learner’s perspective” (Aspy & Grossman, 2008, p. 176). “Social stories are a means of incorporating an individual with autism’s propensity toward visual learning with educationally necessary behavior modifications” (Brownell, 2002, p. 117). Social stories provide the child with information about his environment he might not pick up on his own, such as what is expected or how his actions may impact others. While it can be used in a self-contained classroom, a frequent purpose of this intervention is to “enable the student to function as a fully participatory member of their (sic) same-aged class of nondisabled peers” (Brownell, 2002, p. 118). Typical goals that can be addressed by social stories include reduction of problem behaviors, increase in social skills, acquisition of academic or functional skills, and assisting students in transitions and novel situations (Kokina and Kern, 2010, p. 815). Since Carol Gray developed the intervention in 1993, numerous studies have suggested that social stories can be effective in reducing problem behaviors and increasing pro-social behaviors in children with all levels of autism (e.g., Barry &

Burlew, 2004; Crozier & Tincani, 2005; Lorimer, Simpson, Myles, & Ganz, 2002; Thiemann & Goldstein, 2001), however, there have been some questions concerning the internal validity of some of these studies (Sansosti et al., 2004). The following examples show the variety of ways in which social stories can be used.

One example, which confirms the effectiveness of the intervention, was Bledsoe, Smith, and Simpson's study (2003), which used a social story in an attempt to improve the eating behaviors of an adolescent diagnosed with Asperger's Syndrome. This single subject design study compared the number of food and drink spills as well as the frequency of appropriate mouth wiping during two series of baseline data compared to two alternately introduced series of reading a social story to address these behaviors. The results showed that the intervention produced significant improvement in both target behaviors, which did return to the baseline level when the intervention was removed.

Many of the current studies on the use of social stories have combined it with a secondary intervention, such as technology (e.g., Bernard-Ripoll, 2007; Mancil, Haydon, & Whitby, 2009; Sansosti & Powell-Smith, 2008). Mancil, Haydon, and Whitby (2009) used such a combined intervention with one female and two male kindergarten participants, ages six to nine years, in an attempt to reduce aggressive behaviors, specifically, pushing. This single subject design study compared social stories which the students read to themselves to stories they viewed via a PowerPoint presentation. The results of this study clearly showed an improvement in behavior from both interventions, with the computer-assisted version producing slightly better results. The interventions used included training the children to read the social stories with 100% comprehension prior to having them use the story independently. While asking comprehension

questions is part of Gray's recommended protocol (Gray & Garand, 1993), few studies have included this part of the procedure.

Children with high-functioning autism have been the focus of the majority of research conducted on the use of social stories. Most studies do not specify a level of severity. Only one has specifically addressed using the intervention with children who are severely impaired. This study, conducted by Reynhout and Carter (2007), failed to replicate others' positive results with this intervention. The study looked at an eight-year-old male diagnosed with severe ASD, a moderate intellectual disability, and associated deficits in language. The target behavior for the social story intervention was tapping hands during reading. The single subject design compared three treatment conditions of baseline, reading a social story to the child immediately prior to the targeted activity, and reading the social story followed by making it available to him for independent or teacher-prompted review during the activity. Results showed that while the target behavior decreased over time, no functional relationship was demonstrated between the behavior and the intervention.

A meta-analysis conducted by Kokina and Kern (2010) reviewed all research regarding social stories between 2002 and 2009. Of 64 studies, only 18 were considered to be valid and included in the evaluation. This analysis and a prior meta-analysis by Reynhout and Carter (2006) of studies prior to 2004 "revealed the extreme variability of the individual outcomes" (Kokina and Kern, 2010, p. 822). Of all the studies included in their analysis, nearly an equal portion of studies showed social stories to be effective or highly effective as those that showed them to be ineffective. A mean PND of 62% put them in the category of a "mildly effective" intervention (p. 822).

Of particular interest to the researcher is the effect of the addition of music to this intervention, as some studies have also demonstrated that children with autism are particularly responsive to music (e.g., Blackstock, 1978; Kim, Wigram, & Gold, 2009; Thaut, 1987). The National Autism Center has also identified music therapy as an "emerging treatment" in the research on evidence based interventions (EBI) (National Autism Center, 2009, p. 58). Music therapy seeks to "teach individual skills or goals through music. A targeted skill (e.g. counting, learning colors, taking turns) is first presented through song or rhythmic cuing and music is eventually faded" (National Autism Center, 2009, p. 64).

Two studies have been conducted to date on the effects of social stories set to music. In 2004, Pasiali studied the effects of social stories set to music on problem behaviors in one girl and two boys with autism, ages seven to nine. In this study, the social story was set to the tune of a song that the child knew and for which he or she had a particular affinity. The study showed that there was an immediate treatment effect of the musical social stories in reducing problem behaviors. In two of the three cases, the behavior did not rebound when the intervention was removed (Pasiali, 2004). In other words, for these participants, across all phases of the single subject design study, the targeted behavior continued to decline, indicating that the treatment resulted in a learned behavior change.

In 2002, Brownell studied the effect of musical social stories on four boys with autism, ages six to seven. In this single subject design study, a traditional social story and a social story set to music were the respective treatment conditions in the time series. Unlike Pasiali (2004), Brownell used social stories set to original compositions for the musical version. In this study, both conditions showed a positive effect and a return to baseline following their removal. Additionally, the musical social story proved significantly more effective for one of the

participants. There was no statistically significant difference in effectiveness between the two types of social stories for the other three participants. The results of the Pasiali and Brownell studies suggest that “the use of a musically adapted version of social stories is an effective and viable treatment option for modifying behaviors with this population” (Brownell, 2002. p. 117).

Purpose

The purpose of the current study was to provide a systematic replication of the previous investigation by Brownell of the comparison of differential treatment effects of traditionally read social stories and social stories set to music. It explored the effect of verbal and musical social stories on the classroom behavior of elementary school students with autism. Specifically, the study investigated the effectiveness of three conditions comprising an interrupted time series design with two participants: baseline (A), verbal social stories (B), and social stories set to music (C).The previous studies have shown mixed results regarding the question of whether the use of social stories results in learned behavior or improvements in behavior that are merely performance driven. In addition to replicating the quest for treatment effects, this study asked the question of whether social stories result in learned behavior. In summary, it is hoped that this problem driven research will add to the body of knowledge regarding social stories and support a more definite conclusion as to whether the addition of music adds to the effectiveness of a traditional social story in improving the social behavior of children with autism.

Research Questions

With regard to the classroom conduct of children with autism:

1. Relative to baseline, did the participants show an improvement in the target behavior when exposed to verbal social stories (B condition)?

