Using Social Stories to Improve the Social Behavior of Children With Asperger Syndrome

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Abstract: To date, the empirical support for the use of social story interventions for children with Asperger syndrome (AS) is small. The purpose of this study was to examine the effects of individualized social story interventions on the social behavior of three children with AS. Using a multiple-baseline-across-participants design, social stories were implemented, and direct observations of the participants' identified target behaviors were conducted three times per week during unstructured school activities (e.g., recess). Data revealed an increase in the social behavior of two of the three participants when the treatment was implemented. Unfortunately, maintenance of target behaviors was not observed. These data provide some initial support for the use of social stories to teach social skills to children diagnosed with AS. However, failure to demonstrate skill maintenance and poor results for one participant highlight possible limitations of the social story intervention and suggest a strong need for further research. Recommendations for future research endeavors and the potential benefits of social story interventions are discussed.

Asperger syndrome (AS) is a relatively new category in autism spectrum disorders (ASD) that has come into more general use during the last 20 years, despite its shared history with autism. Currently, AS is a term used to describe the mildest and highest functioning end of ASD (Atwood, 1998). Similar to autism, AS is characterized by sustained impairments in the use of social skills necessary for meaningful social interactions, as well as the development of a range of restricted behaviors, activities, and asocial interests that dominate the child's life (Volkmar & Klin, 2000). Despite such impairments, children with AS show no obvious delays in cognitive or language development, have generally good prognoses, and often display interests in the social world (Safran, 2001; Volkmar & Klin, 2000; Wing, 2000). Notably, these characteristics are not typically observed in children with autism.

Although students with AS express interest in the social world, their lack of social skills creates lifelong challenges when interacting and communicating with peers and adults (Church, Alisanski, & Amanullah, 2000). Individuals with AS may perserverate on their topic of interest (e.g., Harry Potter, lawnmowers, dinosaurs) and offer detailed and highly specific, fact-based monologues with little awareness of whether the listener is interested (Myles & Simpson, 1998). This lack of social reciprocity and inability to interpret the listener's verbal and nonverbal social cues results in individuals' perceiving the child with AS as self-absorbed and lacking empathy. Furthermore, children with AS may not understand the unwritten rules of social conduct and engage in inappropriate behaviors (e.g., blurting out socially inappropriate comments). These characteristics distance the child with AS from the social world. Such inappropriate social skills and obsessive interests in obscure subjects may cause children with AS to be victims of continued ridicule and further alienation, despite their attempts at friendship (Moore, 2002; Myles & Simpson, 1998; Williams, 1995). Such ridicule, combined with the lack of social skills necessary to interact with other students, may cause children with AS to be easily stressed and emotionally vulnerable during school and throughout life.

Compounding their social interaction difficulties, children with AS are often misunderstood by educators because of their elevated verbal and cognitive skills and average to above-average academic ability. In fact, educators often describe students with AS as "normal" or "typical" but with odd and/or eccentric social behaviors (Volkmar &

Klin, 2000). Too often, educators view such atypical social behaviors as intentional or as evidence of a lack of impulse control (Safran, 2001), rather than as an absence of the skills necessary to understand social phenomena and engage in appropriate interpersonal social interactions (Volkmar, Klin, Schultz, Rubin, & Bronen, 2000). As a result, educators may employ punitive actions rather than specific interventions to teach socially appropriate skills to children with AS.

Over the past several years, the number of children and youth identified as having AS has increased substantially. In a recent report, Hyman, Rodier, and Davidson (2001) suggested prevalence rates for AS to be as high as 63 per 10,000 births. Other age-specific prevalence studies have estimated the prevalence of AS as ranging from 8.4 per 10,000 in preschool children (Chakrabarti & Fombonne, 2001) to 71 per 10,000 in children ages 7 to 16 (Ehlers & Gillberg, 1993). Safran (2001) reported that such prevalence rates appear to be "several times higher than classic Kanner childhood autism, [and suggest] a large unserved student population in North America" (p. 151). Related to this, state departments of education have reported increases in the number of students with AS (National Research Council, 2001). Such increases are likely to lead to significant increases in referrals for special education services. With this in mind, developing and implementing effective programming for children with AS becomes an auspicious challenge for special education.

The most appropriate method for incorporating social skills training for children with AS has received little research attention. Although there is a growing body of research on interventions for higher-functioning individuals with autism, few studies have systematically addressed the efficacy of social skills interventions with purely AS samples. This presents a challenge for assisting students with AS in schools, given recent policy shifts presented in the Individuals with Disabilities Education Act in 1997 (IDEA, 1997) and its current reauthorization in 2004 (IDEA, 2004). Both versions of the law emphasize the use of evidence-based practices based on rigorous scientific research for students with disabilities.

The critical recent information on AS, along with noted policy changes, make it now necessary to evaluate educational interventions with samples of children with AS. As the number of children identified with AS continues to rise, it is imperative that educators and other educational service personnel be mindful of interventions that will benefit these children with cognitive strengths but severe social weaknesses.

Social Stories

A relatively recent intervention recommended for children with AS is the use of social stories. Social stories are brief, individualized short stories that describe a social situation and provide specific behavioral response cues (e.g., appropriate social responses within a defined context) through visual supports and text (Gray, 1998). A social story provides instruction regarding the who, what, when, where, and why of a social situation (Atwood, 1998; Gray, 1998; Gray & Garrand, 1993; Lorimer, Simpson, Myles, & Ganz, 2002). For example, a social story might be written for a child who has difficulty playing fairly. In the story, the setting, target child, and perspectives of the target child in that particular setting are described (e.g., "When I get to the playground, I like to play football. There are other kids who like to play football with me, too"). In addition, the story would include direct information of what playing fairly looks like (e.g., "A good sport would never yell at anybody while playing football during recess. That hurts others' feelings"). Thus, a social story helps ensure a child's accurate understanding of social information for a given setting (Gray, 1998) and provides "how-to" instruction for initiating, responding to, and maintaining appropriate social interactions (Sansosti, Powell-Smith, & Kincaid, 2004).

