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Using Computer-Presented Social Stories and Video Models to Increase the Social Communication Skills of Children With High-Functioning Autism Spectrum Disorders

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The purpose of this study was to investigate the effects of computer-presented Social Stories and video models on the social communication skills of three children with High-Functioning Autism/Asperger's Syndrome (HFA/AS). Using a multiple-baseline across-participants design, computer-presented Social Stories and video models were implemented and direct observations of the participants' identified target behaviors were collected two times per week during unstructured school activities (e.g., recess). Overall, data demonstrated that the combined treatment package was effective for improving the rates of social communication for the participants, although modifications to allow access to social reinforcement were needed in two cases. In addition, all three participants demonstrated maintenance of skills at a 2-week follow-up. However, generalization of skills was only observed for one participant. This research adds evidence that a combined intervention presented via computer may be a beneficial method for remediating social skill difficulties for individuals with HFA/AS.

Keywords: *autism; Asperger Syndrome; Social Stories; video modeling; social skills*

Defined as a triad of impairment, Autism Spectrum Disorders (ASD) are characterized by deficits in social development, communication, and repetitive behaviors or interests (American Psychiatric Association, 2000). Across the spectrum, characteristics of the disability manifest uniquely as a collection of symptoms that are rarely the same from one individual to another. At one end of the spectrum are children with classic autism, characterized by severe deficits such as significant cognitive and speech delays. At the other end of the spectrum are those children with similar characteristics to classic autism but display low-average to above-average cognitive abilities and more typical language abilities, at least superficially. Such children at this higher end of the spectrum are referred to as having High-Functioning Autism or Asperger's Syndrome (HFA/AS). As is the case with all ASD, a fundamental characteristic of many children with HFA/AS is having difficulty with social interactions. Specifically, these children demonstrate a restricted range of social communication skills such as limited ability to (a) initiate and maintain conversations, (b) request information/materials from teachers and/or peers, (c) listen to and respond to teachers and/or peers, and (d) interact in basic games or other activities (Carter, Ornstein-Davis, Klin, & Volkmar, 2005).

During the past decade, the number of children and youth on the autism spectrum has increased approximately 173%, making it the fastest growing developmental disability in the United States (Autism Speaks, 2008). A large percentage of this substantial increase may be due to increased identification and diagnosis of children with HFA/AS (Hyman, Rodier, & Davidson, 2001). In support of this view, the Centers for Disease Control and Prevention (CDC) reported a prevalence rate for autism of 40 per 10,000 and up to 67 per 10,000 if

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children with higher functioning abilities and AS were included in the figures (CDC, 2000). Similarly, other studies have estimated the prevalence of HFA/AS to range from 8.4 per 10,000 in preschool children (Chakrabarti & Fombonne, 2001) to 71 per 10,000 children ages 7 to 16 (Ehlers & Gillberg, 1993).

As rates of HFA/AS continue to rise, so does its effect on schools. Aside from related special education services, placement in general education settings has become a dominant service delivery issue for individuals with HFA/AS (Simpson & Myles, 1998). In fact, examination of data on inclusion relative to each disability category under the Individuals with Disabilities Education Act (IDEA) suggests that students with ASD (statistics specifically related to HFA/AS are not currently available) are increasingly served in inclusive settings (Office of Special Education Programs, 2004). Since 1991, participation of students with ASD in the general education curriculum (more than 80% of day) increased at a faster pace than that of all disabilities categories combined. Whereas only 4.8% of students with ASD were included in 1990 to 1991, nearly 29.1% were in general education for 80% or more of their day in 2003 to 2004, representing a growth rate of 24.3%. Increases in inclusion of students with ASD from 1991 to 2004 outpaced that of other low-incidence disabilities such as mental handicaps (8% growth) and emotional disturbance (17.4% growth) and were comparable to that of high-incidence disabilities such as specific learning disability (26.4% growth). Despite these statistics, methods that incorporate social communication training for children with HFA/AS in inclusive elementary and middle school environments are scant.

Because of the increase in the number of students with HFA/AS in mainstreamed environments, more unobtrusive (less stigmatizing) teaching formats that are readily accepted by educators and that can be used in a variety of inclusive settings should be considered. In addition to meeting academic proficiencies emphasized as a part of standards-based educational reform movements (e.g., No Child Left Behind), educational goals for students with HFA/AS will need to include the teaching of social interaction behaviors, pragmatic communication, and at times, self-help or functional living skills. To be optimally effective, teaching strategies should capitalize on the visual learning strengths of students with HFA/AS and allow for repeated imitation of targeted social skills or behaviors (National Research Council, 2001). Three promising strategies that can be combined to meet such instructional best practices are Social Stories, video modeling, and computer-assisted instruction.

Social Stories

Social Stories™ are individualized short stories written from a child's perspective that explain challenging social situations through visual supports and text (Gray, 1998). The primary purpose of a Social Story is to provide descriptive information concerning a social concept or situation, such as the people involved, the sequence of events, and the thoughts and feelings of others. A less important but valuable function of a Social Story is to offer suggestions concerning how to respond to a given social cue or situation (e.g., how to remain calm and follow directions during a fire drill). That is, a Social Story provides more explanation for understanding and interpreting what is expected within the environment, rather than providing direct social skill instruction (Ivey, Heflin, & Alberto, 2004).

The effectiveness of using Social Stories to teach children with HFA/AS has been demonstrated on a wide range of social skills such as greeting people appropriately and sharing toys (Swaggart et al., 1995), reducing inappropriate or tantrum behaviors (Adams, Gouvousis, VanLue, & Waldron, 2004; Crozier & Tincani, 2005; Kuttler, Myles, & Carlson, 1998; Lorimer, Simpson, Myles, & Ganz, 2002; Scattone, Wilczynski, Edwards, & Rabian, 2002), increasing appropriate play (Barry & Burlew, 2004), increasing the frequency of social communication behaviors (e.g., securing attention, initiating requests; Thiemann & Goldstein, 2001), and improving positive social behaviors (Ivey et al., 2004; Norris & Dattilo, 1999; Sansosti & Powell-Smith, 2006). In each of these studies, positive trends in the data were observed despite methodological concerns and interference by multiple treatment agents (Sansosti, Powell-Smith, & Kincaid, 2004).

Video Modeling

Video modeling involves having the child with HFA/AS watch a videotape of a model engaging in a target behavior to be imitated (Charlop-Christy, Le, & Freeman, 2000). By modeling target behaviors on videotape in a systematic and often discrete manner, the child learns to memorize and imitate these behaviors. Video modeling, used as a means to modify, change, or shape behavior, appears to be an appropriate strategy for use at home and school. In addition, it may increase the effectiveness of existing treatment programs by offering multiple exemplars necessary to increase the generalization of skills (Stokes & Baer, 1977).

