Development and Evaluation of Interactive Computerized Training to Teach Practitioners to Implement Safety Skills Training

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Development and Evaluation of Interactive Computerized Training to Teach Practitioners to Implement Safety Skills Training

by

Rasha R. Baruni

A dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy Department of Child and Family Studies College of Behavioral and Community Sciences University of South Florida

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DEDICATION

This is dedicated to my family, who have been my constant source of love, support, and strength throughout my life.

To my partner in life, Manar, who has been my rock, my confidant, and my inspiration. You taught me that there is always a way, no challenge too big or impossible. This accomplishment would have been impossible without you. You inspire me to be the best version of myself. I am forever grateful.

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ABSTRACT

Children can experience unintentional injuries due to safety threats found in their environments (Centers for Disease Control and Prevention, 2008). Researchers have shown that children can be taught safety responses using behavioral skills training (BST) and in situ training (IST). Within the safety skills literature, there is evidence that manualized interventions are effective for teaching parents and teachers to deliver BST (Gross et al., 2007; Novotny et al., 2020). An approach that has not been evaluated for teaching safety skills is interactive computerized training (ICT). The ICT approach employs technology to deliver trainings in the absence of a trainer (Gerencser et al., 2018; Higbee et al., 2016). The purpose of the current study was to develop and evaluate an ICT to teach practitioners to conduct a safety skills training protocol with their clients with autism spectrum disorder (ASD). Phase 1 of the study consisted of developing the ICT and soliciting expert feedback. In Phase 2, the researchers evaluated the ICT program with three Board Certified Behavior Analysts (BCBA®) who provided behavior analytic services to clients with ASD. In the final phase, the BCBAs implemented safety skills training with their clients. In situ assessments were arranged to evaluate the effects of training on the clients’ safety responses. Overall, the BCBAs implemented the safety skills training protocol with high fidelity during post-ICT assessments and rated the ICT program positively. Following enhanced-BST and IST, the clients with ASD engaged in the safety skills during in situ assessments. Caregivers rated the safety skills training protocol favorably.
CHAPTER ONE: INTRODUCTION

A variety of environmental events can lead to injury or death of children. These safety threats can come from the physical environment or from the behavior of others. Safety threats in the physical environment can include firearm discharge, poisoning, traffic/pedestrian accidents, burns, and drowning (Centers for Disease Control and Prevention, 2008; World Health Organization, 2008). Safety threats from the behavior of others can include abduction and sexual abuse (Miltenberger et al., 2020). Although these safety threats are low incidence such that most children will not experience them, they are highly dangerous. Therefore, parents and caregivers must strive to keep environments safe by eliminating safety threats. For example, parents should safely lock away firearms and poisonous substances and keep their children in proximity when in public spaces. However, despite parents’ best efforts, children still encounter a variety of safety threats. Therefore, it is important that children are taught the skills to respond safety to these threats.

Safe responses to low incidence, highly dangerous threats consist of the following three components: (a) identify and avoid the safety threat (i.e., do not touch or engage with it), (b) move away from the safety threat, and (c) report the safety threat to a trusted adult (e.g., Miltenberger, 2008). Discriminating the presence of a safety threat is necessary for the individual to avoid, escape, and report the incident (Miltenberger, 2008). Moving away from the threat is critical because the longer the individual is exposed to the threat the greater the risk (e.g., Poche et al., 1988). Reporting the safety threat to a trusted adult is critical so the adult can then take action to remove the safety threat.
Assessment of Safety Skills

Valid assessment of safety skills is critical because it is essential to determine how the child will behave when facing a safety threat in the natural environment. Furthermore, because children most often are exposed to safety threats when they are not directly supervised by adults, valid assessment must occur when the child is not in the presence of an adult. Although three methods of assessments have been described in the literature: verbal report assessments, role-play assessments, and in situ assessments; in situ assessment is the most valid form of assessment of safety skills (Baruni & Miltenberger, 2022).

An in situ assessment measures the child’s responses to a safety threat in a seemingly real but simulated situation in the absence of an adult without the child’s knowledge (Baruni & Miltenberger, 2022; Miltenberger et al., 2020). Researchers have shown that, even when children can describe the skills or demonstrate the skills in a role play, when children are not in the presence of an adult and are unaware of the assessment, they do not always perform the safety skills (Gatheridge et al., 2004; Himle, Miltenberger, Flessner, & Gatheridge, 2004). Given these findings, it is essential that children are assessed in natural contexts where they are unaware of the assessment and not in the presence of a trainer or a trusted adult. For example, Himle, Miltenberger, Flessner, and Gatheridge (2004) described how an in situ assessment would be conducted to assess safety skills when finding firearm. During the assessment, the researcher asked the participant to play in a room where they would find a disabled firearm. The researchers arranged the assessment so that the participant entered the room alone and was unaware that they were being observed. Researchers have demonstrated the effectiveness for evaluating safety skills with safety threats such as poisons (Dancho et al., 2008; Summers et al., 2011), sexual abuse lures (Lumley et al., 1998; Miltenberger et al., 1999), abduction lures (Beck &
Miltenberger, 2009), firearms (Miltenberger et al., 2009), and lighters (Houvouras & Harvey, 2014). If a child does not demonstrate the safety skills during an in situ assessment, it is unlikely that the child will perform the skills when faced with a real safety threat. Thus, in situ assessments are the best predictor of whether a child will engage in the safety skills in real safety threat situation.

