

Evaluating Function-Based Social Stories™ With Children With Autism

Behavior Modification

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DOI: 10.1177/0145445515603708

bmo.sagepub.com



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Abstract

Social Stories™ are often used with children with autism to provide information about appropriate behaviors in specific contexts. Although Social Stories™ often target reduction of problem behavior, there is limited research evaluating function-based Social Stories™ based on the results of experimental functional analyses. This study used a brief functional analysis to assist in developing a Social Story™ that matched the function of the target behavior for two boys with autism. The differential effects of a Social Story™ that matched the function of the behavior, a Social Story™ that did not match the function of the behavior, and a Social Story™ that described baseline were compared in an alternating treatments design. Results indicated that (a) the function-based Social Story™ plus functional communication training (FCT) was effective in decreasing target problem behavior and increasing target mands for both participants, (b) both participants selected the function-based Social Story™ during treatment preference evaluations, and (c) both participants maintained low levels of target problem behavior and maintained target mands when the Social Stories™ were removed.

Keywords

autism, brief functional analysis, Social Stories™, functional communication training

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A Social Story™ is a short, simple story that provides information about a social situation and the appropriate behaviors needed for that situation (Gray, 1994, 1995; Gray & Garand, 1993). The defining feature of a Social Story™, as created and copyrighted by Carol Gray in the early 1990s, is a ratio of two to five descriptive, affirmative, or perspective sentences for every directive sentence (Gray, 2010; Gray & Garand, 1993). Although Gray (2010) stated that the primary purpose of a Social Story™ is to increase understanding of a situation and not to change behavior, reduction of problem behavior is a common target in studies on Social Stories™ (e.g., crying, screaming, aggression, tantrum behavior, talking out, dropping to the floor, pushing; Adams, Gouvousis, VanLue, & Waldron, 2004; Benish & Bramlett, 2011; Crozier & Tincani, 2005; Kuttler, Myles, & Carlson, 1998; Lorimer, Simpson, Myles, & Ganz, 2002; Mancil, Haydon, & Whitby, 2009; Scattone, Wilczynski, Edwards, & Rabian, 2002).

Numerous sources have recommended identification of function of problem behavior as a standard component in developing a behavior change program (e.g., Carr & Durand, 1985; Hanley, Iwata, & McCord, 2003; Individuals With Disabilities Education Act, 1997; Iwata, Dorsey, Slifer, Bauman, & Richman, 1982/1994; Iwata & Dozier, 2008; Steege & Watson, 2009) because it increases the likelihood of an intervention being effective (Carr & Durand, 1985; Durand, Crimmins, Caulfield, & Taylor, 1989; Iwata et al., 1990; Kennedy, Meyer, Knowles, & Shukla, 2000; Repp, Felce, & Barton, 1988; Steege, Wacker, Berg, Cigrand, & Cooper, 1989). Conducting a functional assessment would allow a teacher or clinician to write a Social Story™ uniquely matched to the function of a student's problem behavior. Experimental functional analysis is the "gold standard" of functional assessment procedures because it is the most accurate procedure for measuring a functional relationship between behaviors and consequences (Shriver, Anderson, & Proctor, 2001). Unfortunately, only two studies were found in the Social Story™ literature that used a functional analysis for determining the function of problem behavior. Adams and colleagues (2004) reported that the participant's problem behavior was maintained by negative reinforcement (i.e., escaping homework), which was determined by a previously conducted functional analysis. However, the functional analysis data were not reported in the study. The Social Story™ and functional communication training (FCT) treatment package was effective in decreasing problem behavior and teaching the participant to say, "I don't understand," and to ask for help as a means of appropriately escaping homework.

Cihak, Kildare, Smith, McMahon, and Quinn-Brown (2012) conducted a brief functional analysis (brief FA) with four participants prior to implementing a Social Story™ intervention. The brief FA revealed that the off-task

behavior of two participants was maintained by escape or avoidance, and the off-task behavior of two participants was maintained by positive reinforcement in the form of attention. Each participant self-modeled in two video Social Stories™, one that matched the function of the behavior and one that did not. The Social Stories™ were developed according to Gray's (2000) guidelines; however, a video was used rather than a written format. Results indicated that task engagement improved only after viewing the video Social Stories™ that matched the specific function of their behavior. After the participants viewed the Social Stories™ that did not match the function of their behavior, no improvement was demonstrated. Determining the function of the behaviors allowed the researchers to teach the participants to gain access to the functional reinforcers that were maintaining the problem behaviors with alternative, more appropriate responses.

