Safety Training

42

Antonia R. Giannakakos-Ferman
and Jason C. Vladescu

Worldwide 4.9 million people died in 2016 from injuries that could have been prevented. Of those deaths 644,855 were children under the age of 15 (World Health Organization, 2018). Deaths from unintentional injuries disproportionately occur in developing nations and affect children in disadvantaged socioeconomic areas (Laflamme et al., 2010). In the United States unintentional injuries are the leading cause of death for children, and 9.2 million children under the age of 19 are treated in the emergency room (ER) for non-fatal injuries (Borse et al., 2008). These deaths could be prevented if children and caregivers were provided with evidence-based comprehensive safety instruction.

Chapter Overview

The purpose of this chapter is to provide an overview of behavior analytic evidence-based methods for assessing, designing, and implementing safety instruction. The chapter will focus on child and adolescent safety. The procedures that will be discussed are applicable to both children and adolescents who are neurotypical and those with developmental disabilities. This chapter is divided into three main sections. Section one introduces safety instruction and discusses limitations of education-based methods and the contributions of a behavior-analytic approach. Section two describes the process of assessing safety behaviors and designing instruction. Section three discusses evidence-based interventions, design considerations, and suggestions for generalization and maintenance. For ease of reading, the term *learner* is used in lieu of *children and adolescents*.

An Overview of Safety Instruction: The Need for a Behavior Analytic Approach

Safety instruction addresses safety on two fronts: prevention strategies and safety responses. These two fronts are each an essential part of safety instruction. Prevention seeks to eliminate potential dangers from the environment and teaching safety responses seeks to provide learners with behaviors they can engage in when they encounter a danger. Current mainstream safety instruction attempts to address prevention and teaching safety responses through education-based instruction. Education-based instruction is a passive learning methodology that targets the

A. R. Giannakakos-Ferman
Department of Special Education, Manhattanville College, Purchase, NY, USA
e-mail: Antonia.giannakakos@mville.edu

J. C. Vladescu (✉)
Department of Applied Behavior Analysis, Caldwell University, Caldwell, NJ, USA
e-mail: jvladescu@caldwell.edu

J. L. Matson (ed.), *Handbook of Applied Behavior Analysis*, Autism and Child Psychopathology Series, https://doi.org/10.1007/978-3-031-19964-6_42

acquisition of safety knowledge to promote safety behaviors (Miltenberger et al., 2020).

Education-Based Prevention Instruction

Mainstream safety instruction, focused on prevention, targets caregivers as their behaviors can directly affect the safety of the children in their charge (Krenzelok, 1995). The typical method of intervention is to provide caregivers with a set of rules on how to remove dangers from the environment. The rules are usually disseminated through pamphlets, commercials, ad campaigns, and online recourses (Krenzelok, 1995). A characteristic example of prevention-based safety instruction is the State of Texas's *Keep 'Em Safe Texas* safe gun storage program. *Keep 'Em Safe Texas* is a program launched in 2020 in response to Centers for Disease Control and Prevention (CDC) data that indicated annually Texas is among the top three states in the United States for unintentional shootings by children (Centers for Disease Control and Prevention, 2020). The program targets safe storage of firearms and its message comprises three rules: "Safely store fire-arms, safely store ammunition, and restrict access." Like many of its predecessors this program attempts to change behavior through education. However, research suggests that the effectiveness of education-based prevention programs is limited. Despite the existence of education-based safe gun storage programs in the United States, only about 55% of gun owners with children under the age of 18 report storing all their guns safely (Crifasi et al., 2018).

These data are not presented to suggest prevention initiatives are completely ineffective. Preventative environmental manipulations, such as mandated four-sided pool fencing, smoke alarms, firearm storage programs, and bike helmets, have reduced the number of injuries and deaths, but the reduction is not substantial enough (Centers for Disease Control and Prevention, 2012). Even if caregivers employ preventative measures, learners may still encounter dangers. A learner may encounter a dangerous item or situation at school, in the community, or when at the home of a peer. Therefore, safety instruction also seeks to teach a variety of responses that learners can use to stay safe.

Education-Based Safety Instruction

Concerningly, most mainstream safety programs approach safety instruction by using the same education-based methodology just discussed. Education-based safety instruction uses a variety of age-appropriate activities, such as games, reciting slogans, illustrative anecdotes, and art activities to disseminate safety information (Kennedy & Mason, 2015; Mondozzi & Harper, 2001). For instance, Kennedy and Mason (2015) evaluated the effectiveness of a fire safety program on increasing student knowledge and awareness of the risks of fires and false calls to emergency services. The participants in the study were 226 10- and 11-year-olds at four public middle schools in the United Kingdom. The *Facing up to Fire* program used was implemented by staff at each school and used a series of CDs, DVDs, VHS tapes, and worksheets that described fire-related situations. The participant's knowledge was assessed through a survey that was administered before training, after training, and three months after the end of the program. A comparison of pre-program and post-program data indicated a statistically significant increase in fire safety knowledge and the results of the three-month follow-up survey indicated participants could still recall the information taught. Although Kennedy and Mason (2015) demonstrated the effectiveness of the *Facing up to Fire* program at increasing safety knowledge, the authors acknowledge that it is unknown if there was a subsequent increase in safe behavior.

A potential flaw of education-based safety instruction is that it operates on the assumption that acquisition of verbal-safety behavior will lead to non-verbal safety behaviors. Research evaluating if education-based instruction is effective at increasing safe behaviors has found that this verbal behavior to non-verbal behavior transfer does not consistently occur (Beck &

Miltenberger, 2009; Carroll et al., 1992; Gatheridge et al., 2004; Schwebel & McClure, 2014).

Schwebel and McClure (2014) evaluated correspondence between gains in verbal statements of safety behavior and the related non-verbal safety behaviors. Safe street crossing behavior was taught to 240 participants ages 7 to 8. Participants were assigned to one of four conditions: An education-based instruction condition, a virtual reality (VR) instruction condition, an individualized street side instruction condition, or a no-treatment control condition. Following intervention participants in the education-based instruction group engaged in verbal behaviors regarding safe street crossing, but not the non-verbal safe street crossing behaviors. Participants in the virtual reality condition engaged in the non-verbal safety behaviors, but not the corresponding verbal behaviors and participants in the individualized street side instruction condition acquired both verbal and non-verbal behaviors.

Himle et al. (2004) evaluated the effectiveness of the National Rifle Associations' *Eddie Eagle GunSafe Program*, an education-based instructional program used in the United States to teach learners about gun safety. The *Eddie Eagle GunSafe Program* uses a series of activities to teach participants that when they encounter a firearm they should "Stop. Don't touch. Leave the area. Tell an adult." The activities include reviewing the safety message, responding to "what would you do if…" anecdotes, and art activities such as slogan coloring sheets. After the participants in the study completed the *Eddie Eagle Gun Safe Program*, they were exposed to a simulated situation in which they came across an unattended firearm. The participants were naive to the assessment and were not aware they were being observed. The results of the assessment indicated that although all the participants demonstrated acquisition of the safety message, they did not subsequently engage in the safety response.

Beck and Miltenberger (2009) evaluated the effectiveness of *The Safe Side* program, a training program that purportedly teaches learners 5-to-10-years-old abduction prevention responses. The program comprised a training DVD entitled "Stranger Safety" and its goal is to teach learners through instructions and modeling to respond to various abduction situations. The authors showed the training DVD to six participants, 6-to-8-years-old. After exposure to the training DVD, the participants were exposed to a series of simulated situations such as a stranger knocking on the door and a stranger approaching and violating the participants' space. Beck and Miltenberger found that despite having watched *The Safe Side* DVD none of the participants engaged in the safety responses explained and demonstrated in the video.

The results of these studies identify an expected flaw with education-based instruction. Learners receiving education-based safety instruction fail to demonstrate the safety responses taught because instruction alone is insufficient to establish stimulus control over the safety behavior.

A Behavior-Analytic Approach to Safety Instruction

Although a behavior-analytic approach to safety instruction is similar in focus on prevention and teaching safety responses to an education-based approach, several features distinguish these approaches. First is the addition of an active learning component. The term active learning refers to the addition of components that require the learner to practice the steps of the safety response while receiving feedback on and correction of their performance (Miltenberger et al., 2020). As demonstrated above, numerous behavior analytic studies have demonstrated that skill acquisition is better achieved when an active learning component is included in intervention as opposed to instruction alone.

A second key component of behavior analytic safety instruction is the incorporation of procedures to increase the likelihood that an established safety response will generalize to the natural environment and be emitted under appropriate stimulus conditions. Behavior analytic safety instruction incorporates methods such as programming common stimuli, teaching mediating responses, and multiple exemplar training to facilitate transfer of safety behaviors to the natural environment (Stokes & Baer, 1977).

Behavior analytic researchers have recognized the limitations of an education-based approach and have evaluated interventions to teach safety responses across an impressive array of areas over a span of almost 45 years (Giannakakos et al. 2020a; Mechling, 2008). The safety literature in behavior analytic research has particularly focused on abduction and sexual abuse prevention (Dixon et al., 2010; Doughty & Kane, 2010; Lumley & Miltenberger, 1997), fire safety (Bertsch et al., 1984), and firearm safety (Jostad & Miltenberger, 2004; Miltenberger, 2008).

The remainder of this section briefly discusses each safety category and the types of behaviors that have been taught. Table 42.1 contains a breakdown of each safety area, the safety responses taught within that area, and references for several representative studies in each area.

Transportation Safety Transportation safety involves teaching responses that keep adults, children, and infants safe when using bicycles and motor vehicles. Research on bicycle safety has focused exclusively on increasing helmet wearing behavior (e.g., Ludwig et al., 2005; Van Houten et al., 2007). Research on motor vehicle safety has focused on increased seat belt use (e.g., Geller et al., 1982, 1989), correct installation of child passenger safety restraints (e.g., Giannakakos et al., 2018; Himle & Wright, 2014), and reducing cell phone use while driving (Clayton et al., 2006).

