Teaching Teenagers with Autism to Answer Cell Phones and Seek Assistance When Lost

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ABSTRACT

Three participants with autism were taught to answer a cell phone and to follow directions to seek assistance when lost in community settings. During baseline, none of the participants answered a cell phone or sought assistance. Following instruction at school and in the community, all participants learned to answer the cell phone and follow instructions to seek assistance from a naïve adult by exchanging a communication card. Generalization probes were conducted in non-training community sites and with the participants' parents. Data also were collected on the responses of naïve community members to determine the social validity of the participants' assistance-seeking skills. Results are discussed in terms of the importance of teaching community safety skills to individuals with autism and the challenges of teaching these responses to individuals with severe communication and social deficits.
Descriptors: Autism, cell phones, getting lost, safety skills, seeking assistance

An important goal for individuals with severe disabilities is to increase their independence and integration into community settings. However, safety risks may arise as support and supervision are faded in the community (Collins, Woolery, & Gast, 1991; Taber, Alberto, Hughes, & Seltzer, 2002). Getting lost is a particular concern for parents of individuals with severe disabilities (Wade & Troy, 2001). Taber, Alberto, Seltzer, and Hughes (2003) defined "lost" as not being able to find the person with whom someone arrived at the current location. This poses a number of challenges for individuals with severe disabilities, especially those with autism. For example, they may not be able to make accurate discriminations as to when they are lost, or they may fail to engage in the relevant social and communicative responses necessary to seek assistance and be reunited with their parents or caregivers. These safety issues, along with significant learning challenges, may cause great concern for family members and ultimately limit the independent functioning and community integration of both the individual with autism and his or her family (Wade & Troy, 2001).

There is an emerging body of research examining strategies for teaching individuals with disabilities to seek assistance when lost (e.g., Johnson et al., 2006; Taber et al., 2002; Taber et al., 2003; Taylor, Hughes, Richard, Hoch, & Rodriguez-Coello, 2004). For example, Taber et al. (2002) taught 14 middle school participants with moderate cognitive disabilities to identify when they were lost and to call their teachers for assistance when lost. Using verbal instructions, the authors taught the participants to identify when they were separated from the adult who accompanied them into the community. A least-to-most prompting technique was successful in teaching all participants to call their teachers and to state their locations when lost. In a follow up study, Taber and colleagues (2003) taught participants with moderate cognitive disabilities who could not identify when they were lost to answer a cell phone and describe their locations. Modeling and verbal prompting were used to teach the participants to use specific descriptors about their locations (e.g., "I'm next to the cash register in the hardware store.").

The participants in these two studies demonstrated the ability to identify when they were lost or to identify and describe their surroundings or location. For individuals with autism, however, these responses may be more difficult to learn, in part because the discriminative stimuli that signal that one is lost are vague and may vary depending on location. Similarly, it can be challenging for many individuals with autism to identify and describe salient stimuli related to their location, given their severe language impairments. Thus, it is necessary to identify and evaluate training procedures to teach other potential responses that will result in being reunited with the adult.

To this end, Taylor et al. (2004) developed procedures for teaching 3 teenagers with autism to seek assistance by responding to pager cues when separated from their teachers in the community. The participants in this study were not able to recognize when they were lost and did not know how to seek assistance. Therefore, the experimenters taught them to respond to a more salient discriminative stimulus (i.e., a vibrating pager) to seek assistance by exchanging a communication card with a naïve community member. All participants sought assistance from community members in novel community sites and when on outings with their parents.

As these studies illustrate, recent advances in technology have prompted

research on the use of stimuli such as cell phones by individuals with intellectual disabilities (Bryen, Carey, & Friedman, 2007; Carey, Friedman, & Bryen, 2005; Taber et al., 2002; Taber et al., 2003). While a recent survey showed that 89% of U.S. adults have cell phones (Harris Poll, 2008), Bryen et al. (2007) reported that only 28% of adults with intellectual disabilities were cell phone users. This may be due to a lack of training opportunities and a perception by teachers and care providers that cell phone use is not functional for this population (Bryen et al.). To date, no studies have investigated procedures for teaching individuals with autism to use cell phones. The purpose of the current study was to assess the effects of prompting and reinforcement to teach 3 teenagers with autism to use cell phones to seek assistance when lost. The responses of naïve community members and generalization to untrained community sites also were assessed.