Verbal report assessment involves describing a safety threat scenario and asking the child to state how they would respond to that threat (e.g., Gatheridge et al., 2004; Himle, Miltenberger, Gatheridge, & Flessner, 2004). For example, to assess a child’s knowledge of firearm safety, Gatheridge et al. (2004) described a scenario in which the participant found a firearm in the backyard of their home. They asked the participant to describe how they would behave in that situation. Often, children describe safety skills in response to “what if” scenarios but when presented with a safety threat during an in situ assessment they fail to engage in the safety skills.

Role-play assessments involve the trainer describing a safety threat scenario and asking the child to demonstrate what they would do (Gatheridge et al., 2004; Himle, Miltenberger, Flessner, & Gatheridge, 2004; Kelso et al., 2007). For example, the trainer places a disabled firearm on a table and asks the child to pretend they find the gun on a table in the parent’s bedroom. The trainer then asks the child to walk in the room, find the firearm, and show what they would do. This type of assessment indicates whether the child has the skill in their repertoire. Although role-play assessments can be used to determine whether the child can exhibit the skill in the presence of a safety threat, it is important to note that they do not provide information on whether the child will engage in the safety skills when an adult is not present (Baruni & Miltenberger, 2022; Miltenberger, 2008). Research shows that children may exhibit the skills during role-play assessments and then fail to perform the skills during an in situ
assessment (Gatheridge et al., 2004; Himle, Miltenberger, Flessner, & Gatheridge, 2004). For this reason, in situ assessments should be used to evaluate the effects of safety skills training programs.

**Effectiveness of Training Approaches**

Research has focused on two main approaches to teaching safety skills: informational approaches and active learning approaches.

Informational approaches, or passive learning approaches, consist of instructions and modeling without the opportunity for rehearsal and feedback. They have been evaluated to teach a number of safety skills to children such as sexual abuse prevention, abduction prevention, and firearm safety (Beck & Miltenberger, 2009; Gatheridge et al., 2004; Hardy, 2002; Hardy et al., 1996; Miltenberger & Thiesse-Duffy, 1988; Saslawsky & Wurtele, 1986) but have not been successful in teaching safety skills when evaluated with in situ assessments. Some researchers have assessed the effectiveness of commercially available safety programs such as the Safe Side Stranger Safety program for abduction prevention (Beck & Miltenberger, 2009; Miltenberger et al., 2013) and the Eddie Eagle GunSafe program for firearm safety (Gatheridge et al., 2004; Himle, Miltenberger, Gatheridge, & Flessner, 2004) and found these programs to be ineffective. In these programs, researchers give children information via instructions and modeling using a variety of learning tools such as videos, coloring books, posters, and discussions to teach them what to do if they encounter a safety threat. (Beck & Miltenberger, 2009; Himle, Miltenberger, Gatheridge, & Flessner, 2004; Wurtele et al., 1986). However, these programs lack rehearsal and feedback, which have been shown to be critical for teaching safety skills (Gatheridge et al., 2004; Lumley et al., 1998; Poche et al., 1981, 1988). Children who participate in passive learning programs can describe what they would do in unsafe situations however, they do not perform the
safety skills during in situ assessments (Beck & Miltenberger, 2009; Gatheridge et al., 2004; Himle, Miltenberger, Gatheridge, & Flessner, 2004; Lumley et al., 1998; Miltenberger et al., 2013).

Although active learning approaches include both instructions and modeling, the critical features of such programs are that the researcher gives the child an opportunity to rehearse the skills in the presence of simulated safety threats (the SPDs for the safety skills) and provides praise for correct performance and corrective feedback consisting of further instruction for improvement until the child performs the skills consistently (Baruni & Miltenberger, 2022; Miltenberger et al., 2020). Behavioral skills training (BST) and in situ training (IST) are two active learning approaches. The literature on teaching safety skills provides substantial evidence for the effectiveness of BST and IST (Baruni & Miltenberger, 2022; Giannakakos et al., 2020). BST consists of instructions, modeling, rehearsal, and feedback. During instructions and modeling, the trainer describes the safety threat and the safety skills and demonstrates the safety skill in the presence of simulated safety threats. Thereafter, the trainer requires the child to rehearse the skill in the presence of the SPD in a simulated safety context. During rehearsal, the trainer provides praise for steps performed correctly and corrective feedback for steps that are performed incorrectly. Rehearsal and feedback are repeated until the child performs the safety skills correctly and independently multiple times.

