Video Modeling Interventions for Individuals with Autism

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ABSTRACT

Video modeling interventions involve a child watching videotapes of positive examples of adults, peers, or him- or herself engaging in a behavior that is being taught. The purpose of this review was to examine empirical studies in which video modeling interventions were applied to individuals with autism. Nineteen studies published between 1985 and 2005 met the inclusion criteria for this review. The findings suggest that video modeling interventions are effective in teaching a variety of skills to children with autism. Descriptive summaries are provided for each study. Directions for future research and implications for practitioners are provided.

Autism is a developmental disability significantly affecting verbal and nonverbal communication and social interaction that has an adverse impact on a child's educational performance (U.S. Department of Education, 1999). The incidence of students classified in this category of disability almost doubled from 1997 to 2000 (U.S. Department of Education, 2001). Children with autism may display attention deficits, engage in repetitive behaviors, resist environmental changes, and have unusual sensory experiences. Educational programs for children with autism must address communication and language development, social and affective development, life skills, and academics. Furthermore, some individuals with autism may engage in high rates of problem behaviors that require the development of positive behavior support plans. Thus, children with autism present a unique set of challenges to caregivers and educators. Consequently, identifying effective educational interventions for this population is a critical task for researchers and practitioners.

Consistent with Bandura's (1969) social learning theory, video modeling is a versatile intervention that capitalizes on the potency of observational learning and is well suited to address the educational needs of children with autism. Video modeling interventions involve a child watching videotapes of positive examples of adults, peers, or him- or herself engaging in a behavior that is being taught (Haring, Kennedy, Adams, & Pitts-Conway, 1987). The term *video modeling* is used broadly in the present study to encompass interventions that use the self as model (video self-modeling) and interventions that use another as model (e.g., peer or adult). Videotapes are individualized for the student and may be created for a wide array of skills (e.g., social, communication, functional) and in a variety of settings (e.g., home, school, community).

Although there have been several comprehensive reviews in which researchers have examined the literature on video self-modeling (Dowrick, 1999; Hitchcock, Dowrick, & Prater, 2003), these reviews have not focused on individuals with autism, nor have they examined additional video modeling procedures (e.g., the use of another as model). The purpose of this review was to summarize empirical studies published in the past 20 years that evaluated the use of video modeling interventions with children with autism. The following five research questions were addressed:

1. What participant characteristics and settings were described in the studies?

Volume 28, Number 1, January/February 2007, Pages 33–42

2. What type of video modeling intervention was used most frequently (self as model or other as model)?
3. What skill areas were addressed, and what types of dependent measures were used?
4. What types of research designs were employed, and how often were data collected concerning interobserver agreement, treatment fidelity, and social validity?
5. How effective were video modeling interventions in improving the skills of individuals with autism?

METHOD

Search Procedures

An electronic search of the Educational Resources Information Center (ERIC) and PsycINFO databases was conducted for the years 1985–2005. Keywords used in the search were *autism*, *Asperger syndrome*, *video interventions*, *videotape modeling*, *video modeling*, and *video self-modeling*. Studies cited in each article were checked to locate additional articles.

Selection Criteria

Articles selected for this review had to meet several criteria. First, articles were published in a peer-reviewed journal between 1985 and March 2005. Second, articles described experimental research in which an independent variable was manipulated and quantitative measures of a dependent variable were included. Studies without a carefully defined experimental design or studies without quantitative data were excluded. Third, the participants in the studies were identified as having an autism spectrum disorder. Fourth, the primary independent variable was a video modeling intervention. Studies in which a video modeling intervention was part of a treatment package or part of a computer-based instructional program were excluded. Finally, the videotapes used in all studies were individualized and created specifically for the research participants. Studies that evaluated the use of commercial videotapes were not included in the review.

RESULTS

The search procedure identified 19 studies that met the criteria for inclusion in this review. Each study is summarized in Table 1.

Participant Characteristics and Settings Described

Seven female and 48 male individuals with autism participated in the 19 studies reviewed (N = 55). Fifteen of the investigations involved fewer than 4 participants, and four of the investigations involved between 4 and 7 participants. Participants ranged in age from 3 to 20 years, with more than half of the participants being under 8 years of age. Only 6 participants were 12 years or older, and 3 of these were 20 years of age.