Method

Participants

Three teenage males with autism, Sam (age 15 years), Jack (age 15 years), and Michael (age 14 years), participated in this study. All were diagnosed with autism between the ages of 24 and 36 months by outside physicians. The participants' current GARS scores ranged from 108 to 113, indicating characteristics similar to the average child with autism. All of the participants exhibited significant deficits in language, socialization, and self-care skills. Jack and Michael had limited vocal behavior. They vocally requested items and activities and engaged in brief spoken scripted conversations with adults. Jack's age equivalent score on the Peabody Picture Vocabulary Test-III (PPVT-III) was 3-03 (standard score of 40), and Michael's was 4-04 (standard score of 55), indicating significant deficits in receptive language skills. Sam engaged in several one- and two-syllable vocal approximations; however, he communicated mainly by using an augmentative communication device (Chat PC). Sam's age equivalent score on the PPVT-III was 3-03

(standard score of 40). Vineland Adaptive Behavior Scales (VABS) composite scores for all participants revealed general adaptive functioning scores of Low, with age equivalents of no more than 12 years 3 months (typically much lower) in receptive, expressive, and total communication domains.

These individuals were chosen to participate because they were often included in community activities (e.g., supported volunteer work, shopping) but were unable to seek assistance if separated from their teacher. Further, their parents expressed concern that their children's independence in the community was compromised due to fears that their children would be unable to seek assistance if they were to become lost. The participants were taught to seek assistance from store employees located at counters or cash registers. These employees served as the "naïve" community adults throughout the study.

Settings

All of the participants attended a school serving individuals with autism (average enrollment for the participants was 10 years at the time of the study). Pre-baseline and baseline sessions were conducted at five different community sites. Initial training sessions were conducted in various locations around the participants' school building. Subsequent training sessions were conducted at two of the community sites (Stop & Shop® and Best Buy®). Probe sessions were conducted at the other three (non-training) community sites (Barnes & Noble®, Tower Records®, and K-Mart®). All of the community sites were chosen based on the participants' typical and preferred community outings (e.g., all of the participants visited Barnes & Noble® regularly) and proximity to the participants' school.

Materials

Materials included a cell phone (purchased by each participant's parent) and a 7.6 cm x 12.7 cm index card. The following information was printed on the index card: "I am lost. I cannot

speak. My teacher/parent is on this phone. Please listen to the phone. My name is _____. I have autism." This card was placed in the participant's pocket and was available to him throughout the study.

Data Collection and Measurement

Data were collected by the participant's teacher and by a second instructor from the participants' school. During all pre-baseline, baseline, and probe sessions conducted in the community, observers remained out of sight until they were reunited with the participant. They observed the participant covertly throughout the entire outing.

Participant responses. The primary dependent measure was the percentage of correct responses per trial exhibited by the participant each time his cell phone rang. Each trial consisted of one phone call and included five responses: (a) answering the cell phone when it rang, (b) following instructions to locate an adult, (c) stating an approximation of "I'm lost" (Jack and Michael) or "Help me" (Sam), (d) exchanging the communication card and cell phone with the naïve adult, and (e) waiting with the adult until being reunited with his parent/teacher. If the adult did not respond to the participant (e.g., did not take the card or the cell phone), the final two components of the participant's response were not scored (i.e., the participants could still achieve 100% correct responding by completing components a, b, and c). Each session consisted of one trial. The mastery criterion for training at school and in the community was two consecutive sessions with 100% correct responding.

Responses of community members. Data also were collected on the responses of the naïve community adults to the participant (i.e., the recipients of the communication card). For a response to be scored as correct, the adult had to (a) accept the communication card and phone from the participant, (b) speak to the participant's teacher/parent on the phone and communicate their location, and (c) wait with the participant until the participant's teacher/parent arrived.

Data on correct responses were converted to percentage of correct responses per trial. If the participant did not exchange the card and/or phone, the community adult's response was not scored or graphed.