In an early demonstration of BST, Poche et al. (1988) highlighted the importance of rehearsal and feedback to teach children safety skills. The investigators compared video modeling plus rehearsal and feedback to video modeling only, a standard school program, and no-training conditions to teach abduction prevention skills. The performance of the safety skill during video modeling plus rehearsal and feedback was superior to the other conditions where
rehearsal of skill was not included. Numerous researchers have demonstrated the effectiveness of BST for teaching a variety of safety skills such as poison prevention, firearm safety, fire safety, sexual abuse prevention, and abduction prevention (Carroll-Rowan & Miltenberger, 1994; Dancho et al., 2008; Gatheridge et al., 2004; Houvouras & Harvey, 2014; Miltenberger et al., 2004). However, this research has shown that BST is not consistently effective for promoting the use of the safety skills with all children during in situ assessments (Baruni & Miltenberer, 2022; Gatheridge et al., 2004; Himle, Miltenberger, Flessner, & Gatheridge, 2004, Jostad et al., 2008; Miltenberger et al., 2004; Novotny et al., 2020). Although BST is a superior approach to passive learning programs, BST is enhanced when it is combined with IST (Baruni & Miltenberger, 2022; Giannakakos et al., 2020).

Giannakakos et al. (2020) conducted a systematic review of safety skills training and found that among the 19 experiments that used BST, 47.4% of the studies reported positive results for all of their participants. Furthermore, among the studies that utilized a combination of BST and IST, the authors reported that 52.6% obtained positive outcomes for all participants. Baruni and Miltenberger (2022) conducted a review of these studies looking at individual participants, we found that 48.3% of 296 participants who received BST demonstrated the safety skills and 86.3% of 204 participants who received IST demonstrated the safety skills. Of the participants who received IST, it was effective for 89% of 173 neurotypical children and 71% of 31 children or adults with DD. Of the participants who received IST, it was effective with 88.4% of 138 individuals who received it after some variation of BST failed, 88.5% of 26 individuals who received it after an informational program failed, and 77.5% of 40 individuals who received it as a stand-alone procedure. These results indicate that when BST and IST are combined in a
safety skills program, children are more likely to engage in the safety skills during in situ assessments.

In situ training consists of some or all components of BST conducted in the presence of the simulated safety threat in a naturalistic setting (Baruni & Miltenberger, 2022; Miltenberger, 2008). During an in situ assessment, if the child fails to perform the safety skill, the previously unseen trainer intervenes and initiates IST. The trainer turns the assessment into a training opportunity wherein the participant practices the safety skills multiple times in the natural environment where they encountered the safety threat during the in situ assessment. For example, Gatheridge et al. (2004) compared two training programs to teach 6- and 7-year-old children safety responses when encountering a firearm. They evaluated BST and Level 1 of the Eddie Eagle GunSafe program. The children who failed to perform the safety skills in either group participated in an IST session. In the IST session, the trainer entered the room where the child failed to engage in the correct responses and provided instructions, modeling, rehearsal, and feedback. The child had to rehearse the safety skills successfully multiple times in the presence of the “real” gun in the natural environment. In situ training was effective for participants in the Eddie Eagle group and participants in the BST group.

Other studies have demonstrated the effectiveness of IST after the failure of BST (Himle, Miltenberger, Flessner, & Gatheridge, 2004; Kelso et al., 2007; Miltenberger et al., 1999, 2004) or in combination with BST (Johnson et al., 2005; Miltenberger et al., 2005). Moreover, some studies have evaluated the efficacy of IST after informational programs failed to teach safety skills (Beck & Miltenberger, 2009; Miltenberger et al., 2013). Researchers have demonstrated IST’s effectiveness with a variety of safety skills such as abduction prevention (Beck & Miltenberger, 2009; Johnson et al., 2005), sexual abuse prevention (Egemo-Helm et al., 2007),
firearm safety (Gatheridge et al., 2004; Miltenberger et al., 2005), and poison prevention (Dancho et al., 2008). As cited above, the majority of studies have evaluated IST following BST, in combination with BST, or following an information-based training program. Few studies have investigated the efficacy of IST as a stand-alone procedure. Miltenberger et al. (2013) compared two groups; the treatment group watched the Safe Side Stranger Safety DVD and the control group did not experience the training. After a failed in situ assessment, parents implemented IST with their children. The results showed that IST was effective for children in the treatment and control groups suggesting that IST may yield positive outcomes as a stand-alone procedure.

Although BST and IST are effective in almost all cases, research shows these procedures are not effective for some participants (Hanratty et al., 2016; Miltenberger et al., 2004). In cases where IST has not resulted in generalization of the safety skills to in situ assessments, the addition of tangible reinforcers has proven successful (e.g., Hanratty et al., 2016; King & Miltenberger, 2017; Miltenberger et al., 2004). For example, Miltenberger et al. (2004) showed BST worked for three of six children and IST worked for two of three children, but one child did not perform the safety skills until the researchers used a tangible reinforcer in training.