2. Relative to baseline, did the participants show an improvement in the target behavior when exposed to social stories set to the tune of a familiar song (C condition)?
3. If the answer to either the first or second question was affirmative, did the behavior return to baseline when the treatment is removed?
4. If the answers to the first two questions were affirmative, was there a differential effect between the B and C conditions?

Chapter Two

Setting and Participants

The study was conducted in two public elementary schools in a midsize Midwestern metropolitan area. It was conducted mostly by the primary researcher, with the assistance of one special education teacher, three special education paraeducators, and one special education graduate student. All of the people involved in the implementation of the study had well-established relationships with the study participants and extensive experience with children with autism.

The two participants were selected based on teacher recommendation, which, in turn, was based on the existence of an undesirable behavior exhibited in the school setting. The following selection criteria were used:

1. Each student will be between the ages of 5 and 12 attending a public elementary school.
2. Each participant will have a primary diagnosis of severe autism as measured by the Childhood Autism Rating Scale (CARS) or the Gilliam Autism Rating Scale, 2nd Edition (GARS-2).

Procedures

After the two participants were selected and informed consent was obtained from their parents, each child was observed during a time period recommended by the teacher based on a high prevalence of challenging behaviors during that time. The teacher and the primary researcher agreed on an appropriate target behavior for intervention and wrote operational definitions for them. A unique social story was then written for each participant addressing the target behaviors.

The development of the social stories followed the specific format and guidelines outlined by Gray to describe the social situation and provide instructions on how to respond (2000). They were five to ten sentences in length, consisting of descriptive, perspective, and directive sentences according to the following definitions:

1. Descriptive sentences objectively define where a situation occurs, who is involved, what they are doing, and why.
2. Perspective sentences are statements that describe a person's internal states. Perspective sentences may simply describe a physical state or desire. Perspective sentences frequently describe another person's thoughts, feelings, or beliefs and motivation.
3. Directive sentences are statements that describe what is expected as a response to a given cue or situation. Directive sentences should also take on positive, provisional characteristics (i.e. "I will try…" rather than "I will…) (Gray, Schopler, Mesibov, & Kunce, 1998, pp. 178-179).

The stories followed the prescribed ratio of a combination of five to seven descriptive and perspective sentences for each directive sentence.

The text was printed on plain white 8.5 x 11 inch paper in 18 point Times New Roman font with one sentence or phrase on each page. Each page also contained a color clip art sketch depicting the content of the sentence. These pages were laminated and spiral bound into a book format.

Using the text of the story for lyrics, the story was set to a tunere which the participants particularly liked, as reported by the parents and educational staff who worked with them. The intention was for the song to be appealing and easy to recall. The independent variables for the

study were one of three conditions: (A) no treatment, (B) a written and illustrated social story read to the child, and (C) a written and illustrated social story sung to the child.

The standard technique outlined by Gray includes the interventionist presenting the child with a few comprehension questions following the delivery of the story (Gray & Garand, 1993). This step has not been mentioned in the majority of previous studies conducted regarding the effectiveness of this technique and was not included in the Pasiali or Brownell studies. It was not included in this study due to the severity of the participants' autism and their limited verbal communication.

The dependent variables were the frequency of each participant's targeted problem behavior immediately following each of these three conditions. The targeted behavior was observed and recorded in a specific setting and at a specific time on a daily basis.

Experimental Design

This study used the same single subject design as Brownell, an alternating treatments design counterbalanced across two participants (Kennedy, 2005). In the first phase, baseline data were taken for each dependent variable for five consecutive data days. A data day was defined as a day the participant was available for the study. Non-availability was due either to an absence or a school activity that conflicted with the observation time. Detailed explanations of specific instances of non-availability are provided in the *Unanticipated Factors* section in Chapter Four. Phase 2 consisted of the B or C condition for a total of five consecutive data days. Phase 3 was a return to baseline for five consecutive data days. Phase 4 consisted of the B or C treatment that was not previously delivered in Phase 2.

While reinforcement is typically used in conjunction with interventions for children with autism, this variable was controlled for the purposes of this study. The staff was instructed not to

make any evaluative or reinforcing comments to the child, and the observers were instructed not to deliver any positive reinforcement, verbal or nonverbal, following the observation session in order to control the potential influence of reinforcement on treatment effectiveness.

Participant 1 – Susan

Susan was a five-year old kindergarten student who was served in a self-contained classroom for children with ASD. She was diagnosed with autism at the age of three by an independent licensed psychologist. When the Childhood Autism Rating Scale (CARS) was administered on February 2, 2010, she received a score of 42.5, which puts her in the severe range of autistic behavior. Susan had limited verbal communication skills. She typically responded to requests with one- to two-words when prompted. Academically, she was at the pre-reading stage. Her instructional goals in this area were limited to the receptive identification of pictures. She had a strong affinity for music. Listening to rock music on headsets was frequently used as a reinforcer for work completed in the classroom, and she typically sang songs when walking in the hallway.

Definition of target.

The target behavior selected for Susan was appropriate responding to greetings. It was operationally defined as: When a child or adult verbally greets Susan with “Hi,” “Hello,” “Hi, Susan,” or “Hello, Susan,” Susan will respond with an appropriate greeting in a voice that is audible to an observer standing two feet away. An appropriate response was defined as “Hi,” “Hello,” or one of these greeting words followed by the person’s name. Negative responses were defined as a failure to respond or saying, “Hi, Susan,” which was a typical echolalic response.

Variables.

The independent variables were traditional verbal social stories and social stories set to a familiar tune. The dependent variable was the percentage of eight trials each data day in which Susan produced an appropriate response to the stimulus of a verbal greeting.

Procedure.

Figure 1 shows the text and illustrations of the story that was used with Susan. For the C condition, this text was set to the tune of *Livin' on a Prayer* by Bon Jovi and sung to the student.

Page	Text	Illustration
Title	Saying "Hi"	Girl waving
1.	My name is Susan.	Girl with backpack
2.	I go to school.	Class listening to teacher
3.	I see my friends and my teachers there.	Adult saying "Hi" to girl with a speech bubble
4.	When I'm there, people say, "Hi," to me	Group of children smiling
5.	Because they like me!	Girl saying "Hi" to adult with a speech bubble
6.	People like it when I say, "Hi," back.	School building
7.	At school, I'll try to say, "Hi,"	Girl saying "Hi," to boy with a speech bubble
8.	When they say, "Hi," to me.	Boy saying "Hi,' to girl with a speech bubble
9.	They'll be so happy!	Smiley face
10.	The End	(none)

FIGURE 1 ***Social story for Susan.***

Case 2 - Gerald

Gerald was a seven year-old first grade student who was served in a self-contained classroom for children with ASD. He was diagnosed with autism at the age of three by an independent child psychologist. The Childhood Autism Rating Scale (CARS), administered on September 19, 2010, resulted in a score of 39, which places him in the severe range of autistic behavior. Gerald's verbal communication skills consisted of two-three word requests or responses with and without prompting. He was a beginning reader and could expressively identify most standard

Dolch sight words at the kindergarten level. Gerald also has an affinity for music as evidenced by his very active participation in the music group at school.

