Social Story™ Efficacy With a Child With Autism Spectrum Disorder and Moderate Intellectual Disability

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Social Stories™ have gained wide acceptance as an intervention for children with autism spectrum disorders (ASD), yet extant research provides little empirical evidence in support of their efficacy. This study examines the use of Social Stories to target repetitive tapping behavior displayed by a child with ASD, moderate intellectual disability, and associated language impairment. Over an extended period there was evidence of a decrease in the target behavior. Further, this decrease was associated with increased comprehension of the Social Story. The findings suggest that it is appropriate to consider language skills when evaluating the suitability of this intervention for students with moderate intellectual disabilities and to monitor comprehension.

The term *Social Story*™ describes an intervention specifically designed to teach children with autism spectrum disorders (ASD) to identify and respond appropriately to social cues in a wide variety of situations and environments. Social Stories typically describe social situations in which an individual might have difficulty identifying salient social cues, expected behaviors, and consequences of behaving in various ways (Barry & Burlew, 2004; Gray, 2000a, 2000b). Because they are easy to implement and applicable to a wide range of behaviors (Bledsoe, Myles, & Simpson, 2003; Brownell, 2002; Cullain, 2002; Feinberg, 2002; Kuttler, Myles, & Carlson, 1998; Pettigrew, 1998; Scattone, Wilczynski, Edwards, & Rabian, 2002), Social Stories have gained widespread acceptance as an intervention for children with ASD (Backman & Pilebro, 1999; Chapman & Trowbridge, 2000; Rowe, 1999; Simpson & Myles, 1998).

Despite the increasing clinical popularity of Social Stories (Backman & Pilebro, 1999; Chapman & Trowbridge, 2000; Rowe, 1999; Simpson & Myles, 1998), a literature review and synthesis conducted by Sanosti, Powell-Smith, and Kincaid (2004) located only eight studies relating to Social Story effectiveness. In general, the studies were described as lacking experimental control, with weak treatment effects or confounding treatment variables. The data offered some evidence of positive trends, providing a preliminary indication that Social Stories may be effective with some individuals with ASD (Sanosti et al.). In a more recent review, Reynhout and Carter (2006) conducted a single-subject meta-analysis on 12 studies and found an overall percentage nonoverlapping data (PND) of 43 (range = 16–95) in the studies, where ceiling or floor effects were observed. An overall PND of 51 (range = 16–95) was obtained when data showing ceiling or floor effects were excluded. The mean PND values were interpreted as indicating that Social Stories were an ineffective intervention overall, but variability was extreme and it appeared that a small number of interventions may have been effective.

Interpretations of the extant studies are confounded by a number of variables. For example, Gray (2000b) gives clear guidelines on how Social Stories should be constructed. Reynhout and Carter (2006), however, found that 39% of the stories reported in research studies deviated from the recommended basic or complete Social Story. In addition, 47% of perspective sentences were written from the viewpoint of the person with autism, which is inconsistent with the recommended practice of writing perspective sentences from the viewpoint of individuals in the social situation other than the person with ASD and only rarely from the perspective of the individual with ASD (Gray, 2000b, 2003).

In addition to providing specific instructions describing how Social Stories should be written, Gray (2000b; 2003) gives guidelines for implementing Social Stories. Gray and Garand (1993) state, "Regardless of how a social story is introduced, comprehension is checked using different techniques. A student may complete a checklist or answer questions in writing at the end of a story" (p. 6). In more recent guidelines for implementing Social Stories, there is no mention of evaluating comprehension. This is an interesting anomaly; common sense would suggest that comprehension

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of the Social Story by the person with ASD is essential if the intervention is to be effective. Different strategies for fading the Social Story are also provided in the newer guidelines (Gray, 2003).

Similarly, the use of illustrations was not generally recommended, but subsequent guideline revisions recommend the use of illustrations "that reflect consideration of the age and personal learning characteristics of the person with ASD" (Gray, 2003, p. 5).

Gray and Garand (1993) suggested that "social stories are most likely to benefit students functioning intellectually in the trainable mentally impaired range or higher who possess basic language skills" (pp. 2–3). Participant descriptions in the literature lack detail, and few studies provided evidence identifying the participants as fulfilling these criteria. Direct evidence that Social Stories have been successful with children who have significant intellectual disabilities has only been provided by two studies (Kuoch & Mirenda, 2003; Kuttler et al., 1998), and evidence that Social Stories have been successful with children with limited language skills by only one study (Barry & Burlew, 2004).