To date, a myriad of empirical studies demonstrating the effectiveness of video modeling interventions used

with children with ASD have been identified in the literature. Specifically, video modeling has been demonstrated to increase conversational speech skills (Charlop & Milstein, 1989), perspective taking (Charlop-Christy & Daneshvar, 2003; LeBlanc et al., 2003), play sequences (D'Ateno, Mangiapanello, & Taylor, 2003), and social initiations (Nikopoulos & Keenan, 2003, 2004; Wert & Neisworth, 2003) in children with ASD. Video modeling not only has demonstrated effectiveness for teaching skills to children with ASD but also has demonstrated considerable efficacy as an intervention approach in community and school settings. Within community settings, video modeling techniques have been implemented to reduce tantrum behaviors during transitions within the community (Schreibman, Whalen, & Stahmer, 2000), as well as reduce fear and anxiety associated when visiting the dentist (Luscre & Center, 1996). Furthermore, video modeling techniques have been employed within school-based settings to teach correct spelling sequences (Kinney, Vedora, & Stromer, 2003), spontaneous social interactions (Maione & Mirenda, 2006; Wert & Neisworth, 2003), compliment giving (Apple, Billingsley, & Schwartz, 2005), and pretend play skills (MacDonald, Clark, Garrigan, & Vangala, 2005) in children with ASD. Although the research concerning the effectiveness of video modeling is strong, only a few studies have specifically targeted social interactions.

Computer-Assisted Instruction

The use of computers for instructing students with ASD is a relatively new area of research, but one that has proven to be particularly successful. The success of computer-assisted instruction rests on the motivation of the learning environment that is created. That is, the majority of children with ASD find computers intrinsically motivating. Heimann, Nelson, Tjus, and Gillberg (1995) reported that students with autism not only learned more vocabulary words via computer-assisted instruction but also appeared to enjoy learning more when taught by the computer rather than by a teacher. Furthermore, the use of computers has been demonstrated to decrease inappropriate behaviors (Chen & Bernard-Opitz, 1993; Whalen, Liden, Ingersoll, Dallaire, & Liden, 2006) and improve vocabulary acquisition (Moore & Calvert, 2000) among children with ASD. More important, computer-assisted instruction has been shown to increase the use of social skills (Bernard-Opitz, Sriram, & Nakhoda-Sapuan, 2001; Silver & Oakes, 2001; Swettenham, 1996) among children with autism. With the increasing availability of computers within classrooms, it becomes of paramount importance to further investigate how such technology can be used to benefit the academic, behavioral, and social outcomes of students with HFA/AS.

Purpose

The purpose of the study was to use a collection of solid treatment approaches to teach social skills within general education environments. Specifically, this study examined the effectiveness of computer-presented Social Stories and video models on the social communication skills of children with HFA/AS. This study expands the current body of research in this area by (a) demonstrating how Social Stories can be implemented and used simultaneously with video modeling for teaching social skills to individuals with HFA/AS; (b) incorporating the use of technology (computers) to implement a packaged intervention in general education classrooms; (c) demonstrating how a multimedia intervention can be implemented by school staff; and (d) evaluating the effectiveness of this packaged intervention in less structured settings (i.e., the recess playground).

Method

Participants

Three boys ages 6 years 6 months to 10 years 6 months (M = 8 years, 6 months) participated in this study. Participants were selected from an established educational program for students with ASD located in a public elementary school in West Central Florida. For inclusion in this study, participants (a) had a current diagnosis of autism, Asperger's Syndrome, or Pervasive Developmental Disorder–Not Otherwise Specified (PDD-NOS) that was provided by an outside evaluator using the *Diagnostic and Statistical Manual of Mental Disorders–Fourth Edition–Text Revision* (*DSM-IV-TR*; American Psychiatric Association, 2000); (b) displayed current levels of cognitive functioning in the low-average to above-average range on a published standardized measure (e.g., *Reynolds Intellectual Assessment Scales*); (c) demonstrated the ability to communicate functionally as evidenced by a standardized language instrument (e.g., *Clinical Evaluation of Language Fundamentals–Third Edition* [CELF-3]); or had no communication concerns and (d) were included in the general education curriculum for 100% of the school day. Information relevant to these inclusion criteria are presented in Table 1.

Table 1
Participants' Performance on Standardized Measures

Test	Participants		
	Vito	Michael	Santino
GARS	—	103	113
GADS	127	—	—
OWLS			
Oral Language Composite	—	74	53
Listening Comprehension	—	75	62
Oral Expression	—	77	48
WPPSI-III			
Full Scale Intelligence	120	—	—
Verbal Intelligence	118	—	—
Performance Intelligence	125	—	—
Processing Speed	88	—	—
RIAS			
Nonverbal Intelligence Quotient	—	82	84

Note: GARS = *Gilliam Autism Rating Scale* (Gilliam, 1995); GADS = *Gilliam Asperger's Disorder Scale* (Gilliam, 2001); OWLS = *Oral and Written Language Scales* (Carrow-Woolfolk, 1995); WPPSI-III = *Wechsler Preschool and Primary Scale of Intelligence–Third Edition* (Wechsler, 1967/2002); RIAS = *Reynolds Intellectual Assessment Scales* (Reynolds & Kamphaus, 2003).

Vito (age 6 years 6 months) attended kindergarten in a primary general education classroom. He received a diagnosis of AS and scored in the *very likely* range of AS on the *Gilliam Asperger's Disorder Scale* (GADS; Gilliam, 2001). Across all domains, Vito demonstrated above-average performance (see Table 1). Because no communication concerns were noted, there was no record of any formal language evaluations. Vito spoke in complete sentences and had above-grade-level reading skills. Aside from these strengths, Vito was described as having difficulty in group social situations. Specifically, both parents and teachers stated that Vito had difficulty engaging in social activities with other children (e.g., initiating conversations, joining in activities). Informal observations prior to the study revealed that Vito wandered the playground alone and failed to initiate conversations with peers or join in activities with his classmates.