Another training approach that has not received much attention in the safety skills literature is small-scale simulation training. This involves simulating stimuli from the natural environment into a model and providing training in the model (e.g., Neef et al., 1978, 1989; Page et al., 1976). When implemented successfully, small-scale simulation may be a more efficient form of training (Maxfield et al., 2019; Orner et al., 2021). Maxfield et al. (2019) used a small-scale simulation to teach 3- to 5- year old children firearm safety skills. Simulation training included all components of BST as the participants manipulated a doll to engage in the safety skills in a table-top model of a home. After training, the researchers arranged in situ assessments.
Maxfield and colleagues found that one or two sessions of small-scale simulation training were effective for three out of four participants. Orner et al. (2021) replicated the small-scale simulation training with three children with autism spectrum disorder (ASD) but found the procedure worked for only one of the children. Some benefits of using small-scale simulation training are that it is an accessible and inexpensive approach that can be easily implemented. Although the findings from these two studies are preliminary, they suggest that this approach may be effective in teaching children to engage in safety skills, but may be less effective for children with autism.

**Strategies for Promoting Generalization**

Assessing and promoting generalization is essential when teaching safety skills to children. Assessing generalization occurs through in situ assessments. Promoting generalization occurs by incorporating generalization strategies during training. Stokes and Baer (1977) described the importance of programming for generalization from the outset to increase the likelihood that the behavior will occur in the relevant environment. Researchers have included various strategies for promoting generalization in their evaluations of safety skills training (Akmangolu & Tekin-Iftar, 2011; Bergstrom et al., 2014; Godish et al., 2017; Houvouras & Harvey, 2014; Kim, 2016).

In their review, Giannakakos et al. (2020) reported that researchers used multiple exemplar training most frequently. Multiple exemplar training involves including a variety of relevant stimuli within the training context (Miltenberger, 2016; Stokes & Baer, 1977). If the child learns to respond to a variety of stimuli in different contexts, then it is more likely that they will engage in the safety skills when they encounter similar stimuli in a natural context. For example, when teaching abduction prevention skills, the training program may incorporate
different scenarios (e.g., incentive lures or authority lures) and different abductor confederates (Miltenberger et al., 1999). Similarly, a trainer might include different pill containers or place pill containers in different locations when teaching poison prevention skills (Giannakakos et al., 2020; Moroshohk & Miltenberger, 2022; Petit-Frere & Miltenberger, 2021). A second strategy for promoting generalization includes incorporating common stimuli (Stokes & Baer, 1977). The stimuli that are selected for training should come from the natural environment to facilitate generalization to the natural environment. For example, researchers have incorporated real, disabled firearms when teaching children firearm safety skills (Himle, Miltenberger, Flessner, & Gatheridge, 2004; Miltenberger et al., 2004). Finally, fading prompts and trainer presence are strategies that can facilitate generalization when teaching safety skills. Petit-Frere and Miltenberger (2021) and Moroshohk and Miltenberger (2022) used generalization strategies with BST to teach poison prevention skills to children with ASD. Petit-Frere and Miltenberger included a system of least prompts and a fading procedure in which the trainer moved out of the room when the child rehearsed the skill of reporting the safety threat. Moroshohk and Miltenberger added tangible reinforcers to BST and also faded the researcher’s presence during training so the participant had to leave the room to report the pills to an adult. In both studies, all participants performed the safety skills during in situ assessments following BST sessions.

The aforementioned strategies included generalization tactics within BST and demonstrated successful generalization of the skills to in situ assessments. However, most of the studies evaluating BST to teach safety skills have added IST to enhance generalization (Godish et al., 2017; Himle, Miltenberger, Flessner, & Gatheridge, 2004; N. Lee et al., 2019; Miltenberger et al., 2004; Morgan & Miltenberger, 2017; Novotny et al., 2020). Numerous safety skills studies indicate that IST may be necessary following BST to produce generalization of the
safety skills to in situ assessments (e.g., Bergstrom et al., 2014; Himle, Miltenberger, Flessner, & Gatheridge, 2004; Miltenberger, 2008). When researchers added IST after a failed in situ assessment, children were more likely to engage in the safety skills (Himle, Miltenberger, Flessner, & Gatheridge, 2004; Miltenberger et al., 2004). This research demonstrates that training in a simulated but realistic safety threat situation is highly effective for promoting generalization. However, IST typically is implemented following the failure of BST and thus takes more time and effort. Therefore, it is desirable to incorporate strategies into BST to promote generalization so that the addition of IST is not necessary.

