The Use of Video Self-Modeling and Peer Training to Increase Social Engagement in Preschool Children on the Autism Spectrum

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ABSTRACT: Impairments in social functioning are common in children with autism spectrum disorder (ASD) and can create great difficulties in the life of an individual on the autism spectrum. Social skill deficits increase the likelihood of children experiencing social failure, peer rejection, and isolation, leaving them vulnerable to developing anxiety, depression, and other forms of psychopathology. The present study expands previous research addressing deficits in social functioning, through the implementation of a video self-modeling (VSM) procedure and a brief peer-training intervention. The VSM-only phase led to rapid and marked increases in social engagement for all three preschool-aged children with ASD. The addition of a peer-training intervention did not lead to improvements in social engagement when compared to the VSM-only phase. The findings are discussed within the context of previous research, and suggestions for future research and implications for school psychologists and other school personnel are provided.

Social skills are essential components of successful social, emotional, and cognitive development. Impairment in social functioning is a fundamental feature of autism spectrum disorder (ASD) and is well documented in the research literature (American Psychiatric Association, 2013; Rogers, 2000). In particular, young children with ASD exhibit significant deficits in the ability to initiate and maintain social engagement, often leading to social withdrawal. Social engagement is a pivotal social behavior that provides the gateway to more sustained and complex social relationships. Further, poor social skills are associated with detrimental long-term outcomes, such as poor academic achievement, social failure and peer rejection, anxiety, depression, substance abuse, and other forms of psychopathology (Bellini, 2006; Tantam, 2000; Welsh, Parke, Widaman, & O'Neil, 2001).

Young children with ASD are in critical need of effective social skill interventions that increase positive social engagement, and help to impede the development of deleterious social and emotional outcomes. Unfortunately, few young children with ASD are receiving social skill interventions as part

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of their early childhood education program (Hume, Bellini, & Pratt, 2005). Furthermore, based on the results of meta-analytical research on children with ASD and other disabilities, children who are receiving social skills programming may not be receiving effective social skills programming (Bellini, Peters, Benner, & Hopf, 2007; Gresham, Sugai, & Horner, 2001). Gresham and colleagues (2001) noted that the weak outcomes of social skill interventions could be attributed to the fact that these interventions often take place in "contrived, restricted, and decontextualized" (p. 340) settings, such as resource rooms or other pull-out settings. This assertion is supported by the findings of a meta-analysis conducted on school-based social skill interventions for youth with ASD (Bellini et al., 2007). Results of the meta-analysis indicated that intervention, maintenance, and generalization effects were significantly lower for social skill interventions that were implemented in pull-out settings only. In contrast, interventions that were implemented in the child's typical classroom produced higher intervention, generalization, and maintenance effects. In addition to implementing social skill interventions in natural environments, interventions should also include typically developing peers (National Research Council, 2001). Early intervention practices that promote positive social interactions with peers in natural settings would be instrumental in the improvement of quality of life and learning for young children with ASD.

VIDEO SELF-MODELING AND PEER TRAINING TO TEACH SOCIAL SKILLS

Video self-modeling (VSM) is considered an evidence-based practice for youth with ASD (National Autism Center, 2015). Results of meta-analytical research have indicated that VSM is effective for children across the autism spectrum, often producing rapid and substantial changes in children irrespective of verbal or cognitive ability (Bellini & Akullian, 2007). In VSM interventions, children view a video of themselves demonstrating the successful performance of a target behavior. VSM involves recording the child's behavior and then editing the footage into 1–2 minute video clips that display positive, efficacious behavior. The edited videos are shown to the child multiple times per week in evenly spaced intervals for approximately 2–8 weeks. VSM has been used across multiple disciplines and populations to teach a wide variety of skills including motor behaviors, social skills, communication, self-monitoring, functional skills, vocational skills, athletic performance, and emotional regulation (Bellini & Akullian, 2007; Delano, 2007; Dowrick, 1999; Hitchcock, Dowrick, & Prater, 2003; Kehle & Bray, 2009). Most salient to the present study, VSM has been shown to be an effective strategy for rapidly improving the social behaviors of young children with ASD (Buggey, 2012; Buggey, Hoomes, Sherberger, & Williams, 2011).