The use of Social Stories™ among special education professionals has increased to address social, academic, and specific skill acquisition (Test, Richter, Knight, & Spooner, 2011). Social Stories™ have been considered easy to implement (Dodd, Hupp, Jewell, & Krohn, 2007; Mancil et al., 2009; Soenksen & Alper, 2006) and are widely used with children with autism (Hanley-Hochdorfer, Bray, Kehle, & Elinoff, 2010; Test et al., 2011). They are often considered a non-invasive method for decreasing challenging behavior and increasing appropriate behavior (Scattone et al., 2002; Schneider & Goldstein, 2009). Social Stories™ may be a convenient, time-efficient, and cost-effective intervention for public-school classrooms (Benish & Bramlett, 2011; Dodd et al., 2007; Hanley-Hochdorfer et al., 2010). According to the National Standards Project (National Autism Center: May Institute, 2009), "story-based intervention packages" are considered an established treatment and have favorable outcomes for individuals with Autistic Disorder and Asperger's Syndrome aged 6 to 14 years. The National Standards Project defines "story-based intervention packages" as treatments that involve a written description of the situations under which specific behaviors are expected to occur, and stories may be supplemented with additional components such as prompting, reinforcement, and discussion. However, in a recent comprehensive review and meta-analysis of the Social Story™ literature, the authors indicated that Social Stories™, when used in isolation, could not be considered evidence-based practice (Test et al., 2011). Test and colleagues (2011) determined that Social Stories™ intervention was not an evidence-based practice according to the quality indicators defined by Horner and colleagues (2005). Therefore, it is important to determine the limitations of the current research and improve those areas so that Social Stories™ can be effectively used by special educators.

The purpose of this study was to use a functional analysis to assist in developing a Social Story™ that matched the function of the target behavior of each participant. The differential effects of a function-based Social Story™, a non-function-based Social Story™, and a Social Story™ that described baseline were compared in an alternating treatments design. A participant treatment preference evaluation was conducted to determine which Social Story™ was most preferred. Generalization was programmed for by using multiple stimuli that the participant was likely to come in contact with in school, and the alternative behavior that was taught to replace the target behavior was selected based on utility in the classroom. Treatment extensions included evaluation of behavior with staff, stimuli, and an environment that were not used during the treatment evaluation. Last, the Social Story™ was removed, and maintenance data were collected.

Method

Participants

Two boys diagnosed with autism (American Psychiatric Association, 2000) by an independent agency and who met the eligibility category of *autistic* based on their individualized educational program (IEP) participated in the study. Thomas was 10 years, 3 months, and was placed in a general education classroom with the support of a one-to-one aide. Charles was 15 years, 2 months, and attended a Language and Learning Disabilities self-contained classroom with a one-to-one aide. Educational programs of both participants used procedures based on the principles of applied behavior analysis (ABA). Participants were selected based on (a) having a diagnosis of autism, (b) demonstrating problem behavior as reported by school staff and as observed by the experimenter, and (c) attending a public school. Parent consent was obtained for participation, and the study was reviewed and approved by Caldwell University's Institutional Review Board.

Settings and Materials

Sessions were conducted in the participant's home. A treatment extension was conducted for both participants in an area of the public school they attended. For Thomas, the treatment extension was conducted at a table in the library where he received small-group instruction during the extended school year program. For Charles, the treatment extension was conducted in his self-contained classroom. Materials used during the Social Story™ intervention included the three Social Stories™, the worksheet that was presented to the participant during the target situation, and a pencil for writing. A digital timer

was used to time the 10-min sessions for the brief FA, treatment evaluation, and treatment preference, and a MotivAider® was used to time the 20-s break.

Dependent Measures

The target behavior for Thomas was *facial grimacing*, defined as wrinkling his nose, squinting his eyes, and clenching his jaw while pressing lips together or tightening his jaw muscles while his mouth was open. The target behavior for Charles was *non-contextual smiling/laughter*, defined as upward curving of one or both sides of mouth or laughing that did not occur within 5 s of a contextual, observable event (e.g., a joke, other people laughing). Data were collected on each target problem behavior using a 20-s partial-interval recording system. Data were summarized as the percentage of intervals during which the target behavior occurred.