Definition of target.

Gerald participated in a daily play group with peer models in his classroom. He enjoyed this group and interacted with his peers. The volume of his communication attempts, however, was very low, and it was typically very difficult to hear him. The target behavior that was selected for Gerald was audible verbal communication. It was operationally defined as: During peer group, whenever Gerald makes a verbal communication to a peer, the utterance will be audible to an observer sitting two feet away from him. A communication attempt is any verbalization made by the student that is clearly directed at a communication partner. Echolalia, humming, singing, mumbling, screaming, or crying, etc. were not counted as communication attempts in accordance with this definition. "Audible" was defined as being clearly heard and understood. It was also specified that the observer would sit two feet to the side of the student rather than behind him to enable consistent data between observers and consistency over time.

Variables.

The independent variables were the same as for Susan. The dependent variable was the percentage of communication attempts during the observation period which were audible to the observer according to the criteria specified.

Procedure.

Figure 2 shows the text and illustrations of the story that was used with Gerald. For the C condition, this text was set to the tune of *Twinkle, Twinkle, Little Star* and sung to the student. The term "just right voice" was used to describe appropriate volume, because this was the prompt the staff had been using in the classroom to encourage Gerald to speak louder.

Page	Text	Illustration
Title	Talking to Friends	Children playing with toys on the floor
1.	My name is Gerald. I go to school.	Boy reading
2.	Every day my friends come too.	Children holding hands
3.	We play with toys and make art together,	Children playing with toys
4.	And we like to talk to each other.	A boy and a girl engaged in conversation
5.	When I talk very quietly	A half circle gauge with picture of a boy holding his hand to his ear to indicate that he can't hear (on left side), a boy speaking and holding a thumbs up (middle), and a boy screaming (on right side), with a red arrow pointing to the boy on the left
6.	My friends might feel sad because they can't hear me.	Children crying
7.	When I talk to my friends I will try to use my very best "just right" voice.	The same picture as Page 5 with the arrow pointing to the boy in the middle
8.	Then I will be happy and my friends will too	A group of smiling children
9.	Because they will know what I want them to do.	Children playing with toys with a speech bubble of one boy saying, "My turn."
10.	The End	(none)

FIGURE 2 ***Social story for Gerald.***

Treatment Fidelity

To assess treatment fidelity the checklist in Figure 3 was used to ensure the intervention was delivered consistently and according to the proper procedure. The checklist was completed by an independent observer during two sessions of the B condition and two sessions of the C condition for each participant.

Reliability

Interobserver agreement (IOA) data were collected for a minimum of one session during each phase of the study. For Participant 1 (Susan), each of the eight trials was rated by two observers as either positive or negative. IOA was calculated by the number of agreements divided by the number of agreements plus the number of disagreements. For Participant 2,

Treatment Implementation Fidelity Checklist

Item	Question	Yes	No
1	Did the interventionist read the story in a clear and audible manner with moderate inflection? (Treatment B) OR Did the interventionist sing the text clearly to the correct tune? (Treatment C)		
2	Did the interventionist show the pictures to the student as she is reading or singing?		
3	Did the interventionist successfully avoid reinforcement, including any verbal reinforcement, during the treatment process?		

Total "Yes"	
Total "No"	
Total Items	3
% Correct	

FIGURE 3 ***Treatment implementation fidelity checklist.***

(Gerald), observers tallied the total number of communication attempts and the number of audible communication attempts, from which a percentage of audible attempts out of the total was derived. Agreement was calculated separately for the total number of communication attempts and for the percentage of audible communication attempts using the formula provided by Kennedy (2005 – Total Agreement = S/L*100%, where S is the smaller total and L is the larger total).

Measurement Plan

The primary means of measuring the results of the study was a visual analysis of the data. The median of the scores for each condition was used for comparison because it is less sensitive to the effects of violations of non-normality of distribution posed by time series data from single participants. The Percentage of Non-overlapping Data (PND), as defined by Scruggs and Mastropieri (1998, as cited in Kokina & Kern, 2010), comparing each condition to the baseline and comparing the two conditions to each other was calculated in order to provide a measure of effect size for the first two research questions. The t-tests performed in the studies by Brownell

and Pasiali were not considered to be an option for replication in this study because parametric statistical methods are not considered to be appropriate measures for analysis of effect significance due to the presence of serial autocorrelation of error variance in single case designs (Busk & Marascuilo, 1988).

Social Validity

In addition to measures of the students' target behaviors, the post-intervention survey in Figure 4 was administered to determine the social validity of the intervention. The survey measured the staff's perception of satisfaction, ease of implementation, and effectiveness of both interventions. Open ended questions solicited feedback on the staff's perception of the advantages of the interventions and any concerns they may have with using them.

Multi-Modal Social Story Study - User Survey

Please answer the questions below according to the following scale.

1 = *strongly agree*
2 = *agree*
3 = *neither agree nor disagree*
4 = *disagree*
5 = *strongly disagree*

Question	5	4	3	2	1
1. The verbal social story™ was effective in producing the desired behavior.					
2. The student appeared to enjoy the verbal social story™.					
3. The verbal social story™ is a method that I could easily implement in my classroom.					
4. The verbal social story™ is something that I could easily train another professional to use.					
5. I would recommend the use of the verbal social story™.					
6. The musical social story™ was effective in producing the desired behavior.					
7. The student appeared to enjoy the musical social story™.					
8. The musical social story™ is a method that I could easily implement in my classroom.					
9. The musical social story™ is something that I could easily train another professional to use.					
10. I would recommend the use of the musical social story™.					

What did you like or dislike about the verbal social story™?

What did you like or dislike about the musical social story™?

Based on your experience with this study, do you prefer the verbal social story™ or the musical one? Why?

FIGURE 4 ***Post-intervention survey.***

Chapter Three

Fidelity

Treatment fidelity was assessed via direct observation during 40% of the treatment sessions. It was planned that scores of less than 100% would result in a review of the proper procedure with the interventionist; however, treatment fidelity for both participants was 100% for all observations. Thus, retraining was not necessary. This high treatment fidelity was not difficult to obtain because the same person conducted all treatments for the B and C conditions.