Interobserver agreement. A second instructor from the participant's school collected data independently during 90% of the sessions throughout the study for all participants. Interobserver agreement (IOA) data for the participant's behavior and the community adult's responses were calculated on a trial-by-trial basis. The number of agreements was divided by the number of agreements plus disagreements and multiplied by 100%. IOA was 100% for both participants' and community adults' responding.

Procedure

A multiple baseline probe design across participants was used to assess the effects of prompting and reinforcement on assistance seeking.

Pre-baseline. Initial pre-baseline sessions were conducted to determine the participant's responses to being separated from familiar adults in the absence of any explicit cues to the separation. During all sessions, the participant was instructed to place his cell phone on his belt or in his pocket and place the communication card in his pocket. Two familiar adults (the participant's teacher and a second instructor from the participant's school) accompanied the participant to each community site. After entering the store, both teachers slipped out of view of the participant until they were no longer visible to him. The second observer remained out of view of the participant but observed him covertly at all times to ensure his safety. During these sessions, if the participant did not seek assistance from an adult within approximately 2 min (the interval used by Taylor et al., 2004), the trial was ended and the teacher reunited with the participant.

Baseline. Baseline sessions were conducted to examine the participants' responses when called on their cell phones when separated from familiar adults in the community. Just as in pre-baseline sessions, two familiar adults accompanied

the participant to the store, and the second observer kept the participant in her sight at all times. These sessions were identical to pre-baseline sessions except that the teacher called the participant's cell phone if the participant did not seek assistance from another adult within 1 min of being separated. The time limit was 1 min as compared to 2 min during pre-baseline to prevent further elongated practice of non-responding. If the participant answered the cell phone, the teacher provided verbal instructions to the participant to find an adult and give him/her the communication card and cell phone (i.e., the teacher stated, "Jack, find someone and give them your card and your phone."). If the participant followed the instructions, and the community adult took the cell phone, the teacher instructed the adult to have the participant stay with him or her until a teacher approached them (e.g., the teacher said, "My student is lost. Please have him stay with you. Tell me where you are and I will come find you."). The teacher then stayed on the phone with the adult until she reached them. If the participant did not respond to the cell phone after five rings, the teacher ended the call, approached the participant, and left the store. One trial was conducted per session. Baseline sessions were conducted with each participant at all training and probe sites.

Pre-training sessions. Initial sessions were conducted by the participants' teachers in various locations around the school building to teach the participants to answer the cell phone and to follow general directions delivered via the cell phone (e.g., "find an adult," "go to the office," "give someone your phone"). During these sessions, the teacher called the participant on his cell phone in various locations around the school building. Immediately upon its ringing, a second instructor provided manual prompts for the participant to take the phone out of his pocket or off his belt and press "talk," and provided a vocal model for the participant to say "hello." The teacher then delivered an instruction (e.g., stated, "go to the office"). If the participant did not follow

the instruction within 5 s, the second instructor provided full physical prompts to guide the participant to complete the action (e.g., the instructor put her hands on the participant's shoulders and guided the participant to walk to the office). After three to five trials with full physical prompts, the instructor faded to partial physical prompts (e.g., lightly touched the participant's elbow or shoulder to guide him to walk to the office). Once prompts were fully faded to partial physical prompts, a time delay was imposed. Over successive trials, the time between delivery of the instruction on the phone (by the first instructor) and providing the prompt (by the second instructor) was increased in 2-s increments. Thus, following delivery of the instruction, the second instructor waited 0 s, then 2 s, then 4 s to assess if the participant followed the instruction independently. The teacher provided social praise and tangible reinforcers (e.g., food, tokens) for correct responses using the participant's regular individualized reinforcement system (e.g., token board with 10 to 15 tokens needed to access a preferred activity). Tangible reinforcers were initially provided on a fixed ratio (FR)-1 schedule for following the instructions. Five trials were conducted per teaching session. Following one session with 100% accurate responding, the schedule of reinforcement was changed to a variable ratio (VR)-2 schedule. The reinforcement schedule continued to be thinned (in two-response increments) across sessions until tangible reinforcers were no longer provided. Training sessions were initiated when the participants responded to the general directions at 100% accuracy for two consecutive sessions.