Michael (age 9 years 3 months) attended second grade in a general education classroom. He had been diagnosed with autism and scored in the *average* range of autism on the *Gilliam Autism Rating Scale* (GARS; Gilliam, 1995). In addition, Michael demonstrated low-average nonverbal intelligence and relatively impaired delays in communication (see Table 1). However, he conversed using simple sentences and communicated effectively with adults and peers within the school setting. Similar to Vito, Michael demonstrated difficulty initiating conversations and joining in activities. Observations conducted prior to the study verified the information gathered from Michael's family and teacher. Specifically, Michael often spent the first few minutes of recess on the playground equipment with other children engaging in parallel play (e.g., walking up to other children and just standing beside them). However, if no child(ren) asked him to play, he walked away and spent most of his time alone.

Santino (age 8 years 10 months) attended the third grade in an intermediate Language Learning Disabled (LLD)/Varying Exceptionalities (VE) classroom that included typically developing students during the entire school day. He scored in the *average* range of autism on the GARS. On a cognitive measure, Santino demonstrated low-average nonverbal intelligence and severe delays in his communication skills (see Table 1). However, the language scores available for review were several years old and may not have been an accurate estimate of Santino's current communication skills. Santino effectively communicated his wants and needs using simple sentences, and his current goals and objectives for his speech and language therapy were focused solely on social pragmatics. Despite lower academic scores, he successfully read and comprehended grade-level materials. With regard to his social communication skills, both Santino's mother and his teachers indicated that he would benefit from learning how to maintain conversations with others. His mother and teachers noted that Santino often walked away from a conversation, screamed into others' ears, and showed little interest in carrying on a conversation. Preliminary observations revealed that Santino was often followed by several peers who tried to get him to engage in activities. During these interactions, Santino initiated some conversations, but he often walked away and sometimes pushed others.

Settings

Each participant was observed during recess time during regular school hours. The primary setting for these observations was directly related to the identified behaviors targeted for each participant's intervention. For Vito and Michael, observations were conducted in a fenced-in area on the side of the school where there were several swings, slides, and monkey bars. In addition, this area had one large "jungle gym" and a picnic table. Around this area was a sidewalk where children could sit and play games or engage in conversation. During recess time, multiple classrooms were on the playground at once. Typical behaviors included climbing on the jungle gym and other playground equipment, playing tag, and engaging in conversation.

For Santino, the observation settings included the fenced-in area described previously, as well as a nearby courtyard that included multiple basketball hoops. Recess time occurred immediately following lunch and included six classrooms sharing the same areas. During this time, the children were permitted to use multiple toys (e.g., balls, hula-hoops, jump-ropes) in the courtyard, play on the swing/slide set, or walk around and talk. Typical behaviors included playing kickball or shooting basketball, jumping rope, and engaging in frequent social interactions among students.

Materials

Social Stories

Three Social Stories (one per participant) were designed to address an identified target behavior for each participant. Each Social Story was designed according to Gray's (1998, 2002) and Gray and Garand's (1993) recommendations and was constructed using Microsoft PowerPoint. Specifically, each PowerPoint slide was black with a 6-inch (width) by 8-inch (length) white box centered on the slide. The cover page of each Social Story contained only the title, which was placed ½ inch from the top of the page and typed in 16-point Times New Roman font. The remaining pages contained one or two sentences typed in 14-point Times New Roman font and were printed near the bottom of each page. Each story was 5 to 9 pages in length, including the cover page. There were ½-inch margins on all sides of the white box on the PowerPoint slide. This spacing left approximately a 5-inch by 7-inch area above the sentences where color Mayer-Johnson picture symbols were placed (Mayer-Johnson, 1994). The Mayer-Johnson symbols were used to increase the communicative intent of the Social Story message and make the story more appealing to the reader.

Video Models

Three videos were constructed using a digital camcorder. In each video, the content of each participant's Social Story was modeled by a similar-aged peer. Similar-aged peers were used to increase the generalization of the intervention. Peer models engaged in the targeted behavior in a way that was as natural as possible, avoiding a slow or exaggerated pace. Each video was approximately 45 seconds to 1 minute in duration.

Computer-Presented Social Stories and Video Models

To increase the consistency of intervention implementation, an enhanced digital media presentation was created. Specifically, each participant's Social Story and accompanying video model were converted into a self-advancing slide show using Microsoft PowerPoint. The title page of the Social Story included a button with the word "Start" for the participant to click. When the participant clicked the Start button, the PowerPoint slides advanced automatically. In addition, voice-over for each slide was incorporated. That is, the primary investigator's voice was heard reading each line from the Social Story as part of the presentation. Once all of the pages of the Social Story had advanced, a page appeared with the words "Show Me How" and accompanying voice-over that said, "Show me how to do it." After this slide, the video clip played automatically. Each computer-based video-modeled Social Story was presented on an Apple iBook G4 laptop computer.

Dependent Measures

The effect of each video-modeled Social Story was assessed by measuring the percentage of intervals of social communication during observations. Specific target behaviors were identified for each participant through interviews between the participants' caregiver(s) and teacher(s), as well as direct observations prior to the study.

For Vito and Michael, *joining in* was defined as instances in which they were actively initiating or participating in a preferred play activity or conversation with one or more children. For Santino, *maintaining conversations* was defined as instances in which he actively contributed to a reciprocal conversation or attended to a topic of conversation with a peer or groups of peers. Detailed examples of these dependent measures appear in Table 2.

Data Collection and Interobserver Agreement

A direct observation system, developed by the primary investigator, was used to code the occurrence of target behaviors using 15-second partial-interval recording. Observers using this coding system first observed for a 10-second interval, then had 5 seconds to record the behavior in which the target child was engaged. Each participant was observed for 15 to 20 minutes two 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 saw and recorded his or her behavior. 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 often social engagement occurs for a typical child. When examining

Table 2
Descriptions, Examples, and Nonexamples of Dependent Measures

Measure	Description	Example	Nonexample
Joining in	instances in which the target participant actively initiates or participates in some play activity or conversation with one or more children; displays of joining in should demonstrate awareness of group interactions and appropriate ways to ask to participate	requesting attention or acknowledgment from peers verbally (e.g., saying "Hey" or "Look" or calling peer's name) or gesturally to establish joint attention (e.g., taps peer on shoulder, hold an object up to show peers)	engaging in any sort of aggressive act such as cursing, shouting, pushing, name calling, hitting, and making forceful bodily contact with someone else during a conversation or a play activity
		verbally initiating a new idea or topic that relates to the ongoing joint activity	walking up and observing without actively joining in
		borrowing or lending toys, using each other's toys, or sharing accomplishments (e.g., successfully building a tower with blocks)	playing independently and separately from peers
		participating in any type of organized group game that involves taking turns (e.g., tag, hide-and-seek) or fulfilling a group role (e.g., playing goalie in soccer)	not responding to his or her name being called by another peer
Maintaining conversations	instances in which the target participant actively contributed to a reciprocal conversation or attended to a topic of conversation with one or more children; displays of maintaining conversation should demonstrate awareness of the topic of conversation	making "small talk" with another peer playing next to each other and using a variety of social exchanges to show recognition of peers	walking away from an ongoing conversation
		providing a comment following a 3-second interval after a peer's last utterance (talking about information heard from a peer in the conversation)	changing the topic of conversation to something unrelated
		answering a peer's question	not responding to his or her name being called by another peer
		confirming or clarifying a question or comment from a peer	

individuals with HFA/AS, 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 HFA/AS.