The target mand for the Social Story™ that matched the function of the behavior (i.e., escape Social Story™) was defined as the participant requesting a break by asking, “Can I take a break?” or similar mands (e.g., “Can I have a break, please?”). The target mand for the Social Story™ that did not match the function of the behavior (i.e., attention Social Story™) was defined as the participant asking, “Can you check my work?” or similar mands. Data were collected on the frequency of target mands per session and summarized as the rate of mands (per minute).

Preference Assessments

Seven items were assessed using a multiple-stimulus without replacement preference assessment (MSWO; Carr, Nicolson, & Higbee, 2000). The items identified as moderately preferred (i.e., items ranked as fourth and fifth) were used during the attention condition during the brief FA. The items identified as highly preferred (i.e., items ranked as one through three) were used during the control condition of the brief FA and were also used for Charles while the Social Stories™ were read and during the comprehension check (described below).

An MSWO (Carr et al., 2000) color preference assessment was also conducted to identify colors to be used as condition-correlated stimuli. The colors that were ranked four, five, and six were quasi-randomly assigned to each Social Story™ to facilitate discrimination of the contingency described in each story (Hanley, Piazza, Fisher, Contrucci, & Magliere, 1997).

Functional Assessments

The Functional Analysis Screening Tool (FAST; Iwata, DeLeon, & Roscoe, 2013) was administered to a staff member who worked with the participant.

For both participants, the results suggested that the target problem behavior was maintained by negative reinforcement. Next, the experimenter conducted observations using the Conditional Probability Record (CPR; Steege & Watson, 2009) during activities in which the target behavior was likely to occur. Scheduled observations occurred for a minimum of 30 min and continued until the problem behavior was observed. For both participants, these data suggested that the target behavior was most likely to occur after an academic demand was given and was maintained by negative reinforcement (i.e., escape from the demand). Subsequently, a demand assessment was conducted to identify the tasks to use in the demand condition of the brief FA (Roscoe, Rooker, Pence, & Longworth, 2009).

The brief FA (Northup et al., 1991) included no interaction, attention, control, and demand conditions conducted in a fixed-order sequence (Hammond, Iwata, Rooker, Fritz, & Bloom, 2013). Each condition was 10 min with approximately 1 min between each session. During the no interaction condition, the participant was seated at a table. Demands and attention were not presented. The experimenter did not interact with the participant and ignored all occurrences of the target behavior. During the attention condition, the experimenter gave the direction, "I have some work to do, you can play with these things," and pointed to the moderately preferred items that were on the desk. When the target behavior occurred, the experimenter oriented toward the participant and provided verbal attention (e.g., "Don't get upset") for approximately 10 s. During the control condition, the participant had access to high-preference items. The experimenter provided verbal attention (e.g., praise) every 30 s, contingent on the absence of problem behavior for 5 s. No demands were presented. During the demand condition, demands given were those that were identified in the demand assessment (Thomas, copying text in cursive; Charles, reading out loud and writing answers). The experimenter instructed the participant to do his work. If he did not begin to complete the task within 5 s, the experimenter instructed and pointed to the location of the required response. If the participant still did not begin to complete the task within 5 s, the experimenter instructed and manually guided the participant to the location of the required response (Cihak, Alberto, & Fredrick, 2007). Following each occurrence of the target behavior, the experimenter removed the materials and said, "This is hard, you can take a break," and turned away from the participant for 20 s or until the participant was no longer engaged in the target behavior. Then, the experimenter presented the materials and the direction again. To approximate the classroom environment, the experimenter provided praise on an intermittent schedule contingent on independent or prompted responses in the absence of the target behavior. The FA condition that produced the highest percentage of the target behavior was repeated to provide replication (Tincani, Castrogiovanni, & Axelrod, 1999).

Design and Procedures

An alternating treatments design (Kazdin, 2010) was used to compare the effects of the three Social Stories™. Sessions for each participant were approximately 10 to 12 min. Three to nine sessions were conducted per week.

Social Stories™. Following the brief FA, the experimenter developed three Social Stories™ for each participant using the checklist for writing Social Stories™ (Gray, 2000). One Social Story™ matched the function of the target behavior, one Social Story™ did not match the function of the target behavior, and one Social Story™ described baseline (Social Stories™ are available on request from the first author). The Social Stories™ were written in the first-person perspective; included an introduction, a body, and a conclusion; and contained two to five *descriptive*, *perspective*, or *affirmative* sentences for every one *directive sentence* (i.e., the Social Story™ ratio; Gray, 2010). The number of words used across the function-based Social Stories™ was equated to increase the consistency of the format of the escape and attention Social Stories™. There were slightly fewer words in the baseline Social Stories™ because *directive sentences* that describe the alternative replacement behavior (target mand) were not used in the baseline Social Story™. The readability level of the Social Stories™ did not exceed the reading level of each participant.