Personal Safety Personal safety is focused on three main areas: responding to emergency situations, abduction prevention, and sexual abuse prevention. Safety training on emergency situations has focused on determining emergency situations and dialing 911 (e.g., Jones & Kazdin, 1980; Spooner et al., 1989). Abduction prevention targets teach learners to resist lures from strangers (e.g., Beck & Miltenberger, 2009;

Table 42.1 Overview of responses addressed in the behavior analytic literature

Safety area	Response taught	Select references
Transportation safety		
Bicycle safety	Increasing correct helmet use	Ludwig et al. (2005), Van Houten et al. (2007)
Motor vehicle safety	Increasing seat belt use	Geller et al. (1982, 1989)
	Decreasing cell phone use while driving	Clayton et al. (2006)
	Increasing correct installation of child car seats	Giannakakos et al. (2018), Himle and Wright (2014)
Personal safety		
Abduction prevention	Responding to a lure from a stranger by saying “no,” leaving the area, and telling an adult	Ledbetter-Cho et al. (2019)
	Responding to the doorbell ringing, by not answering the door and telling a parent	Beck and Miltenberger (2009), Summers et al. (2011)
Abuse prevention	Discriminating good and bad touch	
	Responding to a potential violation by saying “no,” leaving the area and telling an adult	Egemo-Helm et al. (2007), Miltenberger et al. (1999)
Emergency response	Calling 911	Spooner et al. (1989), Ozkan et al. (2013)
	Discriminating emergency situations	Rosenbaum et al. (1981)
Home safety		
Fire safety	Responding to a fire alarm	
	Exiting during a fire	Garcia et al. (2016), Haney and Jones (1982)
	Responding to an unattended lighter	Houvouras and Harvey (2014), Rossi et al. (2017)
	Extinguishing cooking fires	Mechling et al. (2009)
Gun safety	Responding to an unattended firearm	

(continued)

Table 42.1 (continued)

Safety area	Response taught	Select references
Sharp object safety	Disposing broken items	Winterling et al. (1992)
Suffocation prevention	Identification and removal of household hazards	Barone et al. (1986), Metchikian et al. (1999)
Poison prevention	Responding to household poisons	Dancho et al. (2008), Collins and Griffen (1996)
	Responding to medications	Giannakakos et al. (2018), King and Miltenberger (2017)
Infant safety	Arranging a safe sleep environment	Austin et al. (2018), Carrow et al. (2020)
Community safety		
Social safety	Refusing requests for money and personal information	Spivey and Mechling (2016)
Pedestrian safety	Crossing the street	Harriage et al. (2016), Wright & Wolery (2014)
Seeking help when lost	Making and answering calls from parents	Carlile et al. (2018)
	Exchanging an ID card	Taylor et al. (2004)
	Making a vocal request for help	
Water safety		
	Basic swimming and flotation skills	Alaniz et al. (2017)
	Holing on to the pool side to reach the stairs and throwing and catching a lifeline	Turgut et al. (2015)

Note: The references provided in this table are illustrative of the research in each area. Additional studies have been published that are not listed on the table

Ledbetter-Cho et al., 2019) use a safe word (Rodriguez & Jackson, 2020), and respond to a stranger at their door (Summers et al., 2011). Sexual abuse prevention teaches individuals to identify private body parts (Boyle & Lutzker, 2005; Miltenberger & Thiesse-Duffy, 1988), and discriminating and responding to abuse situations (e.g., Egemo-Helm et al., 2007; Miltenberger et al. 1999).

Home Safety Home safety is one of the largest areas of focus within the behavior analytic literature and includes the widest range of safety responses. Interventions have targeted both preventative methods and safety responses. Researchers have evaluated procedures for teaching children and young adults fire-related safety (e.g., Haney & Jones, 1982; Houvouras & Harvey, 2014), responding to an unattended firearm (e.g., Himle et al., 2004; Rossi et al., 2017), cleaning up sharp and broken objects (Winterling et al., 1992), and poison prevention responses (e.g., Collins & Griffen, 1996; Dancho et al., 2008). Studies targeting caregiver prevention strategies have trained safe arrangements of infant sleep environments (Austin et al., 2018; Carrow et al., 2020; Vladescu et al., 2020) and removing potential hazards from the home environments (e.g., Barone et al., 1986).

Community Safety Community safety covers skills related to safely navigating community locations such as public transportation, stores, and streets. Research has been conducted evaluating procedures for teaching safe street crossing (e.g., Harriage et al., 2016; Wright & Wolery, 2014), seeking help when lost in public (e.g., Carlile et al., 2018; Taylor et al., 2004), and refusing inquiries from strangers for money and personal information (Spivey & Mechling, 2016).

Water Safety Water safety is an area of research that has garnered limited attention within the behavior analytic literature. The responses taught in this area comprise basic swimming, flotation, and water awareness skills (Alaniz et al., 2017), water recovery and deck behavior, and throwing and catching of a lifeline (Turgut et al., 2015).

Assessment and Design

Assessment

The first step to comprehensive safety instruction is assessment. Safety assessments can be separated into two categories: assessing the environment and assessing behavior. There are two types of assessments indirect and direct. Indirect assessment can provide useful information on a learner's safety repertoire or lack thereof. Direct assessment allows direct observation of the learner's behavior and can identify if a learner will engage in a safety response under the appropriate conditions. Research supports the use of indirect assessment methods if they are followed up with direct assessment of the behavior (e.g., Lutzker et al., 1998; Mandel et al., 1998). Comprehensive assessment is essential to identifying deficits in prevention and responsive behaviors and should inform subsequent intervention.

Assessing the Environment The purpose of assessing the environment is to identify potential hazards that may interfere with safe behavior. To date, the behavior analytic literature has paid little attention to methods of environmental assessment as they pertain to safety. The recommendations provided in this section are behavior analytic in nature; however, the supporting literature is largely derived from safety research in other fields.

One environmental assessment commonly used in research on child neglect and family services, that may be of use to behavior analysts, is the Home Accident Prevention Inventory-Revised (HAPI-R; Mandel et al., 1998). The HAPI-R is a validated checklist that assesses safety hazards across 10 categories (i.e., poison, choke, suffocation, drowning, fire/electrical, fall, sharp object, firearm, crush, and allergen/organic). The HAPI-R is administered using an assessment form (available in Lutzker & Bigelow, 2002). The person assessing the environment uses the form to collect information on the learners in the home, including their eye level and how far and high they can reach. This information is subsequently used to determine if dangerous items are placed safely out of reach. The assessor then goes through each room of the home and indicates the number of hazards present across each category. One assessment form is filled out per room. The total number of hazards within and across the 10 categories is calculated and used as a measure of safety.

Jabaley et al. (2011) provided a characteristic example for how the HAPI-R is used as an assessment tool. The authors used the HAPI-R to assess the existence of safety hazards in the homes of three families living in a large metropolitan area in the United States. During the initial assessment, the experimenters first established the eye level and reach of the oldest child in the home (up to age 5). These data were used to determine at what height hazards would need to be placed to be considered inaccessible. The experimenters then went through each of the three rooms and collected data on the number of hazards in each room. The number of hazards recorded provided a baseline measure of safety within the home.

The existing research using the HAPI-R assessment has emphasized in-person consultation. However, in-person assessment of the home environment may not always be possible. One solution may be to incorporate videoconferencing software, wherein a researcher or practitioner could score the HAPI-R, as a caregiver virtually navigates their home.

The HAPI-R provides a comprehensive assessment of household dangers; however, there are some home safety areas not included in the assessment. One such absent area is home pool safety. CDC (2012) data indicate 74% of fatal pool accidents occur at residential locations and the highest drowning rates are in children 1-to-4-years-old. Drowning prevention research has identified several environmental manipulations that are effective in decreasing pool-related drownings, including four-sided pool fencing, pool alarms, automated covers, and restricting access by keeping the pool area locked when appropriate supervision is not available (Coffman, 1991). Researchers might consider developing a checklist that could be used to identify potential safety risks and subsequently inform safety instruction targeting responsible caregivers.

Finally, for individuals with disabilities an additional prevention assessment may be needed. It is estimated that 49% of learners with autism spectrum disorder (ASD) engage in elopement behavior (Anderson et al., 2012). Elopement can be potentially life threatening as learners may encounter dangers outside the home (e.g., traffic, drowning, suffocation). To date, no experimentally validated elopement prevention checklist for individuals with ASD or developmental disabilities exists. The National Autism Association developed an elopement prevention checklist that caregivers can use to evaluate their home (https://nationalautismassociation.org/docs/BigRedSafetyToolkit.pdf). Used in a research or clinical context this checklist may present an assessment option to identify preventative measures already in place and guide caregivers through implementing the remaining safety precautions.

Indirect Safety Response Assessment Indirect assessments can be a useful tool for identifying deficits in a learner's safety repertoire. To our knowledge, there is only one commercially available standardized assessment that evaluates safety responses, the Assessment of Functional Living Skills (AFLS; Partington & Mueller, 2012). The AFLS assesses several areas including safety responses related to independent living, basic health safety and first aid, and workplace safety.

There are also several checklists specific to a variety of common safety areas available from national and international organizations such as Safe Kids Worldwide. Researchers and practitioners might consider using these checklists to collect information from caregivers or guide interviews about safety. Checklists on a variety of areas including fire safety, water safety, and pedestrian safety are available of the Safe Kids Worldwide website (https://www.safekids.org/).

Direct Safety Response Assessment The most reliable method of determining a learner's safety repertoire is to directly observe whether the learner engages in safety responses when they are required. Two methods of assessment have been well researched in the behavior analytic safety literature, in situ, and role-play assessments (Giannakakos et al. 2020a; Miltenberger et al., 2020). These assessments simulate a dangerous situation the learner might encounter without placing them at risk.

In Situ Assessment In situ assessment has been used to assess safety behavior across numerous areas including firearm safety (e.g., Hanratty et al., 2016; Jostad et al., 2008), abduction prevention (e.g., Beck & Miltenberger, 2009), fire safety (e.g., Houvouras & Harvey, 2014; Vanslow & Hanley, 2014), help-seeking behavior (Pan-Skadden et al., 2009), and poison prevention (Dancho et al., 2008). In situ assessment involves arranging a simulated situation in which the safety response can occur without exposing the learner to actual danger. In situ assessment is often conducted in the natural environment with precautions in place to ensure the learner's safety (Carlile et al., 2018; Summers et al., 2011). During in situ assessment, the learner is observed remotely or covertly and is unaware they are being assessed. Covert observation during in situ assessment is essential so that the observer's perceived presence does not exert control over the safety response (Miltenberger et al., 2005). There are several ways to arrange covert observation during in situ assessment. For instance, Dancho et al. (2008) observed participants during in situ assessment through a one-way mirror in an observation area attached to the assessment area. Giannakakos et al. (2020b) used video streaming software installed on a tablet device placed in the assessment room and streamed to the instructors' smart phone and Hanratty et al. (2016) placed a baby monitor with video capability in the assessment area.