Social Stories are written specifically for individuals with ASD, and almost all of the students in the studies reviewed were described as being on the autism spectrum. Quantification of the degree of autism in the form of scores on standardized tests was, however, rarely provided (Reynhout & Carter, 2006; Sanosti et al., 2004), so the effect of variation in population on outcomes is difficult to ascertain. In addition, there is a lack of research on the effects of Social Stories on students who may not have ASD but who might have significant social skills deficits (Reynhout & Carter).

Existing studies have frequently failed to isolate the contribution made by Social Stories because they have typically been combined with other, well-validated strategies, such as prompting and reinforcement (Reynhout & Carter, 2006; Sanosti et al., 2004). In addition, maintenance and generalization, issues of pivotal importance for children with ASD, are inadequately addressed (Reynhout & Carter).

The present study represented an attempt to evaluate the efficacy of Social Story interventions by addressing gaps in our knowledge and several flaws in the existing research. Previous studies have failed to provide adequate participant description in terms of levels of autism (Brownell, 2002; Kuoch & Mirenda, 2003; Kuttler et al., 1998; Norris & Dattilo, 1999; Scattone et al., 2002; Swaggart et al., 1995), degree of intellectual disability (Brownell; Lorimer, Simpson, Myles, & Ganz, 2002), receptive and expressive language skills (Bledsoe et al., 2003; Hagiwara & Myles, 1999; Lorimer et al.), and adaptive behaviors. In this study results of standardized testing of the participant's level of autism, intellectual disability, and communicative functioning were reported. Also, unlike most existing studies, Social Story construction and implementation was consistent with the guidelines provided by Gray (2000a; 2000b; 2003) and carried out in isolation from other empirically verified interventions (such as operant reinforcement). Maintenance and generalization were specifically examined.

Method

Research Design

The study employed an ABC single-subject design consisting of three phases: baseline (no Social Story), Intervention Phase B (Social Story read prior to observation session, then left for student to access independently), and Intervention Phase C (Social Story read prior to observation session, then left for the student to access independently and for the teacher to review with the student).

Participant

The participant attended a university-based program for children with disabilities and/or learning difficulties. He was selected following direct observation by the researcher and in consultation with his teachers, the school psychologist, and the school speech pathologist as being likely to benefit from Social Story intervention. The participant did not take any medication or demonstrate physical or sensory disabilities. The participant was assessed on several standardized measures including the *Peabody Picture Vocabulary Test–III* (PPVT-III; Dunn & Dunn, 1997) and the *Renfrew Language Scales: Action Picture Test* (Renfrew, 1997), both of which were administered by a speech pathologist. The PVVT-III provides a measure of receptive vocabulary and correlates well with a number of intelligence tests. The *Renfrew Language Scales: Action Picture Test* provides a measure of expressive language for individuals 3 to 8 years old. An age equivalence score could not be estimated for the participants as he was older than the test ceiling when evaluated. Two additional measures were used: the *Adaptive Behavior Inventory* (ABI; Brown & Leigh, 1986) and the *Childhood Autism Rating Scale* (CARS; Schopler, Reichler, & Renner, 1986). The ABI, which is designed to assess adaptive behavior across self-care, communication, social, academic, and occupational domains, provides standardization data based on a sample with normal intelligence and a sample of individuals with mental retardation. The CARS is a 15-item behavioral rating scale developed to identify children with ASD and to distinguish them from children with intellectual disabilities without ASD. It also provides information as to the position of the child on the autism spectrum, differentiating between children in the mild-to-moderate and moderate-to-severe ranges. The first author, using the parent as an informant, administered the ABI and the CARS. The parent was the participant's 40-year-old mother, who spoke English as a second language and had a college degree. The participant's family would be considered middle class economically.

The participant, Adam, was a boy age 8 years 9 months. Psychometric reports indicated that he was functioning in the

mild-to-moderate range of global disability based on *Griffiths' Mental Developmental Scale* (Griffiths, 1984). Adam achieved a standard score of 40 on the PPVT-III, giving an age equivalence of 3 years 3 months, consistent with a moderate level of intellectual disability. On the ABI, his standard scores and percentile ranks based on the sample with mental retardation were as follows: self-care, 8 (25th percentile); communication, 5 (4th percentile); social skills, 4 (2nd percentile); academic, 11 (63rd percentile); occupational, 10 (50th percentile); and full score, 83 (13th percentile). He obtained a total score of 39.5 on the CARS, placing him in the range of severe autism.