Peer-mediated instruction is another evidence-based strategy used to facilitate social interactions between young children with ASD (and other disabilities) and their typically developing peers (Banda, Hart, & Lan Liu-Gitz, 2010; Laushey & Heflin, 2000; National Autism Center, 2015; Odom, McConnell, & McEvoy 1992; Sasso, Mundschenk, Melloy, & Casey, 1997). Peer training is an important component of peer-mediated instruction. Peer training involves teaching typically developing children how to interact with and help their peers with ASD acquire and perform targeted social skills (Neitzel, 2008). In particular, the typically developing peers, or peer buddies, may be trained to make social initiations or respond promptly and appropriately to the initiations of their peers with ASD. Peer-mediated instruction allows children with ASD to perform social behaviors through direct social contact and by modeling the social behaviors of peers. Peer-mediated instruction allows teachers to structure the physical and social environment to promote successful social interactions between children with ASD and their peers. Peer-mediated instruction can be used in naturalistic settings (classroom and playground) and also in structured settings (structured playgroups). The use of peer mentors allows the teacher and other adults to act as facilitators (via prompting of the peer mentors) rather than participate as active playmates with children with ASD. The use of trained peer mentors may also facilitate generalization of skills by ensuring that newly acquired skills are performed and practiced with peers across natural settings (Zhang & Wheeler, 2011).

Similar to the present study, Banda and colleagues (2010) examined the effectiveness of peer training in combination with direct instruction in increasing social initiations and responses of young children with

ASD. The study included two male kindergarten students diagnosed with ASD and three typical peers in a school setting. The peer-training intervention occurred in two parts. First, the investigators conducted a 4–5-minute training session involving the children with ASD and their typically developing peers. During this brief training procedure, the children were trained to ask questions and respond to questions from their peers. Intervention strategies used during the peer-training phase included adult modeling, prompting, and reinforcement. Immediately following the training, the children with ASD and their peers were observed in the children's typical classroom. The interventionists continued to provide prompting to facilitate questions between the target children and their peers. The results showed immediate and substantial improvements for both participants with ASD.

PURPOSE OF THE PRESENT STUDY

One aim of the current study is to replicate and expand on the work of Bellini, Akullian, and Hopf (2007). The researchers implemented a VSM intervention in a public school preschool classroom for two preschool-age children with ASD. In the study, teachers were asked to prompt social engagement (initiations and responses) between the children with ASD and their classmates during the video recording portion of the study. Teacher prompts were then edited out of the videos prior to showing the videos to the children with ASD. The edited clips showed exclusively autonomous, positive, and efficacious engagement with peers. The intervention led to rapid and substantial increases in unprompted social engagement with peers. In addition, levels of social engagement were maintained after the VSM intervention was withdrawn. In spite of the substantial improvements in social engagement for the participants with ASD, the researchers and classroom teachers noted on the social validity assessment that there were many instances during the observational period that the children with ASD attempted to engage their typically developing peers, but were rejected or ignored by the peer. Teachers also noted that in some situations the children with ASD had few opportunities to respond because the other children in the class rarely initiated play with them. It was hypothesized that social engagement would have increased even further had the research team implemented a peer-training program that taught and encouraged typically developing peers to appropriately initiate and respond to their classmates with ASD.

The present study will expand this previous research by examining the combined effectiveness of two evidence-based social skill interventions for children with ASD: VSM and peer-mediated instruction (National Autism Center, 2009). Of primary importance to young children with ASD, both VSM and peer-mediated instruction are promising intervention modalities that can be used to target social behaviors in naturalistic settings while also including typically developing peers in the intervention. The primary purpose of the study was to examine the effectiveness of VSM as an intervention for improving the social engagement of young children with ASD. Another purpose of the present study was to examine whether the addition of a peer-training procedure in combination with VSM would lead to more substantial increases in social engagement for young children with ASD as compared to a VSM-alone procedure.

METHOD

Three preschool-age students with ASD—Adam, Bob, and Chuck (pseudonyms are used here)—participated in the study. All three children were identified by their school system as students with ASD, and were receiving special education services in a public school preschool program. Adam and Bob were classmates in the same half-day public preschool program. Chuck attended a different classroom at another school. Adam was 4 years, 9 months of age at the beginning of the study. Adam communicated with others using mainly two to three word phrases. Bob was 5 years, 2 months at the beginning of the study. Bob spoke in one to two word phrases, which were mostly echolalic. Both boys were described by their teacher as extremely socially withdrawn, with limited spontaneous verbal and nonverbal interactions with peers. Chuck was 5 years, 8 months at the beginning of the study. Chuck had no

discernible expressive language deficits. His speech was fluent and articulate. His teacher described his social interaction as "inconsistent." She indicated that some days he would play with one other child throughout the day, but other days we would only play alone. The intervention was conducted in two public preschool classrooms. Adam and Bob's classroom consisted of nine students (including two typically developing peers) and two teachers. The two typically developing peers participated in the peer-training program following the implementation of the VSM-only phase. Chuck's classroom consisted of seven students, including one typically developing peer, and two teachers. However, the typically developing peer in Chuck's class left the school following the eighth observation session. As such, the peer-training intervention was not implemented with Chuck due to the lack of a typically developing peer mentor in his classroom.