Observations were conducted by graduate students who have 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 device designed by the primary investigator prior to the initiation of the study. Specifically, observers were trained with written, verbal, and videotaped examples of the dependent measures until they reached at least 80% agreement.

Interobserver agreement (IOA) was calculated by dividing the number of rater agreements by the number of agreements plus disagreements and then multiplying the result by 100. An agreement was defined as an occurrence when both observers agreed that the behavior occurred or did not occur. Disagreements were defined when one observer indicated the occurrence of a target behavior but the second observer did not observe the occurrence of the behavior. These reliability checks occurred during 20% of the baseline condition, 25% of the intervention condition, and 20% of the follow-up condition. IOA ranged from 87% to 100% for Vito (M = 93%), 82% to 100% for Michael (M = 89%), and 81% to 94% for Santino (M = 89%).

Experimental Design

A multiple-baseline across-participants design was used to assess changes in social communication skills of the three participants. Thus, the intervention was systematically applied to one participant at a time, permitting the evaluation of the effectiveness of the intervention before applying the procedure across additional participants (Kazdin, 1982). A multiple-baseline 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). Furthermore, a follow-up phase was added for each participant. The design used in this study allowed for an initial demonstration of controlling effects prior to intervention, sequential repeated demonstrations of intervention effects, and documenting intervention maintenance effects of the intervention during follow-up.

Procedure

Identification of Target Behaviors

Target behaviors relating to social communication skills (e.g., greeting behaviors, joining in, sharing) were identified through interviews with parents and teachers. Once a specific behavior was identified for each participant, preliminary observations were conducted by the primary investigator. These observations included recording relevant cues of the behavior, the typical sequence of events that occurs prior to and after the behavior, and descriptions of the setting-specific variables for that behavior. This information was essential to understanding what was important to include in the Social Stories and corresponding videotapes for each participant, as well as what information was irrelevant.

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-second interval, the observer recorded the appropriate response on the data collection sheet. All baseline observations occurred two times per week and were 15 to 20 minutes in length.

Intervention

Implementation of participants' interventions progressed according to Ferron and Jones's (2002) recommendations. Specifically, the primary investigator plotted the baseline data for each participant, and when those data stabilized, intervention with the first participant began. The observers continued collecting data. However, the observers were not told which participant was selected for the intervention. The primary investigator continued reviewing the data and began the intervention with the next participant when stability among the first participant's data was maintained for at least three data points. Again, the observers were not told which participants entered treatment. This same process was used for the third participant. That is, once the data for the second participant stabilized, as defined by at least three data points, the primary investigator initiated the intervention for the third participant.

During the intervention phase of the study, each participant viewed his video-modeled Social Story prior to the targeted social setting. A teacher, paraprofessional, or behavior specialist was identified in each classroom as the primary person responsible for implementing the intervention. This person was responsible for setting up the computer program so that the participant only had to put on a pair of headphones and click the Start button to begin the intervention. Each video-modeled Social Story was reviewed by participants once per day immediately before the targeted event (e.g., recess). Observational data were collected in the same manner as baseline observational data.

Intervention modifications. For Vito and Michael, modifications were made during the intervention phase because of reduced occurrences of previously targeted social communication skills. The previously developed Social Stories and video models were still implemented as planned. However, teacher prompting was incorporated into the intervention. Teacher prompting occurred during the beginning of recess. First, Vito's and Michael's teachers prompted them to use the skill they had been taught. Then, the teachers prompted other students (confederates) to engage in an activity upon request from Vito or Michael. That is, when Vito or Michael appropriately asked to play, the confederates engaged in the activity with them.

Fading procedure. Following the intervention phase, each participant's intervention was faded over 2 weeks. Fading included reducing the frequency of when Social Stories, video models, and teacher prompts were used. During the 1st week of the fading-out process, the intervention was in effect for 4 out of the 5 school days. During the 2nd week of fading, participants received the intervention twice during the week (e.g., Tuesday and Thursday). Data collection did not occur during the fading procedure. Following the fading, no intervention occurred and follow-up phase data were collected.

Follow-Up

Two weeks following the intervention (after the fading procedure was completed), observations examining the maintenance of targeted skills occurred. During this phase, no interventions were implemented for any of the participants. Follow-up data were collected in the same manner as baseline and intervention conditions. The follow-up phase lasted 2 weeks, allowing for four data points to be collected. Although a limited amount of follow-up data was collected, this phase served as maintenance of targeted skills for each participant.

Generalization Probes

Generalization probe observations were conducted for each participant during baseline, intervention, and maintenance phases of this study. Observations during the generalization probes occurred in the same fashion as the primary observations and were conducted weekly. No interventions occurred during the generalization period. Settings for generalization probes included other unstructured locations where targeted social communication behaviors could be observed. For Vito and Michael, generalization probes occurred after lunch on a separate playground located behind the school. This area contained some playground equipment located in a fenced-in area that contained shredded rubber tires. Generalization probes for Santino occurred in the school cafeteria during lunch. Santino sat with his classmates during lunch and was frequently visited by his mother, who was a volunteer at the school.

Treatment Integrity

Validity of Measures

Validation of each participant's Social Story and corresponding video occurred prior to beginning the intervention. Four professionals from a center for autism in West Central Florida validated the intervention materials. Two of these individuals were trained in special education and specialized in working with individuals with ASD. The other two were advanced doctoral students in school psychology working with individuals with ASD. The two professionals trained in special education examined the content and design of each Social Story using a checklist created by the primary investigator. This checklist was developed to assess whether the content and structure of the Social Story were based on the specific requirements (e.g., sentence types, ratio of sentences) as outlined by Gray (1998) and Gray and Garand (1993). Based on the feedback from these two individuals, all of the participants' Social Stories included the appropriate types of sentences in the specified ratio. However, general suggestions were provided to change the wording of some sentences to ensure ease of reading and/or understanding by the participants.