Adam was unable to participate in a conversation and his speech was generally limited to two- to three-word utterances. He was able to follow basic instructions but unable to attend to self-care needs independently. His academic skills included being able to read more than 300 sight words, write simple sentences with prompting, and perform three-digit addition without renaming. Adam habitually tapped on many surfaces, including his own body, with a frequency and intensity that was noisy and disruptive. His teachers and peers described this behavior as annoying and distracting. The teacher observed that Adam tapped whenever he was happy, that is, whenever any of his expectations associated with his daily routine were fulfilled. Adam displayed a similar behavior of wiggling his fingers in front of his face, sometimes while blowing on them. Throughout the study a points-and-stickers system of rewards not found previously to be effective in reducing the tapping behavior displayed by Adam was maintained to reinforce appropriate behavior in class. The points-and-stickers system, a whole-class intervention, was set in place prior to, and continued during, the study. In addition, Adam's teacher employed positive teaching strategies to reinforce his behavior when he was not tapping, saying, for example, "Well done, Adam. Good hands still."

Setting

Social Story reading took place in a small room adjoining the participant's classroom. Observations of behaviors occurred in the participant's classroom. The class consisted of 15 students with a wide range of special needs and disabilities, including mild to moderate intellectual disability, ASD, and various genetic disorders (e.g., Sotos syndrome). The teachers were trained special educators, and the teacher-to-pupil ratio was 1:5. The school day ran from 9:00 a.m. to 2:45 p.m., Monday to Friday.

Target Behaviors

For Adam, the behavior targeted for decrease was the tapping of hands during reading. Tapping of hands was defined as the repetitive tapping of one or both hands, palms parallel to the surface, on any surface including the participant's own body. Tapping did not include wiggling of fingers (palms up or down) or blowing on fingers.

Social Story Development

Prior to the research, the first investigator undertook training in Social Story construction and implementation using the *Writing Social Stories With Carol Gray* training video and workbook (Gray, 2000b). An individualized Social Story was written following consultation with the participant's teacher, the school psychologist, and the school speech pathologist. The story consisted of a ratio of 1 directive sentence to 5 directive/perspective sentences, adhering to Gray's basic Social Story ratio (Gray, 2000b), together with comprehension questions and answers (see the appendix). The story, written by the researcher, reflected the participant's target behavior and abilities. To ensure the appropriateness of the story, a draft of it was shown to the participant's parents, his teacher, and the school speech pathologist for feedback and modification prior to its use. Because of Adam's communication problems, the story was illustrated with photographs to provide visual support. There were six pages to the Social Story. Each was 20 centimeters by 20 centimeters, with one photograph and one sentence typed in 20-point font. The first page also had the story title typed in bold 22-point font. The pages were laminated and bound with two plastic curtain rings inserted through holes. The story was evaluated using the Social Story checklist provided by Gray (2003) to ensure conformity to recommended construction.

Equipment

Both the classroom and the Social Story intervention sessions were video recorded. A video camera was placed within 2 meters of the participant. The video camera had occasionally been placed in the classroom 2 weeks prior to the start of the study to familiarize students with its presence. Students did not appear to attend to the presence of the camera during the research. For the classroom observations, a CD player emitting faintly audible beeps every 10 seconds was used to time 10-second intervals. An earphone attached to the CD player was attached to the microphone on the cameras during recording.

Social Story Intervention Implementation

Before the beginning of the study, the teacher was informed of the purpose and nature of the intervention. As previously mentioned, the teacher was involved in the selection of the participant, in the identification of targeted behaviors, and in editing the Social Story to ensure its appropriateness. Gray suggested that more than one person should read a Social Story; thus, the researcher trained the teacher in implementing it in accordance with Gray's recommendations (2000b; 2003).

Daily review of the Social Story occurred on school days immediately before the lesson in which data were collected. In the Social Story intervention session, the researcher or the teacher read the Social Story with the participant. The researcher or teacher then asked the participant comprehension questions to evaluate his understanding. If the participant was

unable to answer a question, the researcher or teacher repeated the question, and then gave an appropriate answer (suggested answers were provided).

In Phase B, following the intervention session, the Social Story was left for the participant to access independently. The teacher did not review the Social Story during the lesson. In Phase C, following the intervention session, the Social Story was left for the student to access independently. In addition the teacher reviewed the Social Story with the student during the lesson, when the teacher felt it to be appropriate.

Data Collection and Procedures

During baseline and intervention, data were collected from video recordings of classroom reading lessons. In the classroom, observations started as soon as each lesson began and finished after 20 minutes. Data were collected using 10-second partial interval recording; the behavior was recorded on a prepared coding sheet for an interval if there was any instance of the behavior during that interval. There was no rest between intervals.