Another consideration during in situ assessment is the inclusion of a termination criterion to ensure the learner does not practice, or inadvertently contact reinforcement, by engaging in a dangerous behavior. For example, Ledbetter-Cho et al. (2016) taught four learners with ASD an abduction prevention response. During the in situ assessment, the participant was brought to the assessment area by a known adult who then gave an excuse to leave the participant unattended. A confederate unknown to the participant approached and presented a lure such as "Come play with my iPad." If the participant began to leave with the confederate, the confederate made an excuse such as "I forgot I have to meet a friend" and disengages from the interaction. Thereby eliminating the possibility that the participant's behavior might contact reinforcement by leaving with the confederate. Although in situ assessment provides the closest indication of how a learner might respond to an actual danger, the covert and simulated aspects of the procedure may not be appropriate to all safety responses.

Role-Play Assessment In the case of some safety responses such as exiting a house fire (Rosenbaum et al., 1981) or sexual abuse prevention (e.g., Egemo-Helm et al., 2007; Katz & Singh, 1986; Miltenberger et al., 1999), it may be unethical or infeasible to conduct an in situ assessment. Unlike in situ assessments, during role-play assessments the learner is aware that their behavior is being assessed. During role-play assessments, the learner is presented with a scenario and asked to demonstrate how they should respond.

Egemo-Helm et al. (2007) used a role-play assessment to evaluate the sexual abuse prevention skills of four women with developmental disabilities. During the role-play assessment, the participants were aware of the assessment condition. Abuse lures were presented by the experimenter and the participant was asked what they would do if it were a real situation.

Rosenbaum et al. (1981) used a role-play assessment to evaluate 27 preschoolers' ability to differentially respond to emergencies and dial 911 when required. During the role-play assessment, participants were shown videotaped scenes. For each scene, the participant was told to pretend they were at home and then asked if the situation required them to call someone and why. The participant was then asked to act out the response they described.

Designing Safety Instruction

After deficits in a learner's safety repertoire has been identified, it is necessary to select target safety responses, instructional settings, and instructional materials.

Expert Consultation Expert consultation can be an integral tool when designing safety instruction (Jones et al., 1981; Katz & Singh, 1986). Experts such as firefighters, police officers, and physicians can provide useful information on how a certain safety response will keep a learner out of danger. Because safety recommendations may change over time as further research is conducted, recommendations should not be taken directly from the published literature without verifying their current accuracy from experts. Researchers and practitioners are encouraged to collaborate with local agencies and consult official websites such as the Centers for Disease Control and Prevention, the American Medical Association, and the National Fire Protection Association for up-to-date information that can assist in the selection of the most effective safety recommendations. One example of changes in safety recommendations is exemplified by a study that taught participants to extinguish cooking fires (Mechling et al., 2009). One of the extinguishing materials used in the study was flour. Although flour was a recommended extinguishing method at the time of publication, the National Fire Protection Associations has since recommended against the use of flour to extinguish cooking fires, as flour is flammable and particles suspended in the air may catch fire and can cause an explosion (Ahrens, 2017). Therefore, it is imperative to include qualified experts into the process of designing safe and effective safety interventions.

Selecting the Safety Response

General Safety Response Learners may come across a variety of dangers: comply with a lure from a stranger, play with an unattended lighter, mistake a bottle of pills left out on the counter for candy, or gain access to an unsupervised pool area. With such a wide variety of possible situations, numerous studies have targeted a safety response that is applicable to most dangerous situations. In a systematic review of the literature, Giannakakos et al. (2020a) reported that nearly half of the studies taught a general three component safety response. The general safety response comprises three components and is appropriate to a wide range of potential dangers, including abduction prevention, abuse prevention, and dangerous object safety (e.g., Giannakakos et al., 2020b; Houvouras & Harvey, 2014; Johnson et al., 2005; Rossi et al., 2017; Summers et al., 2011; Vanslow & Hanley, 2014). First, the learner is taught to identify that a danger is present in their environment. As part of this component intervention should include teaching the learner to identify the names of any stimuli that will be involved in safety training. For learners with appropriate skill sets, tact training (i.e., expressive identification; Sundberg et al., 2000) and listener training (i.e., receptive identification; Grow & LeBlanc, 2013) can be used to ensure learners can identify dangers and other stimuli associated with safety training.

Second, the learner is taught that after identifying a danger they should immediately avoid interaction with the danger. Depending on the nature of the danger being addressed, avoidance may be leaving the area or not entering an unsafe one (e.g., unattended pool) or it may comprise refraining from handling an item (e.g., lighter or prescription medication). Any level of interaction with a dangerous item could lead to injury or death; therefore, learners should be taught that no level of interaction with a dangerous item is acceptable. For instance, a learner putting their foot in an unattended pool may fall in, or a learner who verifies if a firearm is real by picking it up may accidentally discharge the weapon.

Finally, the learner must locate and notify a responsible adult of the danger. This final component is essential as it allows a caregiver to remove the danger and establish a safe environment.

Specific Safety Responses The general safety responses discussed above are applicable across multiple dangers, but situation-specific safety responses are sometimes required.

Several studies on fire prevention responses have taught participants to exit their home or school in response to a fire alarm (e.g., Bigelow et al., 1993; Garcia et al., 2016; Jones et al., 1981). The complexity of the exiting response varies greatly across studies as is dictated by the skill repertoire of the learners targeted for intervention. Some studies have taught learners to stop what they are doing and walk out the nearest exit in response to a fire alarm (Bigelow et al., 1993). Others have taught learners to exit their homes via multiple routes and to make decisions when pathways are blocked by fire or smoke (Jones et al., 1984).

In the area of pedestrian safety learners are taught safe street crossing behaviors. These behaviors are similar across studies and include stopping at the edge of the roadway, checking for oncoming vehicles, and crossing when the way is clear. Some studies have taught learners to cross only simple one- or two-lane road ways (e.g., Steinborn & Knapp, 1982), while other have taught learners to navigate more complex environments such as four-way roadways with a center island (e.g., Wright & Wolery, 2014).

While most of the abduction prevention literature has taught learners to engage in the general safety response described above, one study is a notable exception. Rodriquez and Jackson (2020) taught learners a safe word response applicable to abduction attempts by familiar adults. When approached by a familiar adult, the learner was required to ask for the safe word and provide an appropriate response to the adult's knowledge of the word. If the adult said the safe word, the participant would say "ok" and comply with the adults' request. If the adult did not know the safe work, the participant would say "no" and run away (Dowshen, 2018).

Modifications for Individuals with Developmental Disabilities Individuals with developmental disabilities may have skill deficits that necessitate modifications to safety responses described above.

First, safety responses with vocal components may present a barrier for learners with limited vocal verbal behavior repertoires. Modifications to common safety responses are required to ensure the topography of the safety response is appropriate to the vocal repertoire of the learner. One example of this type of modification is demonstrated in Taylor et al. (2004). The study taught three teenagers with ASD who had limited vocal repertoire to seek help when lost. As a complex vocal request for help was not possible, the participants were taught that if separated from a caregiver, they should approach an adult, say "excuse me" and produce a communication card. The communication card contained the participant name, a statement that they were lost, and instructions to call their parent or caregiver. Although this study was conducted with teenagers, the response topography is appropriate to younger learners as well.

Second, some learners may not have the skills necessary to respond differentially to safe and unsafe stimuli and situations that share common features. When an undeveloped discriminative repertoire poses a barrier to safety-skills acquisition, stimulus prompts can be used to facilitate differential responding (Maglieri et al., 2000). For example, a learner could be taught that if a certain sticker, such as the Mr. Yuk sticker (Fergusson et al., 1982; i.e., green stickers emblazoned with a disgusted face and the national poison control number) appears on an item, they should not touch it and, when skill sets allow, should report the item to a caregiver. Then stickers are placed on all dangerous items or access points (e.g., pool gate). Reinforcement in the form of praise is provided for avoiding and reporting stickered items left unattended in the environment. The primary advantage of this discrimination method is that it does not require the learner to respond differentially based on physical features, which vary widely across different types of dangers. The stimulus control exerted by the stickers serves to control the safety response and can be extended to novel dangers as needed. In the context of generalization, the stickers may be conceptualized as common stimuli (Stokes & Baer, 1977). A response trained in their presence is likely to generalize to untrained stimuli that are labeled with that same sticker.

Selecting the Instructional Setting(s) Research recommends teaching in the natural environment to promote generalization and increase the likelihood the safety response will occur when needed (Miltenberger, 2008; Miltenberger et al., 2020). For instance, Johnson et al. (2005) taught thirteen 4-and-5-year-olds to engage in an abduction prevention response. Behavioral skills training sessions occurred at each participant's day-care program, in a classroom, various hallways, and outside on the playground. Following behavioral skills training (BST), in situ assessments were conducted on the playground, in the school building, and at each participant's home. The results of this study indicated that the inclusion of BST and in situ training (IST) components was effective at establishing the abduction prevention response for all participants.

However, if teaching in the natural environment is not possible or not feasible, practitioners should attempt to create an analog instructional setting that contains stimuli common to the natural environment (i.e., program common stimuli; Stokes & Baer, 1977). The inclusion of common stimuli promotes generalization by pairing the targeted safety response with stimuli which may be present in the natural environment or may share a sufficient number of stimulus features (e.g., signs, store employee regalia, locations of customer service markings) Several studies have incorporated stimuli common to the natural environment into controlled teaching settings. Page et al. (1976) arranged a simulated street model complete with houses, cars, trees, and people to teach individuals with disabilities to discriminate safe conditions for crossing the street. Carlile et al. (2018) taught participants in a public school setting how to respond when lost in public through simulated commercial stores using large color photos of store interiors and instructors dressed in employee uniforms. Jones et al. (1984) taught four individuals with congenital blindness to exit their school dormitories during a nighttime fire. The experimenters simulated the features of an actual fire using a taped recording of the school's fire alarm, a recording of the sound of flames, and a hair dryer to provide the sensation of nearby flames.

Selecting Instructional Materials When selecting instructional materials, the practitioner should ensure training exemplars are physically representative of actual dangers the learner might encounter. One method that has been used to identify representational stimuli is a psychometric sort (Giannakakos et al., 2020b; Lee et al., 2019, Rosch, 1975), in which the instructor identifies a pool of exemplars of a danger and has relevant stakeholders (e.g., caregivers, individuals in the local community) order the exemplars from most representative to least representative by assigning each exemplar a number from one (most representative) to 10 (least representative). An average score is calculated for each exemplar and these averages can be used to establish a representation gradient from which exemplars can be chosen. An example of a representation gradient is displayed in Fig. 42.1. A psychometric sort could also be used to select non-dangerous exemplars. Non-dangerous exemplars could be selected based on having non-relevant shared characteristics with the dangerous exemplars, then a psychometric sort could be conducted to establish a gradient of most representative to the least representative exemplars (i.e., boundary stimuli).