To date, research on the relative effectiveness of social story interventions used with children with ASD is scant. Prior research has investigated the effects of social story interventions on greeting people appropriately and sharing toys (Swaggart, et al., 1995), reducing tantrum behaviors (Kuttler, Myles, & Carlson, 1998; Lorimer, Simpson, Myles, & Ganz, 2002), improving positive social interactions during lunch (Norris & Dattilo, 1999), decreasing disruptive classroom behaviors (Scattone, Wilczynski, Edwards, & Rabian, 2002), increasing hand-washing and on-task behavior (Hagiwara & Myles, 1999), increasing the frequency of social communication behaviors (e.g., securing attention, initiating requests; Thiemann & Goldstein, 2001), and increasing appropriate play (Barry & Burlew, 2004). In each of these studies, positive trends in data were observed. However, in all of these studies, the participant(s) carried a primary diagnosis of autism, and in most of these studies the goal of the intervention was to increase prosocial behaviors (e.g., social awareness, positive social integration skills) by eliminating pervasive problem behaviors (e.g., tantrum behaviors, spitting, yelling).

The empirical support for social story interventions is limited, but promising. However, with increased emphasis on evidence-based practice, more rigorous research is necessary so that educational personnel can be confident when choosing social stories as possible interventions for children with AS (Sansosti, Powell-Smith, & Kincaid, 2004). Significantly, no published research exists regarding the effects of social story interventions for children with AS specifically. However, social stories seem to be an effective approach for individuals with AS because they draw upon the unique characteristics that many individuals with ASD possess. Specifically, individuals with AS often possess very rigid thinking styles and demonstrate a strict adherence to rules and routines (Atwood, 1998; Myles & Simpson, 1998).

The social story format may be an approach that can be used to establish rules or routines for particular social situations (Scattone et al., 2002). Furthermore, traditional social skill instruction (e.g., modeling and role play) may be perceived as aversive for the individual with AS due to the highly social nature of its presentation. By presenting social skill materials in writing (as opposed to verbal instruction), teachers may render the learning of new skills less aversive and provide the individual with skills that are commensurate with his or her learning style.

The purpose of this study was to (a) examine the effectiveness of social stories designed to increase identified target behaviors in three children with AS and (b) illustrate how a treatment approach for individuals with AS that incorporates the use of social stories can be applied and evaluated in a naturalistic context.

Method

PARTICIPANTS

Three elementary-aged boys, ages 9 years 9 months to 11 years 6 months (M = 10 years 5 months) participated in this study. These children were selected from a child development center at a regional children's hospital in the southeastern United States. All of the participants were former clients at the center who had not received any direct treatment for a period of 1 year or longer, but who still demonstrated social skill difficulties, as indicated by parent and teacher reports. For inclusion in this study, participants (a) had a current diagnosis of AS (confirmed by an evaluation team consisting of a developmental pediatrician and psychologist at the child development center) according to the *Diagnostic and Statistical Manual of Mental Disorders–Fourth Edition* (*DSM-IV*; American Psychiatric Association, 1994); (b) displayed current cognitive functioning levels in the average to above-average range; (c) possessed the ability to communicate orally with others; and (d) demonstrated basic reading skills necessary to read the social story. Parental consent was obtained for each participant.

Darius (age 10 years 1 month) attended fourth grade in a fully integrated private school. Information gathered through functional assessments revealed that Darius was a very energetic child who enjoyed playing video games, soccer, and football. Across all academic domains, Darius demonstrated above-average performance with no academic concerns. His teachers described him as a good reader and gifted in math. Aside from these strengths, Darius was described as having difficulty in group situations. Specifically, both parents and teachers noted that he could be extremely oppositional and negative when playing games (e.g., called other child names, yelled at teammates). When observed on the playground prior to this study, Darius's oppositional behaviors led him to be ridiculed and teased by his classmates. Such teasing often escalated Darius's oppositional behaviors.

Francis (age 11 years 6 months) attended the fourth grade in a private Catholic school dedicated to meeting the needs of students with learning disabilities. Both the parents and teacher described Francis as a sweet, sensitive boy with great creativity and high academic skills. Specifically, Francis enjoyed art, reading and writing stories, and creating adventure games. Aside from his talents, Francis made many social blunders and often said things (e.g., inappropriate jokes) or did things (e.g., walked away from a conversation) that offended others at school. Observations conducted at Francis's school revealed that he showed difficulty with maintaining conversations that did not reflect his interests. Specifically, Francis seemed to want to talk with many other children on the playground; however, after approaching them, he would walk away if he was not interested in the topic being discussed. Such behaviors led to his rarely being included in activities during recess. In addition, his eye contact was infrequent, and he did not seem to respect others' body spaces.

Angelo (age 9 years 9 months) attended the fourth grade in an integrated private school. Both his family and teachers described Angelo as a very scientific child who enjoyed experimenting. In particular, Angelo spent a great deal of time developing a juice modeled after one consumed by ancient Egyptians. His other interests included soccer, video games, and various cartoon characters (e.g., Spider-Man, SpongeBob SquarePants). The main area of difficulty for Angelo appeared to be spontaneously joining in activities. His parents stated that it took a great deal of effort to get Angelo to join in any activity with other children and that they often resorted to making deals with him (first this, then this). Angelo's teacher verified this information, stating that Angelo spent most of his time during recess alone and sometimes talked to himself. Both his parents and the teacher believed that Angelo would benefit from an intervention that focused on how to politely ask to join in an already existing game or conversation in order for Angelo to create friendships.

SETTINGS

Observations of the three participants were conducted at each of the participants' schools during regular school hours. The primary setting in which these observations occurred was directly related to the identified behaviors targeted for the social story interventions.

The observational setting for Darius was a fenced in area on the side of the school, where there were several jungle gyms and an area to play an active sport (e.g., football). Around this area were sidewalks and breezeways where children could sit and play games or engage in conversation. Multiple grades were on the playground during recess time. Typical activities included playing a variety of

sports, climbing on the swing sets, and engaging in conversation under the breezeways.

Francis was observed in a courtyard in the middle of the school, where there were several picnic tables. Around this area was a sidewalk with an overhanging roof. This area was used during the morning hours for recess/snack time. Multiple classrooms (first through sixth grade) were in the courtyard during this time. Typical behaviors during the recess/snack time included walking around the courtyard engaging in conversation, eating the morning snack, or playing tag.

A large, fenced-in soccer field behind the school served as the observational setting for Angelo. This area also had a swing/slide set that the children were permitted to play on. Recess time occurred immediately following lunch. Only Angelo's classmates and one other fourth-grade class were present during this time. The children were permitted to play soccer, play on the swing/slide set, or walk around and talk. Typical activities included playing soccer. In fact, most of the children played soccer each day during recess. Angelo's class often picked teams in the morning prior to going to recess.

