Journal of
Applied Behavior Analysis

JOURNAL OF APPLIED BEHAVIOR ANALYSIS 2018, **51,** 191–206 NUMBER 2 (SPRING)

TEACHING HELP-SEEKING WHEN LOST TO INDIVIDUALS WITH AUTISM SPECTRUM DISORDER

KELLY A. CARLILE, RUTH M. DEBAR, SHARON A. REEVE, KENNETH F. REEVE

CALDWELL UNIVERSITY

AND

LINDA S. MEYER

LINDA S. MEYER CONSULTING, LLC

Deficits in safety skills and communication deficits place individuals with autism spectrum disorder (ASD) at an increased risk of danger. We used a multiple-probe across-participants design to evaluate the effects of video modeling and programming common stimuli to teach low- and high-tech help-seeking responses to children with ASD when lost. Participants acquired answering or making a FaceTime® call and exchanging an identification card in contrived and natural settings. Responses generalized to novel community settings and maintained during a one- and two-week follow-up. Social validity measures showed that the procedures and outcomes of the study were acceptable to indirect and direct consumers, and immediate and extended community members. Implications are that children with ASD can effectively be taught both low- and high-tech help-seeking responses when lost.

Key words: ASD, programming common stimuli, safety skills, technology, video modeling

In the United States between 2009 and 2011, 91% of total deaths of children with autism spectrum disorder (ASD) up to 14 years old were from accidental drowning after the child had wandered or eloped (Interactive Autism Network, 2011). Forty-nine percent of children with ASD between the ages of 4 and 10 had engaged in elopement behavior (e.g., leaving an area without permission). Of the families that have had a child with ASD elope, 35% reported that their children could not readily answer social questions, such as name, address, or phone number. More than half of those surveyed reported wandering as being the most stressful behavior exhibited and that the stress and fear kept the family from participating in community activities and sometimes disrupted sleeping.

Individuals with ASD are especially at risk of not independently and appropriately seeking help while lost in the community. Individuals with ASD often have limited language and social skills, impacting communication and interaction with others (American Psychiatric Association, 2013). These challenges can make it difficult for an individual with ASD to initiate and respond to social interactions and social questions (e.g., about the individual's name or phone number). Ultimately, these deficits may delay being reunited with caregivers. Deficits in safety skills place individuals with ASD at an increased risk of injury, abduction, getting lost, or death in community settings (American Psychiatric Association, 2013). Teaching safety skills is important to increase the independence and safety of individuals with ASD.

Teaching help-seeking responses when lost has recently received attention from researchers (e.g., Bergstrom, Najdowski, & Tarbox, 2012;

This study was conducted in partial fulfillment of the Ph.D. degree in applied behavior analysis by the first author under supervision of the second author.

Address correspondence to Ruth M. DeBar, Department of Applied Behavior Analysis, Caldwell University, 120 Bloomfield Ave., Caldwell, NJ, 07006; rdebar@caldwell.edu

doi: 10.1002/jaba.447

Hoch, Taylor, & Rodriguez, 2009; Purrazzella & Mechling, 2013; Taber, Alberto, Hughes, & Seltzer, 2002; Taber, Alberto, Seltzer, & Hughes, 2003; Taylor, Hughes, Richard, Hoch, & Coello, 2004). Ages of participants who were taught help-seeking ranged from 10 to 29 years old, with diagnoses of moderate cognitive disabilities (Taber et al., 2002; Taber et al., 2003) or ASD (Bergstrom et al., 2012; Hoch et al., 2009; Purrazzella & Mechling, 2013; Taylor et al., 2004). Interventions used to teach help- seeking included video modeling (Purrazzella & Mechling, 2013), behavioral skills training (Bergstrom et al., 2012), and prompt and prompt fading strategies (Hoch et al., 2009; Taber et al., 2002; Taber et al., 2003; Taylor et al., 2004). Help-seeking responses ranged from (a) identifying when one was lost and using a cell phone (Taber et al., 2002; Taber et al., 2003); to (b) answering a ringing cell phone and providing location information (Taber et al., 2003); (c) responding to a pager by exchanging a communication card (Taylor et al., 2004); (d) answering a cell phone and seeking assistance (Hoch et al., 2009); (e) calling for mom and dad and then finding an employee (Bergstrom et al., 2012); and (f) using a cell phone to record and send a video clip of their current location (Purrazzella & Mechling, 2013).

Although similar responses were taught, teaching procedures and the technology incorporated in the aforementioned studies varied. Some interventions embedded low-tech technology which included materials not relying upon batteries or electricity (e.g., pictures) or high-tech technology, which involved battery- or electricity-operated materials (e.g., cell phone; Scherer, 2009). Most studies used a cell phone (Hoch et al., 2009; Purrazzella & Mechling, 2013; Taber et al., 2002; Taber et al., 2003). One study did not rely upon technology and required participants to vocally communicate they were lost to a store employee (Bergstrom et al., 2012). Another study combined a high-tech response of responding to a vibrating pager with a low-tech response of exchanging a communication card with a community member (Taylor et al., 2004). To date, no study taught separate low- and high-tech responses. It remains unknown whether teaching a low-tech or high-tech response is more effective or efficient. Including an alternative response to a high-tech response seems important as technology for the high-tech responses may become inoperable (e.g., poor signal, dead battery).

To be socially valid, it is critical that help-seeking responses are durable across people, places, and settings, and that they maintain over time. Previous studies assessed generalization in novel community settings (Bergstrom et al., 2012; Purrazzella & Mechling, 2013) or both in novel settings and with novel people (Hoch et al., 2009; Taber et al., 2002; Taber et al., 2003; Taylor et al., 2004). Some of the studies reported mixed results during generalization probes in the community (Bergstrom et al., 2012; Taylor et al., 2004), with one participant requiring booster sessions to demonstrate the response in the generalization setting (Bergstrom et al., 2012). Mixed results for generalization measures is problematic when teaching help-seeking responses because the goal is for the participant to demonstrate the response across a variety of settings and people to help ensure safety. None of these studies systematically programmed for generalization during intervention. Only two studies included maintenance assessments (Bergstrom et al., 2012; Purrazzella & Mechling, 2013), which produced positive results for four of the six participants.