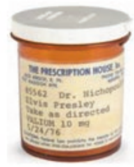
For ethical and safety purposes, actual dangerous materials are never used in safety instruction unless they have been rendered inoperable (e.g., lighters emptied of fluid and refilled with water, firearm with cemented barrel). The literature provides several innovative methods for the creation of realistic instructional materials, including lighters (e.g., Houvouras & Harvey, 2014; Rossi et al., 2017), firearms (Jostad et al., 2008; Lee et al., 2019), medications (Dancho et al., 2008; Giannakakos et al., 2020b), and cleaning products (Rossi et al., 2017; Summers et al., 2011). There are several ways to simulate dangerous items. Table 42.2 provides suggestions for safe alternatives for use in research and instruction.

Safety Response Interventions

Antecedent Interventions

Antecedent interventions as they pertain to safety are focused on manipulating a dangerous environment to eliminate or reduce learner exposure to danger. The section on assessment discussed using the HAPI-R and publicly available checklists to assess the home environment and identify potential dangers. This section describes how to use the results of these checklists might be used provide instruction on preventative safety measures to caregivers.

The results of the HAPI-R provide information on the locations and number of hazards in the home and are used to identify specific training targets for caregivers (Barone et al., 1986). For example, Metchikian et al. (1999) used the HAPI-R to assess the homes of three families referred from their county's child protective services. The HAPI-R was used to identify the presence of hazards in at least four rooms including the living room, kitchen, bathroom, and the child's bedroom. The rooms were target for treatment based on the number of hazards recorded during baseline, whereas the room with the highest number of hazards was targeted first. During training, the instructor informed the caregivers of the types of hazards that could posed a threat and provided three suggestions on how to eliminate such hazards, such as, placing it out of reach, locking it up, or fastening drawers with child locks. Then the instructor asked the parents to identify other hazards and demonstrate how they could be made inaccessible. Positive and corrective feedback were delivered and parents were

Exemplar	Average rating	Exemplar	Average rating
	1.4		2.2
	3.6		4.4
	4.5		6.6
	7.4		7.6
	8.4		8.9

Note: Unpublished data from Giannakakos, A. R., Vladescu, J. C., Reeve, K. F., Kisamore, A. N., Fienup, D. M., & Carrow, J. (2020b). Using behavioral skills training and equivalence-based instruction to teach children safe responding to dangerous stimuli: A proof of concept. *Psychological Record.* Advanced online publication. https://doi.org/10.1007/s40732-020-00380-8

Fig. 42.1 Example of psychometric sort of prescription medications. (Note: Unpublished data from Giannakakos et al. (2020b)

asked to make the target room safe before the next session. The intervention was successful at training parents to reduce the number of hazards in all target rooms.

After completing the elopement checklist like the one described intervention might focus on training caregivers putting missing preventative measures in place. Here we describe some useful prevention strategies that can be targeted for intervention. First, installation of secondary locks should be considered if a learner is able to independently exit their home (e.g., unlock doors, reach door handles). Secondary locks are installed out of the learner's reach or require a key to

Table 42.2 Recommendations for simulations of dangerous objects

Dangerous object	Safe preparations	Average cost
Firearm	Movie prop replicas can be obtained from online movie prop warehouse	$100–$200 per replica
	Real firearm disabled by pouring cement down the barrel	Sometimes available through police departments
Lighter	Empty one time use lighter of fluid, refilled with water, and remove flint. Lighting mechanism should be tested to ensure it no longer produces a flame	$2–$4 per lighter
	Reusable lighters can be purchased online and filled with water. Flint should be removed	$15–$30 per lighter
Prescription medications	Pharmacies may donate empty l prescription bottles. Simulated prescription labels can be printed online. Lids should be sealed with super glue	Free
	Empty prescription bottles can be obtained from online sellers. Simulated prescription labels can be printed online. Lids should be sealed with super glue	$0.20–$0.50 per bottle
Cleaning chemicals	Bottles can be obtained online and filled with water. Food coloring can be used to replicate color as needed. Lids and spouts should be rendered inoperable by sealing them with glue	$1.50–$30 per bottle
Broken objects	Breakaway glass also known as sugar glass, is a transparent form of sugar. It is available from theater production companies. It breaks similar to glass, and although it can still cause a cut is generally less dangerous	$20–$50 per item

which the learner does not have access. Second, contact sensors on exterior doorways can act as an alert if a door is opened unexpectedly. A contact sensor is a small two-piece device that attaches to the door and door frame. When a door is opened, the contact between the sensors is broken and an alarm is triggered.

Direct Intervention Procedures

Behavioral Skills Training A recent review of the literature found that the majority of studies used behavioral skills training (BST) in isolation or in combination with other methods to teach a wide range of safety responses (Giannakakos et al., 2020a). BST is a treatment package comprising instructions, modeling, role-play, and feedback. In the context of safety training, the instructor first provides the learner with information on the nature of the danger and the safety response. The type and complexity of this information are appropriate to the learner's age and skill level can be written, vocal, or both. Next, the safety behaviors are modeled. The model is presented so that the learner can observe every component of the response. Then the instructor gives the learner the opportunity to practice the response and provides feedback, both positive and corrective on their performance. The cycle of modeling, role-play, and feedback is repeated until the learner completes the target behavior correctly and independently. The termination criteria for BST vary across studies. One commonality is the requirement that learners emit all steps of the target safety responses independently and without error; however, the number of times a learner emits the response before BST is considered complete varies. Some studies required only one instance of criterion responding (e.g., Ledbetter-Cho et al., 2016) and others required as many as five instances (e.g., Carrow et al., 2020; Sanchez & Miltenberger, 2015).

One example of how BST may be used to teach an appropriate safety response is exemplified by Summers et al. (2011) who used BST to teach six young children with ASD how to respond to the ringing of the doorbell in their home. First, the instructor provided the participant with a clear rule, "when the doorbell rings, do not open the door, you need to go tell mom." Next, the instructor gave the participant the opportunity to engage in the safety response. The instructor observed the participant as they completed the response and provided praise contingent on a correct response. If the participant did not engage in the safety response a series of partial physical prompts were provided to complete the response and another opportunity to engage in the response was presented. Rehearsal and feedback were repeated until the participant independently engaged in the safety response for three consecutive opportunities across three separate days.

Another example of how BST has been used to teach safety responses is a study conducted by Vladescu et al. (2020) who used BST to teach 31 new or expectant caregivers to arrange a safe infant sleep environment. During BST, the instruction and modeling portion was conducted in a group format. The instructor reviewed an educational brochure called Safe Sleep for Babies (Consumer Product Survey Commission, n.d.) with the participants and reviewed the importance and rationale for arranging a safe sleep environment. Next, the instructor modeled the steps of setting up the safe sleep environment. Participants questions were answered throughout this group training. Rehearsal and feedback were conducted with participants individuals. The participant was given an opportunity to arrange the sleep environment independently. If the participant completed a response correctly, they received behavior-specific praise. If the participant engaged in an error, corrective feedback was immediately provided. BST continued until the participant demonstrated 100% correct responding for two consecutive role-play opportunities.

Variations on Behavioral Skills Training Several effective variations of the standard BST format have been evaluated in the literature. One variation of BST that can be useful in settings with low trainer-to-client ratios, such as public schools is to replace the in-person instruction and modeling portion of the treatment with a video model (e.g., Giannakakos et al., 2018; Gunby et al., 2010). There are several important factors to consider when using video modeling. Video lengths vary within the literature, but research supports that the video should be long enough to demonstrate the skill (Karsten et al., 2015). Video models can be shot from the point-of-view of the person engaging in the behavior (i.e., first-person perspective) or that of an observer (i.e., third-person perspective). Studies comparing first-person and third-person perspective suggest both perspectives are equally effective as models for target behaviors (Ayers & Langone, 2007). Although video models can be time intensive to create and require some technical knowledge (e.g., using video editing software, using a device with a sufficient camera quality), they have the advantage of providing a standardized model and set of instructions that can be used across multiple learners (Karsten et al., 2015). For instance, Giannakakos et al. (2018) taught three adults to correctly install and use child passenger safety restraints (CPSR; i.e., car seats). The instruction and modeling portion of BST was provided via video. During the first session of BST, participants watched a short video which provided information on motor vehicle-related infant and child mortality rates and the role correctly installed and used CPSRs serve in reducing deaths and injuries. Next, the participants were brought out to a vehicle and given a tablet containing the video model of correct installation and use of the CPSR. Participants watched the video and followed a checklist as they completed the steps of the installation. Following completion of the installation they were provided with behavior specific positive and corrective feedback on their performance. This was repeated until the participants installed the CPSR 100% correct for three consecutive sessions.

A second variation of BST is computer-based BST. Vanslow and Hanley (2014) evaluated computerized BST and in-person IST to teach abduction prevention and responses to dangerous items. Computer-based BST consisted of a computer game approximately 20 min in length. In the first part of the game a narrator described the dangers and steps of the safety response. Video models of children responding to the dangers were shown. Then the participants completed a series of mini games that required them to practice the order of the steps of the safety response, discriminate safe and unsafe objects, and act out the steps of the response with a cardboard cutout that was placed in the room. In study one computerized BST was used to teach an abduction prevention response. However, in a subsequent in situ assessments only one participant demonstrated the entire safety response. IST was added to establish the abduction prevention response.

A third variation is parent implemented BST. Parent implemented BST has the advantage of reducing the need for a behavior analyst to be present for sessions and may be an attractive option in remote areas or areas with few behavior analysts. In a recent study, Novotny et al. (2020) used a web-based manual to guide parents through the steps of using BST to teach their children to respond to the presence of an unattended firearm. The website created for the study provided parents with all the materials needed to conduct BST, instructions and checklists on how to conduct each component, and video models of the rehearsal and feedback components of the safety response. Experimenters conducted in situ assessments before and after the parent training to measure its effectiveness. Results indicated parent implemented BST was effective for three of the six child participants. For the other three participants experimenter implemented IST was required before they mastered the safety response. The findings of this study are preliminary support for parent implemented web-based BST.

In Situ Training Giannakakos et al. (2020a) reviewed the safety literature and found that in almost half of the studies, BST alone was insufficient to establish the target safety response for all learners. The subsequent inclusion of in situ training (IST) was effective at increasing responding to mastery levels (Giannakakos et al., 2020a). Once a safety response has been established it is then necessary to ensure that response will occur under the control of the danger rather than irrelevant aspects of the environmental arrangement present during training. Including IST as a component of safety instruction serves to assess and facilitate the establishment of appropriate stimulus control (e.g., Beck & Miltenberger, 2009; Giannakakos et al., 2020b; Lee et al., 2019; Miltenberger et al., 2005.) During IST, the practitioner sets up a simulated situation in which the learner will have an opportunity to demonstrate the safety response. The learner is then introduced to the situation while the instructor observes covertly. If the learner completes a step of the safety response incorrectly the instructor interrupts the situation in a natural way and provides corrective feedback, models the correct response, and has the learner practice.