Eight studies focused on settings within a special education program (e.g., specialized after school program, self-contained class). Two studies were conducted in an integrated preschool or kindergarten classroom, and a private inclusive school served as the setting for three studies conducted by Buggey (2005). Researchers in five studies collected data in home settings, and community settings were described in one study.

Type of Video Modeling Intervention Used

The majority of studies reviewed evaluated the use of other as model (peer or adult). Several studies examined video self-modeling (i.e., self as model). Most of these were conducted by the same researcher. Two studies involved comparisons.

Other as Model. Adults or peers were used as models in 12 studies. A video was created in which target behaviors were performed by an adult or peer. Participants with autism viewed the video prior to entering the setting in which the target behaviors were measured. For example, D'Ateno, Mangiapanello, and Taylor (2003) created videotapes using adults to model three appropriate play sequences including baking, shopping, and a tea party. A child with autism viewed a video of one play sequence. After a delay of at least 1 hour, the child with autism was provided with the play materials that were used in the video, and data were collected on the child's play behaviors. Throughout the study, this procedure was repeated for each of the three play sequences. Adult models were used in 5 studies. Peer models were used in 7 studies. Peers interacted with an adult in 6 of the 7 studies with peer models.

Self as Model. Researchers evaluated a second type of video modeling procedure, video self-modeling, in five studies. This procedure was similar to the first procedure; however, instead of using peer or adult models, the children with autism served as their own models. Videotapes were created and edited to show the child with autism performing the target skill. This can be accomplished by taping the child's behavior over time and editing the tape so that only examples of appropriate target behaviors are on the final tape (Buggey et al., 1999). Another method of creating the videotapes is to have the student with autism imitate or role-play the target behavior and edit the tapes so that only appropriate target behaviors are on the final tape. During intervention, the child with autism watches a videotape of him- or herself performing the target behaviors and then participates in the activity that was depicted in the tape. Three studies that evaluated video self-modeling were conducted by Buggey (2005), and one was conducted by Buggey et al. (1999). Wert and Neis-

worth (2003) completed the other evaluation of video self-modeling. Furthermore, video self-modeling was implemented with one participant by Nikopoulous and Keenan (2003) after video modeling with an adult serving as the model did not lead to an increase in social initiations. Neither intervention led to an increase in social initiations for this participant.

Comparison Studies. Charlop-Christy, Le, and Freeman (2000) compared the use of video modeling and in vivo modeling to teach developmental skills (e.g., coloring, brushing teeth) to five children with autism. Children watched a videotape of an adult model performing the target behavior in the video modeling condition. Children watched a live model perform the target behavior in the in vivo condition. Children's acquisition of the tasks was faster in the video modeling condition than in the in vivo condition. Video modeling also facilitated generalization. Charlop-Christy et al. (2000) suggested that video modeling may have been more effective than in vivo modeling because video modeling may help children with autism focus on relevant cues; watching videos may be reinforcing to some children with autism, and the intervention makes no social demands on the children.

A second comparison study (Sherer et al., 2001) compared self versus other video modeling interventions to teach children to answer conversation questions. The results suggested no difference in the rate of task acquisition between the two intervention conditions.

Skill Areas and Types of Dependent Measures

Four general areas were targeted for instruction in the studies that were reviewed. These areas included social–communicative behaviors, functional living skills, answering perspective-taking questions, and challenging behaviors (e.g., tantrums, pushing).

Social–communicative behaviors were targeted in 12 investigations. Specifically, these behaviors included social initiations and language production (Buggey, 2005), duration of appropriate play and latency to social initiation (Nikopoulous & Keenan, 2003, 2004), verbal statements about play (D'Ateno et al., 2003; Taylor, Levin, & Jasper, 1999), conversational speech (Charlop & Milstein, 1989; Buggey et al., 1999; Sherer et al., 2001), compliment giving (Apple, Billingsley, & Schwartz, 2005), and spontaneous requesting (Wert & Neisworth, 2003). Although the majority of studies reviewed focused on the acquisition of social–communicative skills, only three research teams (Apple et al., 2005; Buggey, 2005; Taylor et al., 1999) repeatedly evaluated the students' performance with nondisabled peers or siblings in a natural setting. Six research teams (Buggey et al., 1999; Charlop & Milstein, 1989; D'Ateno et al., 2003; Nikopoulous & Keenan, 2003, 2004; Sherer et al., 2001) examined the students' performance with an adult conversation partner, and two of these (Charlop & Milstein, 1989; Sherer et al., 2001) conducted generalization probes with a nondisabled peer or sibling. In one study, it was unclear whether the target children's communicative partners were peers with or without disabilities.