Programming common stimuli (Stokes & Baer, 1977) may be beneficial when the safety skill cannot be easily taught in the natural environment. Even when it would be possible to teach in the natural environment, using naturalistic teaching opportunities may not expose the learner to the full range of stimulus and response variations needed to acquire the response. Additionally, the natural environment may include confounding variables that cannot be predicted or controlled (Mechling, Gast, & Gustafson, 2009). To date, no studies have explicitly programmed common stimuli in a contrived setting when teaching safety skills to individuals with developmental disabilities, including ASD.

Video modeling, which is an intervention that has been demonstrated to successfully teach important life skills such as safety skills (e.g., Akmanoglu & Tekin-Iftar, 2011; Branham, Collins, Schuster, & Kleinert, 1999; Purrazzella & Mechling, 2013), can be used to program common stimuli. Video modeling can be used to teach skills efficiently, as it can lead to faster skill acquisition when compared to in vivo modeling (Charlop-Christy, Le, & Freeman, 2000). By controlling for presentation of instruction, video modeling potentially increases the consistency and integrity of procedures. Videos can display simulated environments, which can provide a safe manner to encounter otherwise dangerous, not commonly encountered, or not easily accessible environments in the community, such as department stores. To date, studies of safety skills have not evaluated the effectiveness of using video models to teach help-seeking responses to individuals with ASD.

The purpose of the present study was to investigate the effectiveness of a packaged intervention for teaching a low-tech (e.g., exchanging an identification card) and a high-tech (e.g., cell phone) help-seeking response. The packaged intervention consisted of video modeling, programming for common stimuli, and an error-correction procedure. Specifically, this study sought to address three questions. First, is a packaged intervention consisting of video modeling and programming for common stimuli effective at teaching low- and high-tech help-seeking responses for use by lost individuals with ASD? Second, does the packaged intervention implemented in a school setting generalize to community settings and other people? Third, would the responses taught maintain over a 1-week and 2-week follow-up? Fourth, will the intervention procedures be acceptable and outcomes satisfactory to parents?

METHOD

Participants

Six males with ASD, ages 3 to 14, participated in this study. Participants were diagnosed by an outside agency according to the *Diagnostic and Statistical Manual of Mental Disorders* (4th ed., text rev.; DSM–IV–TR; American Psychiatric Association, 2000). Participants attended public school across a range of classroom environments including self-contained ABA-based classrooms for children with ASD or multiple disabilities, self-contained special education classrooms, or inclusion classrooms. All participants, except for Eric, had a 1:1 paraprofessional assigned to them throughout the school day. See Table 1 for participant characteristics.

Participants were invited to participate irrespective of mode of communication, the presence of stereotypic behaviors, or prior experience with iOS® technology that included using an iPad®, iPod touch®, and iPhone®. None of the participants had been formally taught to seek help when lost in the past. Selection of participants was based on parent and teacher report of concerns that the child may become lost and not independently seek assistance. Participants were excluded if they (a) could not be out of arms' reach of an adult due to medical concerns as noted by a doctor, (b) did not imitate a video model during preassessments, and (c) did not wear a camera and/or ID bracelet during preassessments. Two participants were excluded because of a seizure disorder and other medical concerns.

Table 1
Participant Description

Participant Age (years: months)	Diagnosis	GARS-3	VB-MAPP	ABAS-3	PPVT-4	EVT-2	Stereotypic Behavior	Identified Lost During Pretest (%)/ Group
Mark 14:6	ASD	ASD Index: 99, Very Likely, Level 2	Milestones: 154, Level 3 Barriers: 11	GAC –SS: 59% tile: 0.3 Extremely Low	SS: 44%tile: <0.1 AE: 5:7 Extremely Low	SS: 63%tile: 1 AE: 6:9 Extremely Low	Motor and vocal	100% Group A
Corey 11:1	ASD	ASD Index: 81, Very Likely, Level 2	Milestones: 169, Level 3 Barriers: 0	GAC – SS: 86 %tile: 18 Below Average	SS: 84 %tile: 14 AE: 8:8 Moderately Low	SS: 88 %tile: 21 AE: 8:11 Average	Vocal	100% Group A
Noah 10:8	ASD	ASD Index: 94, Very Likely, Level 2	Milestones: 143.5, Level 3 Barriers: 12	GAC – SS: 65 %tile: 1 Extremely Low	SS: 68 %tile: 2 AE: 6:4 Extremely Low	SS: 72 %tile: 3 AE: 6:2 Moderately Low	Motor and vocal	100% Group A
Chris 6:3	ASD	ASD Index: 75, Very Likely, Level 2	Milestones: 154, Level 3 Barriers: 7	GAC –SS: 83%tile: 13Below Average	SS: 102%tile: 55 AE: 6:3 Average	SS: 81% tile: 10 AE: 4:5 Moderately Low	Motor and vocal	60% Group B
Alex 3:5	ASD	ASD Index: 66, Probable, Level 1	Milestones: 122, Level 2 Barriers: 15	GAC – SS: 59 %tile: 0.3 Extremely Low	SS: 96 %tile: 39 AE: 3:0 Average	SS: 103 %tile: 58 AE: 3:6 Average	Vocal	50% Group B
Eric 5:0	ASD	Autism Index: 100, Very Likely, Level 2	Milestones: 124.5, Level 2 Barriers: 13	GAC – SS: 86 %tile: 18 Below Average	SS: 88 %tile: 21 AE: 4:2 Average	SS: 90 %tile: 25 AE: 4:2 Average	Motor and vocal stereotypy	40% Group B

Note. GARS-3 = Gilliam Autism Rating Scale, Third Edition; VB-MAPP = Verbal Behavior Milestones Assessment and Placement Program; ABAS-3 = Adaptive Behavior Assessment System, Third Edition; PPVT-4 = Peabody Picture Vocabulary Test, Fourth Edition; EVT-2 = Expressive Vocabulary Test, Second Edition; GAC = General Adaptive Composite; SS = Standard Score, %tile = Percentile Ranks; AE = Age Equivalence

Four males and two females of typical development (i.e., not reported to be diagnosed with a developmental disability) were age-matched to each participant. Peers of typical development, who were included to provide a measure of social validity for the responses taught to participants with ASD, were selected based on age, availability, and parental consent. Per parent report, no participant was formally taught what to do when lost. The peers were not exposed to intervention; however, their help-seeking responses when lost were assessed during pre- and postintervention probes in the community settings.