Sanchez and Miltenberger (2015) taught four young adults with intellectual disabilities the general abduction prevention response described earlier in the chapter using BST. Then participants were exposed to an IST condition. The participants were placed in a simulated situation like the one described above. If the participant failed to engage in the abduction prevention response the instructor interrupted the session and demonstrated the correct behaviors. The participant was then required to rehearse the behaviors until they completed the response correctly. Training was considered complete once the participant engaged in the abduction prevention response independently and correctly during an IST probe.

Virtual Reality Virtual reality is an intervention tool that has been garnering increased attention in the safety literature recently. Virtual reality technology is used to create a realistic simulated learning in which the learner can practice the target safety skills. Virtual reality technology has been incorporated into safety instruction to teach fire safety (Çakiroğlu & Gökoğlu, 2019; Padgett et al., 2006) and safe street crossing (e.g., Josman et al., 2008; McComas et al., 2002). One consideration when seeking to use virtual reality as a training mode is to ensure that sufficient hardware is available to run the simulations. As with any relatively new technology, the advancements in this area are constant and become more affordable over time. A recommendation is therefore made to thoroughly research the hardware capability needed to run the targeted simulations and determine if the investment is financially reasonable. Another consideration is that some VR immersive simulations carry the risk that some individuals might experience simulator sickness. In a study evaluating VR software to teach pedestrian safety 11% of participants dropped out due to simulator sickness. A final consideration for using virtual reality is that simulations may not be available for all intended safety responses and finding qualified programmers may be challenging.

Çakiroğlu and Gökoğlu (2019) used VR-based BST to teach 10 adolescents fire safety responses. Participants were taught a variation of the general safety response, if they see a fire they should not interact with it, get away, and tell an adult. During VR training participants wore a virtual reality headset that created a 360 view of a simulated home. The instruction, modeling, rehearsal, and feedback components of BST were provided using avatars in the VR environment. Three participants mastered the safety response following VR BST, for the other seven participants one to four subsequent IST sessions were required to reach mastery. As we discussed earlier in the chapter, research recommends teaching in the natural environment whenever possible; however, it may not always be possible to do so. Virtual reality technology may provide an alternative method in which a realistic instructional setting can be simulated. The simulated environmental stimuli created would have the potential to produce strong stimulus control over the safety response and increase the likelihood of generalization to the natural environment.

Important Intervention Elements

Establishing a Mastery Criterion Mastery criterion is an important consideration when teaching safety responses. In all cases a safety response should be taught to a mastery criterion of 100% or all components completed correctly. Incorrect completion of even a single step of a safety response could result injury or death.

Discrimination Training Just as it is important to establish an appropriate safety response, it is equally important that learners be taught the conditions under which the safety response is not required (Lee et al., 2019; Giannakakos et al., 2020b). Research suggests that safety instruction without discrimination training may lead to overgeneralization of the safety response (Ledbetter-Cho et al., 2019). We therefore recommend that discrimination training be incorporated into all safety instruction. In the context of safety training an individual is taught to emit one response in the presence of a dangerous stimulus and an alternative response in similar situations that do not contain the dangerous component.

Procedures used by Giannakakos et al. (2020b) provide an illustrative example. Two typically developing preschoolers were taught to engage in a safety response when they encountered a variety of dangerous items (i.e., firearm, medications, lighters). Discriminated responding was obtained by also teaching the participants to stay and play when physically similar non-dangerous items (i.e., hair dryer, containers, flash drives) were present in the same environment.

Rossi et al. (2017) also evaluated responding in the presence and absence of the dangerous items in their study to demonstrate appropriate stimulus control. Rossi et al. taught three 5- and 6-year-olds diagnosed with ASD to engage in the general safety response in the presence of an unattended firearm, lighter, or cleaning product and to continue to play if those items were absent in the environment.

Ledbetter-Cho et al. (2019) also used discrimination training to establish correct stimulus control over a safety response. The instructors used BST to teach four learners with ASD to engage in an abduction prevention response following lures from strangers. All participants acquired the abduction prevention response, but when an overgeneralization probe was conducted in which participants were approached by a police officer all participant engaged in some portion of the safety response. Discrimination training was provided in the form of BST and participants were taught to differentially respond to civilian strangers and police officers, and to go with the police officer if asked. Following discrimination training participants successfully engaged in differentiated responding.

Instructional Context The conditions under which a learner encounters a danger may be multifaceted. Most of the studies that have established a safety response in the presence of dangerous stimuli such as poisons, firearms, and fire-starting devices have used only one instructional context. The instructional context typically is a simplistic one, a learner is left in, or told to go to a room that is baited with a dangerous stimulus. Although this is a realistic context a learner may come across a dangerous stimulus in other more complex situations. For example, a learner may see prescription medications left on a table after viewing their parent consume them. A learner may be enticed to touch a firearm by a friend or sibling or a learner who sees birthday candles left out and knows the location of matches may attempt to access them. One study to date has evaluated procedures for teaching a response to a dangerous item under more varied contexts. Lee et al. (2019) evaluated the extent to which a safety response taught in the presence of a firearm under one context would generalize to a representative sample of additional contexts. BST and IST with discrimination training were used to teach participants to engage in the three-step safety response in the presence of an unattended firearm or to stay and play in the presence of a hair dryer. Participants were taught that in the context of finding a firearm placed on a piece of furniture among their toys they should engage in the three-step response—don't touch, leave the area, and tell an adult. Generalization was then assessed to four other contexts. In general, the contexts varied by who was present in the setting, the placement of the gun, and in what way it was left unattended. More specifically, these contexts included, the participant's parent being present in the room, the firearm placed on a piece of furniture, the experimenter asking the participant to retrieve an item from a location where the firearm is placed, a firearm left unattended after a parent finishes interacting with it in view of the participant, and a peer or sibling holding the firearm and attempting to induce the participant to play with it. Following BST and IST in the first context all participants demonstrated generalization of the safety response to the remaining untrained contexts. The results of this study provide preliminary evidence that BST and IST may be effective in establishing a safety response with generality to a variety of related contexts. Additional replications of Lee et al.'s (2019) procedures are needed to establish the generality of this outcome.

Modified Reinforcement Contingencies It is sometimes necessary to modify the reinforcement contingencies surrounding the safety response (Hanratty et al., 2016; Miltenberger et al., 2004). If the natural reinforcing contingency for the safety response (i.e., caregiver praise) is not sufficient to establish and maintain responding additional reinforcement contingencies may be required. In their study evaluating the effects of BST and IST on teaching a firearm safety response to 5 preschool children, Hanratty et al. (2016) found that following BST and IST participants failed to acquire the safety response. To address this issue the experimenter added both a positive and negative reinforcement contingency to the IST procedure. If during an IST session the participant did not engage in the correct response within one minute or if they touched the firearm the experimenter interrupted the session, reviewed the safety response and had the participant practice the skills for 10 min instead of attending their class playtime. If the participant correctly engaged in the safety response during the IST session, they were given the option to go outside and play or complete an activity of their choice. These modifications were effective in increasing correct responding for four of the five participants.

Generalization and Maintenance Establishing a safety response is only a fraction of comprehensive safety instruction. It is unknown when, if ever, a learner will need to demonstrate a safety response. Therefore, it is imperative that established responses generalize to novel stimulus conditions and maintain over time (Miltenberger, 2008). Careful consideration should be given to programming for generalization and maintenance. This section breaks down the procedures described above and identifies those elements that promote generalization and long-term maintenance.

First, several of the studies discussed used realistic simulations of dangerous stimuli during training. This procedural element serves to establish a common stimulus (dangerous item) that is shared by both the training setting and any future dangerous situation. Subsequently, the common stimulus serves to control the safety response regardless of how other stimulus conditions might vary. If appropriate stimulus control of the response is established during training it will increase the likelihood the learner will engage in the safety response if they encounter that dangerous stimulus.

Second, because we cannot predict the exact stimulus conditions surrounding a dangerous situation, the practitioner should incorporate multiple exemplar training into their safety instruction (e.g., Lee et al., 2019; Rossi et al., 2017). Depending on the safety response being taught this may include multiple exemplars of dangerous stimuli, discrimination stimuli, or teaching the response in a variety of different scenarios. For example, a learner being taught not to touch fire starting devices might be exposed to multiple exemplars of fire-starting devices (e.g., matches, butane lighter, Bic lighter) and variations in appearance for each one (e.g., different colors and sizes). If designing an intervention to teach a learner not to approach an unattended pool, multiple scenarios could be used such as, being outside when the pool gate is left open, or a sibling suggests jumping in the pool when caregivers are inside. Including varied materials and scenarios in training increases the likelihood that generalization of the response will occur to similar untrained conditions and therefore be more likely to maintain over time.

The unpredictable nature of dangerous situations makes it imperative that behavior analysts conduct regular maintenance checks. Whenever possible maintenance probes should be conducted using an IST format (Miltenberger, 2008). Regular assessments to evaluate in the target safety response are still present in a learner's repertoire can in themselves be a type of preventative measure as they allow parents and practitioners to identify if a response needs to be retrained. Few studies in the safety literature have evaluated the long-term maintenance of the responses they established (Giannakakos et al., 2020a). It is essential therefore that established responses maintain long term. There is a need in the field of behavior analysis for follow-up studies that evaluate if safety responses have maintained at mastery levels. It is concerning that it remains largely unknown how safety responses established using behavior-analytic methodology maintain over time.