MATERIALS AND MEASURES

Social Stories

Three social stories (one per participant) were designed to address an identified target behavior for each participant (see Appendix). The social stories were individualized print books that the students could carry to and from school and use in multiple settings (e.g., library, cafeteria, playground). Each book was constructed on 6-inch (width) by 8-inch (length) pieces of paper. Including the cover page, there were five to nine pages in each story that were laminated and fastened together along the left margin. The cover page of each social story contained only the title, which was placed ½ inch from the bottom of the page and typed in 14-point Times New Roman font. The remaining pages contained one or two sentences typed in 14-point Times New Roman font and printed near the bottom of each page. There were ½-inch margins on three sides of each page (the margin on the bottom of the page was set at 0 to allow for appropriate room for the sentences). This spacing left approximately a 5-inch × 7-inch area above the sentences where color Mayer-Johnson picture symbols were placed (Mayer-Johnson, 1981).

The content for each social story was based on information collected by the primary investigator prior to the initiation of this study. Using data gathered through indirect measures (e.g., interviews with parents and teachers) and direct measures (e.g., observations), information regarding the relevant cues for behavior, the typical sequence of events that occurred prior to and after the behavior, and the environmental context in which the social skill occurred was gathered. This information was used to increase the relevance of the information presented in the social stories and was essential for understanding the necessary content for each participant's social story.

Social Story Journal

Due to the highly individualized nature of social stories implementation, both the participating children and their parents kept journals. The journals allowed the primary investigator to assess whether the social story had been implemented according to the recommendations of Gray (1995) and Gray and Garrand (1993). Journals allowed participants to keep a running record of their progress and/or any difficulties with the story. Specifically, each journal entry assessed where and with whom the social story was read and the child's reaction to the social story (see Figure 1). Each family was provided with a 1-inch three-ring binder containing the journal entry sheets.

DEPENDENT MEASURES

The effect of each social story was assessed by measuring the percentage of intervals of social engagement during observations. Social engagement was defined for each participant on the basis of information obtained from interviews between the participant's caregiver(s) and teacher(s) and the primary investigator and from direct observations prior to the study.

For Darius, *sportsmanship* was defined as instances in which he actively treated teammates, opponents, and/or coaches with respect (e.g., cheering). For Francis, *maintaining conversation* was defined as instances in which he contributed to a reciprocal conversation with another peer or groups of peers (e.g., engaging in small talk). For Angelo, *joining in* was defined as times when he actively participated in some play activity with one or more children (e.g., playing in a group game). Detailed examples of these dependent measures appear in Table 1.

DATA COLLECTION

A direct observation system, developed by the primary investigator, was used to code the occurrence of target behaviors using 15-s partial interval recording. Observers using this coding system first observed for a 10-s interval then had 5 s to record the behavior in which the target child was engaged. Each participant was observed during 15-min observation periods three times per week.

Peer comparison data were also collected to ascertain the median level of social interactions in which typical peers engaged. During every fifth interval, data collectors selected the first comparison peer they were able to observe and recorded his or her behavior. Thus, during each comparison peer interval, a different child was observed. These data were collected across all phases. Peer comparison data were collected because little is known about how

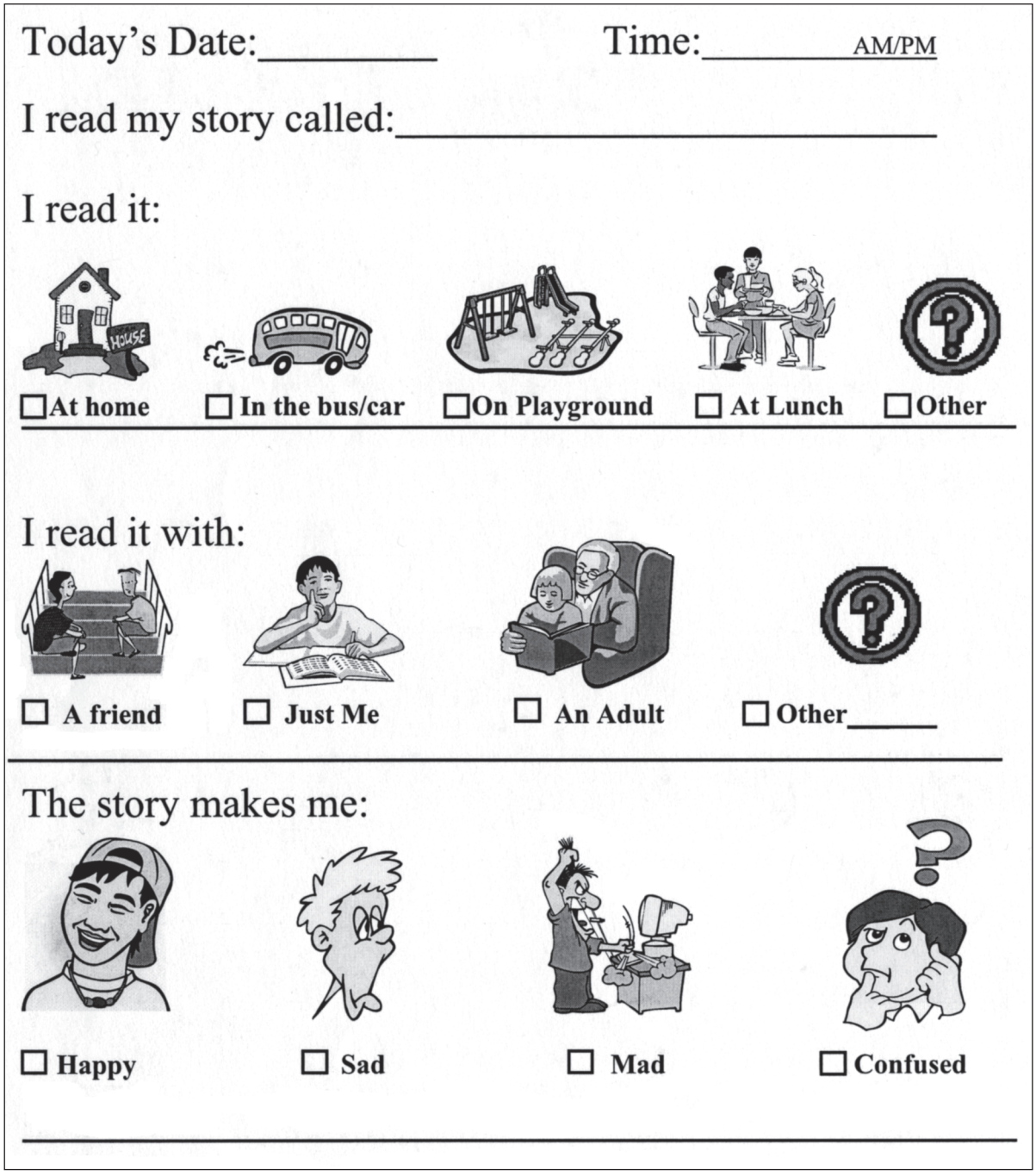

Figure 1. Social story journal entry sheet.