Data Collection Procedures

Data were collected by three graduate student data collectors (the second, third, and fourth authors) three times per week during a classroom free-choice activity. Each data collector was assigned to one child. Observations lasted 30 minutes and took place at the beginning of the school day. A partial interval recording system with 10-second intervals was used to measure unprompted social engagement.

Observational Data and Dependent Measures
Codes developed by Bellini, Akullian, and Hopf (2007) were used for the present study. Social engagement was defined as active participation in an activity or play sequence with a peer involving shared toys, objects, and play items. Parallel play with separate or similar play items was not counted as engagement unless a reciprocal exchange of play items occurred during the interval. For instance, if the child were seated at a table with other children and played with Play-Doh, the activity would not be counted as social engagement unless there was a reciprocal exchange of Play-Doh (sharing), or unless the two children played jointly with the Play-Doh (e.g., making a shape together). Negative behaviors such as taking an object from another student or pushing another student were not counted as social engagement. Instances of unprompted verbal and nonverbal social initiations and responses to peers during the 10-second intervals were also coded as social engagement. Social initiations included requesting assistance, requesting information, requesting participation, joining in play activities, greeting, providing compliments, giving/sharing/showing objects, and providing physical affection. Social responses involved providing assistance following a request, responding to questions, joining in activities following an invitation, responding to greeting or compliment, accepting a toy or object when offered, and accepting physical affection. Social interactions that were prompted by the school staff were not counted as social engagement.

Interobserver Agreement and Observer Training
The first author trained the student data collectors in the behavioral observation techniques (collection and coding) that were used in the present study. In addition, the student data collectors had an opportunity to practice recording social interactions prior to beginning the study. In order to establish interobserver agreement in training sessions, the student data collectors engaged in practice sessions where they recorded behaviors while watching a video of Adam, Bob, and Chuck's social interactions in the classroom. The student data collectors recorded behaviors in 15-minute segments and then immediately compared their recordings. Training continued in this fashion until the data collectors achieved 90% agreement in their recordings. Interobserver agreement was calculated by dividing agreements by agreements plus disagreements and multiplying by 100. Interobserver agreement was measured in the classroom setting for 28% of all observation sessions and was calculated for each participant and across all phases of the study. Interobserver agreement was calculated by comparing the recordings of a fourth observer (the lead author) with the responses of each data collector. Interobserver agreement ranged from 94 to 100% with a mean of 98% across participants and intervention phases.

Social Validity

Each week questionnaires were provided to the classroom teachers to measure their satisfaction with the intervention and their acceptance of the intervention procedures. The questionnaire consisted of a series of questions using a 5-point scale, which ranged from *strongly agree* to *strongly disagree*. This survey had questions that addressed the following concerns: (a) interference with school activities or routines, (b) the perceived effectiveness of the intervention, (c) the practicality of the intervention, and (d) the extent to which the children and teacher liked/disliked the intervention. Space was also provided on the survey for teachers to share additional comments or concerns.

Intervention Fidelity

Each teacher in the study was given a form with boxes representing the days of the week, and was asked to check the box if the child watched the video that day. The teacher was also asked to note whether the child was attentive to the video that day. Teachers were also instructed to check the Did Not Show box if the video was not shown or check the Partial Showing if only a portion of the video was shown that day. Each teacher was asked to note any equipment failure (or user error) that prevented the showing of the video on a particular day. During the peer-training phase of the study, the first author completed a self-report implementer checklist after each of the four training sessions to ensure intervention fidelity. The implementer checklist listed each step and procedure used during the 30-minute session. In addition, the teachers were also asked to record the number of prompts delivered to the peer mentors to facilitate social engagement between the peers and the participants with ASD.

Intervention Procedures

Video footage was collected 2 weeks prior to collecting baseline data. Video recording took place over 5 days, and approximately 90 minutes of raw footage was collected per child. Though infrequent, instances of unprompted social interactions with peers were captured on video. The feed forward technique of hidden support was used to facilitate social initiations and responses (Dowrick, 1999). For instance, during the 5 days of video recording, the children with ASD were frequently prompted by their classroom teachers to facilitate social interactions with peers. More specifically, the teacher might provide a verbal prompt, "Adam, say 'Hi, Michael,'" or "Adam, say 'Play with me.'" Classmates of the children with ASD were also provided frequent prompting during this 5-day recording phase to interact with their classmates with ASD. The level and type of prompt used was commensurate with the developmental and skill level of the child with ASD. The videos were then edited to remove the continual prompting delivered by the teacher (hidden supports). All interactions that were considered inappropriate or ineffectual (e.g., solitary play, lack of response to peer initiations, hitting other students) were also eliminated from the videos. All video editing was performed by a member of the research team. Three video clips of approximately 1 minute in duration were produced for each participant. The three video clips were saved on a flash drive and could be played by clicking on an onscreen menu. A flash drive was produced for each participant.