Giannakakos et al. (2020b) evaluated the effectiveness of a treatment package consisting of BST, IST, and equivalence-based instruction (EBI) at establishing a concept of danger that was not limited by the physical features of the dangerous stimuli and a collateral safety response. The authors first determined their exemplars of dangerous stimuli through a psychometric sort. Ten individuals were asked to sort 10 pictures each of handguns, medication, and lighters. The results of the psychometric sort generated a gradient of stimuli for each dangerous item. The most representative and least representative exemplars were used during training, while the exemplar with the median score in each gradient was reserved for generalization. Non-dangerous items were then selected for use in discrimination training based on shared physical features with the non-dangerous items (i.e., hair dryers, flash drives, and containers filled with small objects or liquid). BST and IST were used to teach participants a safety response—don't touch, leave the area, tell an adult—in the presence of one type of dangerous stimulus, and to stay and play in the presence of the corresponding non-dangerous stimulus. Then participants were exposed to EBI to establish classes of dangerous (i.e., handguns, lighters, and medications) and non-dangerous (i.e., hair dryers, flash drives, and containers) stimuli. After participants demonstrated acquisition of the classes, their response in the presence of the two remaining types of dangerous and non-dangerous stimuli was probed. Both participants demonstrated transfer of the safety response taught during BST to untrained types of dangers and novel exemplars following EBI and engaged in discriminated responding in the presence of the related non-dangerous stimuli. Several aspects of this study provide examples of generalization strategies. First, generalization of the safety and play responses to untrained exemplars was likely facilitated by the responses having been trained in the presence of the most and least representative exemplars during BST and IST. The most and least representative exemplars of each stimulus served as boundary stimuli for each of their respective classes, making generalization to examples with physical characteristics between these boundaries highly likely. Second, the authors demonstrated that EBI could be used to establish classes of stimuli that were related to each other not by their physical characteristics, but by a conceptual property (i.e., dangerous of non-dangerous). The inclusion of the dangerous and non-dangerous stimuli used during BST and IST in the class formation during EBI facilitated transfer of the safety and play responses to the untrained stimuli without the need for BST and IST.

Future Directions

There are several areas of the safety literature that could be strengthened. One such area is environmental assessment. The HAPI-R assessment discussed in this chapter is a useful tool but does not cover all the areas that might need to be evaluated. To date no assessment of environmental manipulations related to safety exists that reflects the unique needs of individuals with developmental disabilities. Environmental assessment plays an important role in subsequent antecedent interventions targeting creating a safe environment. Researchers should consider developing and evaluating assessments that could assist practitioners in identifying safety response deficits.

A second area for future research is discrimination training. Several studies have found that safety training is enhanced by the inclusion of discrimination training. Ledbetter-Cho et al. (2019) demonstrated the risk for overgeneralization that occurs when a safety response is not established under appropriate stimulus control. Future studies should seek to incorporate discrimination training into different areas of safety instruction. For instance, the area of emergency responses seems a prime candidate for teaching discriminated responses. Information provided by Arizona State University Center for Problem-Oriented Policing (Sampson, 2004) suggests that in some United States counties close to 50% of monthly calls are non-emergencies. These findings suggest a vast majority of people fail to discriminate the conditions under which they should *not* call emergency services. Discrimination training could be employed to teach learners at a young age to respond differentially to emergency and serious, but non-emergency situations.

A final area of safety instruction that has received limited attention within the behavioral literature is water safety, particularly regarding preventative methods and responses that could help a learner should they begin to drown. Researchers and practitioners should look to the prominent water-safety courses by organizations such as the American Red Cross and seek expert consultation from credentialed Water-Safety Instructors (https://www.redcross.org/take-a-class/swimming/water-safety) when designing safety responses around water safety. A general safety repertoire for water-safety instruction should minimally address treading water, identifying life guards, walking while on the pool deck, identifying prominent pool signs (e.g., no diving) as well as gauging the depth of water by referencing the numbers marked around the pool deck. Other behaviors which may help a learner in a pool setting may also include recognizing the signs of active drowning so that they can alert a lifeguard or adult if they witness an individual in distress

Chapter Summary: Key Points

- Education-based instruction is insufficient to establish safety behaviors due to the lack of an active learning component. To effectively establish a safety response instruction must include a rehearsal and feedback component.
- The first step in comprehensive safety instruction is to use identify potential dangers in a learner's environment and deficits in safety responses. Subsequent instruction should be comprised of both antecedent and direct intervention procedures.
- Expert consultation is an important component of safety research and instruction. Researchers and practitioners should collaborate with local agencies and consult official websites such as the Centers for Disease Control and Prevention, the American Medical Association, and the National Fire Protection Association for up-to-date information during the intervention planning process.
- BST in isolation and in combination with IST are the most evidence-based methods for establishing safety responses.
- All learners regardless of skill level should have a repertoire of safety responses. Research has identified procedures that are effective for both neurotypical learners and learners with developmental disabilities.
- Programming for generalization of the safety response to the natural environment should be incorporated into safety instruction. Evidence-based methods of programming for generalization may include programming common stimuli, multiple exemplar training, and discrimination training.
- The most important area for future research in behavior analytic safety instruction is response maintenance. It is unknown when, if ever, a learner will need to demonstrate a safety response. Therefore, it is imperative that established responses maintain over time.

References

Ahrens, M. (2017). *Home fires involving cooking equipment.* National Fire Protection Association. https://lawdogs.org/wp-content/uploads/sites/641/2017/11/HomeFiresInvovingCookingEquip.pdf

Alaniz, M. L., Rosenberg, S. S., Beard, N. R., & Rosario, E. R. (2017). The effectiveness of aquatic group therapy for improving water safety and social interactions in children with autism spectrum disorder: A pilot program. *Journal of Autism and Developmental Disorders, 47*(12), 4006–4017. https://doi.org/10.1007/s10803-017-3264-4

Anderson, C., Law, J. K., Daniels, A., Rice, C., Mandell, D. S., Hagopian, L., & Law, P. A. (2012). Occurrence and family impact of elopement in children with autism spectrum disorders. *Pediatrics, 130*(5), 870–877. https://doi.org/10.1542/peds.2012-0762

Austin, J. E., Doering, J. J., & Davies, W. (2018). Using technology to teach parents to create a safe infant sleep space. *Clinical Practice in Pediatric Psychology, 6*(3), 211–222. https://doi.org/10.1037/cpp0000241

Ayres, K. M., & Langone, J. A. (2007). Comparison of video modeling perspectives for students with autism. *Journal of Special Education Technology, 22*(2), 15–30. https://doi.org/10.1177/016264340702200202

Barone, V. J., Greene, B. F., & Lutzker, J. R. (1986). Home safety with families being treated for child abuse and neglect. *Behavior Modification, 10*(1), 93–114. https://doi.org/10.1177/01454455860101006

Beck, K. V., & Miltenberger, R. G. (2009). Evaluation of a commercially available program and in situ training by parents to teach abduction prevention skills to children. *Journal of Applied Behavior Analysis, 42*(4), 761–772. https://doi.org/10.1901/jaba.2009.42-761

Bertsch, G., Fox, C. J., & Kwiecinski, J. (1984). Teaching developmentally disabled persons how to react to fires. *Applied Research in Mental Retardation, 5*(4), 483–497. https://doi.org/10.1016/s0270-3092(84)80040-5

Bigelow, K. M., Huynen, K. B., & Lutzker, J. R. (1993). Using a changing criterion design to teach fire escape to a child with developmental disabilities. *Journal of Developmental Disabilities, 5*(2), 122–127. https://doi.org/10.1007/BF01045971

Borse, N. N., Gilchrist, J., Dellinger, A. M., Rudd, R. A., Ballesteros, M. F., & Sleet, D. A. (2008). *CDC childhood injury report*. Centers for Disease Control and Prevention, National Center for Injury Prevention and Control. https://www.cdc.gov/safechild/pdf/CDC-ChildhoodInjury.pdf

Boyle, C. L., & Lutzker, J. R. (2005). Teaching young children to discriminate abusive from nonabusive situations using multiple exemplars in a modified discrete trail teaching format. *Journal of Family Violence, 20*(2), 55–69. https://doi.org/10.1007/s10896-005-3169-4

Çakiroğlu, Ü., & Gökoğlu, S. (2019). Development of fire safety behavioral skills via virtual reality. *Computers & Education, 133*, 56–68. https://doi.org/10.1016/j.compedu.2019.01.014

Carlile, K. A., DeBar, R. M., Reeve, S. A., Reeve, K. F., & Meyer, L. S. (2018). Teaching help-seeking when lost to individuals with autism spectrum disorder. *Journal of Applied Behavior Analysis, 51*(2), 191–206. https://doi.org/10.1002/jaba.447

Carroll, L. A., Miltenberger, R. G., & O'Neill, H. K. (1992). A review and critique of research evaluating child sexual abuse prevention programs. *Education and Treatment of Children, 15*(4), 335–354. https://www.jstor.org/stable/42899281

Carrow, J. N., Vladescu, J. C., Reeve, S. A., & Kisamore, A. N. (2020). Back to sleep: Teaching adults to arrange safe infant sleep environments. *Journal of Applied Behavior Analysis, 53*(3), 1321–1336. https://doi.org/10.1002/jaba.681

Centers for Disease Control and Prevention, National Center for Health Statistics [October 15, 2020]. Underlying Cause of Death 1999-2018 on CDC WONDER Online Database. Data are from the Multiple Cause of Death Files, 1999-2018, as compiled from data provided by the 57 vital statistics jurisdictions through the Vital Statistics Cooperative Program. http://wonder.cdc.gov/ucd-icd10.html

Centers for Disease Control and Prevention, National Center for Injury Prevention and Control. (2012). National Action Plan for Child Injury Prevention. https://www.cdc.gov/safechild/pdf/National_Action_Plan_for_Child_Injury_Prevention-a.pdf

Clayton, M., Helms, B., & Simpson, C. (2006). Active prompting to decrease cell phone use and increase seat belt use while driving. *Journal of Applied Behavior Analysis, 39*(3), 341–349. https://doi.org/10.1901/jaba.2006.153-04

Coffman, S. P. (1991). Parent education for drowning prevention. *Pediatric Health Care, 5*(3), 141–146. https://doi.org/10.1016/0891-5245(91)90024-k

Collins, B. C., & Griffen, A. K. (1996). Teaching students with moderate disabilities to make safe responses to product warning labels. *Education and Treatment of Children, 19*(1), 30–45. https://www.jstor.org/stable/42899439

Consumer Product Safety Commission. (n.d.). *Safe sleep for babies [Brochure]*. Author.