Adam's tapping was highly disruptive due to its increasing intensity and duration during baseline. This necessitated the introduction of the intervention after 7 days of data collection and before stabilization of the baseline was achieved. After 5 days of Phase B intervention, Phase C was implemented because the Phase B intervention did not appear to be effective and because the student did not access the Social Story independently on any occasion during Phase B, even though it was left for him to do so. Gray and Garand (1993) suggested that a Social Story be reviewed as often as necessary; thus it seemed appropriate for the teacher to do this as part of the intervention. After 6 days of intervention during Phase C, the student was sick for 3 days; there was also a school vacation of 3 weeks during this phase (see Figure 1). Forty-four school days from the start of Phase C, Adam's teacher expressed a desire to make a significant change in instructional arrangement, involving removing the sight-word matching component of the reading lesson, as she deemed it no longer necessary to fulfill the needs of the group. This seemed an appropriate time to terminate the intervention, and consequently, systematic fading of the intervention was not attempted. The Social Story remained available to Adam after the intervention was terminated.

To evaluate maintenance, probes of Adam's behavior were conducted 4 weeks after intervention was terminated. To evaluate generalization, probes of his behaviors were conducted in different lessons during the baseline and Phase C of the intervention. The generalization probes were videotaped during phonics lessons, which were taught by a different teacher.

Additionally, to evaluate responses to comprehension questions during the reading of the Social Story, a written transcript of each session was made. Answers given by the participant were coded as correct or incorrect. The percentage of comprehension questions correctly answered in each intervention session during Phase B and C was then calculated.

In addition to participant behavior, teacher prompting was observed in Phase C of the study. If the teacher referred directly to the Social Story in any way during a 10-second interval, it was recorded. Direct reference to the Social Story included the teacher's reading the entire Social Story to the student, reading part of the Social Story, or simply pointing to the Social Story.

Reliability

Interobserver reliability was assessed for data collection in the classroom (behavior and teacher prompting) and during the Social Story reading sessions (for treatment integrity and answering comprehension questions). The first researcher provided training to a research assistant. The two observers jointly watched videotapes of a Social Story reading and comprehension session and a classroom data collection session. For the Social Story reading and comprehension sessions, the first researcher demonstrated the use of the procedural checklist adapted from the "Instructional Strategies for Social Stories" and the procedure for recording the written transcript and coding the answers given by the participant to comprehension questions. For the classroom sessions the first researcher identified targeted behavior, then demonstrated the use of the observation schedule. The observers then independently coded one videotaped Social Story reading and comprehension session and one videotaped classroom session. No specific criteria for agreement were set during training.

Interobserver agreement was assessed for 30% of all classroom observations and all comprehension question sessions. Reliability was calculated by dividing agreements by the total of agreements and disagreements and multiplying by 100. Interobserver agreement for tapping during classroom sessions for Adam was 97% (range = 93%–100%), 100% for teacher prompting, and 90% (range = 88%–100%) for percentage of comprehension questions answered correctly.

Data Analysis

Results from the partial interval recording were converted into a percentage of overall intervals in which targeted behavior occurred, and these were plotted on a graph. The graphed data were first inspected visually. Visual inspection of graphed data is somewhat subjective; thus the percentage nonoverlapping data (PND) was calculated to provide a more objective measure of treatment efficacy. The PND is the number of treatment data points that exceed the highest (or lowest, if appropriate) baseline data point divided by the total number of treatment data points and multiplied by 100 (Scruggs, Mastropieri, & Casto, 1987). Although the procedure has been subject to some criticism (e.g., Salzberg, Strain, & Baer, 1987; Strain, Kohler, & Gresham, 1998; White, 1987), it has gained credence and has been applied for a number of different purposes, including the evaluation of social skills interventions for students with emotional and behavioral problems and the evaluation of language interventions (e.g., Didden, Duker, & Kor-

zilius, 1997; Mathur, Kavale, Quinn, Forness, & Rutherford, 1998; Scruggs, Mastropieri, Forness, & Kavale, 1988; Xin & Jitendra, 1999).

Results

Visual inspection of Figure 1 shows that during baseline reading lessons, the percentage of tapping steadily increased. With the introduction of the Social Story intervention in Phase B, where the Social Story was read to Adam and left for him to access independently, the tapping initially decreased, then steadily increased, paralleling the increase seen at baseline. With the introduction of Phase C, where the Social Story was read to Adam and then left for him or for the teacher to use as a prompt, after an initial marked increase in tapping, the tapping decreased. Following a 3-week vacation, the tapping dramatically decreased over four sessions before increasing again for one session. After Adam was absent for 3 school days due to an illness, the tapping was variable but generally decreased. The decrease in tapping seen from baseline to Phase C was maintained for 4 weeks after the intervention was terminated. During Phase B of the intervention, the percentage of comprehension questions answered correctly generally increased. During Phase C, a further increase in comprehension was observed, concurrent with the decrease in tapping.