The VSM-only phase lasted 5 weeks for Adam, 3 weeks for Bob, and 4 weeks for Chuck. During this phase, the children viewed one edited video clip per day. Teachers were instructed to rotate the video clip that they showed to the child each day so that the child did not view the same video on consecutive days. To promote consistency, the child viewed the video at the beginning of each school day. The child watched the video in the presence of a designated member of the school staff (teacher or paraprofessional). The school staff member was instructed to not speak to the child or provide verbal reinforcement during the viewing of the video other than to provide redirection in cases where the child was not attending to the video screen. In such cases, the staff member was instructed to provide redirection in the form of verbal or nonverbal cues and prompts (e.g., "Watch video," or by tapping the screen and saying "Look"). Staff members received a brief inservice training on how to interact with the child during the viewing of the video. The children individually watched their videos in their teacher's office, which was connected to their classroom. The children were told that they were going to watch a video of themselves "playing with your friends." After watching the video, the children were sent out to the classroom to participate in a

free-play activity. Teachers were instructed to refrain from prompting the social interactions of the children with ASD or their classmates during the 30-minute observational period.

Peer-Training Phase

A brief peer-training intervention was implemented in Adam and Bob's classroom after the implementation of the VSM-only phase. Adam and Bob continued to view their video clips during this phase to measure the combined impact of VSM and peer training. Selection of peer mentors took place prior to the collection of baseline data. However, training of peer mentors did not occur until after the implementation of the VSM-only phase. Two typically developing peers participated in the peer-training intervention. The primary goals of the training were to teach the peers about autism and its characteristics, and how to make social initiations and how to respond promptly and appropriately to the initiations of their classmates with ASD during play activities in the classroom. The peer-training phase lasted 2 weeks. Peer training was conducted by the first author, who has extensive experience conducting peer-training programs and social skill interventions in school and clinical settings.

Training for the peers occurred in small group lessons apart from the typical classroom two times per week and for 30 minutes per lesson. In these lessons, the first author briefly described the importance of being a good peer buddy, provided information regarding the behaviors of their peer with ASD (e.g., various stereotypical behaviors exhibited by Adam and Bob), reviewed peer buddy skills previously introduced (e.g., how to initiate play), introduced new skills, and then modeled the performance of the new skill. Skills taught to the peer buddies included initiating and responding appropriately and promptly to their peer with ASD. A verbal description of the skill was provided to the child, followed by examples that highlighted the use of the social skill with a child in his or her classroom. Each peer was then required to practice the use of the skill with the other peer in the group. The peer-training lessons also included the peers with ASD for a portion of the lesson to promote transfer of skills from the training session to the typical classroom. For instance, the peer mentors would establish a game and then each take turns asking their two peers with ASD to join the game. The peers were given stickers at the conclusion of each session for "being a good peer buddy." To facilitate the generalization to the classroom setting, the teacher was instructed to prompt each peer mentor to initiate with his or her classmates with ASD at least three times per day during the peer-training phase (but only when the research team was not conducting observations).

Design and Data Analysis

A combined multiple baseline across participants and changing conditions design was used in the present study. The combined series design followed an A-B-C-A progression for Adam and Bob, and an A-B-A progression for Chuck. The effectiveness of the intervention was determined in part through visual inspection of the graphical representation of the data, including the immediacy of change in the dependent variables following the introduction of the independent variables, the degree of overlap in data points across phases, and an analysis of the slope and direction of the dependent variables across phases. A trend analysis was conducted via the construction of a split middle line of progress (White and Haring, 1980). In addition to visual inspection, the magnitude of change in the dependent variables across phases was analyzed by descriptive analysis of mean rates of engagement across phases and through the calculation of the nonparametric effect size metric, improvement rate difference (IRD). IRD (Parker, Vannest, & Brown, 2009; Parker, Vannest, & Davis, 2011) is an effect size metric that represents the rate of improvement between baseline and intervention phases. IRD shares many of the same characteristics and strengths of other overlap procedures such as percent of nonoverlapping data and percent of data points exceeding the median (e.g., easily interpretable results), but with improved statistical precision and with less vulnerability to outliers (Parker et al., 2009). The present study employed the robust IRD procedure (Parker et al., 2011), which provides an outcome metric that is the equivalent of phi. Parker et al. (2009) provides the following guidelines for interpreting the magnitude of IRD: scores less than or

equal .50 have questionable effects, scores between .50 and .70 have moderate effects, and scores greater than .70 have strong effects.