Setting and Sessions

The instructional setting was located within a public, Pre-K to 8th grade elementary and middle school. Preassessment, baseline, intervention, and maintenance sessions were conducted in a self-contained classroom. Pre- and postintervention sessions were conducted across these community locations: ToysRUs®, Michaels®, Target®, Home Depot®, and ShopRite®, which were close in proximity to the participants' homes and were reportedly frequented by the parents. Participants did not visit any of these stores as part of their typical educational experiences. In addition, approval from the store manager and the human resources department was obtained prior to conducting sessions in store settings. Four stores were assigned to each participant to be targeted during intervention; the fifth store was used as the novel location (i.e., Michaels®, ToysRUs®, Target®).

Up to six sessions were conducted per day, one to five times per week. Pre- and postintervention generalization probes were collected up to three times per location per day. All pre- and postintervention sessions took place outside of school hours. Duration of sessions ranged from 16 s to 232 s, depending on the experimental condition and the frequency of error correction procedures implemented.

Materials

To identify stimuli to program as common stimuli, we visited each community location and requested materials (e.g., uniform shirts, name tags, baskets, bags) to be used during training sessions within the self-contained public-school classroom setting. See Table 2 for a complete list of materials used during sessions and Supporting Information for pictures of supplemental materials. In addition, employees of each store who wore uniforms participated during community sessions in which the skill involved approaching an employee or responding to an employee's question. Two pictures of an aisle printed on foam core boards (91 cm by 122 cm) were included in the classroom. Five items depicted in the pictures of the aisles (e.g., paint cans, books) from each side of the targeted store's aisle were placed on a shelf either in front of or right above the aisle pictures. A picture of the register area of each store was displayed on the SmartBoard® (2 m) within the classroom. For each location, a banner of a picture of the store name (61 cm by 122 cm) was hung from the ceiling in the classroom. Participant exposure to materials used as common stimuli were restricted to experimental sessions; materials were not present in in the classroom when sessions were not underway.

One video model per low- and high-tech response was recorded in each of the five stores (totaling five videos per response). High-tech videos were recorded in the community setting. Low-tech videos were recorded equally in the community setting and the instructional setting. To represent the actual store, the videos included a school staff member who wore a store-specific shirt, vest, or apron with a name-tag and stood in front of a backdrop of the store (i.e., aisle or register area)˙ The mean duration of the videos was 58 s (range,

Table 2
Target Responses

	Low-Tech Response	High-Tech Response
Group A: Can Identify Lost (Mark, Corey, Noah)	1. Identify lost (turns head in at least two different directions) 2. Scan area for a store employee (moves head from left to right) 3. Walk up to store employee 4. Say "Excuse me, I am lost." 5. Hand over identification card 6. Remain within 1.5 m of store employee (maximum duration 2 min)	1. Identify lost (turns head in at least two different directions) 2. Place finger on left side of screen and swipe to the right 3. Tap the phone icon 4. Tap the name/picture of the person that he came with under favorites 5. Wait until person answers call and face is visible on screen to say "I'm lost. I'll show you where I am." 6. Touch the camera icon in the bottom left to have the camera face away 7. Turn body around counterclockwise 360 degrees 8. Touch the camera icon again so their face is visible on the screen 9. Stay within 1.5 m of current location (maximum duration 2 min) until person returns
Group B: Cannot	1. Remain within 1.5 m of current location	1. Answer FaceTime call w/in 4 rings: touch green phone and slide right
Identify Lost (Alex, Chris, Eric)	2. Employee approaches child and child remains within 1.5 m of employee	2. Listen for directions to show location and then touch camera icon in bottom left to have camera face away
	3. Employee asks child if he or she is lost and then child hands communication card that notifies he is lost	3. Turn body around counterclockwise 360 degrees 4. Touch the camera icon again so their face is visible on the screen
	4. Remain within 1.5 m of employee until person returns (max duration 2 min)	5. Stay within 1.5 m of current location (max duration 2 min)

50-67 s). Videos were presented on an iPad mini™ 3. Participants used an iPhone® 6 during help-seeking responses that required the use of a phone. Both the iPad mini™ 3 and iPhone® 6 were housed in black LifeProof™ cases. Preloaded applications of Phone and FaceTime® on the iPhone® 6 were used. Caregiver phone numbers were programmed into the favorites section of the Phone application to automatically make a FaceTime® call when the name was selected. See Supporting Information for additional experimental materials.

Nonexperimental materials in the instructional setting included desks, chairs, and shelves with classroom materials, a play area, a sink, teacher's desk, computers, and rolling cabinets. The classroom contained a range from one to five students and one to seven adults. Sessions were recorded using an iPod touch® 5.

Preassessments

Safety skills survey. We used the results of an unpublished survey (Carlile & DeBar, 2015) to select a safety skill. Using a 5-point Likert-type scale, 148 respondents (e.g., first responders, teachers, and community members) completed a 5-item survey related to the importance of safety skills for children. Results of the survey identified help-seeking when lost as a very important safety skill. Additional information regarding the survey and skill-selection process is available from the corresponding author.

Community acceptability of procedures. Indirect consumers (e.g., staff members in the same school), immediate community members (e.g., individuals who lived in the same town who may encounter the participants), and extended community members (e.g., individuals who lived in other towns or states and were not likely to encounter the participant) completed an 11-item close-ended survey with optional open-ended probes. This survey assessed the acceptability of procedures to teach help-seeking responses when lost and was conducted across 117 respondents. The most frequently endorsed items directly informed the procedures of the current study: the use of an iPhone®, the specific low- and high-tech responses, how the experimenter separated from the participant, and the duration of separation from the participants. Survey results are available from the corresponding author.

Normative surveys of individuals of typical development. Forty-five peers of typical development were recruited from classrooms within the public school where the study took place. Classrooms were selected to include a range of similar-aged peers that were representative of the participants within this study. They completed an open-ended survey that queried what it meant to be lost, what to do when lost, and their use of cell phones. For younger participants, responses were transcribed. All surveys were completed confidentially, and respondents self-selected their age range.

Additionally, the same group of 45 similar-aged peers of typical development assessed video examples of "lost" and "not lost" across 10 videos. The videos showed a child not associated with this study in the community setting and were presented in random order. Peers were instructed to circle whether the video was an example of "lost" or "not lost" on a data sheet or vocally indicate their response. Percentage of correct responses per video was used to validate the video examples of lost and not lost. The videos were correctly identified by between 93% and 100% of peers.