Training sessions. The teacher called the participant on his cell phone in various locations around the school building. If the student did not take the phone out of his pocket or off his belt, press "talk," and say, "hello," immediately upon its ringing, a second instructor provided manual guidance and vocal models as needed. Upon hearing the participant say, "hello," the teacher then delivered the instruction, "Find an adult and give

them your card and phone." The second instructor then immediately manually guided the participant to take the communication card out of his pocket and approach the nearest adult (typically another teacher), provided a vocal model for the participant to say, "I'm lost" or "Help me," and manually guided the participant to hand the communication card and phone to the adult. For the first two training sessions, another classroom teacher was designated to serve as the adult and was in close proximity to the participant. In further sessions, adults were not placed in particular locations around the school building; rather, the participants were taught to walk around the building until an adult was in sight and to approach that adult. Prompts were faded using a most-to-least prompting hierarchy (as described above) until the participant independently exchanged the communication card in response to the phone and verbal instruction alone. The second instructor systematically faded her distance from the participant until she was no longer in view of the participant. The teacher provided social praise and tangible reinforcers (e.g., food, tokens) for correct responses using the participant's individualized reinforcement system. Tangible reinforcers were faded across sessions using the same schedules and procedures as those used during pre-training until they were no longer provided. Five trials were conducted per teaching session. The mastery criterion for training was 100% correct responding on all five trials for two consecutive training sessions. Because two instructors were needed to teach the skill, only one to two training sessions were conducted per week. Sam and Jack met the criterion within 11 sessions (2 months), and Michael met the criterion within 15 sessions (3 months). (Training data are available from the first author.)

Community training sessions. Once the participant exchanged the card and phone at 100% accuracy with a familiar adult at school, teaching began at two of the community sites. Procedures were identical to those in baseline with the following exceptions: If the participant

did not answer the phone after three rings, the teacher (who was previously out of view) approached the participant (came into view) and provided physical or gestural prompts for him to do so. Prompting was initiated after three rings because the voice mail function was activated immediately following the fourth ring. There was no evidence to suggest that waiting longer to initiate prompts would have resulted in independent responding because, with the exception of one session for Michael, the participants never answered their phones during baseline. If, after answering the phone, the participant did not locate an adult, state "I'm lost" or "help me," exchange the card and phone, and/or wait with the community adult, the teacher approached the participant and provided least-to-most prompting (e.g., vocal, gestural, and manual prompts) for the participant to complete the step. After the participant completed the prompted step, the teacher backed away to allow the participant to complete the rest of the response sequence independently. The teacher, however, remained visible to the participant and stepped back in to provide prompts if the participant did not complete another step. If the participant answered the phone, located a naïve adult, and successfully exchanged the communication card, the teacher provided verbal praise and discretely delivered a preferred food item when reunited with the participant (e.g., "Great job finding an adult, giving him your card, and staying here!"). Sam was initially taught to use his augmentative communication device to communicate, "I'm lost." The community adults, however, did not consistently respond to this initiation. Therefore, after eight training sessions and one community probe session, Sam was taught to vocally state, "Help me," a phrase he had previously learned to say clearly. The participants were prompted to only approach store employees located at counters or cash registers. All prompts and food rewards were eventually faded as described above.

Initially, Sam and Jack were taught to exchange their phones along with

the communication cards. It was noted, however, that the community adults often did not respond correctly to the participants when the participants offered their phones. They indicated confusion as to what they were supposed to do with the phones (e.g., shook their heads and said, "That's not my phone"). Therefore, after session 29, the procedures were changed as follows: The participants were taught to exchange the communication card alone and to wait for the adult to ask for the phone before giving it to him or her. At this point, the text on the communication card also was changed from, "My teacher is on this phone. Please listen to the phone," to, "Please take this phone. Listen to my teacher/parent." Michael, the third participant, was only taught to exchange the card alone (i.e., he never exchanged the phone with the card). The criterion for community training was 100% correct responding for two consecutive training sessions (of one trial per session). Jack and Michael met the criterion within five sessions (3 weeks), and Sam met the criterion within eight sessions (1 month). After meeting the training criterion, one to three "booster" training sessions were conducted at these sites whenever correct responding fell below 80% at the community probe sites.