Functional living skills were the focus of two investigations. Haring et al. (1987) used video modeling to teach purchasing skills to students. Shipley-Benamou, Lutzker, and Taubman (2002) taught young children a variety of skills, including setting a table, mailing a letter, caring for a pet, and squeezing orange juice.

Video modeling was used to teach perspective-taking skills in two studies (Charlop-Christy & Daneshvar, 2003; LeBlanc et al., 2003). Children with autism are said to have difficulty developing a *theory of mind*, or the ability to understand that people's mental states guide their behavior (Baron-Cohen, Leslie, & Frith, 1985). Researchers (e.g., Baron-Cohen et al., 1985; Ozonoff & Miller, 1995; Swettenham, 1996) have used a variety of perspective-taking tasks in experimental settings to examine children's theory of mind abilities. Children are presented with a scenario and then asked questions that require them to demonstrate an understanding of another person's perspective. Charlop-Christy and Daneshvar (2003) and LeBlanc et al. (2003) taught children how to complete similar perspective-taking tasks.

Problem behavior was the focus of two studies conducted by Buggey (2005). A video self-modeling procedure was implemented to reduce tantrum behavior in one study and pushing in another study.

Social–communicative behaviors, functional living skills, perspective-taking skills, or challenging behaviors were examined in all but one of the studies included in this review. Charlop-Christy et al. (2000) identified appropriate target behaviors for each of five participants and examined an assortment of skills, including expressive labeling of emotions, independent play, greeting, conversational speech, self-help skills, comprehension, cooperative play, and social play.

Types of Research Designs and Fidelity and Validity Measures

Research Designs. Single-subject research designs were used in each study. Seventeen studies used a multiple baseline design. One study (Sherer et al., 2001) combined a multiple baseline across participants design with an alternating treatment design. A multiple treatment design was implemented in one study (Nikopoulous & Keenan, 2003).

Interobserver Agreement. All of the 19 studies included in this review reported acceptable mean levels of interobserver agreement (80% agreement ratio; $\kappa = 60\%$). However, D'Ateno et al. (2003) obtained a few instances of low interobserver agreement measures (e.g., 60%) for unmodeled and unscripted responses. They suggested that these low rates occurred because there were very few of these responses that were made in any one session.

Treatment Fidelity. None of the 19 studies provided a measure of treatment fidelity for video modeling. Apple et al.

TABLE 1. Key Components of Video Modeling Intervention Studies

Study	Participants	Setting	Skill	Maintenance	Generalization	Social Validity	Treatment Fidelity	Interobserver agreement
Apple et al. (2005), Study 1	2 boys 5 years of age	Integrated preschool	S	+	0	+	+	+
Apple et al. (2005), Study 2	2 boys/1 girl 5 years of age	Integrated preschool & kindergarten	S	0	+	+	+	+
Buggey (2005), Study 1	2 boys Ages 9–11 years	Inclusive private school	S	+	0	+	0	+
Buggey (2005), Study 2	2 boys Ages 6–8 years	Inclusive private school	B	+	0	+	0	+
Buggey (2005), Study 3	1 boy Age 5 years	Inclusive private school	B	+	0	+	0	+
Buggey et al., (1999)	2 boys/1 girl Age 7–12 years	Home	S	+	0	+	0	+
Charlop & Daneshvar (2003)	3 boys Age 6–9 years	Special education program	P	+	+	0	0	+
Charlop-Christy, Le, & Freeman (2000)	4 boys/1 girl Age 7–11	Special education program	M	0	+	+	+	+
Charlop & Milstein (1989)	3 boys Age 6–7 years	Special education program	S	+	+	+	0	+
D'Ateno, Mangiapanello, & Taylor 2003	1 girl Age 3 years	Special education program	S	0	0	0	0	+
Haring et al. (1987)**	2 boys/1 girl Age 20	High school community	F	+	+	0	0	+
Le Blanc et al.(2003)	3 boys Age 7–13	Special education program	P	+	+	0	0	+

(Table 1 continues)

(Table 1 continued)