Discrimination of being lost. Prior to the start of the study, participants were shown the same 10 video examples of lost and not lost that were validated by peers of typical development. Participants vocalized "lost" or "not lost." Alex and Eric engaged in vocal responses that were difficult to understand, so these two participants pointed to "lost" or "not lost" cards. No feedback or reinforcement was provided. Participants who scored 80% or higher were taught Group A responses. See Table 1 for group assignments and Table 2 for task analyses. Participants who scored below 80% were taught responses from Group B. For participants in Group B, the discrimination assessment was also conducted after the study to assess whether identifying "lost" emerged as a result of participation and acquisition of responses targeted (Hoch et al., 2009).

Preference assessment. The Reinforcer Assessment for Individuals with Severe Disabilities (RAISD; Fisher, Piazza, Bowman, & Amari, 1996) was completed with the parents or guardians to nominate edibles and tangibles to be assessed in a brief multiple stimulus without replacement preference assessment (MSWO; Carr, Nicolson, & Higbee, 2000). Two brief MSWO preference assessments were conducted with five to seven edibles and five to seven items. A choice of the top three edibles or items was presented at the end of baseline and intervention sessions for session participation.

Dependent Variables

The preexperimental assessment of discriminating when lost informed the dependent variables targeted per participant. The first row of Table 2 contains the task analyses for Mark, Corey, and Noah, who could discriminate when lost. The low-tech response consisted of six steps (adapted from Taylor et al., 2004) and the high-tech response consisted of nine steps (adapted from Purrazzella & Mechling, 2013). The second row of Table 2 shows the task analyses for Alex, Chris, and Eric, who could not discriminate lost. The low-tech response consisted of four steps (adapted from Taber et al., 2003); the high-tech response consisted of five steps (Purrazzella & Mechling, 2013). Across steps, a correct response was required to be emitted within a 5-s interresponse time. Data were collected in vivo using paper and pencil for all help-seeking responses and summarized as the percentage of steps correctly and independently completed. The mastery criterion was 100% across two sessions for each response. In addition, data were collected on the percentage of intervals with stereotypic behavior. Stereotypy data are available from the corresponding author upon request.

Experimental Design

A multiple-baseline-across-participants embedded with an alternating-treatment design was used to assess the effects of a packaged intervention consisting of video modeling and programming for common stimuli on acquisition of one low-tech and one high-tech response to seek help when lost or respond to inquiries regarding being lost (Horner & Baer, 1978).

Procedure

General format. Participants wore a black Vievu2, a live-streaming, high definition, wearable camera on a lanyard during every session in the study. Participants wore an identification BuddyTag® (ID) bracelet (http://www.mybuddytag.com/), which connected to an app and provided proximity alerts and information on the participant's location. Additionally, participants wore a bracelet that contained contact information (i.e., name, phone number) and carried an ID card (e.g., name, phone number, what to do if lost). For each of the four assigned stores, an adult wore a shirt, vest, or apron and nametag typically worn by employees within the store (e.g., a red vest for Michaels® with a Michaels' nametag). Adults serving as employees in the classroom were located 1.5 to 2.1 m from the participant near the simulated register area. Prior to each session, store-specific session materials (i.e., store banner, store aisle signs, items for sale, shopping bags, shopping baskets, store backdrop on the SmartBoard®) were placed in the classroom setting. During pre- and postintervention in the community, a confederate, who was unknown to the participant, was located slightly ahead (within 0.9 and 1.5 m of the participant) to monitor participant safety. If the participant asked questions about where the experimenter was after the experimenter returned into view, the experimenter made a neutral statement (e.g., "I'm right here.") and redirected the participant to his or her next scheduled activity (e.g., return to the classroom, go to a related service). For baseline and intervention, a choice of preferred edibles or items was delivered after the session for participation, regardless of performance. No edibles or items were delivered for session completion during preintervention, maintenance, and postintervention.

Preintervention. During preintervention sessions, low- and high-tech responses targeted per participant assignment (see Table 2) were assessed in the community. No directions were given to the participant. Once in the store, the experimenter removed herself from view of the participant by walking down an adjacent aisle (Taber et al., 2002; Taber et al., 2003) or by walking away while the participant was looking at an item or group of items (Bergstrom et al., 2012; Taber et al., 2002). If the participant did not engage in any steps in the task analysis for the response or did not emit a correct response within 1 min, the experimenter came back into the view of the participant, and the session was ended. Preintervention sessions occurred in five different stores.

Help-seeking responses of peers of typical development were also assessed during preintervention, and data were collected on low- and high-tech responses (i.e., either Group A or Group B task analyses were used depending on matched participant assignment) using the same procedures and locations as matched participants with ASD. Peers of typical development age-matched to Group A (ages 10-14), initiated a FaceTime® call to a caregiver and approached a store employee when lost. Those age-matched to Group B (ages 3-6) answered a FaceTime® call and responded to a store employee asking if they were lost (see Table 2 for task analyses). Responses of peers of typical development were scored correct if they vocally stated that they were lost, responded to the store employee asking if they were lost, or exchanged an ID card.

Baseline. During baseline, the experimenter escorted the participant to the area of the classroom that contained the simulated store. The experimenter removed herself from the participant's view. As in preintervention, if the participant did not engage in any steps of the task analysis or did not emit a correct response within 1 min, the experimenter returned in view, and the session was ended. No instructions, prompts, or reinforcement for correct responding were provided.

Intervention. During video modeling, the experimenter presented an iPad mini™ 3 on the desk in front of the participant, which was approximately 1 m away from the instructional setting. Sessions began with the vocal instruction "Watch the video." Next, a point-of-view video model of the targeted response (e.g., low- or high-tech) was presented to the participant and played twice consecutively (Charlop-Christy et al., 2000). The order of locations shown in videos was block counterbalanced across sessions with the requirement that the same location would not be displayed for more than two consecutive sessions. After showing the video, the participant was escorted to the area of the classroom that was arranged as the store, and the instructor then moved out of view behind a cabinet while the participant was looking at an item. The participant then had the opportunity to complete the steps of the task analysis as viewed in the video model.

If a participant erred, the behavior was immediately interrupted by the experimenter or trained assistant, and a video model of the step of the error was re-presented by a second observer. After watching the specified portion of the video model, the participant was given an opportunity to engage in the modeled response with no additional prompts. If correct, the participant was provided an opportunity to continue with the steps in the task analysis. If an additional error occurred after re-presenting the video segment, the experimenter provided manual guidance or vocal prompts when appropriate. This procedure was repeated until the participant independently emitted a correct response.

Once a participant met criterion (i.e., two consecutive sessions with 100% of components completed correctly and independently) with the video model, the video was removed for subsequent sessions. Mastery criterion was two consecutive sessions with 100% of components completed correctly and independently in the absence of the video model.