often social engagement occurs for a typical child. When examining higher-functioning individuals, who may already possess some appropriate skills, it becomes difficult to determine the effectiveness of the intervention without peer comparison. This information provided the comparison for future observations of targeted students and allowed for a direct comparison of the effects of the social stories on increasing the social communication skills of children with AS.

All observational data were collected by school psychology graduate students who received training on observational methods, as well as behavioral definitions. The observers all had at least 1 year of experience in behavioral observations. In addition, observers were trained using the observational recording system designed by the primary investigator prior to the initiation of the study. Specifically, observers were trained with written, verbal, and modeled examples of the dependent measures until they reached

Table 1. Definitions of Target Behaviors

Dependent measure	Description
Sportsmanship	Instances in which the target child treats teammates, opponents, and/or coaches with respect and/or attending to the parameters of a game/activity with a full commitment to participatory cohesion. Displays of sportsmanship should demonstrate an awareness of encouraging group play through verbal, physical, or gestural means, as well as demonstrating aspects of fairness and appropriate play. Examples: • offering positive encouragement during play activity (e.g., saying "good job," "way to go," "awesome," "good luck," "maybe next time") • helping a player up off the ground • adjusting play to keep the game fun (e.g., taking turns) • following and/or playing within the rules of the game Nonexamples: • arguing with opponents or own team members • making negative comments or sarcastic remarks • making aggressive actions towards opponents or own team members
Maintaining conversation	Instances in which the target child is contributing to a reciprocal conversation or attending to a topic of conversation with one or more children. Displays of maintaining flow should demonstrate awareness of the topic of conversation. Examples: • actively engaging in reciprocal conversation with another peer(s) • playing next to each other and using a variety of social exchanges • talking about information heard from a peer in the conversation • engaging in "small talk" • listening to an ongoing conversation and showing approval (e.g., nodding) Nonexamples: • walking away from an ongoing conversation • not responding to his or her name being called by another peer
Joining in	Instances in which the target child is participating in some play activity with one or more children. Displays of joining in should demonstrate awareness of group interactions and appropriate ways to ask to participate. Examples: • playing next to each other and asking to play or join in an activity • borrowing or lending toys, using each other's toys, or sharing accomplishments • participating in any type of organized group game that involves taking turns • playing next to a group of peers and using the same toys or engaged in the same activity Nonexamples: • engaging in a game or other activity by himself • not responding to his or her name being called by another peer • fighting, name calling, and making forceful bodily contact with a peer

80% agreement. Interrater agreement was calculated by dividing the number of rater agreements by the number of agreements plus disagreements and then multiplying by 100. An agreement was defined as an occurrence when both observers agreed that the behavior occurred or did not occur. Disagreements were defined as occasions when one observer indicated the occurrence of a target behavior but the second observer did not observe the occurrence.

EXPERIMENTAL DESIGN

A multiple-baseline-across-participants experimental design was used. This design requires that interventions be systematically applied to one participant at a time, permitting the evaluation of the effectiveness of the intervention before it is applied across individuals (Kazdin, 1982). Such a design was selected to strengthen internal validity by demonstrating functional relationships when, and only when, the independent variable was introduced (Hayes, Barlow, & Nelson-Gray, 1999).

PROCEDURE

Baseline

During the baseline condition, observational data were recorded for each participant's targeted behaviors. No intervention occurred prior to or during this period. If any of the targeted behaviors occurred during a 10-s interval,

the observer recorded the appropriate response on the data collection sheet. All baseline observations occurred three times per week and were, on average, 15 min in length.

Intervention

Implementation of the social story interventions progressed according to Ferron and Jones's (2002) recommendations. Specifically, the primary investigator plotted the baseline data for each participant and decided that when the data had stabilized, intervention with the first participant would begin. The observers continued to collect data; however, they were not told which participant was selected for the intervention. The primary investigator continued to monitor the data and implemented the initiation of treatment with the second participant when increasing data trends were observed and maintained for at least three data points (1 week) in the first participant's data. Again, the observers were not told which participant entered the treatment phase. The same process was used for the implementation of the intervention for the third participant. That is, once the data for the second participant had shown increasing trends or stabilized, as defined by at least three data points (1 week), the primary investigator initiated the intervention.

During the intervention phase, the child and the primary caregiver(s) were the primary persons responsible for reading and reviewing the social story each day. Prior to the initiation of the interventions, caregiver(s) were provided with a copy of their child's social story, as well as the social story journal. At this time, caregivers reviewed the content of the social story with the primary investigator. Caregiver(s) were instructed to have their child read and review the social story with them two times a day. Specifically, participants were to read and review their respective social story with their caregiver(s) at the beginning (e.g., before going to school) and end (e.g., returning home from school) of each school day. At the end of each session, the child and/or caregiver indicated that the social story was read and reviewed by answering the questions on each journal sheet provided by the primary investigator. During the intervention phase, the primary investigator contacted the families each week to verify that the social stories were being read, as well as to discuss any potential problems associated with the social story.

Follow-Up

Following the intervention phase, all social stories were faded over a period of 2 weeks. That is, each participant was instructed to read his or her respective social story with less frequency until the story was not read at all. Each family was to read and review the social story only once per day for the first week and then every other day the following week. Following this 2-week period, observations were conducted at each participant's school. Follow-up data were collected in the same manner as baseline and intervention data.

INTERRATER RELIABILITY

Interrater reliability checks occurred during 20% of the baseline condition and 25% of the intervention condition. Observations were considered reliable if at least 80% interrater agreement was achieved for each observation. Agreement was calculated in the same manner described previously. Interrater agreement was consistently above 80% for all participants. Agreement ranged from 87% to 100% for Participant 1 (Darius; $M = 94\%$), 82% to 94% for Participant 2 (Francis; $M = 87\%$), and 80% to 84% for Participant 3 (Angelo; $M = 82\%$).