RESULTS

The percentage of social engagement for each participant is displayed in Figure 1.

Intervention and Maintenance Effects

Adam's mean rate of social engagement during baseline was 1%. Adam's level of social engagement was stable and flat at baseline, ranging from 0 to 5%. His engagement increased to 22% during the VSM-only phase with an ascending trend line, and 17% during VSM + peer-training phase with a flat trend line. All intervention data points were higher than the mean rate of engagement at baseline. IRD between baseline and VSM was .86, indicating a strong effect size for the VSM intervention. IRD between the VSM-only phase and the VSM + peer-training phase was −.21, indicating no improvement between the two phases. Adam's mean rate of social engagement was 8% during the maintenance phase. IRD between baseline and maintenance was 1.00, indicating a strong rate of improvement across these two phases.

Bob's mean rate of engagement was 0% at baseline with a flat trend line. His engagement increased to 8% during the VSM-only phase, with a flat trend line, and 6% during the VSM + peer-training phase also with a flat trend line. Bob's rate of engagement during the intervention was consistently higher than baseline levels, with only two data points falling below the mean of baseline. IRD between baseline and VSM for Bob was .79, indicating a strong effect size for the VSM intervention. IRD between the VSM-only phase and the VSM + peer-training phase was .12, indicating no improvement between the two phases. Bob's mean rate of engagement during the maintenance phase was 4%. IRD between baseline and maintenance was .36, indicating questionable improvement across the two phases.

Chuck's mean rate of social engagement at baseline was 20%, with a decreasing trend line. His rate of social engagement was inconsistent, ranging from 2% to 58%. This was because his primary playmate was frequently absent during baseline and left the school following the eighth observational session. Circles were added to Chuck's data on the figure to indicate which days this peer was present. During the first eight observation sessions, Chuck played almost exclusively with this one typically developing peer. These data were consistent with his teacher's report of his variable social behavior. Chuck's mean rate of engagement increased to 37% during the VSM-only phase, with a flat trend line. Engagement during the VSM-only phase also stabilized, with all but one data point falling above the mean rate of engagement of baseline. IRD between baseline and VSM was .56, indicating a moderate effect size for the VSM intervention. Chuck's mean rate of engagement increased to 77% during the maintenance phase with a steep upward trend line. IRD between baseline and maintenance was .79, indicating a strong rate of improvement between these phases.

Social Validity and Intervention Fidelity

The classroom teachers reported that the intervention was easy to implement and that they enjoyed being a part of the VSM intervention. The teachers' responses on the weekly social validity questionnaires indicated that the VSM intervention did not interfere with normal classroom activities and that it was not distracting to other students. (Please contact the lead author for a copy of the social validity and treatment fidelity measure used in the present study.) Both teachers "strongly agreed" that the VSM intervention was beneficial for their students and that the boys enjoyed watching the videos. Adam and Bob's teacher indicated that both boys enjoyed watching the video; however, Adam required frequent prompting to attend to the video on the first day. After the first day the teacher reported that Adam was attentive throughout each video clip. Adam watched his video every day with the exception of one day when he was absent. Bob failed to watch his video on three days of the intervention phase, also