Study	Participants	Setting	Skill	Maintenance	Generalization	Social Validity	Treatment Fidelity	Interobserver agreement
Nikopoulos & Keenan (2003)	6 boys/1 girl Age 9–15	Special education program	S	+	+	+	0	+
Nikopoulos & Keenan (2004)	3 boys Age 7–9	Special education program	S	+	+	0	0	+
Sherer et al., (2001)	5 boys Age 5–11	Home	S	+	+	0	0	+
Shipley, Lutzker, & Taubman (2002)	2 boys/1 girl Age 5	Preschool assessment room	F	+	+	+	0	+
Taylor, Levin, & Jasper (1999), Study 1	1 boy Age 6	Home	S	0	0	0	0	+
Taylor, Levin, & Jasper (1999), Study 2	1 boy Age 9	Home	S	0	0	0	0	+
Wert & Neisworth 2003	4 boys Age 3–6	Home/School	S	+	+	0	0	+

Note. F = Functional skill; S = Social–communicative skill; P = Perspective-taking skill; B = Challenging behavior; M = Multiple skills; + Indicates characteristic was assessed in the study; 0 Indicates characteristic was not assessed in the study.

(2005) reported procedural reliability for the prompting behavior of teachers and peers during observation sessions. Charlop-Christy et al. (2000) addressed treatment fidelity for an in vivo modeling condition, but not for the video modeling condition. The fact that researchers did not address treatment fidelity of video modeling procedures may be due to the nature of the intervention. The intervention procedures require that participants view a brief video depicting a target skill. The simplicity of this procedure may make it difficult to provide a meaningful measure of fidelity of treatment implementation. However, it may be possible to assess the fidelity of procedures used to create the video modeling tapes or to evaluate the accuracy with which the target skill is modeled on the video. For example, much like the raters in Charlop-Christy et al. (2000) observed the action of in vivo models and marked correct demonstration of the target skills, raters could view video modeling tapes to make certain that models correctly performed the target skills. Evaluating videotapes in this manner would at least ensure that each tape contained an accurate demonstration of the target skill and, thus, provide some measure of treatment fidelity.

Social Validity. Five studies reported specific measures of social validity. A pre- and posttest questionnaire was administered to parents in both investigations reported by Apple et al. (2005). The questionnaire required adults to rate student performance in relation to the dependent measures. These investigators also conducted pre- and posttest interviews with the target students to assess their understanding of the target skills. Charlop and Milstein (1989) and Nikopoulous and Keenan (2003) also evaluated the level of change in the dependent variables. However, instead of using a questionnaire procedure, these investigators asked parents to watch videotapes of baseline and intervention sessions and to rate the child's behavior in relation to the dependent measure.

Charlop-Christy et al. (2000) reported data on the time and cost-effectiveness of video modeling and in vivo modeling (using live models). Overall, their results suggested that video modeling requires less staff time and is less expensive than in vivo modeling. Charlop-Christy et al. (2000) also selected target skills for each participant according to the child's specific performance in the school curriculum. Several other researchers (Buggey, 2005; Buggey et al., 1999; Shipley-Benamou et al., 2002) attended to social validity by carefully seeking input from parents and teachers about skills needed by the participants and reporting anecdotal data regarding parents' perception of the outcome of intervention.

Effectiveness of Video Modeling Interventions

Overall, the data in the 19 studies reviewed suggest that video modeling interventions were related to positive gains in social–communicative skills, functional skills, perspective-taking skills, and problem behavior. However, five research teams (Apple et al., 2005; D'Ateno et al., 2003; Nikopoulous & Keenan, 2003; Sherer et al., 2001; Taylor et al., 1999) reported mixed results. Except for one study in which the use of self as model was compared to the use of other as model (Sherer et al., 2001) and another study in which self-modeling was used with one of seven participants (Nikopoulous & Keenan, 2003), these research teams investigated the use of other as model. Each of these research teams investigated the application of video modeling to increase social–communicative skills. Video modeling alone was not associated with an increase in social initiations or novel responses in three studies, and three of seven participants did not engage in social initiations in one study.

There are several plausible explanations for these mixed results. First, video modeling alone may not always provide the intensity of instruction necessary to increase initiations in children with autism. Video modeling may need to be combined with another intervention to increase initiations. This was demonstrated when participants in Apple et al. (2005) made gains after a reinforcement or self-management procedure was added to the video modeling intervention. Second, a self-modeling procedure rather than an other as model procedure may be effective in improving social initiations. To date, two research teams (Buggey, 2005; Wert & Neisworth, 2003) have evaluated the effects of video self-modeling on initiations in children with autism. Both reported positive results. However, Nikopoulous and Keenan (2003) did not report gains in social initiations when they implemented video self-modeling with a study participant who had not shown progress with an other as model procedure. Finally, researchers who reported mixed results suggested that individual characteristics of participants (e.g., visual processing skills, rate of challenging behavior, expressive language skills) might be related to variable outcomes.