Post-training community probes. Community probes were conducted at the three designated non-training sites when the participants met the mastery criterion during community training sessions. The same procedures as those used during baseline were followed during all post-training community probes. Prompts, error correction, and reinforcers were never provided at probe sites.

Post-training parent probes. Community probes were conducted with Sam's and Michael's mothers at one probe (non-training) site at the conclusion of the study. Procedures used during these probes were the same as those used during the community probes except that the parents accompanied the participants to the community site and called the cell phone. A teacher traveled to the site in a separate car and covertly
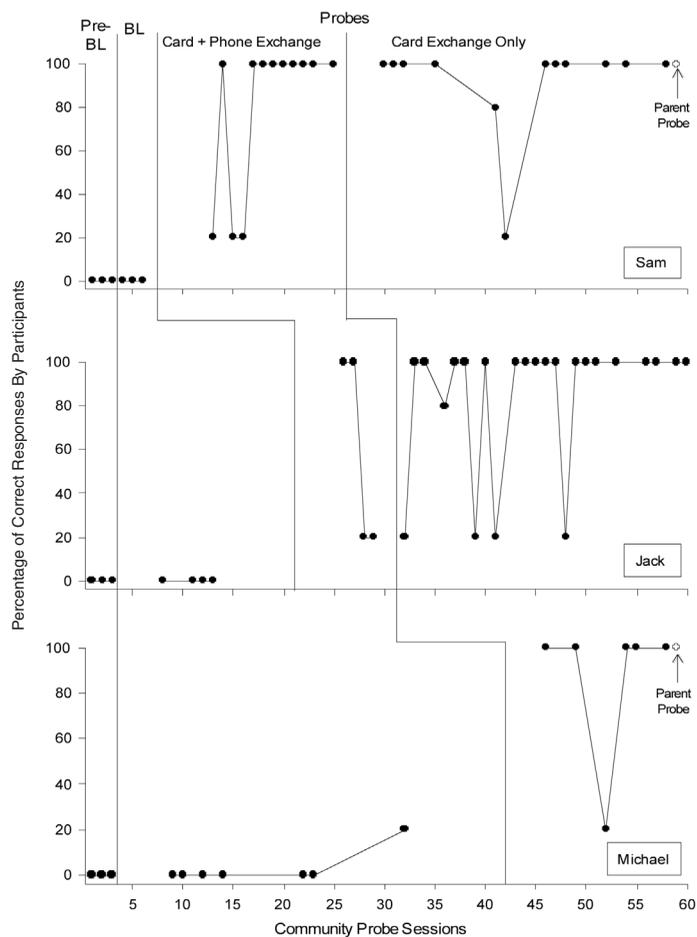
Figure 1. Percentage of correct responses during baseline and post-training community probe sessions for Sam (top panel), Jack (middle panel), and Michael (bottom panel).
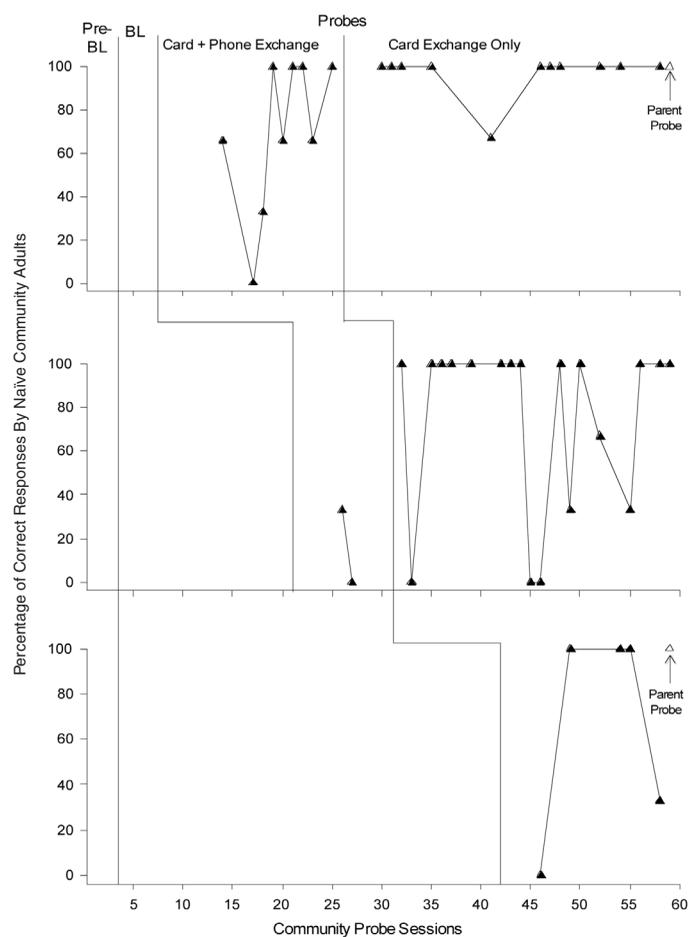