Crifasi, C. K., Doucette, M. L., McGinty, E., Webster, D. W., & Barry, C. L. (2018). Storage practices of US gun owners in 2016. *American Journal of Public Health, 108*(4), 532–537. https://doi.org/10.2105/AJPH.2017.304262

Dancho, K., Thompson, R. H., & Rhodes, M. M. (2008). Teaching preschool children to avoid poison hazards. *Journal of Applied Behavior Analysis, 41*(2), 267–271. https://doi.org/10.1901/jaba.2008.41-267

Dixon, D. R., Bergstrom, R., Smith, M. N., & Tarbox, J. (2010). A review of the research on procedures for teaching safety skills to persons with developmental disabilities. *Research on Developmental Disabilities, 31*(5), 985–994. https://doi.org/10.1016/j.ridd.2010.03.00

Doughty, A. H., & Kane, L. M. (2010). Teaching abuse-protection skills to people with intellectual, disabilities: A review of the literature. *Research in Developmental Disabilities, 31*(2), 331–337. https://doi.org/10.1016/j.ridd.2009.12.007

Dowshen, S. (Ed.). (2018). *Preventing abductions*. Kids Health. https://kidshealth.org/en/parents/abductions.html

Egemo-Helm, K. R., Miltenberger, R. G., Knudson, P., Finstrom, N., Jostad, C., & Johnson, B. (2007). An evaluation of in situ training to teach sexual abuse prevention skills to women with mental retardation. *Behavioral Interventions, 22*(2), 99–119. https://doi.org/10.1002/bin.234

Fergusson, D. M., Horwood, L. J., Beautrais, A. L., & Shannon, F. T. (1982). A controlled field trial of a poisoning prevention method. *Pediatrics, 69*(5), 515–520. https://pediatrics.aappublications.org/content/69/5/515

Garcia, D., Dukes, C., Brady, M. P., Scott, J., & Wilson, C. L. (2016). Using modeling and rehearsal to teach fire safety to children with autism. *Journal of Applied Behavior Analysis, 49*(3), 699–704. https://doi.org/10.1002/jaba.331

Gatheridge, B. J., Miltenberger, R. G., Huneke, D. F., Satterlund, M. J., Mattern, A. R., Johnson, B. M., & Flessner, C. A. (2004). Comparison of two programs to teach firearm injury prevention skills to 6- and 7-year-old children. *Pediatrics, 114*(3). https://doi.org/10.1542/peds.2003-0635-L

Geller, E. S., Paterson, L., & Talbott, E. (1982). A behavioral analysis of incentive prompts for motivating seat belt use. *Journal of Applied Behavior Analysis, 15*(3), 403–413. https://doi.org/10.1901/jaba.1982.15-403

Geller, E. S., Kalsher, M. J., Rudd, J. R., & Lehman, G. R. (1989). Promoting safety belt use on a university campus: An integration of commitment and incentive strategies. *Journal of Applied Social Psychology, 19*(1), 3–19. https://doi.org/10.1111/j.1559-1816.1989.tb01217.x

Giannakakos, A. R., Vladescu, J. C., & Simon, R. (2018). Teaching installation and use of child passenger safety restraints. *Journal of Applied Behavior Analysis, 51*(4), 915–923. https://doi.org/10.1002/jaba.493

Giannakakos, A. R., Vladescu, J. C., Kisamore, A. N., Reeve, K. F., & Fienup, D. M. (2020a). A review of the literature on safety response training. *The Journal of Behavioral Education, 29*(1), 64–121. https://doi.org/10.1007/s10864-019-09347-4

Giannakakos, A. R., Vladescu, J. C., Reeve, K. F., Kisamore, A. N., Fienup, D. M., & Carrow, J. (2020b). Using behavioral skills training and equivalence-based instruction to teach children safe responding to dangerous stimuli: A proof of concept. *Psychological Record*. Advanced online publication. https://doi.org/10.1007/s40732-020-00380-8

Grow, L., & LeBlanc, L. (2013). Teaching receptive language skills: Recommendations for instructors. *Behavior Analysis in Practice, 6*(1), 56–75. https://doi.org/10.1007/BF03391791

Gunby, K. V., Carr, J. E., & LeBlanc, L. A. (2010). Teaching abduction- prevention skills to children with autism. *Journal of Applied Behavior Analysis, 43*(1), 107–112. https://doi.org/10.1901/jaba.2010.43-107

Haney, J. I., & Jones, R. T. (1982). Programming maintenance as a major component of a community-centered preventive effort: Escape from fire. *Behavior Therapy, 13*(1), 47–62. https://doi.org/10.1016/S0005-7894(82)80049-X

Hanratty, L. A., Miltenberger, R. G., & Florentino, S. R. (2016). Evaluating the effectiveness of a teaching package utilizing behavior skills training and in situ training to teach gun safety skills in a preschool classroom. *Journal of Behavior Education, 25*(3), 310–323. https://doi.org/10.1007/s10864-016-9248-1

Harriage, B., Cho Blair, K. S., & Miltenberger, R. (2016). An evaluation of a parent implemented in situ pedestrian safety skills intervention for individual with autism. *Journal of Autism and Developmental Disorders, 46*(6), 2017–2027. https://doi.org/10.1007/s10803-016-2730-8

Himle, M. B., & Wright, K. A. (2014). Behavior skills training to improve installation and use of child passenger safety restraints. *Journal of Applied Behavior Analysis, 47*(3), 549–559. https://doi.org/10.1002/jaba.143

Himle, M. B., Miltenberger, R. G., Gatheridge, B. J., & Flessner, C. A. (2004). An evaluation of two procedures for training skills to prevent gun play in children. *Pediatrics, 113*(1), 70–77. https://doi.org/10.1542/peds.113.1.70

Houvouras, A. J., & Harvey, M. T. (2014). Establishing fire safety skills using behavioral skills training. *Journal of Applied Behavior Analysis, 47*(2), 420–424. https://doi.org/10.1002/jaba.113

Jabaley, J. J., Lutzker, J. R., Whitaker, D. J., & Self-Brown, S. (2011). Using iPhones™ to enhance and reduce face-to-face home safety sessions within SafeCare®: An evidence-based child maltreatment prevention program. *Journal of Family Violence, 26*(5), 377–385. https://doi.org/10.1007/s10896-011-9372-6

Johnson, B. M., Milenberger, R. G., Egemo-Helm, K., Jostad, C. M., Flessner, C., & Gatheridge, B. (2005). Evaluation of behavioral skills training for teaching abduction-prevention skills to young children. *Journal of Applied Behavior Analysis, 38*(1), 67–78. https://doi.org/10.1901/jaba.2005.26-04

Jones, R. T., & Kazdin, A. E. (1980). Teaching children how and when to make emergency telephone calls. *Behavior Therapy, 11*(4), 509–521. https://doi.org/10.1016/s0005-7894(80)80067-0

Jones, R. T., Kazdin, A. E., & Haney, J. I. (1981). Social validation and training of emergency fire safety skills for potential injury prevention and life saving. *Journal of Applied Behavior Analysis, 14*(3), 249–260. https://doi.org/10.1901/jaba.1981.14-2499

Jones, R. T., Sisson, L. A., & Van Hasselt, V. B. (1984). Emergency fire-safety skills for blind children and adolescents: Group training and generalization. *Behavior Modification, 8*(2), 267–286. https://doi.org/10.1177/01454455840082007

Josman, N., Ben-Chaim, H. M., Friedrich, S., & Weiss, P. L. (2008). Effectiveness of virtual reality for teaching street-crossing skills to children and adolescents with autism. *International Journal on Disability and Human Development, 7*(1), 49–56. https://doi.org/10.1515/IJDHD.2008.7.1.49

Jostad, C. M., & Miltenberger, R. G. (2004). Firearm injury prevention skills: Increasing the efficiency of training with peer tutoring. *Child & Family Behavior Therapy, 26*(3), 21–35. https://doi.org/10.1300/J019v26n03_02

Jostad, C. M., Miltenberger, R. G., Kelso, P., & Knudson, P. (2008). Peer tutoring to prevent firearm play: Acquisition, generalization, and long-term maintenance of safety skills. *Journal of Applied Behavior Analysis, 41*(1), 11–123. https://doi.org/10.1901/jaba.2008.41-117

Karsten, A. M., Axe, J. B., & Mann, C. C. (2015). Review and discussion of strategies to address low trainer-to-staff ratios. *Behavioral Interventions, 30*(4), 295–313. https://doi.org/10.1002/bin.1420

Katz, R. C., & Singh, N. N. (1986). Comprehensive fire-safety training for adult mentally retarded persons. *Journal of Mental Deficiency Research, 30*(1), 59–69. https://doi.org/10.1111/j.1365-2788.1986.tb01298.x

Kennedy, P. J., & Mason, C. L. (2015). Evaluating a fire safety programme. *Crime Prevention and Community Safety, 17*(1), 20–29. https://doi.org/10.1057/cpcs.2014.15

King, S., & Miltenberger, R. (2017). Evaluation of video modeling to teach children diagnosed with autism to avoid poison hazards. *Advanced Neurodevelopmental Disorders, 1*(4), 221–229. https://doi.org/10.1007/s41252-017-0028-2

Krenzelok, E. P. (1995). The use of poison prevention and education strategies to enhance the awareness of the poison information center and to prevent accidental pediatric poisonings. *Clinical Toxicology, 33*(6), 663–667. https://doi.org/10.3109/15563659509010625

Laflamme, L., Hasselberg, M., & Burrows, S. (2010). 20 years of research on socioeconomic inequality and children's—Unintentional injuries understanding the cause-specific evidence at hand. *International Journal Of Pediatrics, 2010*, 1–23. https://doi.org/10.1155/2010/819687

Ledbetter-Cho, K., Lang, R., Davenport, K., Moore, M., Lee, A., O'Reilly, M., Watkins, L., & Falcomata, T. (2016). Behavioral skills training to improve the abduction-prevention skills of children with autism. *Behavior Analysis in Practice, 9*(3), 266–270. https://doi.org/10.1007/s40617-016-0128-x

Ledbetter-Cho, K., Lang, R., Lee, A., Murphy, C., Davenport, K., Kirkpatrick, M. Schollian, M., Moore, M., Billingsley, G., & O'Reilly, M. (2019). Teaching children with autism abduction-prevention skills may result in overgeneralization of the target response. *Behavior Modification*. Advanced online publication. https://doi.org/10.1177/0145445519865165

Lee, N., Vladescu, J. C., Reeve, K. F., Peterson, K. M., & Giannakakos, A. R. (2019). Effects of behavioral skills training on the stimulus control of gun safety responding. *Journal of Behavioral Education, 28*(2), 187–203. https://doi.org/10.1007/s10864-018-9309-8

Ludwig, T. D., Buchholz, C., & Clarke, S. W. (2005). Using social marketing to increase the use of helmets among bicyclists. *Journal of American College Health, 54*(1), 51–58. https://doi.org/10.3200/JACH.54.1.51-58

Lumley, V. A., & Miltenberger, R. G. (1997). Sexual abuse prevention for persons with mental retardation. *American Journal of Mental Retardation, 101*(5), 459–472. https://pubmed.ncbi.nlm.nih.gov/9083603/

Lutzker, J. R., & Bigelow, K. M. (2002). *Child maltreatment: A guidebook for parent services*. The Guilford Press.