Maintenance. Maintenance was assessed and positive results were reported in 14 studies. Maintenance data were collected for brief periods of time (e.g., 2 days) and for longer periods of time (e.g., 15 months). Maintenance data were collected immediately following the conclusion of the intervention in half of the studies reviewed, and maintenance was assessed 1, 2, or 3 months after intervention was withdrawn in half of the studies. One research team (Charlop & Milstein, 1989) repeatedly assessed maintenance over a 15-month period of time by conducting probes 1, 2, 3, 6, and 15 months after the intervention phase. Regardless of the timing of maintenance checks, researchers reported positive findings.

Generalization. Generalization was assessed in 10 studies, and another study (Wert & Neisworth, 2003) described a procedure in which the intervention was delivered at home and positive effects were observed in school. Generalization across three conditions (setting, people, and material) was assessed in three studies (Charlop & Milstein, 1989; Charlop-Christy et al., 2000; Nikopoulous & Keenan, 2003), and positive results were reported. Generalization across two con-

ditions was assessed in two studies. Charlop-Christy and Daneshvar (2003) reported generalization across responses or stimuli for two participants and generalization across both conditions for a third participant. Two participants in the study by Sherer et al. (2001) demonstrated generalization across setting and people. Three research teams (Apple et al., 2005; Haring et al., 1987; Shipley-Benamou et al., 2002) described positive results when generalization across setting was assessed. Two research teams (Le Blanc et al., 2003; Nikopoulous & Keenan, 2004) found positive results when generalization was assessed in one condition. Overall, these results are quite promising. Although generalization was not assessed in the two studies that addressed challenging behavior, students receiving a video modeling intervention in the studies reviewed demonstrated generalization of social–communicative behaviors, functional living skills, and perspective-taking skills. This is an important finding because generalization is a central challenge for learners with autism and there is great need for interventions that can effectively support generalization.

Discussion

This review examined the empirical evidence related to the use of video modeling interventions with children with autism. The major findings include the following:

1. Fifteen of the 19 studies reviewed had fewer than 4 participants, and all but 6 of the 55 participants were under 12 years of age. Haring et al. (1987) was the only study that involved older students, who were 20 years of age and learned purchasing skills in community environments.
2. Thirteen studies were conducted in a school setting (e.g., special education program, integrated preschool, inclusive private school), five studies took place in the participants' home, and community environments were the focus of one study. Social–communicative skills were targeted in each of the studies in which the setting was a child's home. Purchasing skills were taught in the one study of community environments.
3. Self-modeling was implemented in just 5 of the 19 studies reviewed. Social–communicative behavior was the focus of 3 of these studies. Challenging behavior was addressed in 2 studies, and one of these also targeted language production. The finding that few studies examined self-modeling is interesting because a voluminous literature highlights the benefits of using video self-modeling with other populations (Dowrick, 1999; Hitchcock et al., 2003). Positive results were obtained from the 5 studies reviewed here, and additional investigations will help determine the efficacy of this procedure with students with autism.
4. Twelve studies focused on social–communicative behaviors. This emphasis is understandable, as learners with autism often experience severe deficits in this area. The remaining studies addressed functional skills, perspective taking, and challenging behavior.
5. Fifty of the 55 participants who were included in the studies reviewed experienced positive gains in one or more targeted skills. Three participants did not make gains in social initiations (Nikopoulous & Keenan, 2003), and two participants did not reach criterion on responses to questions (Sherer et al., 2001). Three research teams reported that although scripted responses increased, social initiations or novel responses did not improve in the video modeling condition.

Recommendations for Future Research

Although overall, the results of the 19 studies reviewed are promising, there is a need for additional research to further evaluate the use of video modeling interventions with children with autism. There are several ways in which researchers could improve the quality of research on video modeling interventions. First, future studies should be conducted with a larger number of participants. Most of the investigations reviewed involved fewer than four participants. Second, researchers should include measures of treatment fidelity. Just three studies in this review included a measure of treatment fidelity. This finding may in part be due to the fact that the implementation of the intervention in several studies consisted of only a few steps, but this was not the case in all studies. Also, none of the studies evaluated the consistency of the process used to create the videotapes. Evaluating treatment fidelity would ensure that the intervention is developed and implemented as planned across all participants.