The observed changes in tapping across phases were not sufficiently salient to provide clear demonstration of experimental control, and the use of the ABC design precluded demonstration of a functional relationship. Nevertheless, there was evidence of a slow decrease in the behavior over an extended period of time. During baseline, the mean percentage of tapping was 63% (range = 46%–81%), during Phase B it was 49% (range = 40%–62%), and during Phase C it was 41% (range = 15%–61%), showing an overall decrease in tapping. During Phase B, the percentage of Social Story comprehension questions answered correctly was 39% (range = 14%–66%), and during Phase C it was 76% (range = 11%–100%), showing an overall increase in comprehension during intervention. Visual analysis of the graph also shows that for the generalization probes taken in phonics lessons, a decrease in tapping was seen from baseline to Phase B of intervention. The generalization probes taken for Adam in phonics lessons also showed an overall decrease in tapping, with a mean of 35% during baseline and 6% (range = 0%–11%) during Phase C. Postintervention, the mean incidence of tapping was 13% (range = 12%–13%), showing that the overall decrease was maintained. During Phase C, the mean fraction of intervals with teacher prompting using the Social Story was 5% (range = 0%–12%) per session; the introduction of teacher prompting was concurrent with the overall decrease in inappropriate behavior (see Figure 1).

The PND from baseline to Phase B was 40%, and from baseline to Phase C was 50%. However, when calculated from the point where Adam answered above 50% of questions correctly in all comprehension sessions, the PND was 65%, suggesting a mildly effective intervention (Mastropieri, Scruggs, Bakken, & Whedon, 1996).

Treatment Acceptability

The teacher completed the *Intervention Rating Profile* (IRP-15; Von Brock & Elliott, 1987) to determine her acceptability of the Social Story intervention. The IRP-15 is a 15-item Likert-type scale used to evaluate the acceptability of an intervention. Scores on the IRP-15 can range from 15 through 90, with higher scores indicating greater acceptance. Scores above 52.5 indicate that an intervention is acceptable (Mastropieri et al., 1996). Adam's teacher obtained a score of 76 on the IRP-15.

Anecdotal Teacher Reports

During the latter half of Phase C, Adam's teacher observed that he was repeating sentences from his Social Story on occasions throughout the day. The researcher also noted that he was beginning to answer the questions in short phrases, rather than with single words, as he had been doing previously. Adam's teacher also felt that the Social Story had, for the first time, made him realize that his behaviors had an impact upon other individuals and had encouraged him to think about things from another's perspective.

Discussion

This study was designed to investigate the efficacy of Social Stories as a behavioral intervention for a child with disabilities, using an ABC single-subject design. Before discussion of the results, some important limitations of the research should be acknowledged. An ABC single-subject design is low in internal validity; thus, experimental control is achieved through measurement of the reliability of the experimenter's observations of the participant's behavior, frequent observations of the targeted behavior, detailed description of the treatment to facilitate replication, and replication of treatment effects within the experiment. However, a functional relationship between the intervention and changes in the behavior cannot be inferred; other factors may have led to the changes observed.

The percentage of nonoverlapping data was used as a measure of treatment efficacy. In Phase B, the Social Story was used as a visual prompt. In Phase C, the intervention may have been confounded as the teacher offered verbal prompts to the student to look at the Social Story. This teacher prompting occurred in a low but consistent percentage of intervals in Phase C. Although teacher prompting in Phase C, in the form of directing the student to the communication book, might arguably be regarded as a confounding intervention, it is logically consistent with Gray and Garand's (1993) suggestion that the Social Story be reviewed as often as necessary.

Although experimental control was not clearly demonstrated, the data for Adam indicated a decline in tapping over