After the content of each Social Story was validated, two advanced doctoral students reviewed the video models. It is unfortunate that guidelines and/or recommendations for designing a video-modeling intervention do not currently exist. However, these advanced doctoral students were familiar with this type of intervention and reviewed the videotapes using a checklist. This checklist was created by the primary investigator and was used to ensure that the target behavior was clearly demonstrated and was likely to be viewed by participants positively. Based on the information provided from the reviewers, all of the videos depicted the targeted behaviors appropriately.

Social Story Comprehension

During the 1st week of the intervention phase, the primary investigator assessed comprehension by asking each participant a predetermined set of questions related to the story. Specifically, each participant was asked four or five simple interrogative and who, what, when, and/or why questions to assess comprehension of the story content. All participants answered the comprehension questions with 75% to 100% accuracy.

Procedural Reliability

Fidelity of the intervention was assessed using a self-report checklist. Specifically, the teacher, paraprofessional, or behavior specialist responsible for implementing the intervention checked off each day when the participant received the intervention. This checklist indicated whether or not the participant viewed his intervention at the specified time. Procedural reliability was computed as a percentage by dividing the number of days the participant viewed the video-modeled Social Story by the number of total days in the intervention phase and multiplying by 100. For Vito and Michael, two additional items were added to the checklist to assess adherence to the intervention modifications that were made. Treatment fidelity was 92% for Vito and Michael and 96% for Santino.

Intervention Acceptability

Teacher acceptability of the video-modeled Social Story intervention was assessed after the final (follow-up) phase of the study. Specifically, each participant's teacher completed the *Intervention Rating Profile* (IRP-15;

Table 3
Mean Rates of Each Social Communication for Each Participant and Peer Comparison by Phase (in percentages)

	Vito		Michael		Santino	
Phase	Target Behavior	Peer Comparison	Target Behavior	Peer Comparison	Target Behavior	Peer Comparison
Baseline	2.75	80.25	4.85	81.69	7.18	92.18
Intervention	30.00	78.70	21.00	80.00	55.56	91.22
Intervention + prompts	51.75	82.25	61.67	83.17	—	—
Follow-up	83.75	83.75	48.50	83.00	82.00	94.25

Martens, Witt, Elliot, & Darveaux, 1985). The IRP-15 is a 15-item scale that was developed to evaluate the acceptability of an intervention. Reliability of the instrument is .98 (Martens et al., 1985). Scores on the IRP-15 can range from 15 to 90, with higher scores indicating a greater acceptance level. Questions on the IRP-15 were adapted to better align with the parameters of this study.

Data Analysis

Each participant's social communication 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 and level (immediacy of effect), as well as nonoverlapping data points (Kazdin, 1982).

Results

Participants' Social Communication Progress

Frequencies of targeted social communication skills across baseline, intervention, and follow-up phases for each participant and comparison peers are presented in Figure 1. For Vito and Michael, an additional intervention plus prompts phase is displayed to account for the intervention modifications that were made.

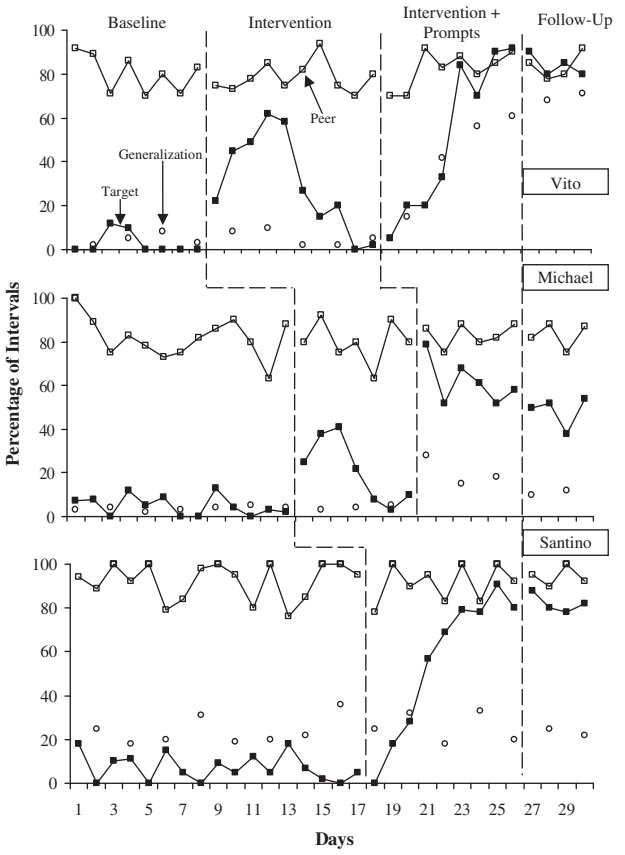
Vito displayed relatively low rates of joining-in behaviors during baseline, with an overall mean percentage of 2.75 (see Figure 1 and Table 3). Upon implementation of the intervention for Vito, a prompt increase of joining-in behaviors emerged. That is, from the last data point of the baseline period to the initial data point of the intervention period, there was a 22% increase. This trend continued for the next three data points, followed by a rapid decline in data to zero levels. Anecdotally, it was observed that when Vito used his skill appropriately, other students either ignored him or walked away. It was hypothesized that Vito was not receiving reinforcement within the natural context for using his skills appropriately. Because of the continued decline in previously acquired skills, intervention modifications (i.e., teacher prompting and child confederate) were implemented. When intervention modifications were introduced (i.e., intervention plus prompts phase), Vito's joining-in behaviors increased to a mean percentage of 51.75, an increase of 49% compared to baseline. At follow-up, Vito maintained an elevated performance of joining-in behaviors. Specifically, mean percentage of joining-in for Vito during follow-up was 83.75% (81% higher than baseline).

Over time, Vito's joining-in behaviors increased to a level that was similar to that of his peers (see Figure 1 and Table 3). Specifically, during baseline, there was a difference in rates of joining in between Vito and his peers of 77.5%; however, during the intervention period, this difference decreased to 48.7%. After the intervention modifications were implemented, Vito continued to approach peer levels of behavior (differing by 30.5% overall), and the final four modified intervention sessions were comparable with peers. At follow-up, both Vito and his peers displayed similar levels of joining-in behaviors (83.75%).

Although data for Vito during the intervention phase were variable, the percentage of nonoverlapping data points between the intervention and baseline phases was 80%. When examining intervention plus prompts, the percentage of nonoverlap was 50% with the intervention period and 87% when compared to baseline. There was 100% overlap when comparing the follow-up period with the intervention plus prompts phase and no overlapping data points between follow-up and baseline phases. These data suggest that Vito's rates of joining-in behaviors during follow-up were within the same range of the intervention periods and remained higher than baseline.