Figure 2. Percentage of correct responses by the naïve community adults during baseline and post-training community probe sessions for Sam (top panel), Jack (middle panel), and Michael (bottom panel).

observed the session, keeping the participant in her view the entire time, but remaining out of his sight. Jack's parents were not available to participate in these probe sessions.

Results

Results indicated that all 3 participants learned to respond to their cell phones, locate a community adult, exchange their communication cards, and wait with the adult at school and at the community training sites (acquisition data for these locations may be obtained from the first author). Figure 1 depicts the baseline and post-training data collected at the three non-training community sites for all participants. None of the participants located an adult when separated from their teachers during pre-baseline. Anecdotal reports indicated that the participants either wandered away to preferred areas in

the stores or attempted to look for their teachers. During baseline, none of the participants completed any of the target responses when the teachers called the participants on their cell phones, with the exception of one session for Michael during which he answered the phone (but did not complete any other responses). None of the participants attempted to seek assistance from a novel adult during pre-baseline or baseline sessions. Once the participants met the mastery criteria at the community training sites, all began to respond to the cell phone and complete all of the target responses in the community probe sites. More specifically, in the card and phone exchange condition, Sam demonstrated 100% correct responding in 9 of 12 sessions (mean, 80% correct responding), and Jack did so in 2 of 4 sessions (mean, 60% correct responding). In the card exchange only

condition, Sam demonstrated 100% accuracy during 10 of 12 probe sessions (mean, 92% correct responding), Jack during 18 of 23 sessions (mean, 85% correct responding), and Michael in 5 of 6 sessions (mean, 87% correct responding). Further, Sam and Michael demonstrated the target responses at 100% accuracy during probes with their parents.

When the participants made errors during community probes, they typically answered the phone but did not complete any of the other responses (resulting in 20% correct responding). During one session each, Sam and Jack completed the first four responses but did not remain with the naïve adult until their teachers arrived (80% correct responding).

The results of the naïve community adults' responses to the participants are depicted in Figure 2. When Sam and Jack

exchanged their phones along with their communication cards, adults engaged in the three components of a correct response at a mean of 63% (range, 0% to 100%) of opportunities in probe sites. When the participants exchanged the communication card alone, the community adults' responding increased to a mean of 80% (range, 0% to 100%) across all sessions for all participants.

Conclusions

Results of this study indicate that individuals with autism who present with significant language and social challenges can be taught to answer cell phones and to follow directions delivered by phone in order to locate an adult and request assistance. The prepared communication cards allow the technique to be used with learners who are otherwise unable to vocally communicate a need for assistance. Importantly, the study demonstrates that cell phone technology can be used to enhance the safety of individuals with autism whether or not they are able to identify that they are in fact "lost," or those for whom separation from parents or companions provokes no immediate anxiety or distress. The use of cell phones may reduce children's exposure to danger by reducing the time they remain unattended in public spaces.