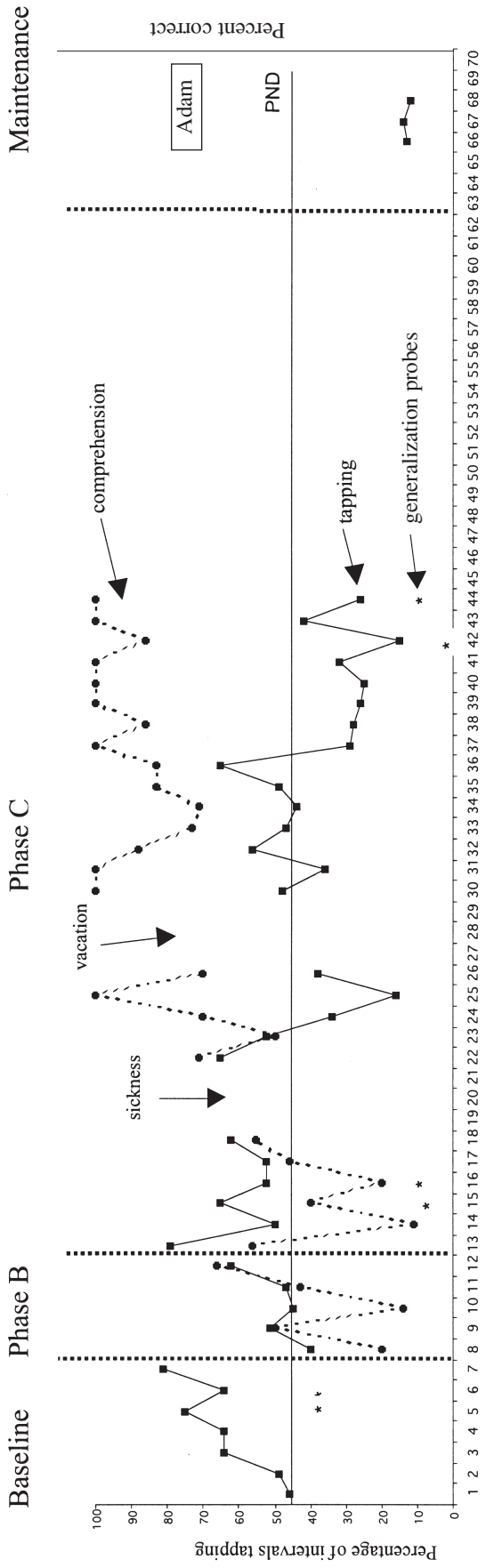

FIGURE 1. Change in behaviors for Adam. *Note. PND* = percentage nonoverlapping data. Generalization probes were conducted during phonics lessons taught by a different teacher.

the duration of the study. During baseline, the tapping increased dramatically. Although the introduction of the Social Story resulted in an initial decrease in tapping in Phase B (possibly a novelty effect), the tapping during this phase generally increased, as it had during baseline. The participant did not access the Social Story independently on any occasion during Phase B, even though it was placed on his desk. During Phase C the class teacher referred to the Social Story during lessons. She would point to one or sometimes two pictures and verbally prompt the student using one or two sentences from the story. On no occasion did she read the entire story during a lesson. A school vacation prevented data collection for 3 weeks during Phase C. When intervention resumed after the vacation, the tapping began at similar levels but then showed a dramatic decrease. Concurrent with the decrease, the researcher and the classroom teacher independently observed that there appeared to be an improvement in the participant's ability to answer the comprehension questions. A retrospective analysis of the comprehension sessions was undertaken to determine if this observation was correct. This analysis revealed that from the point in the comprehension sessions where Adam scored above 50%, the PND was 65%. Early guidelines for Social Story implementation describe the comprehension session, involving the teacher's asking the student to respond verbally or in writing to verbal or written questions, or to fill in a checklist (Gray & Garand, 1993), as a mandatory part of the process. In subsequent guidelines this component of the intervention is not mentioned (Gray, 2000b; 2003). The observed increase in the percentage of comprehension questions answered correctly by Adam indicates that his understanding of the story did improve over time, and that this component of Social Story intervention may contribute to Social Story efficacy.

It is also possible that Adam's initial difficulty in answering the questions may have been related to problems in expressive language (i.e., in producing a verbal answer to the questions). As previously noted, Gray and Garand (1993) have suggested that Social Stories are most likely to benefit students with moderate levels of disability who have basic language skills, although no precise definitions of what constitutes these categories are given. It should be noted, however, that Barry and Burlew (2004) found that Social Stories can be successfully used with some children with apparently quite limited language skills. In addition, Adam's PPVT-III standard score of 44 was the same as that of a child reported by Kuoch and Mirenda (2003) for whom a Social Story intervention was described as effective. Thus, the level of language skills required for effective Social Story intervention requires further examination. Some evidence of the long-term effects of Social Story intervention was provided by the probes conducted after the intervention; maintenance of the decrease in tapping was observed and recorded. If this effect was a product of the Social Story intervention, it is inconsistent with the results reported in two previous studies (Kuoch & Mirenda, 2003; Thiemann & Goldstein, 2001), where the frequency of targeted behaviors returned to baseline immediately after the Social Story intervention was withdrawn, and concurs with findings in two other studies (Kuttler et al., 1998; Swaggart et al., 1995), where the targeted behaviors were maintained. The probes conducted in phonics lessons may provide some evidence of generalization, consistent with findings of some previous studies (e.g., Hagiwara & Myles, 1999; Kuoch & Mirenda, 2003; Kuttler et al., 1998). A much higher level of tapping was apparent during reading lessons than in phonics lessons where probes were conducted, across all phases of the study. The reading lesson was originally identified as the lesson where the selected behavior was most problematic; thus, it can be expected that the behavior might be less frequent in other settings. The teacher for reading lessons observed that Adam tapped whenever he was happy. It may have been that Adam found the reading lessons more enjoyable than the phonics lessons, which were taught by a different teacher, and his levels of tapping reflected this.