Michael displayed relatively consistent, low rates of joining-in behavior prior to the intervention, with an overall mean percentage of 4.85 (see Figure 1 and Table 3). Similar to Vito, Michael demonstrated an abrupt increase

Figure 1
Displays of Target Behaviors Across Participants With Peer Comparison and Generalization Probe Data



in the daily percentage of joining-in behavior upon implementation of the intervention. Specifically, from baseline to the first intervention session, there was a 23% increase in rates of joining-in behavior. However, this rapid change was followed by only two consecutive increasing data points. After this, a rapid decrease in rates of responding was observed (see Figure 1). As was the case with Vito, Michael may not have been receiving immediate social reinforcement for his appropriate behaviors. When the intervention plus prompts were implemented, Michael's mean level of joining in was 61.67% (56.82% higher than baseline). As can be seen in Figure 1, there was an abrupt 69% change in level from the last intervention session to the first intervention plus prompts session. This rapid increase did not persist as it did with Vito, and active rates of joining in began to decrease and then level off prior to the follow-up phase (see Figure 1). However, Michael demonstrated maintenance of skill acquisition during follow-up as indicated by a mean percentage of joining-in behavior of 48.50 (a 43.65% increase from baseline).

Michael's mean displays of joining in increased across time to a level that was closer to that of his peers (see Figure 1 and Table 3). Specifically, during baseline, there was a difference in rates of joining in between Michael and his peers of 76.84%. However, during the intervention and intervention plus prompts phases, this difference decreased to 59% and 21.5%, respectively. At follow-up, there was a 34.50% difference between Michael's rates of joining in when compared with peers.

Because data for Michael during the intervention phase were variable, 57% of the data points overlapped between the intervention and baseline phases. However, there was no overlap between the intervention plus prompts phases when compared to intervention and baseline conditions. The percentage of nonoverlapping data points between follow-up and intervention plus prompts was 75%. Finally, there were no overlapping data points between follow-up and baseline conditions. These data suggest that Michael's joining-in behaviors not only increased but also leveled off and maintained across conditions.

Santino demonstrated rates of maintaining conversation behaviors averaging 7.18% and consistently below 20% throughout baseline. Upon implementation of the intervention, there was an immediate decrease in the daily percentage of active displays of maintaining conversations. That is, from the last data point during the baseline phase (5% active maintaining conversations) to the initial data point during the intervention phase (0% active maintaining conversations), there was a 5% change in level in the negative direction. However, this trend was reversed during the intervention phase. During the intervention phase, Santino averaged 55.56% of active communication, an increase of 48.38% from baseline. Follow-up effects for Santino demonstrated maintenance of target behaviors following the intervention. Specifically, the mean percentage of maintaining conversations for Santino during follow-up was 82%. This change represents an increase of 74.82% from the baseline condition.

The percentage of nonoverlapping data points for Santino when comparing the intervention period with baseline was 88%. Furthermore, 100% of the follow-up data overlapped with the intervention phase, and 0% of the follow-up data overlapped with baseline. These data suggest that Santino continued to demonstrate active maintaining conversation behaviors across conditions.

Maintenance of Skills

For Vito and Santino, data demonstrate that maintenance of behaviors continued during the follow-up condition (see Figure 1). Specifically, both participants'

rates of target behaviors remained elevated following the withdrawal of the intervention. These data demonstrate that for Vito and Santino, maintenance of skills introduced in the video-modeled Social Story intervention occurred during the 2-week follow-up period.

Similar results were found for Michael. Specifically, data suggest that Michael continued to demonstrate improved social communication as compared to baseline (see Figure 1). However, these effects were not as dramatic as they were during the intervention condition. Data during follow-up suggest that Michael maintained behaviors, but this level of maintenance was slightly less than the gains demonstrated during the intervention phase. However, because follow-up data remained higher than baseline and were relatively stable, Michael's social communication behaviors demonstrate skill maintenance.

Generalization of Skills

As displayed in Figure 1, Vito did not demonstrate generalization of skills until the intervention plus prompts phase. At baseline, Vito demonstrated relatively no generalization of skills (4.50%). Following baseline, there was basically no change in Vito's generalization of skills during the intervention condition (see Figure 1). Specifically, Vito averaged 5.40% of joining-in behaviors, an increase of only 0.90% from baseline. However, generalization of skills was particularly noticeable following the child confederate and prompting modifications to the intervention. During the intervention plus prompts phase, Vito's rates of joining-in behaviors increased to an average of 43.50%. This increase is supported by a rapidly increasing trend during the intervention plus prompts period (see Figure 1). During follow-up, Vito's generalization of skills increased to 69.50%.

Generalization data for Michael were less compelling. Specifically, Michael demonstrated no increase in the generalization of joining-in skills following baseline (see Figure 1). When the intervention plus prompts phase was implemented, Michael's generalization of joining-in skills increased only slightly. However, the trend of generalization data during the intervention plus prompts period was decreasing (see Figure 1), indicating little, if any, generalization across time. Michael's teacher did note anecdotally that during the last week of the follow-up data collection, there was free time in the classroom. Because it was the end of the day, Michael's teacher decided to provide the students with free time to play games in the classroom. According to his teacher, Michael got the game *Candyland* and started walking around the classroom asking his peers if they would play a game with him. It is unfortunate that most of his peers said, "no." Michael finally approached his teacher, who praised him for appropriately joining in and played several games with him. Although anecdotal, this information provides some evidence as to the generalization of skills across settings.

Across all conditions, Santino's generalization probe data remained relatively constant. Specifically, data did not vary much throughout each of the conditions (see Figure 1). However, this may have been due to environmental situations beyond the control of this study. Each day at school, Santino ate lunch with his mother. Although they sat in the cafeteria with his classmates, most of Santino's social communication was directed to his mother. Because of this, it was not possible to determine whether Santino would have demonstrated generalization of skills.

Intervention Acceptability

For this study, scores on the IRP-15 were well within the acceptable range for all participants. Specifically, the score for Vito was 78, the score for Michael was 65, and the score for Santino was 71. Of particular notice, two teachers indicated that they "strongly agree" that this intervention was consistent with those used in classroom settings and they would be willing to use this intervention in classroom settings. In addition, the teachers indicated that they "agree" that this intervention would be suitable for a variety of social skills deficits and that most teachers would find this intervention appropriate.