Lutzker, J. R., Bigelow, K. M., Doctor, R. N., & Kessler, M. L. (1998). Safety, health care, and bonding within an ecobehavioral approach to treating and preventing child abuse and neglect. *Journal of Family Violence, 13*(2), 163–185. https://doi.org/10.1023/A:1022893607387

Maglieri, K. A., DeLeon, I. G., Rodriguez-Catter, V., & Sevin, B. M. (2000). Treatment of covert food stealing in an individual with Prader-Willi syndrome. *Journal of Applied Behavior Analysis, 33*(4), 615–618. https://doi.org/10.1901/jaba.2000.33.615

Mandel, U., Bigelow, K. M., & Lutzker, J. R. (1998). Using video to reduce home safety hazards with parents reported for child abuse and neglect. *Journal of Family Violence, 13*(2), 147–162. https://doi.org/10.1023/A:1022841623317

McComas, J., MacKay, M., & Pivik, J. (2002). Effectiveness of virtual reality for teaching pedestrian safety. *Cyberpsychology & Behavior, 5*(3), 185–190. https://doi.org/10.1089/109493102760147150

Mechling, L. C. (2008). Thirty year review of safety instruction for persons with intellectual disabilities. *Education and Training in Developmental Disabilities, 43*(4), 311–323. https://www.jstor.org/stable/23879793

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*(1), 67–79. https://www.jstor.org/stable/24233464

Metchikian, K. L., Mink, J. M., Bigelow, K. M., Lutzker, J. R., & Doctor, R. M. (1999). Reducing home safety hazards in the homes of parents reported for neglect. *Child & Family Behavior Therapy, 21*(3), 23–34. https://doi.org/10.1300/J019v21n03_02

Miltenberger, R. G. (2008). Teaching safety skills to children: Prevention of firearm injury as an exemplar of best practice in assessment, training, and generalization of safety skills. *Behavior Analysis in Practice, 1*(1), 30–36. https://doi.org/10.1007/BF03391718

Miltenberger, R. G., & Thiesse-Duffy, E. (1988). Evaluation of home-based programs for teaching personal safety skills to children. *Journal of Applied Behavior Analysis, 21*(1), 81–87. https://doi.org/10.1901/jaba.1988.21-81

Miltenberger, R. G., Roberts, J. A., Ellingson, S., Galensky, T., Rapp, J. T., Long, E. S., et al. (1999). Training and generalization of sexual abuse prevention skills for women with mental retardation. *Journal of Applied Behavior Analysis, 32*(3), 385–388. https://doi.org/10.1901/jaba.1999.32-385

Miltenberger, R. G., Flessner, C., Gathridge, B., Johnson, B., & Satterlund, & Egmo, K. (2004). Evaluation of behavioral skills training to prevent gun play in children. *Journal of Applied Behavior Analysis, 37*(4), 513–516. https://doi.org/10.1901/jaba.2004.37-513

Miltenberger, R. G., Gatheridge, B. J., Satterlund, M., Egemo-Helm, K. R., Johnson, B. M., Jostad, C., Kelso, P., & Flessner, C. A. (2005). Teaching safety skills to prevent gun play: An evaluation of in situ training. *Journal of Applied Behavior Analysis, 38*(3), 395–398. https://doi.org/10.1901/jaba.2005.130-04

Miltenberger, R. M., Gross, A., Knudson, P., Bosch, A., Jostad, C., & Brower Breitwieser, C. (2009). Evaluating behavioral skills training with and without simulated in situ training for teaching safety skills to children. *Education and Treatment of Children, 32*(1), 63–75. https://www.jstor.org/stable/42900007

Miltenberger, R. G., Sanchez, S., & Valbuena, D. (2020). Teaching safety skills. *Pediatric Prevention, 67*(3), 573–584. https://doi.org/10.1016/j.pcl.2020.02.011

Mondozzi, M. A., & Harper, A. A. (2001). Search of effective education in burn and fire prevention. *Journal of Burn Care & Rehabilitation, 22*(4), 277–281. https://doi.org/10.1097/00004630-200107000-00006

Novotny, M. A., Miltenberger, R. G., Frederick, K., & Maxfield, T. C. (2020). An evaluation of parent implemented web-based behavioral skills training for firearm safety. *Behavioral Interventions*. Advanced online publication. https://doi.org/10.1002/bin.1728

Ozkan, S. Y., Oncul, N., & Kaya, O. (2013). Effects of computer-based instruction on teaching emergency telephone numbers to students with intellectual disability. *Education and Training in Autism and*

Developmental Disabilities, 48(2), 200–217. https://www.jstor.org/stable/23880640

Padgett, L. S., Strickland, D., & Coles, C. D. (2006). Case study: Using a virtual reality computer game to teach fire safety skills to children diagnosed with fetal alcohol syndrome. *Journal of Pediatric Psychology, 31*(1), 65–70. https://doi.org/10.1093/jpepsy/jsj030

Page, T. J., Iwata, B. A., & Neef, N. A. (1976). Teaching pedestrian skills to retarded persons: Generalization from the classroom to the natural environment. *Journal of Applied Behavior Analysis, 9*(4), 433–444. https://doi.org/10.1901/jaba.1976.9-433

Pan-Skadden, J., Wilder, D. A., Sparling, J., Severtson, E., Donaldson, J., Postma, N., Beavers, G., & Neidert, P. (2009). The use of behavioral skills training and in-situ training to teach children to solicit help when lost: A preliminary investigation. *Education and Treatment of Children, 32*(3), 359–370. https://doi.org/10.1353/etc.0.0063

Partington, J. W., & Mueller, M. M. (2012). *The assessment of functional living skills*. Stimulus Publications.

Rodriquez, C. N., & Jackson, M. L. (2020). A safe-word intervention for abduction prevention in children with autism spectrum disorders. *Behavior Analysis in Practice*. Advanced online publication. https://doi.org/10.1007/s40617-020-00418-x

Rosch, E. (1975). Cognitive representation of semantic categories. *Journal of Experimental Psychology, 104*(3), 192–233. https://doi.org/10.1037/0096-3445.104.3.192

Rosenbaum, M. S., Creedon, D. L., & Drabman, R. S. (1981). Training preschool children to identify emergency situations and make emergency phone calls. *Behavior Therapy, 12*(3), 425–435. https://doi.org/10.1016/S0005-7894(81)80129-3

Rossi, M. R., Vladescu, J. C., Reeve, K. F., & Gross, A. C. (2017). Teaching safety responding to children with autism spectrum disorder. *Education and Treatment of Children, 40*(2), 187–208. https://doi.org/10.1353/ec.2017.0009

Sampson, R. (2004). *Problem-oriented guides for police problem specific guides series: Misuse and abuse of 911* (guide no. 19). https://popcenter.asu.edu/sites/default/files/misuse_abuse_of_911.pdf

Sanchez, S., & Miltenberger, R. G. (2015). Evaluating the effectiveness pf an abduction prevention program for young adults with intellectual disabilities. *Child & Family Behavior Therapy, 37*(3), 197–207. https://doi.org/10.1080/07317107.2015.107178

Schwebel, D. C., & McClure, L. A. (2014). Training children in pedestrian safety: Distinguishing gains in knowledge from gains in safe behaviors. *Journal of Primary Prevention, 35*(3), 151–162. https://doi.org/10.1007/s10935-014-0341-8

Spivey, C. E., & Mechling, L. C. (2016). Video modeling to teach social safety skills to young adults with intellectual disability. *Education and Training in Autism and Developmental Disabilities, 51*(1), 79–92. https://www.jstor.org/stable/26420366

Spooner, F., Stem, B., & Test, D. W. (1989). Teaching first aid skills to adolescents who are moderately mentally handicapped. *Education and Training in Mental Retardation, 24*(4), 341–351. https://www.jstor.org/stable/23878518

Stienborn, M., & Knapp, T. J. (1982). Teaching an autistic child pedestrian skills. *Journal of Behavior Therapy & Experimental Psychiatry, 13*(4), 347–351. https://doi.org/10.1016/0005-7916(82)90083-0

Stokes, T. F., & Baer, D. M. (1977). An implicit technology of generalization. *Journal of Applied Behavior Analysis, 10*(2), 349–367. https://doi.org/10.1901/jaba.1977.10-349

Summers, J., Tarbox, J., Findel-Pyles, R. S., Wilke, A. E., Bergstrom, R., & Williams, W. L. (2011). Teaching two household safety skills to children with autism. *Research in Autism Spectrum Disorder, 5*(1), 629–632. https://doi.org/10.1016/j.rasd.2010.07.008

Sundberg, M. L., Endicott, K., & Eigenheer, P. (2000). Using intraverbal prompts to establish tacts for children with autism. *The Analysis of Verbal Behavior, 17*(1), 89–104. https://doi.org/10.1007/bf03392958

Taylor, B. A., Hughes, C. E., Richard, E., Hoch, H., & Coello, A. R. (2004). Teaching teenagers with autism to seek assistance when lost. *Journal of Applied Behavior Analysis, 37*(1), 79–82. https://doi.org/10.1901/jaba.2004.37-79

Turgut, T., Yaman, M., & Turgut, A. (2015). Educating children on water safety for drowning prevention. *Social Indicators Research, 129*(2), 787–801. https://doi.org/10.1007/s11205-015-1109-0

Van Houten, R., Van Houten, J., & Malenfant, J. E. L. (2007). Impact of comprehensive safety program on bicycle helmet use among middle-school children. *Journal of Applied Behavior Analysis, 40*(2), 239–247. https://doi.org/10.1901/jaba.2007.62-06

Vanslow, N. R., & Hanley, G. (2014). An evaluation of computerized behavior skills training to teach safety skills to young children. *Journal of Applied Behavior Analysis, 47*(1), 51–69. https://doi.org/10.1002/jaba/105

Vladescu, J. C., Day-Watkins, J., Schnell, L. K., & Carrow, J. N. (2020). Safe to sleep: Community-based caregiver training. *Journal of Applied Behavior Analysis.* Advance online publication. https://doi.org/10.1002/jaba.777

Winterling, V., Gast, D. L., Wolery, M., & Farmer, J. A. (1992). Teaching safety skills to high school students with moderate disabilities. *Journal of Applied Behavior Analysis, 25*(1), 217–227. https://doi.org/10.1901/jaba.1992.25-217

World Health Organization. (2018). *Violence and injury prevention: Child Injury.* http://www.who.int/violence_injury_prevention/child/injury/en/

Wright, T. S., & Wolery, M. (2014). Evaluating the effectiveness of roadside instruction in teaching youth with visual impairments street crossings. *The Journal of Special Education, 48*(1), 46–58. https://doi.org/10.1177/0022466912453770