It is also critical that researchers make certain that intervention goals are socially important and that the intervention results in socially important changes (Wolfe, 1978). To ensure this, Wolfe (1978) suggested that researchers assess the social validity of intervention goals, procedures, and outcomes. Procedures to identify intervention goals that were meaningful to participants were included by only four research teams (Apple et al., 2005; Buggey et al., 1999; Buggey, 2005; Shipley-Benamou et al., 2002). Other research teams addressed skill deficits typically associated with children with autism, but did so in a contrived context. For example, Charlop-Christy and Daneshvar (2003) and Le Blanc

et al. (2003) implemented a video modeling intervention to improve children's accuracy in answering perspective-taking questions. However, the intervention and assessment occurred in the context of standard, first-order perspective-taking tasks such as the Sally-Anne false belief task (Baron-Cohen et al., 1985). There was no attempt in these studies to determine if the intervention facilitated improved functioning in a natural context.

Likewise, Nikopoulous and Keenan (2003, 2004) and D'Ateno et al. (2003) taught children play skills in a contrived setting instead of in a natural setting with nondisabled peers. In addition to the finding that few studies included a measure of the social validity of treatment goals, the social validity of the intervention procedure was examined in just two studies (Buggey et al., 1999; Charlop-Christy et al., 2000), and two research teams (Apple et al. 2005; Nikopoulous & Keenan, 2003) included a social validity measure of the treatment outcome. This review indicates that video modeling interventions can facilitate rapid skill acquisition in children with autism, but skill development is only meaningful if the skills are useful in normalized settings. Including a larger number of participants, assessing treatment fidelity, and addressing social validity issues are important components of future evaluations of video modeling interventions.

Improving social functioning is a critical intervention goal for children with autism. Although social–communicative skills were addressed in a dozen studies, several researchers assessed these skills in a contrived context, in which the child had an opportunity to interact only with the experimenter. Although this procedure may enhance experimental control, more research is needed to evaluate the effects of video modeling interventions on social functioning in natural settings with nondisabled peers. This research would be more useful if it evaluated the use of video modeling interventions with participants of a variety of ages and included some studies of adolescents with autism. Adolescents with autism often continue to need intervention to improve their social–communicative skills, especially as peer groups become more prominent in middle and high school. Yet, to date, only two studies included a participant who was older than 12.

A large body of literature spanning more than 30 years has demonstrated the benefits of video self-modeling with a variety of populations (Dowrick, 1999; Hitchcock et al., 2003). However, this review identified only three investigations (Buggey et al., 1999; Buggey, 2005; Wert & Neisworth, 2003) that examined the video self-modeling procedure with children with autism. It would also be useful if several different research teams replicated these studies and conducted additional evaluations of video self-modeling with children with autism.

Future researchers may also investigate the use of video modeling interventions to address a wider variety of target skills. To date, most of the research on the use of video modeling with children with autism has focused on improving social–communicative skills. This is important because difficulty with social and communication skills is a defining characteristic of autism. The use of video modeling to improve social–communicative skills remains an important area of inquiry. However, video modeling interventions have been successfully used with other populations of children to improve additional skills. For example, video modeling has been used with other populations (see Hitchcock et al., 2003, for a review) to improve academic engagement (Clare et al., 2000), reading comprehension and fluency (Hitchcock, Prater, & Dowrick, 2004), math achievement (Schunk & Hanson, 1989), and classroom behaviors (Lonnecker et al., 1994; Possell et al., 1999). Given the overall positive results of the studies reviewed here and the fact that many children with autism are receiving at least part of their education in typical classroom settings, research evaluating the use of video modeling to improve academic and classroom skills in children with autism may be beneficial. Such research may have important implications for increasing the success of children with autism in inclusive school settings.

Buggey (2005) examined the use of video modeling interventions to reduce challenging behavior. More research is needed to build on this work and determine if video modeling facilitates the acquisition of skills and also reduces inappropriate behaviors. Buggey (2005) implemented a self-modeling procedure, and future researchers may consider which video modeling intervention is most effective for addressing problem behavior.