In summary, the results of this study suggest that over time the Social Story intervention may have had an effect in reducing Adam's inappropriate, repetitive tapping, but clear causal influence could not be established. Adam demonstrated moderate intellectual disability and limited language skills, raising questions regarding the applicability of the intervention of Social Stories with some such children.

This research raised an additional question about the comprehension component of the intervention. The increase from a low of 11% of comprehension questions answered correctly to a high of more than 50% resulted in an increase in PND from 50% to 65%, highlighting that monitoring comprehension may be critical when working with children with intellectual disabilities and/or limited language skills.

The role of teacher prompting in this study is also of interest. Teacher prompting occurred in only Phase C. The introduction of teacher prompting was concurrent with the overall decrease in inappropriate behaviors, consistent with the findings of Crozier and Tinccani (2005), who observed that behavioral intervention using a modified Social Story was more effective when the modified Social Story was paired with verbal prompts than when it was used in isolation.

Future Research

Future research into Social Story intervention should address a number of issues. This study employed an ABC single-subject design. Future investigations should employ research designs to demonstrate functional relationships.

The Social Story intervention was specifically designed for children with ASD and is claimed to be suitable for individuals with moderate levels of intellectual disability, such as the participant in the present study. Despite consultation with a speech pathologist and modifications to accommodate the intellectual and language abilities of the students, including visual supports, the Social Stories were not clearly effective except in the long term. Further research is needed on the effects of So-

cial Story interventions on children with ASD who have intellectual disabilities. In addition, there is a need to investigate the language levels that may act as a predictor for success of the intervention for children with and without ASD. There also remains a question about whether the construction of Social Stories contributes to the high variability in efficacy reported in the literature (Gray, 2003). The stories developed in this study were all based on Gray's basic Social Story ratio. Investigations using sentence type as a variable could help determine whether particular sentence types are necessary components of a Social Story. Future research should be conducted to determine whether stories adhering to the complete Social Story ratio are more efficacious than those adhering to the basic ratio and to determine if indeed these ratios are important at all in terms of Social Story effectiveness.

Conclusion

In the present study, an ABC single-subject design was used to determine the efficacy of Social Story intervention in bringing about behavior change in a child diagnosed with ASD and developmental disability. Data obtained from the study provided some evidence that the intervention reduced repetitive behavior over an extended period, and this was associated with an increase in performance on comprehension questions. Although a functional relationship between the target behavior and comprehension could not be demonstrated, the correspondence between the two is striking, and these preliminary findings warrant further investigation. Data obtained from the study suggests that language skills should be considered carefully in evaluating the appropriateness of Social Stories interventions for students with moderate intellectual disabilities and that teachers would be wise to monitor comprehension actively. The present study highlights the need for further research into the Social Story intervention.

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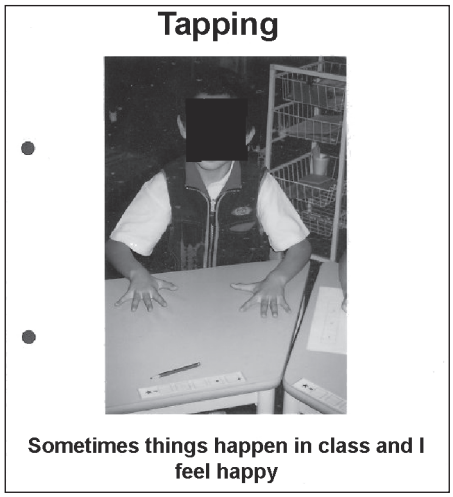
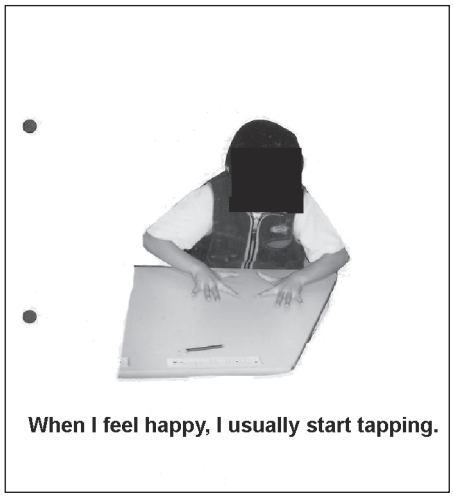
APPENDIX

Comprehension Questions

If Adam is unable to anwer a question, repeat the question and give an appropriate response. Suggested answers appear in italics below each question.