TREATMENT INTEGRITY

The social story journal provided a level of treatment integrity for the social story intervention. Within the journal, the caregiver(s) indicated whether the participant read the social story each day during the intervention at the specified times, as well as any problems the participant had with reading the social story. Social story journals were collected from the caregiver(s) at the end of the intervention phase. Treatment integrity was computed as a percentage by dividing the number of days the participant read the social story by the number of total days the social story was to be read during the intervention phase and multiplying by 100. School holidays (e.g., spring break) were not included in this calculation.

DATA ANALYSIS

Each participant's target behaviors were graphed as a percentage of intervals per session. Data collected during baseline, intervention, and follow-up were inspected visually for changes in mean, level (immediacy of effect), and overlap (Kazdin, 1982).

Results

PARTICIPANTS' SOCIAL COMMUNICATION PROGRESS

Frequencies of targeted social communication skills across baseline, intervention, and follow-up phases for each participant are presented in Figure 2. Figure 3 shows the mean percentage of displays of target behaviors for each participant with comparison peers across baseline, intervention, and follow-up phases. According to the multiple-baseline design, these data show increases in social engagement for two of the three participants following the initiation of the social story interventions. Whereas the mean data relative to Darius and Francis during the intervention phase demonstrated improvement, data for Angelo are highly variable and should be interpreted with caution. In addition, the initial effects of the data demonstrate that Darius and

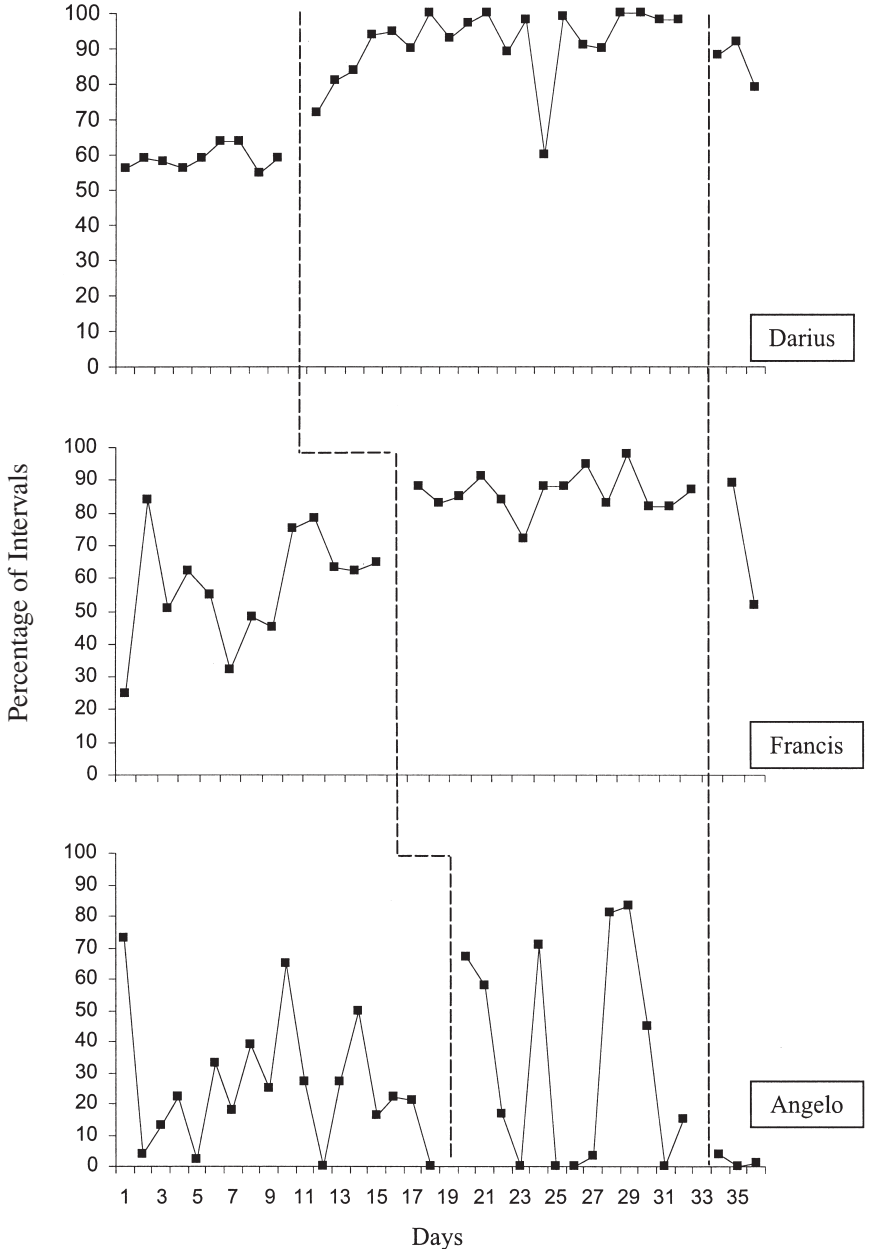

Figure 2. Participants' frequency of target behaviors across phases.

Francis maintained an elevated performance of target behaviors across time.

Darius demonstrated relatively stable rates of sportsmanship during baseline, with an overall mean percentage of 59% (see Figure 2 and Table 2). During the intervention phase, Darius's sportsmanship skills increased by approximately 32% compared to baseline. At follow-up, Darius appeared to maintain an elevated performance of sportsmanship behaviors (see Table 2). When compared to peers, Darius's mean displays of sportsmanship increased across time to a level that was similar to that of his peers (see Figure 3 and Table 2). Specifically, during baseline the difference in rates of sportsmanship between Darius and his peers was 31%; however, during the intervention period, this difference decreased substantially, to 4%. Similar effects were demonstrated during follow-up. Specifically, Darius's mean level of sportsmanship skills differed from his peers' by 11%.