**Importance of Assessing and Promoting Maintenance**

Evaluating maintenance of training outcomes for safety skills is important for assessing the durability of the acquired skills across time. Much of the safety skills literature includes a measure of maintenance following intervention (Baruni & Miltenberger, 2022; Giannakakos et al., 2020). Based on the re-analysis of relevant studies from Giannakakos et al. (2020) at the participant level, Baruni and Miltenberger (2022) found that 72% incorporated follow-up assessments. Furthermore, 42% of these studies achieved success during all maintenance probes for all participants and 55% of studies achieved success for at least one participant during one or more maintenance probes. Finally, only one study did not obtain positive results during maintenance probes for any participant (Lumley et al., 1998). Among the studies wherein only some participants performed correctly during follow-up probes, 21% conducted IST following a failed assessment (e.g., King & Miltenberger, 2017; Miltenberger et al., 1999). In eight studies that incorporated IST when a participant failed to perform the safety skills during follow-up consistently, the participants engaged in the safety skills in subsequent assessments. For studies that demonstrated partial success during maintenance probes, participants demonstrated
improved skills when compared to performance during baseline. Furthermore, among the 55% of studies that achieved some success, the participants maintained the safety skill during at least one follow-up interval (e.g., a participant in Jostad et al. [2008] maintained the safety skills during the 6-month follow-up session but not during the 11-month follow-up session). Given that the studies that included IST following a failed maintenance probe all yielded effective results, all safety skills training programs should utilize IST after a failed maintenance assessment to achieve optimal outcomes.

Baruni and Miltenberger analyzed the data from several studies to get a picture of the length of maintenance evaluations in research. The length of follow-up probes varies across studies; 10.5% of studies assessed maintenance between 1 and 3 weeks, 73.7% of the studies assessed maintenance between 1 and 3 months, and 15.8% of studies assessed maintenance between 4 and 12 months (Beck & Miltenberger, 2009; Haseltine & Miltenberger, 1990; Jostad et al., 2008; Miltenberger et al., 2004; Miltenberger et al., 1990; Tarasenko et al., 2010). No published studies have assessed post-intervention outcomes beyond 12 months.

Incorporating rules into training may be useful for increasing the likelihood that the safety skills will maintain. Olsen-Woods et al. (1998) evaluated correspondence training (CT) to teach children abduction prevention skills. Children in the training with CT group received reinforcement following a verbal response related to the safety skill and performance of that skill. Whereas, the children in the training without CT group were required to perform the skill without providing a verbal response. The researchers found that CT did not increase correspondence between the statements made by the participants and their performance. In fact, both groups performed similarly during in situ assessments. Therefore, more research is required to evaluate the role that rules have when assessment maintenance of the skills.
Training Individuals with Disabilities

Although all children are at risk of harm from safety threats, children with developmental disabilities (DD) are at greater risk for harm (L. Lee et al., 2008). This increased risk may be due to behavioral deficits such as difficulty with communication, social interactions, and limited intellectual abilities that are characteristic of developmental disorders (Dixon et al., 2010). Furthermore, researchers have reported that perceived deficits of safety skills may result in parental over-protection potentially limiting the development of independent skills (Wiseman et al., 2017). Although, parents and professionals have reported safety skills to be a primary concern for children with DD (Collins et al., 1991), they often focus on skills that require immediate attention such as daily living skills or communication skills and place less emphasis on safety skills during instructional contexts (Dixon et al., 2010; Tekin-Iftar et al., 2021).

Furthermore, when it comes to safety skills, researchers have reported that parents and educators simply provide warnings of safety threats and/or arrange the environment so that safety threats are not present (Tekin-Iftar et al., 2021). Although it is important that adults eliminate safety threats from the environment, children with and without DD need to be taught safety skills in case they encounter safety threats.

Numerous studies show BST and IST are effective with neurotypical children but fewer studies have evaluated interventions to teach safety skills to children with DD. Researchers have evaluated BST and IST for skills such as sexual abuse prevention (Egemo-Helm et al., 2007; Lumley et al., 1998; Miltenberger et al., 1999), abduction prevention (Akmanoglu & Tekin-Iftar, 2011; Gunby & Rapp, 2014; Gunby et al., 2010; Ledbetter-Choi et al., 2016; Sanchez & Miltenberger, 2015), poison prevention (Petit-Frere & Miltenberger; 2021; Summer et al., 2011), and avoidance of fire-starting agents and firearms (Morgan & Miltenberger, 2017; Rossi et al.,...
have been evaluated. Although research shows that BST and IST (with the occasional need for tangible reinforcers) are effective for neurotypically developing children (Hanratty et al., 2016; Himle, Miltenberger, Flessner, & Gatheridge, 2004; Johnson et al., 2006; Jostad et al., 2008; Miltenberger et al., 2004, 2005), researchers have evaluated a larger range of procedures for teaching safety skills to individuals with DD. We found approaches to training safety skills to individuals with DD fall into the following categories: (a) BST alone, (b) enhanced BST, (c) BST with complementary interventions, (d) and BST enhancements and complementary interventions. Among the studies we considered, 82% incorporated BST in their interventions with participants with DD. However, only one study evaluated BST alone with individuals with DD (Lumley et al., 1998). Lumley et al. (1998) investigated a sexual abuse prevention program and compared different assessments methods: verbal report, role-play, and in situ assessments. Although the participants performed the safety responses during role play assessments after BST, they did not perform the skills during the in situ assessments. Consistent with the literature, the researchers reported a lack of correspondence between the different assessment methods with individuals with DD.