Figure 1. Percentage of Unprompted Social Engagement With Peers
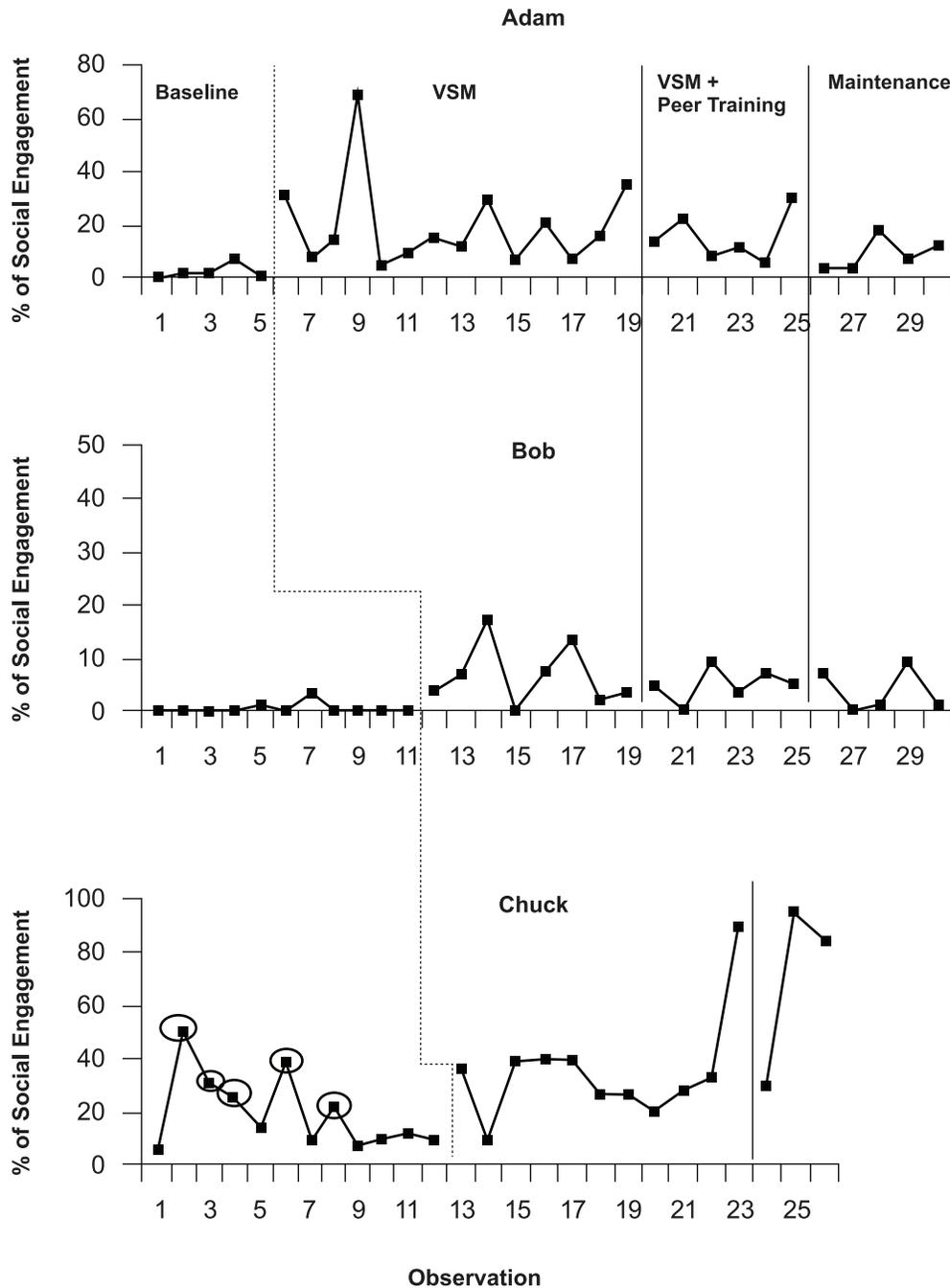
Note. Data were collected during classroom "free-choice" activity using a partial interval system of recording with 10 second intervals. Circles indicate days when Chuck's primary playmate attended school. He withdrew from school after the eighth observational session.

due to absences. In contrast to the VSM intervention, Adam and Bob's teacher did not believe the peer-training portion of the intervention was beneficial to her students, and she "strongly disagreed" that the intervention was easy to implement. She reported that it was very difficult to remember to prompt the peer mentor to initiate with his or her classmate with ASD the requisite three times per day. On the open-ended item of the social validity questionnaire, Chuck's teacher noted that equipment failure prevented

her from showing the video clip to him at least one time per week. Chuck's teacher also noted that he began to use phrases from the video by the end of the first week, such as "let's play boats" and "cool game." She also noted that prior to the VSM intervention Chuck played almost exclusively with one other child. However, following the VSM intervention, Chuck played with a greater number of children. Bob's teacher reported that she observed Bob playing near other children after the first week of viewing the videos. She indicated that after the introduction of VSM intervention, Bob was less likely to withdraw from the other children during free play activities. Intervention fidelity as measured by the implementer self-report checklist was 100% during the three of the four peer-training sessions and 67% in the fourth session because of an unanticipated change in the school schedule. In this session, the peer training was reduced from 30 to 20 minutes to accommodate the change in the schedule.

DISCUSSION

The primary purpose of the present study was to examine the potential of a VSM intervention, with and without peer training, to increase the social engagement of young children with ASD. The VSM-only phase led to increases in unprompted social engagement for all three preschool-age children with ASD. Change in the dependent variable was also rapid for all three participants. This finding is consistent with the growing body of literature that has documented the effectiveness of VSM for youth with ASD, and provides further support for its inclusion as an evidence-based practice for this population (National Autism Center, 2015). VSM provides educators with an opportunity to provide the child with a visual representation of the target behavior. This is particularly important for children with ASD who are thought to benefit from visually cued instruction.