Upon implementation of the intervention for Darius, a prompt 25% increase in the daily percentage of displays of sportsmanship emerged. This demonstrates the relatively immediate effect of the social story intervention. Subsequent data points revealed consistent improvement, with only slight variability in the rates of sportsmanship

Table 2. Mean Rates of Each Target Behavior for Each Participant and Peer Comparison by Phase

	Darius		Francis		Angelo	
Phase	Target behavior (%)	Peer comparison (%)	Target behavior (%)	Peer comparison (%)	Target behavior (%)	Peer comparison (%)
Baseline	59	90	57	96	25	99
Intervention	91	95	86	94	34	99
Follow-up	86	97	71	94	2	100

(see Figure 2). One exception occurred during the intervention phase, whereby data regressed to levels previously observed during baseline (see Figure 2). Unfortunately, no anecdotal information was available to explain the decrease in Darius's sportsmanship behavior. However, even with this single display of lowered performance, the percentage of overlapping intervention data with baseline was only 5%. The percentage of overlapping data points during the follow-up period was 0% when compared to baseline. This overlap suggests that mean performance during follow-up remained consistent with performance during the intervention phase.

Francis displayed increasing and highly variable rates of maintaining conversation behavior prior to treatment, with an overall mean percentage of 57 (see Figure 2 and Table 2). Despite his increasing trend during baseline, implementation of the social story intervention occurred because of the decreasing number of available data collection days prior to the end of the school year, as well as the highly variable data displayed during baseline. During intervention, maintaining conversation behaviors increased by 29% compared to baseline. Maintenance of skill acquisition during follow-up for Francis was less than favorable, as indicated by an abrupt decreasing trend during the follow-up phase. Because only two data points were collected during the follow-up phase, it is difficult to ascertain Francis's level of maintaining conversation behaviors following the intervention. However, despite his rapidly decreasing trend, follow-up data remained higher than during baseline observations (14% higher than baseline; see Table 2).

Similar to Darius, Francis's mean displays of maintaining conversation behaviors approached peer levels. Specifically, during baseline there was a difference in rates of maintaining conversations between Francis and his peers of 39% (see Table 2). However, during the intervention period this difference decreased to 8%. Follow-up data did not reveal similar effects. During follow-up there was a 23% difference between Francis's rates of maintaining conversations compared to his peers'. While the difference in means for Francis are not as pronounced as for Darius, visual inspection of the data (see Figure 2) reveal a relatively stable trend during the intervention phase.

Following implementation of the intervention, an abrupt increase (23%) in the daily percentage of displays of Francis's maintaining conversation behaviors occurred. This rapid change was followed by relatively consistent rates of responding through the intervention phase (see Figure 2). Although high variability was present during the baseline phase for Francis, it was not observed during the intervention phase (see Figure 2). The percentage of overlap (when comparing intervention to baseline) was approximately 36%. During the follow-up period, percentage of overlap was 50% compared to the intervention phase and 50% when examining follow-up with baseline performance. During the follow-up phase, mean performance remained above baseline for one data point but decreased to levels that were previously observed during the baseline period (see Figure 2).

Angelo's data were less compelling. During baseline, he demonstrated highly variable rates of joining-in behaviors (averaging 25%). Upon implementation of the intervention, Angelo's joining-in behaviors increased only 9% from baseline (see Table 2). Evidence of follow-up effects for Angelo was absent. In fact, the mean percentage of joining-in behaviors for him decreased 23% and 32% from baseline and intervention, respectively. In addition, Angelo's mean displays of joining in differed substantially when compared to his peers' (see Figure 3 and Table 2). However, when he was asked to be a team captain (first data point during baseline) or prompted to play a game (data points 8 and 9 during intervention), his data approached peer levels of joining in.

It is interesting to note that there was a 67% change in level for Angelo following the introduction of the social story. Despite this abrupt change in joining-in behaviors, such effects were not consistently repeated across the intervention phase. Conversely, there was a high level of variability in the data during all phases of data collection. The percentage of overlapping data points comparing intervention with baseline was 84. Only two data points did not overlap (see Figure 2). Analysis of accompanying anecdo-

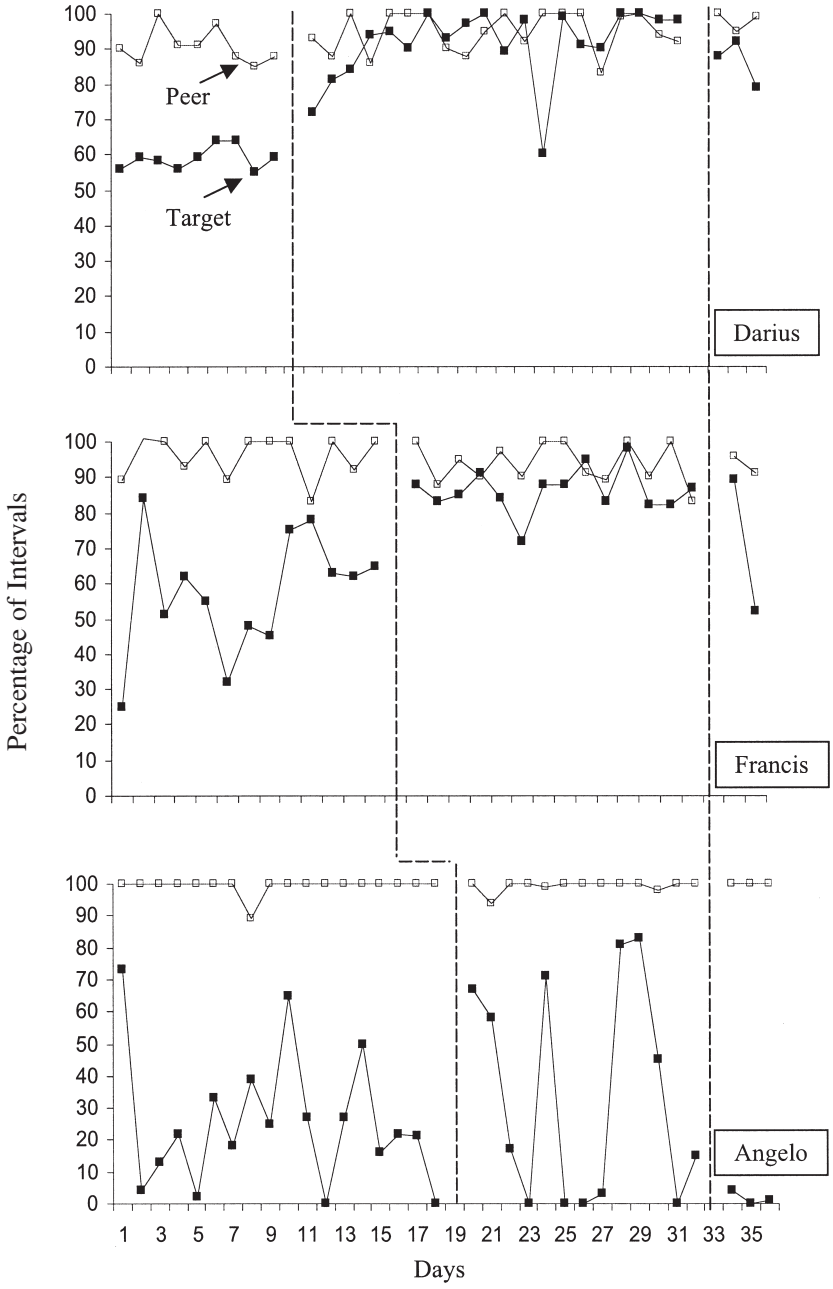

Figure 3. Participants' frequency of target behavior across phases with peer comparison.