Among the studies we considered that used BST to train safety skills, 39% enhanced BST to increase its effectiveness. Enhancements to BST can be defined as procedures that are embedded within training rather than adding interventions after a failure of BST. Prompting and prompt fading procedures, tangible reinforcers, and video modeling are all examples of procedures embedded in BST that have produced positive outcomes for training children with DD (Bergstrom et al., 2014; Ledbetter-Cho et al., 2016; Petit-Frere & Miltenberger, 2021; Summers et al., 2011). Petit-Frere and Miltenberger (2021) evaluated BST with the system of least prompting to teach poison prevention skills to children with ASD. The procedure was
effective for all three children. Morosohk and Miltenberger (2022) enhanced BST by adding tangible reinforcers for correct responding to teach poison prevention skills to children with ASD. During in situ assessments, all participants executed the safety skills following one or two training sessions.

Researchers have shown that complementary interventions, consisting of the addition of IST and incentives to BST following a failed in situ assessment, can be effective when training individuals with DD (Gunby & Rapp, 2014; Haseltine & Miltenberger, 1990; Sanchez & Miltenberger, 2015). Based on our review of relevant studies, we found 28% of studies added complementary interventions to BST resulting in treatment gains for all participants. For example, Egemo-Helm et al. (2007) added IST when BST was not effective for promoting the use of sexual abuse prevention skills during in situ assessments for participants with DD. In another study, Sanchez and Miltenberger (2015) found similar results implementing BST and IST to teach abduction prevention skills to adolescents with DD.

Other researchers developed training programs that include both enhancements to BST and complementary strategies when teaching individuals with DD. Among the studies reviewed by Baruni and Miltenberger, 17% modified an aspect of BST during initial training and added intervention components. For example, in a study evaluating a sexual abuse prevention program, Miltenberger et al. (1999) enhanced BST by providing tangible reinforcers when participants responded correctly to a sexual abuse lure. When the modified BST procedures failed to increase responding to the criterion during in situ assessments, the researchers conducted IST. Miltenberger and colleagues showed that IST was effective in producing generalized responding for four of the five participants. Other researchers have included incentives when they did not obtain positive outcomes following IST (Godish et al., 2017; King & Miltenberger, 2017;
Ledbetter-Chou et al., 2016). In another example, Ledbetter-Chou et al. (2016) used a modified BST that included a video model, rather than a live model, to teach four children with ASD to respond to multiple types of abduction lures. For one participant who did not reach the performance criterion during post-training assessments, the researchers included a contingency-specifying instruction with reinforcement. This participant reached mastery criterion for two out of the four types of lures during post-training assessments.

**Accessibility of Safety Skills Training**

An abundance of research has shown that BST and IST are effective for teaching safety skills to children. However, these procedures can be time-consuming and resource-intensive as a behavior analyst with specific training in teaching safety skills is needed to carry out the procedures (Miltenberger, 2008; Novotny et al., 2020). These potential barriers may limit the adoptability of effective procedures for teaching safety skills (Jostad & Miltenberger, 2004). As a result, researchers have evaluated different delivery methods that may increase widespread adoption of such practices. Increasing accessibility has been addressed in the literature by evaluating training conducted by teachers, peers, and parents.

Researchers have evaluated procedures for training teachers to implement BST with their students (Gast et al., 1993; Holcombe et al., 1995). Carroll-Rowan and Miltenberger (1994) evaluated two training procedures to teach abduction prevention skills to children in a classroom setting. The researchers found that children in the training groups performed the safety skills whereas children in the control group performed lower. This study demonstrates that children can be taught abduction prevention skills in a classroom setting when training is delivered by their teachers. In addition to successfully training teachers to implement BST, researchers have incorporated peer trainers to teach safety skills (Jostad & Miltenberger, 2004). A few children
are trained to conduct BST and IST and then conduct the trainings with other children. Jostad et al. (2008) utilized 6- and 7-year-old peer trainers to teach 4- and 5-year-old children firearm safety. The peer trainers taught students individually using BST. Further, they implemented IST for students who did not engage in the correct skills during in situ assessments. The findings indicate that peer tutors can be effective in teaching safety skills to younger children. Furthermore, Jostad et al. reported that peer-implemented BST required less than 2 hr to complete with little adult assistance. This is an important finding because if training can be done in less time and is as effective as when implemented by an adult trainer, then BST can have far reaching outcomes for children. In a similar study, Tarasenko et al. (2010) evaluated peer training for teaching abduction prevention skills to children. Their results were similar to those of Jostad and colleagues demonstrating that peer trainers effectively utilized BST and IST to teach safety responses in the presence of abduction lures. The authors reported that training the peer trainers lasted 1 hr and training the students ranged from 18 to 25 min. These two studies support the efficacy of using peers to conduct evidence-based practices for teaching safety skills to children.