Besides pursuing these specific research directions, an important task for researchers is to compare the efficacy of different video modeling interventions and to compare video modeling interventions to more traditional behavioral treatments for children with autism (e.g., in vivo training, discrete trial teaching), to video intervention packages (e.g., Alcantara, 1994), and to computer-assisted instruction (e.g., Dauphin, Kinney, & Stromer, 2004; Simpson, Langone, & Ayres, 2004). Also, Schreibman, Whalen, and Stahmer (2000) designed a video priming procedure in which videos are created from the child's perspective and show settings and tasks as the child would see them. This intervention does not require a model, which may make it more practical for practitioners. A comparison of video priming and video modeling would be a useful contribution to the literature in this area. The two comparison studies reviewed in this article (Charlop-Christy et al., 2000; Sherer et al., 2001) suggested that video modeling promoted generalization and facilitated swifter task acquisition than in vivo modeling, and there was no difference in the rate of task acquisition between self as model and other as model intervention procedures. Comparison studies that replicate these studies will ensure that practitioners have the data needed to select appropriate interventions.

Finally, another important task for researchers is to determine what types of students with autism may benefit most from video modeling interventions. Nikopoulous and Keenan (2003) suggested that students with challenging behaviors may have difficulty with imitation and that perhaps some students would need training in imitation skills to benefit from video modeling interventions. Sherer et al. (2001) reported

anecdotal evidence that children who responded positively to video modeling had higher visual learning skills than children who did not succeed with this intervention, and Charlop-Christy et al. (2000) noted that language skills may play a role in an individual's response to video modeling interventions. These issues provide important directions for future research.

In summary, several principal directions for future research have been identified. There is a need for additional evaluations of the self-modeling procedure with children with autism and for investigations in which researchers compare the efficacy of various video and behavioral interventions. There is also a need for video modeling interventions to be evaluated in natural settings and to address a wider variety of target skills. The use of natural settings is essential in future studies targeting social–communicative behaviors. Finally, researchers face the task of determining which students with autism may benefit from which video modeling interventions.

Implications for Practice

The findings of this review have several implications for practitioners serving children with autism:

- Individuals with autism ranging in age from 3 to 20 years have benefited from the use of video modeling interventions. Most of the research has been conducted with children younger than 12 years of age, so practitioners working with adolescents need to exercise caution and may need to adapt the intervention to suit the needs of older children.
- Children who can attend to a videotape for several minutes without exhibiting challenging behavior may respond well to video modeling interventions.
- Video modeling may be useful in treating some of the central deficits found in children with autism (e.g., social skills, communication skills, functional skills, challenging behavior).
- Video modeling has been effective in home, school, and community settings.
- Video modeling often facilitates rapid skill acquisition, maintenance, and generalization across settings, people, and materials. This is important to note because generalization is often not attained by children with autism using traditional prompting methods and in vivo instruction.
- The use of peer and adult models has been effective in teaching a variety of skills to children with autism and may simplify the process of making videotapes. However, a self-modeling procedure may be more effective in some cases, but additional research with children with autism is needed to clarify this issue.
- Video modeling tapes are relatively easy to create (see Dowrick, 1991; Dowrick & Meuniers, 1999; Neumann, 2004), and implementing the intervention may take only minutes each day.

Conclusion

Researchers have used video modeling interventions with children with autism to improve social, communication, and functional living skills. The acquisition of these skills is vital for children with autism. Researchers are beginning to examine the use of video modeling to address problem behaviors and improve perspective-taking skills. The positive outcomes of the studies reviewed in this article suggest that video modeling interventions are important tools for practitioners working with children with autism, but additional research is warranted. Although this review identifies gaps in the extant literature on implementing video modeling interventions for children with autism, it is important to emphasize the limitations of this research synthesis. A small pool of studies was reviewed, and treatment effects were not measured. Consequently, it is unclear at this time whether video modeling is more or less effective than other models of instruction for learners with autism, and too soon to make detailed recommendations for practitioners. However, video modeling is uniquely suited to the characteristics of individuals with autism, who may have significant language deficits and find it challenging to attend to relevant information and engage in social interaction. As Sherer et al. (2001) noted, video modeling may be an effective intervention for children with autism because it reduces attentional and language demands, does not require social interaction with a teacher, and presents information in a visual format (e.g., watching a video), which may already be reinforcing to many children. Future research may lead to more specific guidelines for practice and additional applications of video modeling interventions for children with autism. ■

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AUTHOR'S NOTE

The author would like to thank Dr. Barbara Wert for sharing her expertise in the use of video modeling interventions and Liz Stone for her review of this manuscript.

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