tal data revealed that on each of these days, Angelo was selected as a team captain. The percentage of overlapping data points was 100 when examining overlap with both the intervention and baseline phases.

TREATMENT INTEGRITY

For Darius and Francis, treatment integrity was 88% and 92%, respectively. These data suggest that, for the most part, Darius and Francis read their respective social story at the times indicated with their caregiver(s). Analysis of the journal entries for both participants revealed no major problems. However, Francis did indicate that reading the social story sometimes made him feel sad and that he wished he had more friends. For Angelo, information regarding the amount of times he read his social story was absent. Angelo's family failed to complete the social story journals, for reasons that are unknown. However, when the primary investigator spoke with Angelo's caregivers, there was no indication that he was struggling with the social

story content, nor was there any discussion regarding failure to comply with the guidelines of the study.

Discussion

Social story interventions were effective in increasing specific social engagement skills in two out of the three children included in this study. Unfortunately, maintenance of target behaviors was not observed over time. Due to limited data points and decreasing trends in behavior at follow up, there is no clear evidence that targeted social skills were maintained for any of the participants.

Overall, the effects of the social story intervention appeared to be most promising for Darius and Francis during the intervention condition. Following implementation of the social story, both Darius and Francis demonstrated improved and more consistent rates (less variability) of targeted social behaviors compared to baseline performance. In addition, Darius and Francis approached levels of performance that were similar to, or sometimes greater than, those of their comparison peers across target behaviors (see Figure 3). Furthermore, it is interesting that Darius and Francis demonstrated a correspondence between their rates of behavior and that of their peers. Such correspondence in behavior with comparison peers' during the intervention condition demonstrates the clinical significance of the social story interventions.

Although marked improvements in both Darius and Francis were observed, the same effects were not found for Angelo. Several reasons for the lack of effectiveness of the social story for Angelo are offered. First, it is likely that the ineffectiveness may have been due to poor adherence to the treatment protocol. Angelo's parents were responsible for making sure that he read his social story two times each day during the intervention period. Unfortunately, they did not complete any of the social story journal entries. Therefore, it is difficult to determine whether Angelo engaged in reading the material from the social story. If he did read his social story consistently, another explanation for the ineffectiveness relates to the possibility of a poorly constructed social story. In Angelo's social story, only one behavior (asking to join in) was described. This behavior may not have addressed the important part of the task or was potentially too weak to prompt change. Third, Angelo may have responded well if a reinforcement paradigm was implemented to jump-start the effects of the social story. That is, if he had received reinforcement for engaging in joining-in behaviors during recess, Angelo may have been able to understand the relationship between the social story and his subsequent behavior. Finally, there remains the possibility that identifying soccer as the reinforcing activity within his social story may not have been effective enough to initiate joining-in behaviors. Choice assessments of recess activities may have revealed a more reinforcing situation (e.g., playing in the sandbox) as the focus of his social story.

The findings of this study contribute in several ways to the effectiveness of social stories literature. First, this research demonstrates the potential benefits of using social story interventions to teach new prosocial behaviors to children with AS. The results of this study were similar to those found previously for ASD populations (e.g., Norris & Dattilo, 1999; Swaggart et al., 1995; Thiemann & Goldstein, 2001). In addition, the results of this study appear to replicate previous research by Kuttler et al. (1998) and Swaggart, et al. (1995) by demonstrating an abrupt change in behavior following the implementation of the social story. Aside from the previous research, the impact of this study may be even more significant for the research literature on social story interventions because (a) it is the only known research study to use an AS sample, (b) it demonstrates how social stories can be used to teach specific social skills to individuals with AS, and (c) it demonstrates how the use of social stories can be applied and evaluated in a naturalistic context (e.g., between home and school).

Second, this study offers a unique contribution to the research literature by employing peer comparison data to demonstrate the correspondence of participants' target behaviors with those of comparison peers. To date, no known studies have employed such a comparison to examine the clinical effectiveness of the intervention. Comparing the rates of target behaviors with comparison peers' has several important implications. First, no known information could be found on how often typical peers engage in the behaviors that were under study. However, interventions for children with autism spectrum disorders primarily focus on increasing social engagement (Brady, Shores, McEvoy, & Fox, 1987; Twachtman-Cullen, 2000). The goal in most of this research is to reach functional levels of social engagement. However, without understanding how often typical peers engage in targeted behaviors, it is difficult to determine the level of what signifies clinical significance (Sansosti, Powell-Smith, & Kincaid, 2004). This concern is particularly salient when considering social communication and social behavior. That is, if target behaviors taught through a social story began to exceed the behaviors of typical peers, the child with ASD might be ridiculed and bullied even more, due to not fitting in with the social norms of the environment. Second, comparing the rates of target behaviors with those of comparison peers is essential for demonstrating participants' development of understanding social cues. Finally, comparison data allow for closer examination of any direct correspondence or sequence effect between typical peer behavior and the target child's behavior. Results from this study revealed that there was a correspondence between the behaviors of both Darius and Francis and typical peers. The use of peer comparison data not only provides a means for evaluating the clinical significance of behavior change but also pro-

vides a means of comparing the behaviors of students with severe social deficits and peculiar behaviors with those of typically developing peers.

Finally, this study contributes to the development of evidence-based approaches for student support personnel (e.g., school psychologists, behavior analysts) working with individuals with AS. Although AS is a low-incidence disorder, the likely inclusion of students with AS within general education classes, given Safran's (2001) projections, suggests that educators will be called on to design and implement social skills interventions. Because social stories are developed with contextual fit in mind, student support personnel stand at the forefront of assisting educators with the design, implementation, and evaluation of social story effectiveness.