Reliability

Interobserver agreement measures were taken to reduce the possibility of observer drift over the course of the observation sessions. For Participant 1 (Susan), agreement was measured on 25% of the total sessions – once during each of the first three phases and twice during the final phase. IOA was 100% for each of these assessments. Thus, outcome data for this participant can be considered highly reliable.

For Participant 2 (Gerald), IOA checks were made on 30% of the total sessions – once during the first and last phases and twice during the two middle phases. A Total Agreement measurement for IOA was used because the data did not contain absolute data intervals. IOA was 81% for the total number of communication attempts and 94% for the percentage of audible communication attempts. This IOA suggests a suitable level of reliability. While IOA on percent audibility remained consistent over the four phases of the study, agreement on the total number of communication attempts was higher during the first two phases (85%) than during the last two (77%). The planned procedure was to retrain observers when an IOA score was less than 80%. This desired quality control was not possible, however, because the staff members available to take data changed on a daily basis throughout the study.

Treatment Outcomes

Figures 5 and 7 depict outcomes of the study for each of the participants respectively.

Participant 1 – Susan.

An overall visual analysis of the data for Susan shows that the B condition (verbal social story) did result in an increase in her target behavior over the baseline from a median of 25% to 56% following the intervention. The C condition (musical social story) resulted in a slight increase compared to the baseline (25% to 33%); however the verbal intervention was

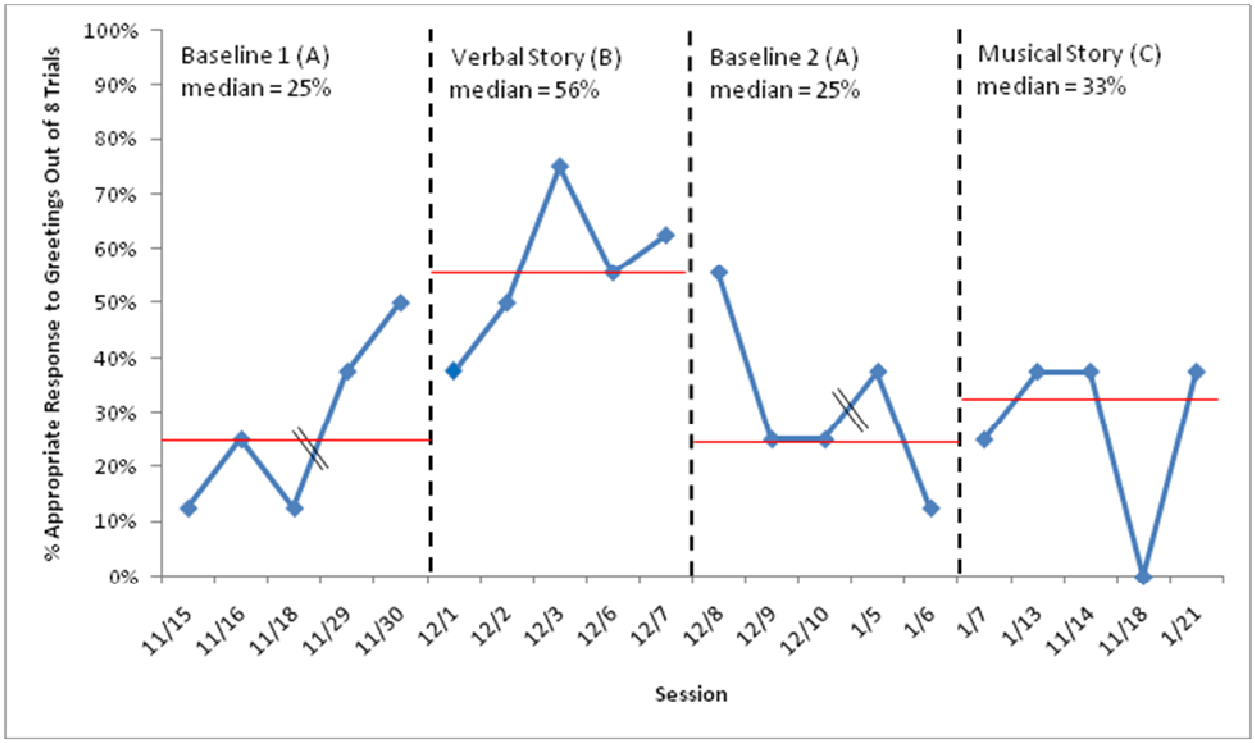


FIGURE 5 ***Susan – Results showing the median for each treatment phase. Double slash marks in the first and third phases indicate extended absences from school which are explained in detail in the final chapter. While the dates show that the sessions did not fall consistently on consecutive school days, the data lines are continuous because there was no break in data days as defined in the design.***

clearly more effective. The upward trend in Susan's performance during the initial baseline phase might cause one to question the treatment effect in the second phase, but the clear and immediate downward trend following the removal of the intervention would mitigate this

concern and argue for the treatment's effectiveness. The complete return to the original baseline level in the third phase indicates that the target behavior was not learned as a result of the intervention. This drop in performance, however, does not rule out the possibility of learned behavior should the intervention be used over a longer period of time or gradually phased out.

The Percentages of Non-overlapping Data (PND) for Susan are shown in Figure 6. Scruggs and Mastropieri (1998, as cited in Kokina & Kern, 2010) state that PND scores above 90 signify a highly effective intervention, those scores between 70-90 signify an effective intervention, scores between 50-70 show that outcomes are questionably low, and finally PND scores lower than 50 determine an ineffective intervention. According to these criteria, the verbal story (PND = 87%) was clearly an effective intervention and more effective than the musical one, with a PND of 60% across the two interventions. The musical story (PDN = 0%), on the other hand, would be rated as an ineffective intervention.

Percentage Non-overlapping Data Points (PND)	**Susan**
Condition B to prior baseline (A1)	70%
Condition C to prior baseline (A2)	20%
Condition B to combined baseline	87%
Condition C to combined baseline	0%
Condition B to Condition C	60%

FIGURE 6 ***Percentage of Non-overlapping Data Point (PND) percentages for Susan.***

Particpant 2 – Gerald.

A visual analysis of data for the second participant in Figure 7 shows consistency between his and the first participant's results. The target behavior was higher during each treatment phase than it was during baseline, and the verbal social story produced a more immediate treatment effect and a higher outcome with a median of 90% than the musical one at 81%. Although it did

not return completely to the original baseline as it did with the first participant, there was also a decrease in the target behavior following the removal of the first treatment.