The Social Stories™ were printed on colored paper using an 18-point Times New Roman font. Colored paper was used to facilitate discrimination of the conditions during the alternating treatments evaluation and during the participant preference evaluation (Hanley et al., 1997). The Social Stories™ included small pictures to illustrate a few of the sentences. Photographs were taken by the experimenter of the participant and materials related to the experiment. Each Social Story™ was placed in a plastic sheet protector. Both participants demonstrated reading 100% of the words in the Social Stories™ in isolation.

Five special education teachers were asked to use the checklist developed by Gray (2000) to assess whether the Social Stories™ created for this study met the Social Story™ criteria; the mean ratings for the three stories were 100% (function-based story), 100% (non-function-based story), and 98% (range, 90%-100%; baseline story). The special education teachers were also asked to answer questions related to the social validity of the Social Stories™. The teachers were provided with the operational definition of the participant's target behavior, the reading level of the participant, and a brief description of the Social Story™ intervention. For each question, the teacher provided a 1- to 5-point rating (1 = *strongly disagree*, 5 = *strongly agree*). Overall, the raters scored the Social Story™ intervention as a positive intervention.

Three questions related to each Social Story™ were developed to test for comprehension of the story (e.g., Delano & Snell, 2006; Mancil et al., 2009; Reynhout & Carter, 2007; Scattone, Tingstrom, & Wilczynski, 2006; Scattone et al., 2002). Prior to the Social Story™ intervention, neither participant correctly answered the comprehension questions for the Social Story™ that described baseline and the Social Story™ that did not match the function of the behavior (i.e., attention Social Story™). They both answered 33% of the questions correctly about the Social Story™ that matched the function of the behavior (i.e., escape Social Story™).

To facilitate discrimination of the conditions, a similar procedure to that of Hanley et al. (1997) was used. All three Social Stories™ were placed on the desk in front of the participant in a horizontal array (order counterbalanced across sessions). The experimenter pointed to a Social Story™ and said, "Point to this one" in a neutral voice tone. If the participant did not point to the Social Story™ within 3 s, the experimenter manually guided the participant to point to the Social Story™. The experimenter then removed the remaining two Social Stories™ from the desk.

Next, the Social Story™ was read to the participant. When the participant was looking at the experimenter, she said, "Let's read your story." If the participant was not looking, the experimenter said, "Look" and then read the Social Story™. If the participant looked away from the experimenter/story, the experimenter paused while reading the story. If the participant looked toward the experimenter within 5 s, the experimenter continued reading the story. If the participant did not look toward the experimenter/story within 5 s, the verbal direction, "Look" was given. Once the participant was looking at the experimenter/story, the experimenter continued reading. For Thomas, one to two praise statements were delivered contingent on attending while the story was read. The experimenter delivered checks on a small card (token system) for every two to three sentences during which Charles was attending and did not require a prompt. When Charles received 20 checks, he earned a preferred item. This token system was not used during the treatment evaluation.

After the Social Story™ was read to the participant, the experimenter asked the comprehension questions. If the participants did not answer a question correctly, the experimenter re-read the relevant portion of the story and then asked the question again (Chan & O'Reilly, 2008; Iskander & Rosales, 2013). If the participant still did not respond correctly, the experimenter provided a verbal prompt to answer correctly.

Immediately after the Social Story™ and comprehension questions, the participant was presented with the materials for that condition. During the baseline Social Story™ condition, when the participant engaged in the target behavior,

the experimenter removed the work for 20 s. Requests for a break and for attention was ignored. During the attention Social Story™ condition, if the participant appropriately requested attention, the experimenter provided 20 s of attention. Target problem behavior and requests for a break were ignored. During the escape Social Story™ condition, if the participant appropriately requested a break from work, the experimenter removed the work materials and allowed the participant a 20-s break. Once the 20-s break was over, the experimenter presented the work materials and an instruction such as, “Do your work.” Target problem behavior and requests for attention were ignored.