Other researchers have also evaluated parent-implemented IST to teach their children safety skills (Beck & Miltenberger, 2009; King & Miltenberger, 2017; Miltenberger et al., 2013; Morgan & Miltenberger, 2017). For example, Beck and Miltenberger (2009) and Miltenberger et al. (2013) used BST to teach parents to conduct IST to teach abduction prevention skills after an informational program was ineffective. In these studies most parents implemented the procedures with fidelity, but in some cases, researchers had to implement IST when parents did not implement with fidelity (King & Miltenberger, 2017; Morgan & Miltenberger, 2017).
Another approach for increasing accessibility to safety skills training has been to incorporate manualized interventions. For example, Carroll-Rowan and Miltenberger (1994) evaluated two training procedures conducted in a classroom setting to teach children abduction prevention skills. Eight classrooms were randomly assigned to a video training group, a teacher’s manual group, and a no treatment control group. The children in the video training and teacher’s manual group performed better than children in the control group however, children in the teacher’s manual group performed better than the video training group. The results of this study indicated that the training manual was effectively utilized by teachers. Gross et al. (2007) developed a training manual and video to teach parents to conduct BST and IST with their children. The results showed that three out of the four parents implemented the procedures with fidelity and their children engaged in the safety skills during in situ assessments. Furthermore, the authors reported that the total parent training time, including preparing for sessions, was less than 1 hour. In another parent training study that utilized a manual, Novotny et al. (2020) evaluated web-based training for parents to conduct BST to teach firearm safety skills to their children. The web site they developed included a series of videos that incorporated all of the BST components. For children who did not perform all three target behaviors after parents conducted training, a researcher conducted IST. Three of the six children engaged in the safety skills following parent-implemented BST; the other three children performed the safety skills following experimenter-implemented IST. This study reported high treatment integrity during training with a mean of 95.5%. These findings lend further support for parent involvement in training children to engage in safe behaviors when in the presence of a firearm. Despite the successes of studies that evaluated manualized interventions, participants in Hanratty et al. (2016) did not engage in the correct safety responses following teacher-implemented training.
Future studies should evaluate the components within manualized interventions that will effectively teach adult trainers to deliver safety skills training.

Video modeling (VM) is another intervention that might contribute to increased accessibility of training. Although VM has been combined with behavioral rehearsal and feedback to teach safety skills (Carroll-Rowan & Miltenberger, 1994; Poche et al., 1988), it has also been evaluated as a stand-alone procedure. Abadir et al. (2021) evaluated VM to teach children with ASD to engage in the safety responses when presented with lures from unfamiliar and familiar people. Participants were taught to discriminate strangers, familiar people with safe words, and familiar people without safe words. The video models included children who modeled appropriate behavior for each of the scenarios across four types of lures. Video modeling alone was effective for two of the four participants. Two participants required additional instructions for VM to be effective. In another study that evaluated VM, Godish et al. (2017) taught children with ASD safety responses when presented with abduction lures from strangers. The videos used during training depicted a child model who received a lure from a stranger and said no, ran away, and reported the safety threat to an adult. The video also had an interactive component in which the video paused when the child in the video was presented with an abduction lure and the narrator asked the participant how the child in the video should behave. The viewer had a chance to respond vocally and then the narrator described the correct answer (“If you said the boy should say no, get away, and tell an adult, you are right!”). The findings of this study indicated that VM alone increased safety responses for all four participants, although one needed IST at follow-up.

Furthermore, Akmanoglu and Tekin-Iftar (2011) evaluated VM as part of a treatment package that included graduated guidance to teach children with ASD how to respond to lures
from a stranger. The authors found that VM was effective for teaching abduction prevention
skills to all three participants, although the researchers included a prompt and prompt fading
procedure that may have contributed to the success of VM. Despite the success of these three
studies, other studies showed VM was not effective for teaching safety skills (King &
Miltenberger, 2017; Morgan & Miltenberger, 2017). King and Miltenberger (2017) found VM to
be ineffective for teaching poison safety skills to all three participants. Similarly, Morgan and
Miltenberger (2017) reported success with firearm safety skills for only one of three participants.
Both studies incorporated IST following failed in situ assessments resulting in criterion
performance for all but one participant. Given the mixed results obtained by studies evaluating
video modeling, additional research is needed to determine the effectiveness of this training
approach.

Another training approach that may make safety skills training more accessible is
computer simulation. Vanselow and Hanley (2014) evaluated a computerized version of
behavioral skills training (CBST) for teaching safety skills to children across different safety
threats. The researchers evaluated the computerized safety skills training with in situ assessments
and conducted IST if necessary. Through a series of studies, they assessed generalization of the
skills to threats that were not explicitly trained such as poisons and strangers. The authors found
that all participants acquired the safety responses in the presence of all three safety threats but
generalization occurred with only specific threats. Finally, not all participants demonstrated the
safety skills after CBST alone, some required the addition of IST to perform the skills. Given the
ease of implementation and accessibility of computerized safety skills training programs, further
research is warranted to evaluate its success. Although Vanselow and Hanley incorporated
technology in their safety skills training program, the authors trained children to respond safely
to simulated safety skills and did not train adults to deliver the training. Computerized programs can be used with adult trainers who will then train children the safety skills. One method that has not been evaluated in the safety skills literature is interactive computerized training (ICT). This format does not require the presence of a trainer because the trainee can interact with the training program independently making it more accessible, efficient, and increasing widespread adoption (Shapiro & Kazemi, 2017).