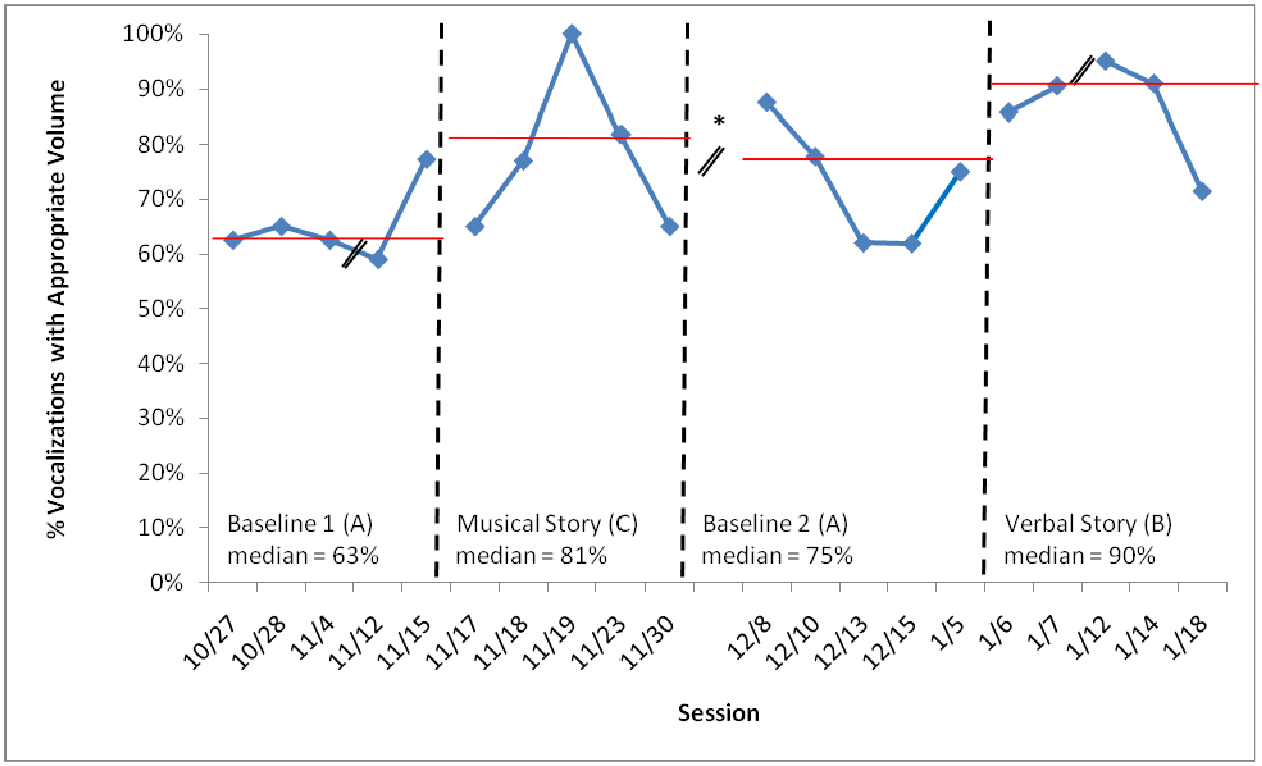


FIGURE 7 ***Gerald – Results showing the median for each treatment phase. The double slash mark in the first phase indicates an extended absence from school due to illness which is explained in detail in the final chapter. *The second double slash mark indicates another extended absence due to illness. This break in the data is unusual because it occurred between phases. The double slash mark with a broken data line in the final phase indicates a break in the data between sessions 18 and 19. This was due to a staff member's interference with the treatment on the day between these two sessions for which data could not be taken. There was also an extended absence between these two sessions. Further descriptions of these incidents are contained in the final chapter. While the dates show that the sessions did not fall consistently on consecutive school days, the data lines are continuous because there was no break in data days as defined in the design.***

Figure 8 shows that according to the previously stated PND effect size thresholds put forth by Scruggs and Mastropieri (1998), the verbal social story was in the questionable range for

Gerald at 60%. While the musical version was more effective for Gerald at a PND of 20% than it was for Susan at 0%, it still garners a rating of "ineffective."

Percentage Non-overlapping Data Points (PND)	Gerald
Condition C to prior baseline (A1)	60%
Condition B to prior baseline (A2)	60%
Condition C to combined baseline	20%
Condition B to combined baseline	60%
Condition C to Condition B	20%

FIGURE 8 ***Percentage of Non-overlapping Data Points (PND) for Gerald.***

Social Validity

Four staff members completed the User Survey in Figure 4. One was completed for the first participant and three were returned for the second participant. User satisfaction was measured as the percent of responses for a given survey item rated as "agree" or "strongly agree." The average rating of the effectiveness of the verbal social story was 50%, while only 25% agreed that the musical social story was effective. While these ratings were consistent with the results data, user satisfaction with both interventions was lower than expected. For the verbal social story, only 50% of respondents expressed agreement that the intervention would be easy to implement, easy to train another professional to use, or that they would recommend the intervention to others. For the musical story, these same survey items received an average satisfaction rating of 25%. Only one in four respondents felt that the students enjoyed the interventions, and they did not perceive the participants as enjoying one intervention more than the other. The comments received indicated that the teachers would choose which intervention to use based on their assessment of the student's response to music. Two respondents also stated

that they would rewrite the stories at a lower reading level because they considered the text to be "too wordy."