Cell phones are age-appropriate, socially acceptable, and readily portable devices that are easy to use in a wide array of community settings. Cell phones carry no social stigma, and they may enhance the ability of children with autism to participate in the community by allowing them to venture further from direct supervision. The availability of cell phones as a simple and effective safety measure may afford the additional security necessary to encourage parents and family members to include their children in a wider variety of community activities. In turn, that inclusion may permit children to expand their social skills and adaptive community response repertoires.

Several challenges arose when implementing this study. First, the study's staffing requirements — at a minimum, one staff person to prompt during teaching and a second to keep the student in view at all times — may render its implementation impractical in some contexts or teaching programs. Future researchers may want to develop alternative strategies that will allow a single staff member to teach the skill, such as on-site analog training procedures or video modeling. Second, the community members' responses to the participants were initially inconsistent, necessitating a change in the participants' target response (i.e., exchanging the communication card only). This raises questions about the social validity of the response that was taught. Efforts should be made to identify alternative assistance-seeking responses that result in higher rates of responding by community members. For example, participants could be taught to approach additional adults after a failed attempt and to continue making such approaches until assistance is obtained.

We taught the response at school before conducting training in the community to minimize the use of potentially stigmatizing prompting procedures in the community setting. This strategy also increased the practicality of the training, as it was difficult to schedule the community training sessions. However, it remains unknown if the training would have been as successful (and perhaps more efficient) if no training had been provided at school.

There were several limitations to the design of the study. Opportunities for data collection in the community were often limited and difficult to arrange. Secondly, all of the participants exhibited inconsistent responding during community probes throughout the study, necessitating "booster" training sessions at training sites, during which prompts and reinforcers were provided. All of the participants demonstrated improvements in performance following these booster training sessions. However, the overall effects of these booster training sessions on the participants' performance during community probe sessions remains unknown. Future researchers may want to evaluate participants' performance in the absence of booster training sessions.

We also did not determine if the participants learned to identify when they were lost or needed to seek assistance. As discussed above, this is, in one sense, an advantage. Children need not make the complex determination that they are "lost" to benefit from the technique. Still, future studies may want to assess performance in the absence of the cell phone prompt once participants master the response or to evaluate strategies to teach individuals with autism to identify when they are lost.

Guidelines for Practitioners

The following best practice recommendations are offered for practitioners interested in conducting these training procedures:

- Teaching this response in the community setting was challenging due to the limited opportunities for practice. It may be helpful to teach cell phone use first (i.e., answering the phone and following instructions on the phone) at school and possibly at home. These pre-training sessions are easier to conduct at school or at home than in the community, and this pre-training may lead to more rapid learning.
- Consider using alternate teaching technologies that reduce the need for one-to-one instruction. For example, although not empirically tested, video-taped instruction might be an effective and efficient strategy through which two or more students could be simultaneously taught.
- To increase the efficiency of training, practitioners may want to consider teaching other care providers to implement the training procedures.
- Results demonstrated that community members did not respond consistently when the cell phones were exchanged with the communication card; however, responding increased when the participants exchanged the communication card alone. Future practitioners should teach the skill of exchanging the communication card alone from the outset of training.
- It may be helpful to teach students to approach adults who are most likely to

respond, such as store clerks, cashiers, and security personnel. Practitioners also should teach students to seek out a second adult if the first adult does not respond.

- Practitioners should run as many training and probe sessions as possible in community sites that the student visits regularly. This will help ensure that the student can respond appropriately if he or she becomes separated from a caregiver during an actual (non-simulated) community outing.
- Once the skill of exchanging the card is acquired, teachers and parents should periodically provide booster or maintenance training trials to ensure the response maintains over time.
- To increase training and maintenance opportunities, the student should practice the skill when on community outings that occur naturally throughout the school year (e.g., field trips).

Clinical practice with individuals with disabilities should support the inclusion of assistive and commonly used modern technologies that can enhance emerging independence and community inclusion. This study appears to be the first to demonstrate that individuals with autism and severe cognitive impairments can learn to respond to cell phones and follow remote prompts to seek assistance. Despite the practical limitations of running this study (e.g., staffing requirements, inconsistency of community members' responses), the findings provide a promising direction for incorporating contemporary technology into the lives of individuals with autism, and for helping families to more fully integrate their children with autism into natural, everyday community environments.

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Author's Note