When compared to the expected engagement levels of typically developing preschool-aged children, Adam and Bob's level of social engagement remained at relatively low levels following the VSM intervention (22% and 8%, respectively). However, when we consider that social engagement was virtually nonexistent for Adam and Bob (1% and 0%, respectively), the increases in unprompted social engagement with peers after just 3–4 weeks of the VSM intervention are substantial and important from both a clinical and developmental perspective. In both cases, Adam and Bob were described as extremely socially withdrawn and isolated from their peers prior to the intervention. Adam and Bob's classroom teacher noted discernible improvements in social engagement for both children following the VSM intervention. The teacher also noted that both boys were more likely to play near and engage in parallel play with classroom peers. Though these behaviors did not involve active interaction with peers, and thus were not coded as "engagement" in the present study, they do represent important and meaningful behaviors for children in preschool settings. Chuck's social engagement also increased during the intervention phase of the study. For Chuck, social engagement was inconsistent at baseline, but became more stable following the VSM intervention. His teacher also reported that he played with a greater number of peers following the intervention.

We hypothesized that social engagement would increase following the inclusion of a peer-training phase. Thus, the purpose of the peer-training phase was to teach typically developing classroom peers how to initiate and respond to their classmates with ASD. However, the addition of a peer-training intervention did not lead to changes in social engagement when compared to the VSM-only phase. This was somewhat surprising given the extensive empirical support of peer-mediated interventions for young children with ASD (National Autism Center, 2009) and our own clinical experience utilizing this procedure as part of a systematic social skills program (Bellini, Benner, & Peters-Myszak, 2009). Nonetheless, much can be learned from these unexpected results.

There are a few potential reasons for the lack of improvement in social engagement following the implementation of the peer-training procedure in the present study. First, the peer-training intervention implemented in the present study was brief. Indeed, the peer-training procedure lasted only 2 weeks. Though previous meta-analytical studies on VSM have confirmed its effectiveness in changing behaviors

in a short period of time (i.e., less than 2 weeks; Bellini & Akullian, 2007), it is likely that peer-training interventions need to be more comprehensive and longer in duration to effectively change the behaviors and/or attitudes of peers (see Odom & McConnell, 1993, as an example of a comprehensive peer-training procedure). It is probable that the outcomes of the current study would have been improved had the intervention dosage been more substantial.

Second, the peer-training phase followed the VSM-only phase. The order in which the independent variables were introduced may have contributed to the lack of change between phases. The sequence of independent variable introduction was purposeful, as we wanted to measure whether the inclusion of a peer-training phase would further improve social engagement of the children with ASD following a VSM-only phase. Finally, the present study did not directly measure the social behaviors of the typically developing peers. Our explicit focus was to determine whether the peer-training procedure would increase the social engagement of the children with ASD. This was based on social validity data collected in previous research (Bellini, Akullian, & Hopf, 2007) where teachers reported that classroom peers were often unresponsive to the initiations of children with ASD. It is possible that the brief peer-training procedure did indeed change the behavior of the typically developing peers, but in a manner that was not measured by the present study.

Practical Implications for School Psychologists and Other School Personnel

The results of the present study provide information on the practical application and social validity of the VSM procedure. This is a particularly important area of inquiry given the fact that video modeling is still a relatively new intervention strategy in educational settings. In regard to social validity, the teachers in the present study reported that the VSM intervention was easy to implement and was beneficial to the participants. They reported that the procedure did not disrupt normal classroom activities, nor was it distracting to other children in the classroom. Selecting strategies that are perceived to be effective and easy to implement are important considerations when consulting with classroom teachers.

The videos produced in the present study followed recommended procedures in regard to length, use of multiple exemplar videos, minimal verbal instructions, and the showing of only positive or efficacious behaviors (Bellini & Akullian, 2007; Dowrick, 199). The video clips used in the current study were quite short, just 1 minute in duration. This allows the viewing of the video clips to be easily incorporated into the regular school schedule. Three video clips were produced for each child so that the child did not view the same video on consecutive days. To avoid distracting the students with ASD, teachers were instructed to not speak to the child during the viewing of the video unless necessary to prompt attention to the video screen. Finally, the videos depicted only positive and efficacious behaviors. Mistakes, errors, and adult assistance were removed from the videos. Finally, psychologists and other school personnel who implement a VSM procedure in a school setting should be advised to follow three simple rules: keep it short, keep it simple, and keep it positive.