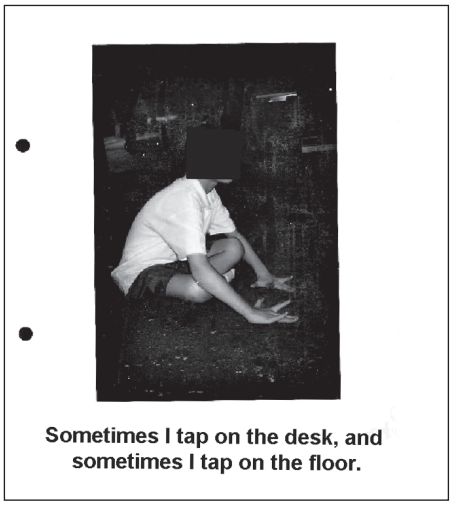
1. Show me tapping.
(If Adam is unable to show tapping, prompt him by demonstrating.)



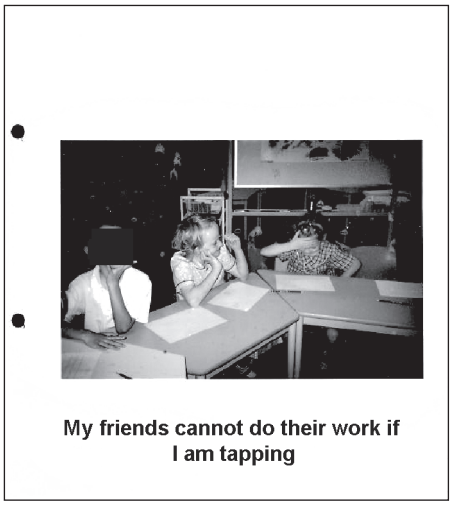
2. When do you sometimes do tapping?
I sometimes do tapping when I am happy.

(Appendix continues next page)

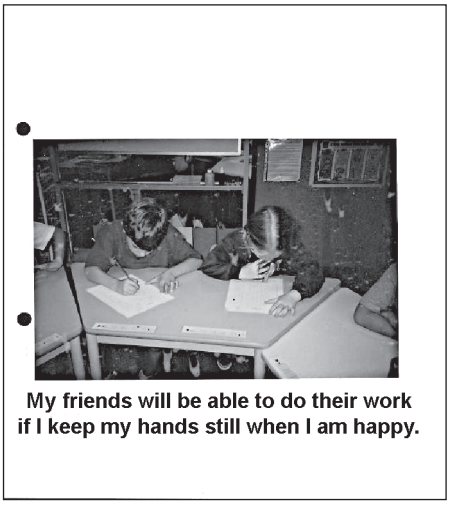
Appendix continued



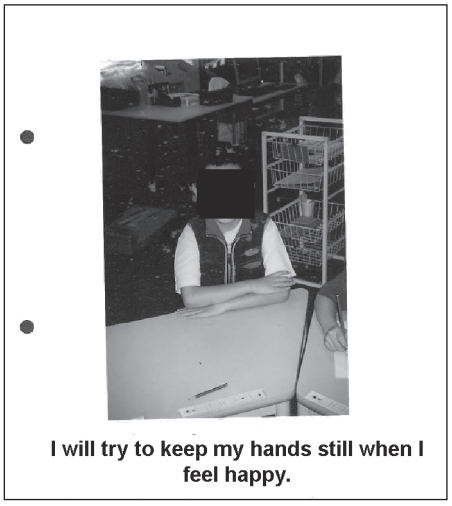
3. Where do you sometimes do tapping?
Sometimes I do tapping on the desk. (Demonstrate examples, e.g., the floor, his face.)



4. Can your friends do their work when you are tapping?
No, my friends cannot do their work when I am tapping.



5. Can your friends do their work when you keep your hands still?
Yes, my friends can do their work when I keep my hands still.



6. What will you try to do when you are happy in class?
I will try to keep my hand still when I am happy in class.