Maintenance. Once criterion was met in the absence of the video model, maintenance was assessed 1 and 2 weeks following intervention in the classroom with the experimenter serving as the caregiver. No opportunities to practice the response between the end of intervention and the beginning of maintenance were provided.

Postintervention. Postintervention occurred 3 to 4 weeks after participants met mastery criterion in the classroom. A primary caregiver participated during one postintervention session. Procedures were identical to preintervention.

Social validity. Social validity of the procedures was assessed by having parents and teachers complete a brief questionnaire postintervention using a modified Treatment Acceptability Rating Form (TARF; Reimers & Wacker, 1988) after being provided with a description of intervention, including materials without costs. Social validity of the outcomes of the study was assessed with parents and family members of the participants, members of the school staff (e.g., teacher, aides, related service providers, administration), and first responders (e.g., fire fighters, police officers, emergency medical technicians, paramedics). The survey was distributed electronically using SurveyMonkey and contained embedded video clips of participants during baseline and maintenance. Consent was obtained for use of videos. In addition, videos were reviewed to ensure they did not contain names of participants or any other identifying information (e.g., name of school). A total of 67 people completed the assessment by watching six video clips (i.e., one baseline session and two maintenance sessions that included low- and high-tech responses for both groups of participants). Video clips were presented in random order. Survey questions are shown in Table 3 and were scored using a seven-point Likert type-scale.

Interobserver agreement (IOA) and treatment integrity. Data were also collected by an independent observer who scored data live but separately from the experimenter on all dependent variables. Interobserver agreement (IOA) data were calculated for 100% of the sessions within each condition by dividing the number of agreements by the number of agreements plus disagreements any multiplying by 100%. IOA was 100% for all sessions.

Treatment-integrity data were collected for 100% of sessions to assess whether the procedures were implemented accurately across all phases of the study. Treatment-integrity data were collected by a trained independent observer via in-vivo observations and with the use of condition-specific checklists (see Supplemental Information for checklists). Treatment integrity scores averaged 99.8% (range, 86%-100%). IOA of treatment integrity data was calculated for 100% of the sessions within each condition by dividing the number of agreements by the number of agreements plus disagreements and multiplying by 100%. IOA for treatment-integrity data was 100%.

Table 3
Parent and Teacher Acceptability of Procedures Results

Question	ParentsMean (Range)	Teachers Mean (Range)
1. How clear is your understanding of the suggested procedures?	6.3 (6-7)	6.4 (4-7)
2. How acceptable do you find the strategies to be regarding your concerns about your child/learner?	6.5 (6-7)	6.4 (4-7)
3. How disruptive will it be to your routine to drive your child to stores, as neeeded?	6.2 (5-7)	NA
4. How willing are you to implement the suggested procedures as you heard them described?	NA	6.2 (1-7)
5. How affordable are these procedures?	6 (5-7)	3.7 (1-7)
6. How much do you like the proposed procedures?	6.8 (6-7)	6.5 (4-7)
7. How much discomfort is your child/learner likely to experience as a result of these procedures?	6.3 (5-7)	5.5 (4-7)
8. How willing would you be to implement these procedures at home for other skills?	6.3 (5-7)	NA
9. How acceptable do you find the safety procedures that will be put into place when your child is in the store setting?	6.7 (6-7)	NA
10. Given the learner's behavior issues, how reasonable do you find the suggested procedures?	NA	6.3 (4-7)
11. How costly will it be to implement these strategies?	NA	2.1 (1-7)
12. How disruptive will it be to your classroom to implement the suggested procedures?	NA	5.6 (3-7)
13. How willing would you be to change your classroom routine to implement these procedures?	NA	5.9 (1-7)
14. How well will carrying out these procedures fit into your classroom routine?	NA	5.9 (4-7)

Note: NA = Not Applicable

RESULTS

Figure 1 shows the percentage of steps completed correctly and independently for participants who could identify lost (Group A) across sessions. During preintervention and baseline, performance was near or at zero across participants. When video modeling was implemented, the percentage immediately increased to 100% and remained high across intervention, maintenance, and postintervention sessions. The effects were similar across participants. Each peer of typical development sought help with 100% accuracy across low- and high-tech response sessions during pre- and postintervention.

Figure 2 shows the percentage of steps completed correctly for participants who could not identify lost (Group B) across sessions. During preintervention and baseline, none of the participants emitted a correct response. Once video modeling was implemented, the percentage increased to 100% within a range of one to five sessions and remained high during subsequent intervention, maintenance, and postintervention sessions. The effects were similar across participants. Each peer of typical development sought help with 100% accuracy in both low- and high-tech response sessions.

Participants in Group B were re-presented with the identifying lost versus not lost assessment postintervention. Results for identifying lost were 100% for Alex, 50% for Eric, and 90% for Chris, which indicates that both Alex and Chris could identify lost following but not prior to intervention.

Data on acceptability of the procedures as rated by parents and teachers are presented in Table 5. Mean ratings by parents were at least 6 for all questions. Mean ratings by teachers were at least 5.5 for questions related to the procedures. However, the costliness of implementing the strategies (question 11) had a mean of 2.1 (range, 1-7), and the affordability of the procedures (question 5) had a mean of 3.7 (range, 1-7), indicating the teachers thought that procedures were costly to implement and somewhat unaffordable.

Data on social validity of the outcomes of the study for Group A and Group B are presented in Figure 3. Respondents for both groups included indirect consumers, immediate, and extended community members. Results indicated that outcomes were socially meaningful as respondents identified levels of seeking help across both low- and high-tech responses during baseline as not appropriate and rated levels of help-seeking during maintenance as appropriate. Interestingly, overall low-tech help-seeking responses were rated as more appropriate than high-tech help-seeking responses.