Results of the present study support the recommendations outlined by previous meta-analytical research that indicates social skill intervention are most effective when implemented in the child's typical classroom rather than a contrived clinical setting (Bellini et al., 2007; Gresham et al., 2001). The intervention in this study was implemented in the children's classroom and included classmates of the children with ASD. This is particularly important for young children with ASD, who may have considerable difficulties transferring skills across settings and persons. These findings have important implications for school-based social skill interventions. School psychologists and other school personnel should look for opportunities to teach social skills in the child's natural environment as opposed to pullout settings.

The results of the present study also support the use of two types of VSM interventions in school settings: positive self-review and feed forward (Dowrick, 1999). In the present study, we showed footage of the children successfully and independently engaged in social interactions with peers. In some

instances the social engagement occurred spontaneously without additional adult support (i.e., positive self-review). However, in most cases, the social engagement required high levels of teacher prompts. The prompting was then removed from the final video clips via editing (i.e., feed forward).

In positive self-review interventions, target behaviors are recorded, then errors or nonsalient video footage are edited out to show only the desired behavior. This results in a video that shows an example of the individual's best performance of the target behavior. For instance, a child with low levels of task engagement could be recorded while working on a particular task. In positive self-review, the edited video would only depict the on-task behavior while eliminating the footage of the off-task behavior. Feed-forward interventions require more editing than positive self-review interventions but have many useful applications in a school setting. Feed-forward videos are created by splicing together component skills (for multiple step tasks) or by editing out adult prompts (Dowrick, 1999). By hiding support (i.e., editing out adult prompts) and removing performance errors from the video clips, the individual is able to watch himself or herself perform a task autonomously and efficaciously. For example, a child may require high levels of adult prompting to remain on task during an activity. The video would then be edited to remove the prompts, resulting in a video that depicts the child autonomously engaged in the task. The use of this hidden-support method can also be useful as a prompt-fading procedure to minimize prompt dependency.

Limitations and Suggestions for Future Research

Though the present study provides valuable information on the benefits of VSM in increasing the social engagement of young children with ASD, a few limitations and suggestions for future research are noted. A major limitation of the present study was the failure to collect data on social engagement across settings not featured on the video, such as recess. Future research should examine the generalization effects of VSM by measuring outcomes in multiple naturalistic settings.

Though interobserver reliability was established, the present study would have been strengthened with a rotational system of observation. In the present study, the three observers were assigned to a specific participant throughout all phases of the study. This method makes the study more vulnerable to observer bias and observer drift. To reduce these threats to internal validity, observers could switch from one participant to another throughout all phases of the study.

The peer-training procedure was implemented for only two of the three participants. This is a major limitation of the study, and, as such, the results of the peer-training procedure should be interpreted with caution. Chuck's potential peer mentor unexpectedly left the school following the eighth observation session. Since Chuck had no other typically developing peers in his classroom, we were unable to implement the peer-training procedure for him. Though unexpected and unavoidable, the use of two participants significantly diminishes experimental control, and impedes our ability to establish a clear functional relationship between the peer-training procedure and the dependent variable measured in the present study.

Though research has documented the efficacy of VSM, little is known regarding the participant, setting, and procedural features that lead to the most effective intervention outcomes for children with ASD. For instance, additional research is needed to identify the specific age groups or developmental characteristics (e.g., verbal versus nonverbal) that benefit most from VSM. Similarly, no empirical data exist to support the optimum dosage and length of VSM interventions. For instance, how many weeks should the intervention last? How often should we show the video? How long should each video clip last? Future researchers should address these questions explicitly in their research design and methodology.

In light of the previously noted issues with the sequencing of the VSM and peer-training phases, and the brief duration of the peer-training phase, future research should examine the effectiveness of peer-training intervention by introducing the peer-training procedure before the VSM intervention, and by

implementing the peer-training component for a longer duration. In addition, future research should directly measure the social behaviors of the typically developing peers to better discern the effects of the brief peer-training procedure. Finally, the classmates who participated in the peer-training procedure did not participate in a VSM procedure. It might prove useful to show the typically developing peers a sequence of video clips depicting themselves engaging in positive and successful interactions with their classmates with ASD.

CONCLUSION

Results of the present study add to an emerging body of research demonstrating the efficacy of VSM in improving the social outcomes of children with ASD. The VSM intervention led to rapid and marked improvements in social engagement for all three participants with ASD. However, the addition of a peer-training intervention did not lead to improvement in social engagement compared to the VSM-only phase. Future research is needed to examine both the efficacy of VSM and peer-training interventions to examine factors that lead to the most beneficial outcomes for children with ASD.

SUGGESTED RESOURCES ON VSM AND PEER TRAINING

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