Discussion

An intervention including computer-presented Social Stories and video models showed positive effects in increasing specific social communication skills of the three participants. Immediately following the implementation of the visually mediated intervention, the participants demonstrated improved rates of targeted social communication behaviors compared to baseline performance. For Vito and Michael, skills began a rapid decline after a brief period of improvement. However, once treatment procedures were modified to include teacher prompting and child confederates, Vito and Michael regained skills that maintained throughout the remainder of the intervention period and during follow-up. Santino's data demonstrated a consistent positive improvement in targeted skills without the need for modifications. It was hypothesized that Santino did not experience a decline in social communication behaviors during the intervention phase because he received consistent

opportunities for practice. That is, Santino was often followed by several peers who not only encouraged him to engage in a variety of conversations but also provided positive reinforcement for maintaining a conversation. Regardless of these differences, all three participants demonstrated some short-term maintenance of target behaviors 2 weeks following the intervention. In addition, Vito demonstrated some generalization of skills to other settings across time. The same effects were not seen for Michael and Santino.

When compared to their peers, all three participants' rates of behavior were equivalent to or approaching the same level of their peers, which demonstrates the clinical significance of the interventions. It is interesting that when peer comparison data were examined visually, each participant demonstrated a correspondence between his rates of behavior and that of his peers during intervention. That is, if peer data were observed to decrease or increase, each participant's behavior decreased or increased (see Figure 1). This correspondence suggests that during the intervention, and to some degree during follow-up, each participant responded to naturally occurring social stimuli in a similar manner to his peers.

The computer-based interventions demonstrated adequate treatment integrity and were rated as highly acceptable by teachers. When working in applied settings (i.e., schools), variables such as teacher time and motivation can have a significant effect on the success or failure of interventions. Therefore, critically examining factors affecting treatment integrity and acceptability is of paramount importance (Gresham, 1989). Results of this study demonstrate the need for considering a combination of factors (e.g., time to implement interventions, complexity of the intervention) when implementing interventions in school settings. For example, the complexity of the intervention in this study was limited by providing teachers with a packaged intervention that contained all of the necessary components. The only requirement was to have the child use the computer. Such a consideration may have increased the treatment integrity and acceptability because it decreased the time and number of treatment agents required to implement the intervention. In addition, when discussing the interventions with the teachers prior to the study, many were already familiar with Social Stories. Only one of the teachers had heard of video modeling, but when all of the teachers were presented with the positive outcome data (e.g., quick acquisition and generalization of skills), the combined intervention was perceived as effective and was readily accepted. Consideration of these factors may have been responsible for the high treatment integrity and intervention acceptability found in this study and underscores the importance of considering such factors when using interventions in naturalistic settings.

Significance of Findings

Given that two of the three participants required modifications to the intervention, it is important not to assume that the multimedia portion of the intervention was responsible for the majority of behavior change observed. Although the addition of teacher prompts and use of peers required minimal effort, it is difficult to separate the effects such modifications had on Vito's and Michael's positive outcomes. Despite such a caveat, the results of this study can be hypothesized to contribute to the treatment efficacy literature for improving social communication skills of children with HFA/AS in several ways.

First, this research demonstrates the potential benefits of using Social Story interventions to teach new prosocial behaviors to children with varied social communication skills. The results of this study were similar to those found previously and contribute to the growing knowledge of Social Story research. Specifically, the results of this study replicate previous findings of the efficacy of Social Stories used to teach appropriate social skill behavior to children with ASD (Norris & Dattilo, 1999; Sansosti & Powell-Smith, 2006; Swaggart et al., 1995; Thiemann & Goldstein, 2001).

Second, this research provides additional support for the use of video modeling for individuals with ASD. Prior research has suggested that video modeling is an effective strategy because it provides a consistent model for an individual to imitate. Evidence in support of this notion has been found when teaching play skills (Apple et al., 2005; D'Ateno et al., 2003), perspective taking (Charlop-Christy & Daneshvar, 2003), conversational speech skills (Charlop & Milstein, 1989), and social interactions (Maione & Mirenda, 2006; Nikopoulos & Keenan, 2003, 2004; Wert & Neisworth, 2003) to children with ASD. Furthermore, video modeling has been suggested to lead to quicker acquisition and greater generalization of skills (Charlop-Christy et al., 2000). The results of this study are similar to these previous findings because the participants often imitated the social behavior that was presented by their video model.

Third, this study offers additional support for the use of computers to aid the instruction or implement interventions for individuals with ASD. Although the use of technology for the treatment of children with ASD is a growing field of research, only a few studies have investigated the use of computers to implement multimedia social skill interventions (e.g., Bernard-Opitz et al., 2001;

Swettenham, 1996). Furthermore, only one published study has presented a Social Story using a multimedia format (e.g., Hagiwara & Myles, 1999). Given the current advances in software technology and educators' increased access to computers that come equipped with the necessary programs, more research is needed. The need for more studies is especially critical for individuals with ASD who often find computer games and instruments intrinsically rewarding.

Fourth, this study offers a unique contribution to the research literature by comparing the target behavior of participants to that of typical peers. Incorporation of peer comparison data allows for a more objective method to evaluate the clinical utility of an intervention by comparing target behavior to a normative standard (e.g., peer behavior in classroom). Although target skills do not need to match exactly with peer comparison data, levels of skill attainment that approach peer levels would be considered clinically significant. To date, only Sansosti and Powell-Smith (2006) have employed such a comparison.

Aside from contributing to the growing research base, the results of this study demonstrate (a) how Social Stories and video models may be implemented and used simultaneously within a multimedia format to teach specific social skills to individuals with HFA/AS and (b) how the use of an intervention package can be applied by educators and evaluated under naturalistic conditions (e.g., school setting). In addition, the results of this study may be highly applicable to educators who are increasingly challenged to use computer technology in the classroom. Computers are a solid solution for many schools because of their relative accessibility and motivation for children. The information from this study may prove useful in the future development of larger programs and/or curriculums for teaching social skills through computer-assisted models.

Implications for Practice

Several implications for practice can be gleaned from the implementation and results of this study. First, the time required and skills necessary to design Social Stories and video models should be considered. Writing a Social Story and adhering to the specifics set forth by Gray (1998) and Gray and Garand (1993) may take some practice for those with no previous training. Specifically, educators may require additional training on how to conduct functional assessments prior to designing and implementing a Social Story in order to individualize the story to meet the specific needs of the student. In addition, educators may need more information with regard to the types of sentences used as well as the ratio of sentences used in a Social Story. Furthermore, creating a video model that presents the targeted skill from the Social Story in an effective and attractive manner not only requires access to a high-quality camera (preferably a digital camcorder) but also requires significant planning for the what, when, and how-to video. Editing can complicate this process, and extra resources (e.g., media specialists) may be necessary for successful design of the video-modeling portion.