DISCUSSION

The present study investigated the effectiveness of teaching a low-tech and a high-tech help-seeking response when lost by incorporating a packaged intervention consisting of video modeling, programming for common stimuli (e.g., uniforms, products, baskets), and error correction for two groups of individuals with ASD. The intervention resulted in the generalization and maintenance of both low- and high-tech responses to stores associated with teaching, novel people (e.g., parents/guardians), and novel locations (e.g., stores not associated with teaching). Indirect consumers, including immediate and extended community members, rated the social validity of the procedures and outcomes highly. Goals of the study were validated by targeting a response based on a preexperimental survey. Social validity of the procedures was assessed prior to the onset of the study with peers of typical development. Skill sets demonstrated by the typically developing peers were consistent with the participants' results at mastery and follow-up, which supported the social validity of the outcomes. In addition, all participants maintained the responses over a 1-week

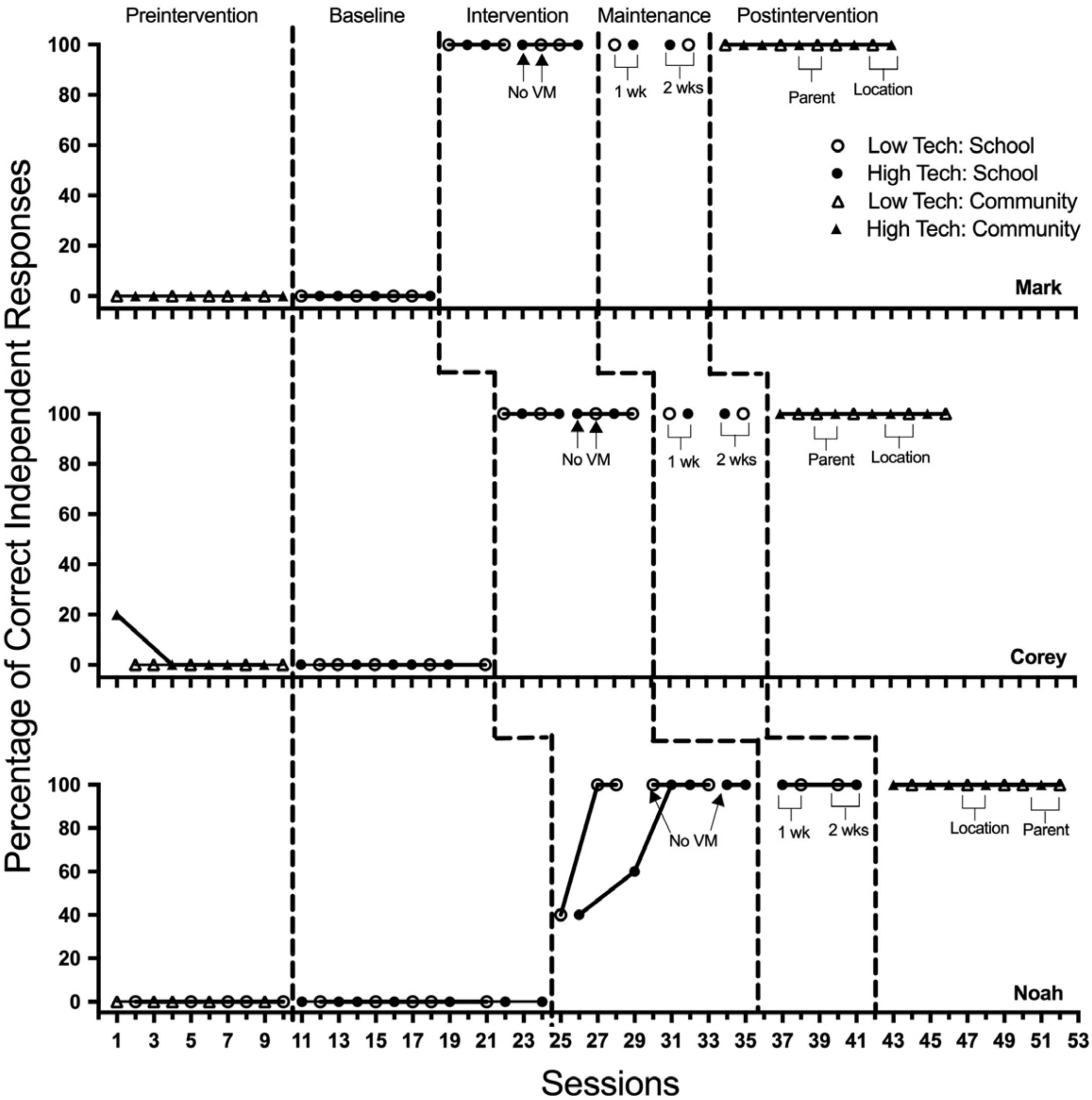

Figure 1. The percentage of steps completed correctly and independently for participants who could identify lost (Group A) across sessions. 'No VM' represents when the video model was removed during intervention. '1 wk' and '2 wks' represent the time between the end of intervention and maintenance probes. 'Location' represents generalization probes to untrained locations and 'parent' represents generalization probes with the parent.

and 2-week follow-up. Also, two of the participants who could not identify lost prior to the onset of the study could do so after the study.

This study extended research teaching help-seeking responses in a number of ways.

First, we programmed for common stimuli by incorporating a variety of items from the generalization settings into the teaching settings. Multiple exemplars of stores, videos, and materials were also included and may have enhanced the effectiveness of instruction. Although generalization of responses was robust, the current study did not directly assess the effects of programming for common stimuli. Future studies should assess