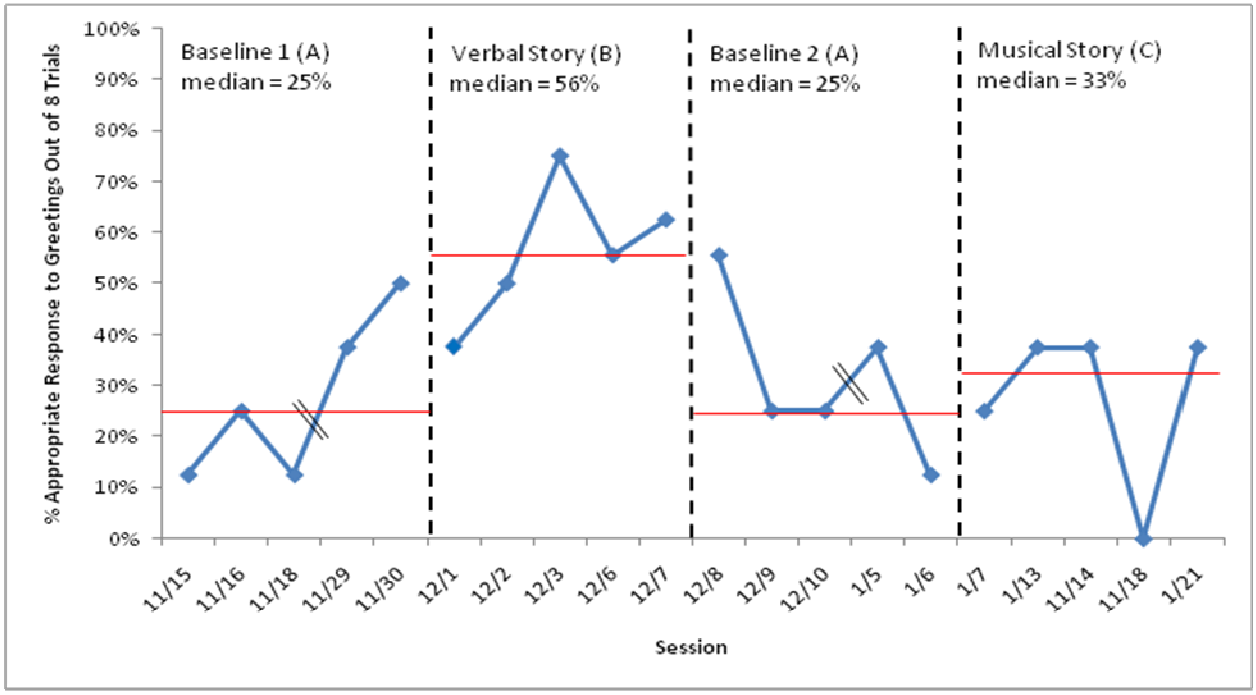
While the researcher was the primary implementer of the interventions during the study, her perceptions were not included in the results of this survey. It was her observation that the students appeared to enjoy both types of stories, as evidenced by their attention to them in spite of arriving at the treatment location in a distracted state. There was also evidence that they particularly enjoyed the musical stories, as they were observed singing them at other times during the day.

Findings

As shown in Figure 9, the overall results of the study were consistent for both participants relative to the first research question. The answer was affirmative – following the B condition (verbal social story) a measureable improvement in the targeted behavior was demonstrated. According to commonly accepted criteria for PND, the verbal social story was an effective intervention for the first participant and somewhat less so for the second participant.

For the second research question, target behaviors also increased for both participants following the C treatment condition (musical social story). However, the magnitude of these behavior changes was too small for this to be considered an effective intervention.

Concerning the third research question, the target behavior did decrease following the removal of the initial intervention for both participants. For the first participant, the second baseline returned to the original baseline median of 25%. The second participant's target behavior did not fall to the original level during the second baseline condition; however, it did show a small decrease. The purpose of analyzing the pattern of the second baseline was to determine if the target behavior is learned over time or is performed only in response to an



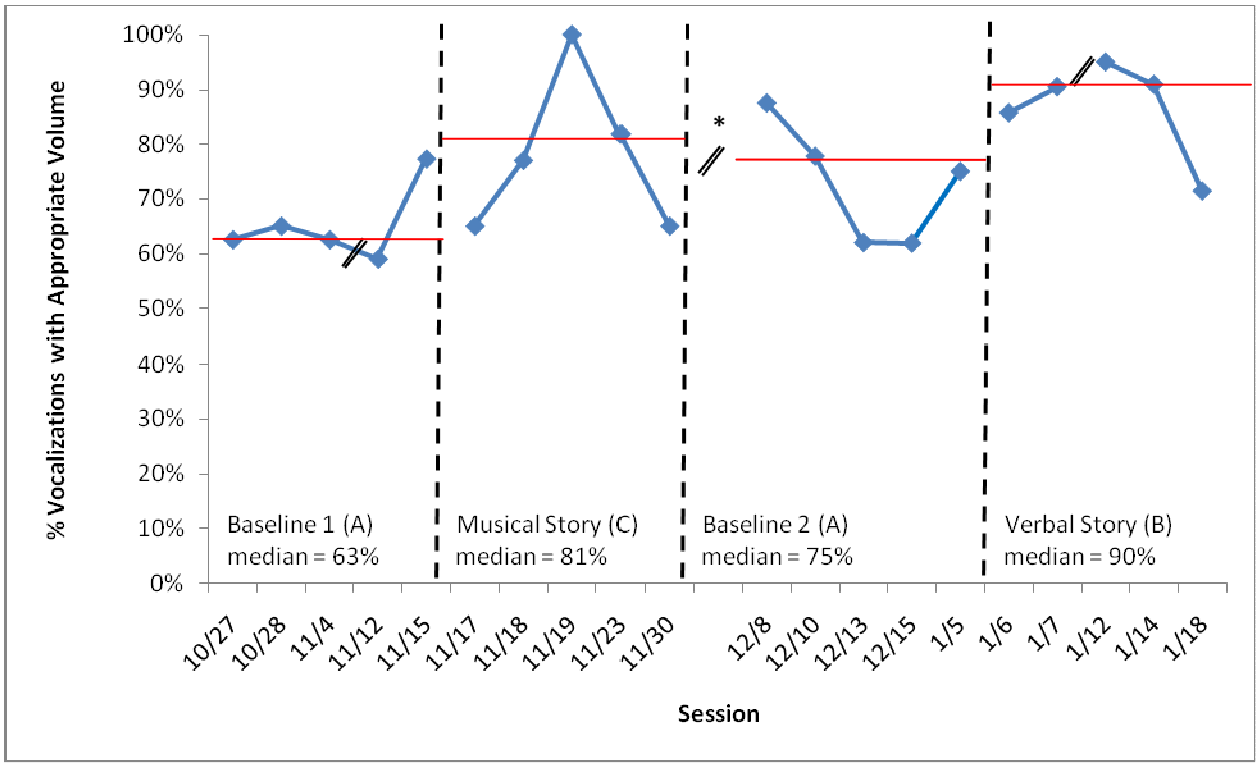


FIGURE 9 ***Results for Participant 1 (upper graph) and Participant 2 (lower graph) showing consistent results, with both interventions resulting in an increase in the target behavior, a return to baseline following the removal of the first intervention, and the verbal story as more effective than the musical one.***

intervention. A small but consistent upward trend across all four phases of the study for the second participant could indicate that the behavior is learned over time, although there is too much overlap in the data to clearly determine this. For the first participant, learned behavior was clearly not indicated.

For the fourth research question, it was anticipated that the impact of musical social stories would be more dramatic than that of traditional verbal social stories. Based on previous findings, it was expected that musical social stories would be at least equally effective. This did not prove to be the case. In fact, the opposite result was shown. There was a consistent difference in the effectiveness of the two interventions shown by both participants, with the verbal story being more effective than the musical one. Thus, the hypothesis of this study – that the addition of music to a social story might produce an added benefit – was clearly not supported.