Although this study contributes much to the existing literature, it does have limitations. A primary limitation is that the social story intervention resulted in initial behavior change in only two of the three participants. Though the data from Darius and Francis suggest that social stories can produce significant behavior change in some students with AS, Angelo's inconsistent response to his social story limits our ability to draw solid conclusions about the efficacy of this intervention. Hypotheses regarding Angelo's response have been suggested, but this does serve as a caution that social stories may not work for all students with AS.

A related limitation involves the potential lack of consistency in the manner or situation in which social stories were implemented. Each of the participants read his respective social story at home with a parent. Because of this, it was not possible to identify whether the manner in which the social story was read, or the context for the reading, has any impact on the effectiveness of the intervention. However, information regarding the individual implementation of the social story interventions was provided with the social story journals completed by the parents. For both Darius and Francis there appeared to be strict adherence to the protocol of reading their respective social stories twice a day during the intervention period. Unfortunately, social story information for Angelo was unavailable. Therefore, the degree to which the intervention was implemented as intended is not known.

Additionally, the amounts of social consequences for the participants in their respective environments were not assessed. That is, the rates of social consequences coming from peers and teachers were not evaluated. Without such information, it is difficult to identify whether the rehearsal of the social stories was more effective than the subsequent access to the natural reinforcement the participant(s) received for engaging in the target skill. It is important to note that this study was not designed to assess the contribution of this social reinforcement apart from the social stories.

Finally, as with most small-*N* or single-subject research, some caution must be taken in generalizing these findings across students, settings, or other behaviors. Also, the generalizability of the treatment effects to children of other disability types (e.g., autism, mental handicaps) is not assured, due to the homogeneity of the participants.

Despite such limitations, this study extends previous investigations of the positive effects of social stories for children with autism. The results of this study provide an example of an intervention protocol that can improve and expand the social repertoires of individuals with AS. More important, this study offers the foundation for much needed empirical support for intervention methods for students with AS. Such information is greatly needed, considering the rapid increase in diagnoses and referrals for special education services for students with AS. This preliminary information may serve as a springboard for future program design and intervention implementation for children with AS in educational settings.

The fundamental concern for future research on the effectiveness of social story interventions should be the continued use of procedures and methods that employ experimental control (Sansosti, Powell-Smith, & Kincaid, 2004). Further research employing experimental control would provide greater validity to the practice of using social stories for children with AS. More important, recent trends in educational practice are calling for more evidenced-based approaches verified through well-controlled research paradigms. Continued efforts using research designs that lack the rigor of experimental control limit the acceptability of using social stories in clinical practice. In addition to demonstrating experimental control, future research endeavors should further examine training for maintenance and generalization of skills following the implementation of social story interventions.

Additional research should clarify the characteristics/behaviors of those students most likely to benefit from social stories, that is, the children who will be most responsive to a social story intervention. It is likely that a variety of variables are responsible for the success of a social story intervention, chief among them being the social awareness of the individual. This is especially true when a social story is used to teach a social skill (e.g., initiating conversations, joining in). However, other variables, such as the individual's language/communication skills and behavioral characteristics (e.g., insistence on sameness), may be responsible for the success or failure of a social story.

Future research also should explore the impact of social stories implemented alone, as opposed to in combination with reinforcement for appropriate target behavior in an identified problematic social situation. Specifically, some individuals using social stories may not be immediately reinforced socially for practicing/engaging in their target skill or may not even attempt to use the target skill

in the relevant setting. By providing some initial reinforcement to the student or a model of appropriate behavior, it may be possible to jump-start the relationship between the social story and social behavior, as well as create ongoing social opportunities for practice of the target skill. Eventually, these initial opportunities may later promote more spontaneous initiations of the target behavior that can be socially reinforced.

In summary, this study investigated the effects of social story interventions for three children with AS. The results of this study provide some support for previous positive findings regarding the use of social story interventions for children with autism. In addition, the results of this study provide some support for clinical recommendations for using social story interventions to teach prosocial skills in children with AS (Atwood, 1998; Gray, 1998; Safran, 2001). Because this study represents the first empirical support for social story interventions with children with AS, this information should be used to assist with the development of social story interventions, as well as provide the foundation for future research. Finally, though the present research provides no definitive claims as to the effectiveness of social story interventions for children with AS, it does add preliminary evidence that social stories may be a beneficial method of remediating social skill difficulties for many children and youth with AS.

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Appendix

Social Stories for Darius, Francis, and Angelo

Darius: Being a Good Sport

After lunch we go to recess. Sometimes, recess is on the playground. When I get to the playground, I like to play football. There are other kids who like to play football with me too. When I play football, I should remember to be a good sport, and never let losing the game bother me. A good sport is someone who says "good job" or "awesome" during a good play or for winning the game, no matter whose team they are on. A good sport would try not to yell at anybody while playing football during recess. That hurts others' feelings. I will try to practice my sportsmanship skills when I play football during recess. I will try to say things like "good job," "nice pass," or "awesome." If I show all of these sportsmanship skills and don't get mad, my friends will want to play with me more often. I want kids to like me and play with me, so I need to show good sportsmanship skills so they will think of me as a fair person.

Francis: Keeping the Flow

Usually, I have recess most of the days I go to school. Recess is a time that I can go outside. I can walk and run around, or I can talk to other kids. Most of the time during recess, I like to talk to other kids because I love to hear what other people have to say. Looking at people is a VERY important part of talking to them, and it is a very nice thing to do. I should try not to turn and walk away from anyone when they are talking, unless I am asked to do so. Sometimes, I may not like what they are talking about. But, this is ok. If I turn away, I will hurt their feelings, and they will think I don't care about them. I would be hurt if my friends walked away from me, and my friends may not want to talk to me again. When I am talking to other kids at recess, I should try to look at a part of their face and listen to what they say. I want to be a good friend, and I'm proud to be a good friend.

Angelo: Joining in a Game

I love playing with other kids during recess. The most fun times I have are when I join kids who are already playing soccer on the playground. I do this by asking in a nice, gentle voice, "Can I play with you?" If they say yes, then I ask, "Show me how to play." When I join other kids who are playing, I really feel like I have friends and that I belong to the group. As long as I keep joining other kids, I will be popular and have lots of friends.