Treatment preference evaluation. Following the treatment evaluation, participant preference of the Social Stories™ was assessed (Hanley et al., 1997). The experimenter sat facing the participant, gave the instruction, “Look,” placed the three Social Stories™ on the desk, and asked “Which one do you want?” The location that each was placed on the desk was counterbalanced. The experimenter implemented the selected Social Story™ procedure as described above. Selection opportunities continued until the participants selected the same Social Story™ for 3 consecutive opportunities, or a total of 10 selection opportunities were provided.

Treatment extension. We programmed for generalization by using multiple stimuli that the participant was likely to contact at school (e.g., variety of worksheets). Also, the topography of the target mand to replace the target behavior (requesting a break) was selected based on utility in the classroom. Treatment extensions included probes with another person (i.e., a staff member with whom the participant was familiar but was not part of the experiment), worksheets in the same academic area (e.g., reading) but in a different (e.g., copying text vs. a written response to an open-ended question), and a probe in the school environment.

Removal of the Social Story™. The Social Story™ was removed following the treatment extension phase. That is, the Social Story™ was not read or in the participant’s view. The experimenter presented the target situation by giving the instruction, “Do your work.”

Maintenance. Follow-up data were collected after the treatment extension over a period of 3 weeks. The Social Story™ was not read during the maintenance phase. When the participant responded with the target mand, the experimenter responded by providing a 20-s break. Target problem behavior was ignored.

Interobserver Agreement and Treatment Integrity

Interobserver agreement (IOA) data were collected across the brief FA sessions, treatment evaluation sessions, the participant treatment preference evaluation, removal of the Social Story™, and maintenance. The interval-by-interval method was used to calculate IOA scores on target behaviors during the brief FA sessions and the treatment evaluation sessions. IOA data were collected for 80% of brief FA sessions. Mean IOA percentage during the brief FA for both participants was 99 (range = 97%-100%). IOA data were collected on 33% of the treatment evaluation sessions. The mean IOA percentage was 98 (range = 90%-100%) for Thomas and 100 for Charles. Trial-by-trial IOA data (33% of sessions) were collected on the participant's response to the comprehension questions. IOA scores for both participants were 100%. Total count IOA on the target mands during the brief FA and during the treatment evaluation was 100% for both participants.

Treatment integrity data were collected to assess whether the experimenter accurately implemented the brief FA, implemented the Social Stories™ and comprehension questions correctly, and responded correctly during the treatment evaluation. Trials (implementing the Social Story™) and intervals (during the treatment evaluation sessions) were scored as either completed correctly (i.e., all procedures correct) or incorrectly (i.e., one or more procedures incorrect). The number of correct trials/intervals was divided by the total number of trials/intervals (correct plus incorrect) and multiplied by 100. Treatment integrity data were collected on 33% of the total sessions. Mean treatment integrity for the implementation of the Social Story was 92% (range = 50%-100%) for Thomas and 100% for Charles. Treatment integrity for the brief FA and the treatment evaluation sessions was 100% for both participants. IOA data on treatment integrity were collected during 33% of the sessions and calculated by comparing the primary observer's data with the secondary observer's data (i.e., number of trials/intervals agreed over the total number of trials/intervals × 100). IOA on treatment integrity was 100% for both participants.

Social Validity

Social validity was assessed after the intervention to determine whether special education staff members in a public-school classroom setting found the procedures and outcomes to be acceptable. Five special education staff members were given descriptions of the target behaviors, the interventions, and the results. After reading the descriptions, the staff members completed the Behavior Intervention Rating Scale (BIRS; Elliott & Treuting, 1991). For each of the 24 questions, the teachers provided a 1- to 6-point rating (1 = *strongly disagree*, 6 = *strongly agree*). All questions were rated as a 6 by all respondents.