Second, developing a multimedia presentation that incorporates both Social Stories and video modeling into one computer program requires some advanced technical skills. However, because the interventions in this study were created using readily available software (i.e., PowerPoint), such skills can be acquired without significant amounts of training, if any is required at all. Moreover, once a routine was established for implementing the interventions, additional human resources were not needed. Thus, video-modeled Social Story interventions have promising applicability to a variety of educational settings.

Third, once a video-modeled Social Story has been created, consideration for who will be responsible for its implementation is in order. Because students with HFA/AS are often included in general education settings, there may not be enough teacher time to implement the video-modeled Social Story intervention. Thus, additional implementation resources may be needed. Overall, an intervention made up of a combination of Social Stories and video modeling is relatively easy to implement across many environments and is cost-effective. Due to their ease of implementation, a variety of service personnel (e.g., teachers, school psychologists, guidance counselors, paraprofessionals) could implement video-modeled Social Story interventions after they have been created. With access to other treatment providers, it is more likely that the interventions will be implemented as planned.

Limitations

Although this study contributes much to the existing literature, it does have limitations. A primary limitation in this study involved the combination of Social Stories and video modeling into one treatment package presented via a computer, as well as the addition of teacher prompting and use of peer confederates for two participants. By combining several components into one treatment package, information concerning the individual effect of each strategy on increasing the social communication skills of children with HFA/AS could not be assessed. That is, this study did not parcel out the individual contributions of each intervention approach, nor compare these approaches and offer evidence as to which had the greater effect on student outcomes.

Similar to the limitation concerning the individual contribution of each strategy, the amount of social reinforcement for each participant in his respective environments was not assessed. That is, the rates of social consequences coming from peers and teachers were not evaluated. Given that Vito and Michael required additional intervention modifications, the assessment of social reinforcement may be essential when examining intervention success for individuals with HFA/AS. Anecdotal information from Vito's and Michael's teachers suggested that both participants may have approached peers at inappropriate times. In addition, Michael's teacher suggested that he had a negative history of interactions on the playground. Without such information, it is difficult to determine if social reinforcement, or lack thereof, was necessary for continued success. Data from this study did not provide specific answers to the issue of low social reinforcement. However, future endeavors should investigate the effect of the social environment as it may alter the way Social Stories and video models are developed and subsequently implemented.

A third limitation of this study relates to the limited data available to make definitive claims with regard to skill maintenance. Follow-up data occurred only 2 weeks after the intervention had been systematically faded. Therefore, one cannot conclude that each participant's behaviors would maintain over an extended period of time (e.g., 2 months).

Finally, as with most small *N* or single-participant 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., mental handicaps) is not known due to the homogeneity of the participants. Therefore, the results of this study provide an example of an efficacious intervention protocol to improve and expand the social communication skills of individuals with HFA/AS.

Recommendations for Further Research

The fundamental concern for further research on the effectiveness of interventions for individuals with HFA/AS should be the continued use of procedures and methods that employ experimental control (Sansosti et al., 2004). Furthermore, research employing experimental control provides further validity to the practice of using computer-presented Social Stories and video models (or other such interventions) for children with HFA/AS. More important, recent trends in educational practice suggest a need for increased evidenced-based approaches verified through well-controlled research paradigms.

In addition to demonstrating experimental control, future research endeavors should further examine training for maintenance and generalization of skills. Training for maintenance and generalization is especially important for populations of children with ASD. Many studies have demonstrated that students with ASD often do not maintain or generalize behaviors (Klinger & Dawson, 1996; Simpson & Regan, 1988; Wing, 1998). These findings have also been reflected in recent Social Story research literature (Kuttler et al., 1998; Swaggart et al., 1995; Thiemann & Goldstein, 2001). It was hypothesized that the video-modeling portion of the intervention would increase the generalization of skills because such results have been demonstrated previously (e.g., Charlop-Christy et al., 2000). However, generalization was not found. Thus, more programmatic generalization methods likely are necessary for generalization to occur. Further research should attempt to promote generalization by providing training with a variety of examples through a variety of lessons, or training with sufficient exemplars (Stokes & Baer, 1977). One technique to promote generalization by using carefully selected and sequenced exemplars is general case programming (e.g., Albin & Horner, 1988; Becker & Engelmann, 1978). General case programming not only emphasizes using sufficient examples of stimuli and response settings but also sequences positive and negative teaching examples to ensure that a student will be able to perform a skill in a variety of situations by learning the range of appropriate applications of targeted behaviors without needing to teach all of them.

Further research should also begin the process of delineating the effective components of combined treatment interventions. For example, further research could identify the effect of Social Stories and video modeling implemented alone versus the effect of Social Stories used in combination with video modeling. In addition, further research should investigate the importance, if any, of other variables outside of Social Stories and/or video modeling necessary for skill attainment and maintenance. For example, reinforcement contingencies for engaging in appropriate target behavior may be necessary for some participants. Specifically, as was discovered in this study, some individuals may not be immediately reinforced by peers or adults for practicing and/or engaging in their target skill. In fact, some students may not even attempt to use the target skill in the setting in which it occurs or they may be ignored by peers. By providing additional supports such as prompts, reinforcers, and/or child confederates, it may be possible to jumpstart the relationship between the content of video-modeled Social Stories 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 are then socially reinforced (i.e., naturally occurring reinforcement).

Finally, additional research endeavors should examine the differential benefits of participation in a video-modeled Social Story intervention with variable treatment duration (i.e., length of intervention) or frequency (i.e., number of times participant views the video-modeled Social Story). Such research may be useful because some social skills may require more instructional time to bring a student with HFA/AS to a level of adequate proficiency or greater opportunities to practice the targeted skill. Therefore, studies examining the effects of varied instructional variables could verify the hypothesis that increasing the duration and/or frequency of a video-modeled Social Story intervention may result in larger treatment benefits, benefits to more participants, or greater maintenance of treatment effects.

In summary, this study investigated the effects of computer-presented Social Stories and video models for three children with HFA/AS. Together, the results of this study support previous positive findings with regard to the use of Social Story and video-modeling interventions for children with autism. In addition, the results of this study support clinical recommendations for using Social Story interventions in combination with other methods to teach prosocial skills to children with HFA/AS (Attwood, 2000; Gray, 1998; Rogers, 2000; Safran, 2001). Because this study represents preliminary empirical support for computer-based video-modeled Social Story interventions with children with HFA/AS, this information should be used to assist with the development of such interventions as well as provide the foundation for further research.

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