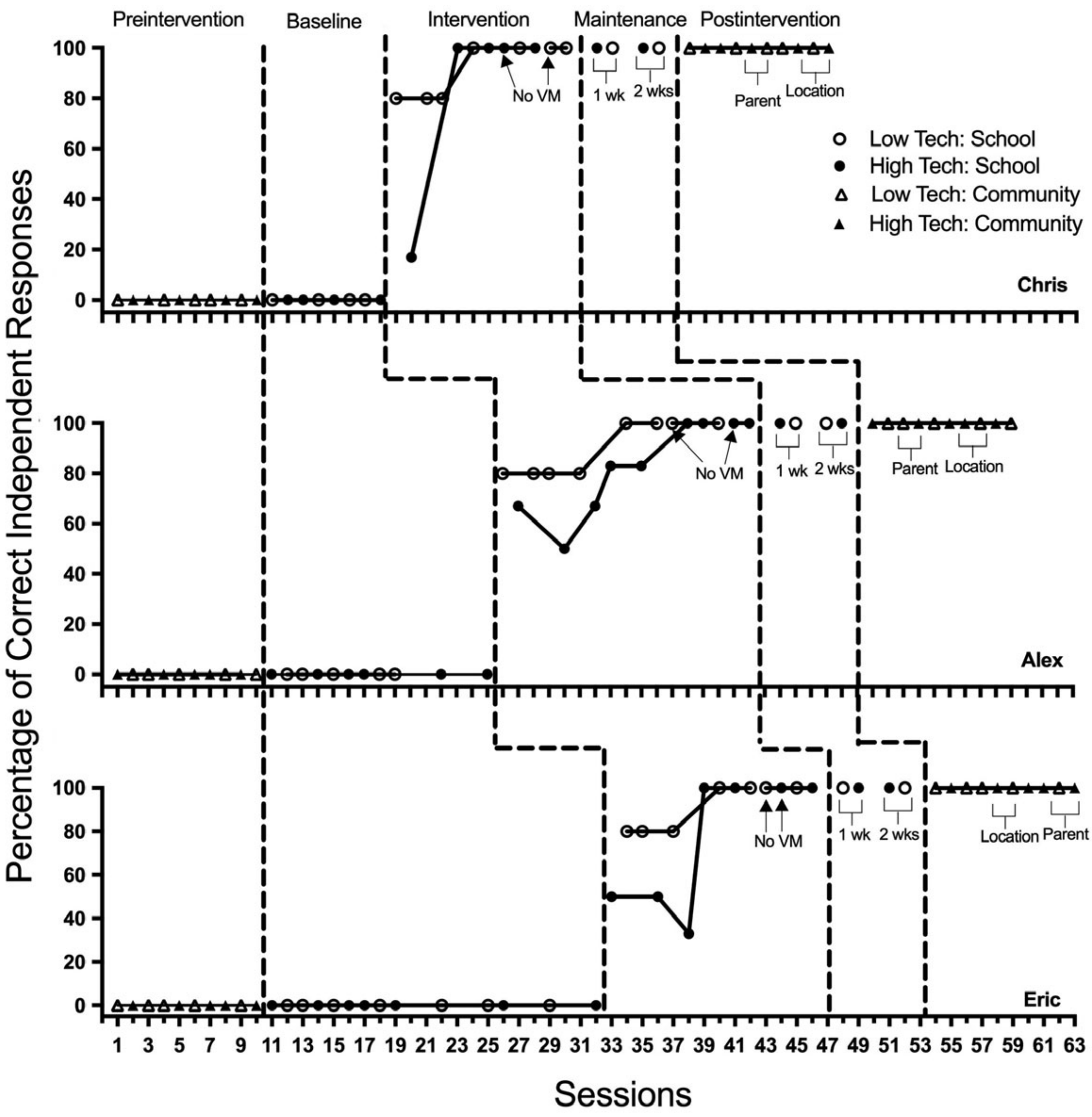

Figure 2. The percentage of steps completed correctly and independently for participants who could not identify lost (Group B) across sessions. 'No VM' represents when the video model was removed during intervention. '1 wk' and '2 wks' represent the time between the end of intervention and maintenance probes. 'Location' represents generalization probes to untrained locations and 'parent' represents generalization probes with the parent.

the role of common and uncommon stimuli on behavior. Moreover, it is possible that the effects of generalization were enhanced because of multiple exemplars (e.g., locations, video models). Which exemplars are most influential is also an important area of future research.

Second, we taught a low-tech response in the present study for situations in which a participant may not have a cell phone or their cell phone may be inoperable (e.g., no cell service, battery not charged), which was not included in previous research (Hoch et al., 2009;

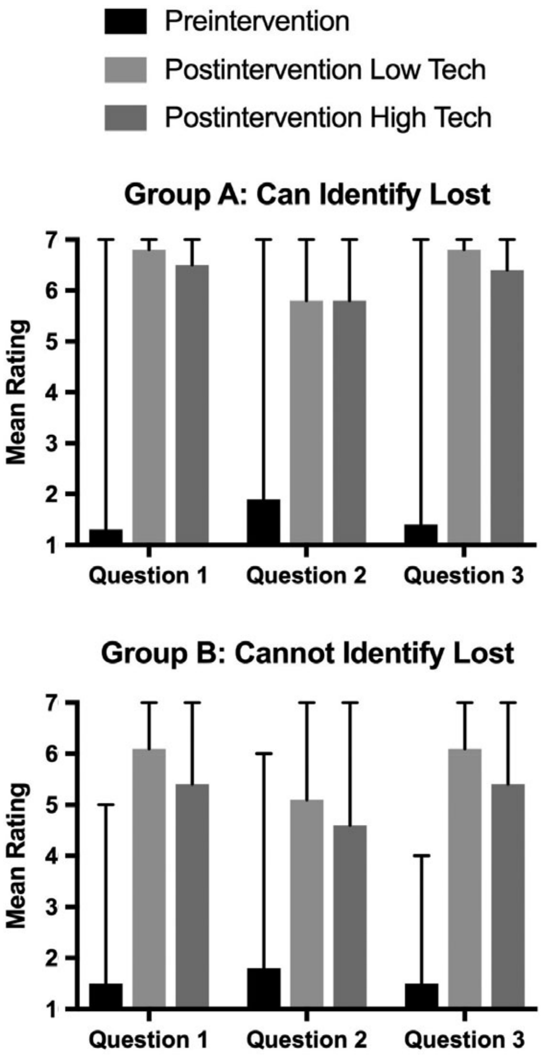

Figure 3. The mean response to social validity questions is shown in the solid black, light grey, and dark grey bars. The Likert-type scale ranged from 1 = Strongly Disagree to 7 = Strongly Agree. Range of responses are represented with the error bars. Question 1: Is the learner appropriately seeking help when lost? Question 2: Is the learner engaging in the same way as your opinion of other children the same age would when lost? Question 3: Overall, does it seem like the learner was appropriately seeking help when lost?

Purrazzella & Mechling, 2013; Taber et al., 2002; Taber et al., 2003). All participants acquired both the low-tech and high-tech responses. However, the current study did not assess the extent to which the high- and low-tech responses formed a response hierarchy (i.e., whether the low-tech response was emitted when the high-tech response failed). Future research should evaluate this to determine the necessity of both responses.

Third, this study included participants as young as 3 years old, whereas the youngest participant in previous studies was 10 years old. Parents and teachers identified teaching help-seeking when lost as an important skill even for young children, but also reported that they had not yet considered the possibility that the skill could be taught. The acquisition of this skill may enhance a family's quality of life by increasing safe access to the community; this general effect of teaching help-seeking when lost should be evaluated.

Fourth, this study extended the Purrazzella and Mechling (2013) study that used a cell phone to send video clips of current location using the FaceTime® feature on the iPhone® 6. Using FaceTime® may be an effective and low effort response for individuals with ASD to share their locations quickly while also allowing the recipients to monitor them. Features of FaceTime® that may make it conducive to learning include its ease of use and accessibility. Although FaceTime® is a standard feature on an iPhone®, future research may consider third-party applications (e.g., Skype) that allow for video-based calls, and cell phones other than iPhone® (e.g., Android).