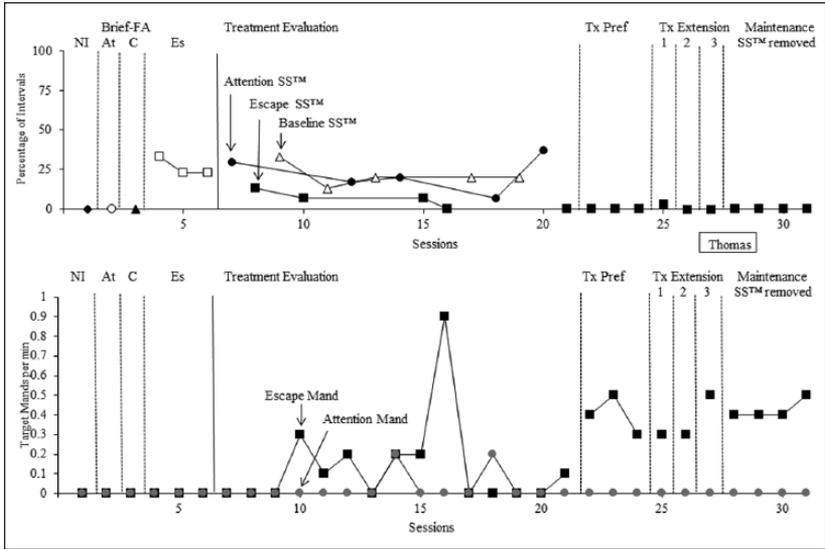


Figure 1. Thomas' percentage of intervals with the target behavior (top panel) and frequency of target mands (bottom panel).
Note. Brief FA = brief functional analysis; NI = no interaction; At = attention; C = control; Es = escape treatment extension: 1 = stimuli, 2 = staff member, 3 = environment.

Results

Figure 1 illustrates the data for the brief FA, treatment evaluation, treatment extension, and maintenance for Thomas. His target problem behavior (top panel) occurred only during the demand condition of the brief FA ($M = 26\%$ of the intervals; range = 23%-33% of the intervals), indicating that the target behavior was sensitive to negative reinforcement. Furthermore, Thomas did not use the target mand (bottom panel) during the brief FA. The results of the treatment extension demonstrated that the function-based Social Story™ plus FCT produced a substantial decrease in the target behavior ($M = 5.4\%$ of the intervals; range = 0%-13% of the intervals). The target behavior did not decrease substantially during the Social Story™ that did not match the function ($M = 21\%$; range = 7%-37% of the intervals) or the Social Story™ that described baseline ($M = 21\%$ of the intervals; range = 13%-33% of the intervals). Thomas used the target mand during the sessions that followed the function-based Social Story™ ($M = .34$ mands per min, range = 0-.9 mands per min). During sessions for the attention Social Story™, Thomas rarely used the attention mand ($M = .01$ mands per min; range = 0-.2 mands per min). During the treatment preference assessment, Thomas selected the

matched Social Story™ on the first three selection opportunities, and the target behavior remained at 0% while he continued to mand appropriately for a break ($M = .4$; range = .3-.5 mands per min). Thomas' target behavior remained low ($M = 1\%$; range = 0%-3% of the intervals), and he continued to use the target mand ($M = .36$ mands per min; range = .3-.5 mands per min) during three treatment extensions that included a new task (different format of worksheet), a familiar staff member not part of the research, and a location (i.e., school library) that was not associated with the treatment evaluation. When the Social Story™ was removed, Thomas did not engage in the target behavior, and he continued to mand for a break ($M = .42$ mands per min; range = .4-.5 mands per min); thus, systematic fading of the Social Story™ was unnecessary.

Results for Charles are illustrated in Figure 2. As with Thomas, the brief FA indicated that Charles' target problem behavior (top panel) was maintained by negative reinforcement ($M = 72\%$ of the intervals; range = 63%-80% of the intervals). The percentages of intervals with the target behavior for the no interaction, attention, and control conditions were 10, 0, and 0, respectively. Furthermore, Charles did not use the target mand (bottom panel) during the brief FA. The results of the treatment extension demonstrated that the function-based Social Story™ plus FCT produced a substantial decrease in the target behavior ($M = 2.3\%$ of the intervals; range = 0%-10% of the intervals). The mean of the target behavior for the attention Social Story™ (that did not match the function) was 13% (range = 3%-27% of the intervals), and the mean for the Social Story™ that described baseline was 69% (range = 23%-90% of the intervals). Also, Charles used the target mand to appropriately escape demands following the escape Social Story™ ($M = .48$ mands per min, range = 0-1.4). Charles did not use the mand that was indicated in the attention Social Story™. Like Thomas, during the treatment preference assessment, Charles selected the escape Social Story™ on the first three selection opportunities, and his target behavior remained low ($M = 1\%$ of the intervals; range = 0%-3% of the intervals) while he continued to mand for a break ($M = 1$; range = 0.4-1.4 mands per min). Four treatment extensions were conducted. He maintained a low level of the target behavior ($M = 2.5\%$ of the intervals; range = 0%-7% of the intervals) while continuing to mand for a break ($M = .63$ mands per min; range = .4-1 mands per min) when presented with two different formats of reading tasks, with a familiar staff member, and in a familiar location (i.e., classroom) that were not associated with the treatment evaluation conditions. Once the Social Story™ was removed, Charles' behavior remained at a low level ($M = 4.8\%$ of the intervals; range = 0%-13% of the intervals), and he continued to use the target mand ($M = .45$ mands per min; range = .2-.7 mands per min). Therefore, a systematic fading procedure to remove the Social Story™ was not implemented.