Chapter Four

Summary

This study used an ABAC/ACAB counterbalanced (for order treatment) experimental design to determine if adding the medium of music to social stories would provide any improvement in the results of this intervention with two participants diagnosed with severe autism. A social story was created and set to music for a five-year old female to teach her to respond appropriately to social greetings. A second social story was written and set to music for a seven-year old male to encourage him to increase the audibility of his attempts to communicate with his peers. The verbal and musical versions of the social stories were implemented daily, as much as was possible, immediately prior to an activity that provided the greatest opportunity to use the target behavior. Data were taken to obtain the percent of positive responses out of the total number of responses. Consistent results in both participants showed that the verbal social story was more effective at increasing the desired behavior than the musical version.

Unanticipated Factors

Several situations occurred during the course of the study that had not been anticipated. For the first participant, a particular negative response seemed to predominate over time. During the first phase of the study, her negative responses included verbiage not relevant to the stimulus, a failure to respond altogether, or an echolalic response in which she repeated back to the greeter, “Hi, Susan.” The first two types of negative responses faded over time, and by the third phase of the experiment, 100% of her negative responses were echolalia. It would probably have been beneficial at this point to introduce a secondary intervention designed to prevent this response; however, it was decided not to introduce any new variables that could interfere with the ability to detect a treatment effect of the musical social story.

For the second participant, the lack of continuous data during the final phase of the study requires an explanation. On what would have been session 19 the student encountered an upset approximately 30 minutes prior to the scheduled intervention. When the interventionist arrived, the student was sitting alone in the hallway crying continuously. The teacher had isolated him with the intent of giving him an opportunity to calm down on his own. A paraeducator, however, did not follow this plan. She went to the student in the hallway and sang to him until he stopped crying, which he did fairly quickly. Unfortunately, the song she chose to use was the same one to which the social story had been set. When the student was brought into the room to listen to the social story 15 minutes later, he did not allow the interventionist to read the story to him as was required by the study. Instead, he sang the story to the adult. Because the B treatment condition was not delivered as scheduled, data were not taken on this day. The B treatment condition was continued the next day through the end of the study with no further issues.

In addition to this instance of interruption to the data, it should be noted that the treatments were not able to be delivered on consecutive days throughout the study. While student absences and other such obstacles were expected, they were not anticipated to occur as frequently as they did. The first participant missed six school days between the third and fourth sessions of the initial baseline due to an extended illness. Coincidentally, the second participant also missed five days between these same sessions for the same reason. A five-day break also occurred for him between the C treatment condition and the second baseline. For both participants, the two-week winter break occurred between the third and fourth sessions of the second baseline.

Another unplanned factor that may have affected the results of this study was that the researcher ended up being the sole provider of the interventions. It was intended that the teachers and para-educators would alternate with the researcher in implementing the interventions;

however, the school staff chose not to participate due to personal time constraints. It would have been advantageous to use multiple interventionists, because Kokina and Kern (2010) found a significant difference in comparative results of studies dependent on whether the intervention was delivered by a researcher, the student's teacher, or even the student himself.

Strengths

In their meta-analysis, Kokina and Kern (2010) used a variety of criteria to qualify a study as strong enough to include in their evaluation. While there are numerous limitations to the current study, it did meet these rigorous standards. They included a thorough description of participant characteristics, including a primary diagnosis of ASD made by an independent diagnostician, demonstration of experimental control, and graphically displayed baseline and intervention data (p. 814). Unlike studies reported in the literature so far, this study provided diagnostic scores from standardized assessments to specify the severity level of ASD in the participants. This information was included in an effort to support the conduct of further research on the use of the intervention with those with severe impairments.

This study was designed to provide a systematic replication of the studies by Brownell and Pasiali. As such, although it failed to confirm an effect of musical stories, it will add to the limited existing knowledge base. Two additions to this study added to its strength compared to the prior research. One of these elements was the strong measure, supervision, and maintenance of the fidelity of implementation. The studies by Brownell and Pasiali did not address fidelity at all. Here, fidelity was measured and maintained at 100%. This measure of quality control helped to reduce the threat to internal validity due to the possibility that the treatment conditions were different in some way other than intended.

A second addition was the social validity measurement. This was also not included in the Brownell and Pasiali studies. This assessment can be particularly beneficial to teachers, because it helps them to determine which interventions are most worth their time and effort. In this study, the stakeholders reported some satisfaction with the ease of use and effectiveness of the verbal social stories. The measurement also indicated that expending the extra effort to add music to the intervention may not result in any return on the investment.

Limitations

There were several threats to external validity in this study—the most significant being the small number of participants. While this limitation arose from the lack of qualifying students available in the supporting schools, the study would have been enhanced by expanding it to a wider variety of participants who differ in characteristics, such as age and geographic area.

A threat to internal validity that cannot be completely mitigated was history effects. Often children with autism will have “good days” and “bad days” for a variety of known or unknown reasons. While this effect may influence some individual data points, the number of sessions in each phase of the experiment should prevent it from impacting the results of one particular intervention over another.

Two significant limitations affected the internal reliability of the data for the second participant. One was that consistent observation duration was not possible. The scheduled length of time for the observation period in Gerald’s daily peer group was 15 minutes. However, the peer models were occasionally late while still required to leave at a set time. This resulted in variations in the length of observations. They ranged from 10 to 17 minutes, with only 35% of them being the intended 15 minute duration. Since the measurement used for comparison was a percentage of the total communication attempts made during the observation session, these data

can still give some indication of the impact of the intervention on the target behavior. However, the findings must be interpreted with a certain level of caution.

The second impediment to the reliability of the results for the second participant was the measurement of the target behavior. In an effort to support what was being addressed in the classroom, the target of an appropriate volume for verbal communication was chosen based on the teacher's request. While Gerald was a good candidate for the intervention, this behavior was too subjective to obtain a clear and reliable measurement. The data could have been further influenced by observer drift, because the observer was not blind to the intervention being used.

Recommendations for Future Research

As the body of knowledge is limited and inconclusive, further research on the effects of both verbal and musical social stories is warranted. Many questions about how to best maximize the intervention's effect remain to be explored. For example, while some studies have included an assessment of comprehension, none have isolated this component. Because comprehension questions are part of Gray's protocol, it would be valuable to measure their impact in isolation. As a further component analysis, it would be valuable to see if there is a differential effect between social stories with clip art pictures and stories illustrated with actual photographs of the child in the setting. Some teachers believe that actual pictures may limit the generalization of the new behavior to other settings. In general, research on the maintenance and generalization of acquired skills is critical. Another need is to investigate the benefit of including illustrations at all. This would be particularly valuable information to have as the most time-consuming part of preparing the intervention is locating the appropriate illustrations. Studies to determine the most effective methods to fade the intervention once the child has achieved a measure of success are also important. Lastly, as a significant amount of research is available showing the effectiveness

of social stories with children with autism, some teachers have expressed an interest in having these studies replicated with students with other disabilities.