There were several limitations to the present study. First, no data were collected on the help-seeking responses in the community in the absence of being lost. It is important to ensure responses taught are under appropriate stimulus control. Future research should assess responding under conditions that should not evoke a help-seeking response (i.e., not lost). Second, generalization was not assessed in other environments, such as a library or mall, or with additional caregivers and family members. Third, all of the participants had a generalized imitative repertoire prior to the onset of the study and imitated video models during preassessments; results may not be replicable with individuals who have less sophisticated imitation skills.

Future research should apply this intervention to other safety skills (e.g., fire safety, street safety), as well as daily living (e.g., grocery shopping) and vocational skills. Future research should evaluate participant preference for low- or high-tech responses and inform interventions based upon preference (Cannella-Malone, DeBar, & Sigafoos, 2009). Available technology (e.g., smart watch, virtual reality, smartphones) should be continuously evaluated to determine how they could be applied to teaching safety skills to individuals with ASD. Using widely available and accepted technology to teach individuals with ASD safety and daily living skills may lead to greater independence in the community and allow teaching to occur in an unobtrusive, nonstigmatizing manner.

REFERENCES

Akmanoglu, N., & Tekin-Iftar, E. (2011). Teaching children with ASD how to respond to the lures of strangers. *Autism, 15*, 205–222. https://doi.org/10.1177/1362361309352180

American Psychiatric Association (2000). *Diagnostic and statistical manual of mental disorders* (4th ed., text rev). Washington, DC: Author.

American Psychiatric Association (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Arlington, VA: American Psychiatric Publishing.

Bergstrom, R., Najdowski, A. C., & Tarbox, J. (2012). Teaching children with ASD to seek help when lost in public. *Journal of Applied Behavior Analysis, 45*, 191–195. https://doi.org/10.1901/jaba.2012.45-191

Branham, R. S., Collins, B. C., Schuster, J. W., & Kleinert, H. (1999). Teaching community skills to students with moderate disabilities: Comparing combined techniques of classroom simulation, videotape modeling, and community-based instruction. *Education and Training in Mental Retardation and Developmental Disabilities, 34*, 170–181.

BuddyTag. (2015). Retrieved February 14, 2015, from http://www.mybuddytag.com/

Cannella-Malone, H. I., DeBar, R. M., & Sigafoos, J. (2009). An examination of preference for augmentative and alternative communication devices with two boys with significant intellectual disabilities. *Augmentative and Alternative Communication, 25*, 262–273. https://doi.org/10.3109/07434610903384511

Carlile, K. A., & DeBar, R. M. (2015). *Safety skills survey*. Manuscript in preparation.

Carr, J. E., Nicolson, A. C., & Higbee, T. S. (2000). Evaluation of a brief multiple-stimulus preference assessment in a naturalistic context. *Journal of Applied Behavior Analysis, 33*, 353–357. https://doi.org/10.1901/jaba.2000.33-353

Charlop-Christy, M. H., Le, L., & Freeman, K. A. (2000). A comparison of video modeling with in vivo modeling for teaching children with ASD. *Journal of ASD and Developmental Disorders, 30*, 537–552. https://doi.org/10.1023/A:1005635326276

Fisher, W., Piazza, C., Bowman, L., & Amari, A. (1996). Integrating caregiver report with a systematic choice assessment to enhance identification. *American Journal on Mental Retardation, 101*, 15-25.

Hoch, H., Taylor, B. A., & Rodriguez, A. (2009). Teaching teenagers with ASD to answer cell phones and seek assistance when lost. *Behavior Analysis in Practice, 2*, 14–20.

Horner, R. D., & Baer, D. M. (1978). Multiple-probe technique: A variation on the multiple baseline. *Journal of Applied Behavior Analysis, 11*, 189–196. https://doi.org/10.1901/jaba.1978.11-189

Interactive ASD Network (2011). *IAN research report: Elopement and wandering*. Retrieved from http://iancommunity.org/cs/ian_research_reports/ian_research_report_elopement

Mechling, L. C., Gast, D. L., & Gustafson, M. R. (2009). Use of video modeling to teach extinguishing of cooking related fires to individuals with moderate intellectual disabilities. *Education and Training in Developmental Disabilities, 44*, 67-79. http://www.jstor.org/stable/24233464

Purrazzella, K., & Mechling, L. C. (2013). Use of an iPhone 4 with video features to assist location of students with moderate intellectual disability when lost in community settings. *Education and Training in Autism and Developmental Disabilities, 48*, 179–189.

Reimers, T., & Wacker, D. (1988). Parents' ratings of the acceptability of behavioral treatment recommendations made in an outpatient clinic: A preliminary analysis of the influence of treatment effectiveness. *Behavioral Disorders, 14*, 7-15.

Scherer, M. J. (2009). Assistive technology and persons with disabilities. In I. Marini & M. A. Stebnicki (Eds.), *Professional counselor's desk reference* (pp. 735-746). New York, NY: Springer.

Stokes, T. F., & Baer, D. M. (1977). An implicit technology of generalization. *Journal of Applied Behavior Analysis, 10*, 349–367. https://doi.org/10.1901/jaba.1977.10-349

Taber, T. A., Alberto, P. A., Hughes, M., & Seltzer, A. (2002). A strategy for students with moderate disabilities when lost in the community. *Research and Practice for Persons with Severe Disabilities, 27*, 141–152. https://doi.org/10.2511/rpsd.27.2.141

Taber, T. A., Alberto, P. A., Seltzer, A., & Hughes, M. (2003). Obtaining assistance when lost in the community using cell phones. *Research and Practice for Persons with Severe Disabilities, 28*, 105–116. https://doi.org/10.2511/rpsd.28.3.105

Taylor, B. A., Hughes, C. E., Richard, E., Hoch, H., & Coello, A. R. (2004). Teaching teenagers with ASD to seek assistance when lost. *Journal of Applied Behavior Analysis, 37*, 79–82. https://doi.org/10.1901/jaba.2004.37-79

Vievu Products. (2014). Retrieved December 11, 2014, from http://www.vievu.com/

Received May 19, 2016
Final acceptance April 17, 2017
Action Editor, Claire St. Peter

SUPPORTING INFORMATION

Additional Supporting Information may be found in the online version of this article at the publisher's website.