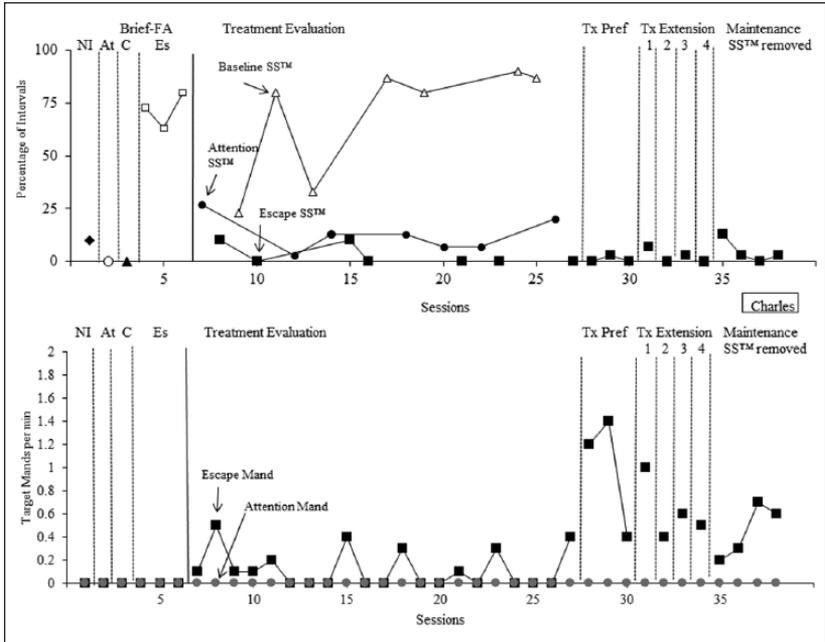


Figure 2. Charles' percentage of intervals with the target behavior (top panel) and rate per minute of target mands (bottom panel).

Note. Brief FA = brief functional analysis; NI = no interaction; At = attention; C = control; Es = escape treatment extension: 1 = stimuli, 2 = stimuli, 3 = staff member, 4 = environment.

Discussion

In the current study, the results of a brief FA were used to develop and implement a function-based Social Story™ intervention for two boys with autism. The differential effects of a Social Story™ that matched the function of the behavior, a Social Story™ that did not match the function of the behavior, and a Social Story™ that described baseline were compared in an alternating treatments design. The function-based Social Story™ plus FCT was effective in decreasing the target behavior and in teaching the participants to use the target mand (i.e., asking to take a break). The participants continued to show appropriate responding under novel conditions (i.e., treatment extension) and demonstrated a preference for the matched Social Story™. Furthermore, target problem behavior and target mands maintained when the Social Story™ was removed.

Several pre-experimental assessments were conducted that may have contributed to the effectiveness of the intervention. Specifically, the FAST

(Iwata et al., 2013) and the CPR (Steege & Watson, 2009) were used to gather information regarding the target behaviors. A demand assessment and stimulus preference assessment were conducted to aide in the implementation of the brief FA. A color preference assessment was conducted to identify colors to be used as condition-correlated stimuli. In addition, several pre-experimental assessments were conducted that may have contributed to the development of an appropriate Social Story™. The DIBELS (Good & Kaminski, 2002) was used to assess participant reading skills, and the readability level of the Social Stories™ did not exceed the reading level for each participant. Also, a word recognition assessment was conducted to ensure that the participants could read the words in the Social Stories™. Finally, the Social Stories™ were reviewed by special education teachers using the checklist developed by Gray (2000) to assess whether the Social Stories™ created met the Social Story™ criteria.