Conclusion

Smith says, “In addition to the theoretical rationale, the relative ease of implementation makes Social Stories an attractive intervention option for practitioners and parents attempting to improve social outcomes of children with ASD” (2001, as cited in Kokina & Kern, 2010, p.813). While many authors (e.g., Nichols et al. 2005; Reynhout and Carter, 2006; Sansosti et al. 2004) consider social stories to be a promising intervention, more evidence is needed with varying circumstances before they can be routinized in the field as an evidence-based strategy.

Prior studies on musical social stories suggest that it can be an effective method; however, the current study was not able to confirm a benefit from the addition of this medium. While neither the verbal nor the musical social story produced highly significant effect sizes, the verbal version was clearly more effective than the musical one. In a way, even though the evidence regarding musical social stories is not conclusive, this is can be considered good news for teachers. The lack, as yet, of strong supporting evidence could save them the time and effort involved in embellishing an intervention when the simpler version appears to be more effective.

References

American Psychological Association. (1994) *Diagnostic and Statistical Manual of Mental Disorders* (4th ed.)

Aspy, R., & Grossman, B.G. (2008). *Designing Comprehensive Interventions for Individuals with High Functioning Autism and Asperger Syndrome: The Ziggurat Model.* Shawnee Mission: Autism Asperger Publishing Co.

Barry, L. M., & Burlew, S. B. (2004). Using social stories to teach choice and play skills to children with autism. *Focus on Autism and Other Developmental Disabilities*, 19(1), 45-51.

Bernad-Ripoll, S. (2007). Using a self-as-model video combined with social stories™ to help a child with Asperger Syndrome understand emotions. *Focus on Autism and Other Developmental Disabilities*, 22(2), 100-106. doi: 10.1177/10883576070220020101

Bledsoe, R., Smith, B., & Simpson, R.L. (2003). Use of social story intervention to improve mealtime skills of an adolescent with Asperger Syndrome. *Autism*, 7(3), 289-295. doi: 10.1177/1362361303007003005

Brownell, M. D. (2002). Musically adapted social stories to modify behaviors in students with autism: Four case studies. *Journal of Music Therapy,* XXXIX (2), 117-144.

Busk, P.L., & Marascuilo, L. A. (1988). Auto-correlation in single-subject research: A counterargument to the myth of no autocorrelation. *Behavioral Assessment*, 10, 229-242.

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

Department of Health and Human Services, Centers for Disease Control and Prevention. (2009). Prevalence of Autism Spectrum Disorders—Autism and Developmental Disabilities Monitoring Network, United States, 2006. *Morbidity and Mortality Weekly Report: Surveillance Summaries*, 58(SS10),1-20. Retrieved from http://www.cdc.gov/mmwr/preview/mmwrhtml/ss5810a1.htm

Gray, C. (2000). *Writing Social Stories with Carol Gray: Accompanying Workbook to Video.* Arlington, TX: Future Horizons, Inc.

Gray, C. A., & Garand, J. D. (1993). Social stories: Improving responses of students with autism with accurate social information. *Focus on Autistic Behavior*, 8(1), 1-10.

Gray, C. A., Schopler, E., Mesibov, G. G., & Kunce, L. J. (1998). Asperger Syndrome or High-Functioning Autism? *Current Issues in Autism.* New York: Plenum Press.

Katagiri, J. (2009). The effect of background music and song texts on the emotional understanding of children with autism. *Journal of Music Therapy*, 46(1), 15-31.

Kennedy, C.H. (2005). *Single-Case Designs for Educational Research.* Boston, MA: Pearson Education, Inc.

Kim, J., Wigram, T., & Gold, C. (2009). Emotional, motivational and interpersonal responsiveness of children with autism in improvisational music therapy. *Autism*, 13(4), 389-409.

Kogan, M. D., Blumberg, S. J., Schieve, L. A., Boyle, C. A., Perrin, J. M., Ghandour, R. M., Singh, G. K., Strickland, B. B., Trevathan, E., MD, & van Dyck, P. C. (2009). Prevalence of parent-reported diagnosis of autism spectrum disorder among children in the US, 2007. *Pediatrics*,124(5), 1395-1403. doi: 10.1542/peds.2009-1522

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

Lorimer, P. A., Simpson, R. L., Myles, B. S., & Ganz, J. B. (2002). The use of social stories as a preventative behavioral intervention in a home setting with a child with autism. *Journal of Positive Behavior Interventions*, 4(1), 53-60.

Mancil, G.R., Haydon, T., & Whitby, P. (2009). Differentiated effects of paper and computer-assisted social stories on inappropriate behavior in children with autism. *Focus on Autism and Other Developmental Disabilities*, 24(4), 205-215. doi: 10.1177/1088357609347324

National Autism Center, (2009). *National Standards Report*. Retrieved from www.nationalautismcenter.org/pdf/NAC%20NSP%20Report_FIN.pdf

Nichols, S. L., Hupp, S. D. A., Jewell, J. D., & Ziegler, C. S. (2005). Review of social story interventions for children diagnosed with autism spectrum disorders. *Journal of Evidence-Based Practices for Schools*, 6(1), 90–120.

Pasiali, V. (2004). The use of prescriptive therapeutic songs in a home-based environment to promote social skills acquisition by children with autism: Three case studies. *Music Therapy Perspectives*, 22(1), 11-22.

Reynhout, G., & Carter, M. (2006). Social stories for children with disabilities. *Journal of Autism and Developmental Disorders*, 36(4), 445-469. doi: 10.1007/s10803-006-0086-1

Reynhout, G., & Carter, M. (2007). Social story efficacy with a child with autism spectrum disorder and moderate intellectual disability. *Focus on Autism and Other Developmental Disabilities*, 22(3), 173-182. doi: 10.1177/10883576070220030401

Sansosti, F.J., Powell-Smith, K.A., & Kincaid, D. (2004). A research synthesis of social story interventions for children with autism spectrum disorders. *Focus on Autism and Other Developmental Disabilities*, 19(4), 194-204. doi: 10.1177/10883576040190040101

Sansosti, F.J., & Powell-Smith, K.A. (2008). Using computer-presented social stories and video models to increase the social communication skills of children with high-functioning autism spectrum disorders. *Journal of Positive Behavior Interventions*, 10(3), 162-179.

Simpson, R. L. (2005). *Autism Spectrum Disorders: Interventions and Treatments for Children and Youth.* Thousand Oaks: Crown Press.

Thiemann, K. S. & Goldstein, H. (2001). Social stories, written text cues, and video feedback: Effects on social communication of children with autism. *Journal of Applied Behavior Analysis,* 34(4), 425-446.