The current study demonstrates the effectiveness of using a brief FA to write and implement a function-based Social Story™. Only two previous studies were found in the Social Story™ literature that used functional analysis methodology prior to writing and implementing a Social Story™ (Adams et al., 2004; Cihak et al., 2012). The brief FA can be an effective viable alternative to the standard functional analysis when results are clear (Northup et al., 1991; Vollmer, Marcus, Ringdahl, & Roane, 1995). In addition, by using a brief FA, the length of time for each experimental condition and the overall number of sessions may be less than when using a multi-element FA, making it more feasible for staff to implement in a public-school setting (Northup et al., 1991). In the current study, the participants demonstrated differentiated levels of the target behavior across the brief FA conditions when the length of the sessions was 10 min each. Therefore, in this study, an extended functional analysis was not warranted. Furthermore, the treatment evaluation provided additional support for the behavioral function that was identified in the brief FA. However, it should be noted that brief FAs may sometimes provide false positive and false negatives outcomes (Kahng & Iwata, 1999).

Consideration should be also given to the data collection procedure used to measure the target behavior. In the current study, a 20-s partial-interval recording (PIR) system was used to measure the target behavior during the brief FA, treatment evaluation, and treatment preference evaluation. Because current literature (Devine, Rapp, Testa, Henrickson, & Schnerch, 2011; Wirth, Slaven, & Taylor, 2014) suggests that PIR may be insensitive to detecting changes in dependent variables, future studies might consider frequency, duration, or momentary time sampling to measure target behaviors.

Although it is common in the Social Story™ literature for researchers to conduct a social validity assessment prior to implementing a Social Story™

by having educators review stories, only four studies were found that included the participants in the assessment of the social validation process (i.e., Cihak et al., 2012; Dodd et al., 2007; Ivey, Heflin, & Alberto, 2004; Mancil et al., 2009). The current study adds to the research on the use of a social validity assessment with the recipients of the behavior change procedure. Specifically, we assessed participant preference for a function-based treatment (escape Social Story™), a non-function-based treatment (attention Social Story™), and a Social Story™ that described baseline. Interestingly, although both the escape and baseline Social Story™ conditions provided the same reinforcer (escape from demands), both participants selected the function-based Social Story™ intervention, which resulted in extinction of problem behavior and reinforcement of appropriate mands for a break. This evaluation differed from the typical preparation in which only effective treatments are presented for selection (e.g., Hanley et al., 1997). However, Dozier et al. (2007) used an evaluation similar to the current study, assessing relative participant preference for a function-based treatment and baseline.

In the Social Story™ literature, there is little information reported about how long the target skill maintained in the absence of the Social Story™. This study contributes to the literature by obtaining maintenance data when the Social Story™ was removed. For both participants, when the Social Story™ was removed, participants engaged in low levels of target problem behavior and high levels of target mands. Therefore, a systematic fading procedure was not needed. Continued research should evaluate methods for systematically fading (when necessary) and removing the Social Story™ intervention and collecting follow-up data.

This study included two male participants with autism. Therefore, replication across a larger number of participants with varying disabilities is warranted. In addition, only one function of behavior (escape from demands) was evaluated because problem behavior of both participants was maintained by negative reinforcement. Social Stories™ that match other functions such as attention and gaining access to tangibles should be further investigated.

Another possible limitation to the current study is that sessions were conducted in the home setting, with the exception of one treatment extension. The home setting allowed for less extraneous variables that might be more difficult to control for in a classroom (e.g., peer behavior, group instruction, multiple staff members). Although generalization was programmed for by using stimuli that the participants were likely to come in contact with in school and the target mand that was taught was selected based on the utility in the classroom, baseline data on these treatment extensions were not obtained. Therefore, the level of problem behavior and appropriate mands with these stimuli and settings prior to treatment is unknown. Anecdotally,

however, staff members reported that, prior to the study, problem behavior was high and target mands did not occur.

Social Stories™ are often used by special educators with children with autism (Hanley-Hochdorfer et al., 2010; Test et al., 2011) and are considered to be a time-efficient and a cost-effective means of changing behavior (Benish & Bramlett, 2011; Dodd et al., 2007; Hanley-Hochdorfer et al., 2010). However, when the function of problem behavior is unknown, inaccurately assessed, or not considered in the development of a Social Story™, the intervention may not be optimally effective. This study provides teachers and clinicians with a brief assessment and Social Story™ intervention package that can be used to identify function and address problem behavior in school settings.

Authors' Note

This study is based on a thesis submitted by the first author, under the supervision of the second author, to the Department of Applied Behavior Analysis at Caldwell University for the master's degree in applied behavior analysis.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

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