**Interactive Computerized Training**

Interactive computerized training (ICT) involves the use of technology to deliver training materials without a trainer present. Features common to technology-based training are that they are delivered via a computer or website, usually incorporating slides with audio, written text, graphics, and video examples of the target skill (Gerencser et al., 2020). Additional critical features are interactive activities and competency assessments. Researchers found that ICT is more effective when learners engage in overt responding through the interface (Scott et al., 2018; Shapiro & Kazemi, 2017). Interactive activities are embedded within the technology-based training and provide opportunities to practice the target skill. Competency assessments include multiple choice, true or false or fill-in the blank questions. Content is usually divided into several modules. Each module consists of a topic with instructional and interactive components. Benefits of ICT as a training strategy are: (a) flexibility, (b) reduced total training time, (c) individualized instructional pace, and (d) accessible to diverse locations (Shapiro & Kazemi, 2017). Other benefits of ICT that have been discussed in the literature are that it does not require the presence of an expert trainer and it offers standardized trainings so that content can be delivered consistently (Gerencser et al., 2020; Marano et al., 2020). Further, ICT procedures may be more cost-effective than approaches that require the presence of a trainer. Anyone with access to a
computer with internet connection can complete the training at their convenience which may promote the dissemination of training programs to a larger population.

Researchers have evaluated ICT with parents, teachers, special educators, behavior therapists, and undergraduate students to teach various skills (Campanaro et al., 2022; Fisher et al., 2020; Gerencser et al., 2018; Rosales et al., 2018; Scott et al., 2018). Several training programs have focused on teaching individuals to implement discrete trial instruction (DTI; Higbee et al., 2016; Pollard et al., 2014) while others have targeted early intensive behavioral intervention techniques such as delivering instructions, responding to appropriate behavior, prompting, and mand training (Fisher et al., 2020, 2014; McCulloch & Noonan, 2013). In a notable example, Higbee et al. (2016) used ICT to teach DTI to undergraduate students in Brazil (Study 1) and to special education teachers in a special needs school in Brazil (Study 2). The ICT used in both studies were identical to that used in Pollard et al. (2014) except that all content was translated to Portuguese. The researchers divided the ICT content into four self-paced modules that included narrated slides, video models, quizzes, and interactive activities. The topics included in each module were data collection, managing antecedents, prompting strategies, and managing consequences (Higbee et al., 2014). Participants completed ICT sessions in the presence of a researcher but researchers did not collect data on participants’ behavior while they were completing the modules. Participants advanced to the next module when they reached the mastery criterion and, those who did not pass, repeated the module and achieved a passing score on the quiz. After participants completed all four modules, they practiced the skills with a researcher who was playing the role of a child with ASD. Role-play sessions incorporated immediate feedback when the participant implemented a skill incorrectly. The authors measured the percentage of DTI components implemented correctly during each post-ICT role play.
session. The undergraduate students in Study 1 completed the ICT modules successfully and demonstrated proficiency in DTI when implemented with a research assistant and a child with ASD. As in Study 1, the ICT increased the percentage of components that the special educator teachers implemented correctly with their students with ASD.

In another demonstration of ICT, Gerencser et al. (2018) trained teachers and paraprofessionals to implement DTI that incorporated error correction and prompting procedures with students diagnosed with developmental disabilities. Furthermore, they extended the ICT literature by evaluating the use of feedback delivered remotely when the participants did not reach the mastery criterion. The ICT training modules included background information on how to implement DTI, video models, competency assessments, and interactive activities. The video models demonstrated to the participant how to implement the relevant component of DTI within each module. Competency assessments tested the participants’ knowledge for each topic area and the interactive activities provided an opportunity for the participants to practice specific skills related to DTI. The researchers embedded brief feedback for correct and incorrect responses within the ICT. For participants who did not achieve the performance criterion, the researcher initiated remote feedback using a session video to review DTI components the participant implemented incorrectly. DTI components implemented correctly resulted in praise. The researchers measured the participants’ fidelity to DTI procedures using a teaching checklist to collect data on the percentage of DTI components implemented correctly. The authors found that the ICT increased performance for one participant however, when they added remote feedback, two additional participants performed at the mastery criterion. Three of the participants required additional coaching sessions. Similar to safety skills training with children, when using ICT, additional training components may be needed to support adult learners to achieve the
performance criterion when training behavior analytic procedures. It is important to note that the authors cited participant characteristics, learning histories, and complexity of the skills as potential variables for why the ICT was not as effective for this population. Although Gerencser and colleagues reported mixed results for ICT alone, all participants demonstrated proficiency when the researchers added other training components to ICT. Future research should examine ICT programs that include active responding components with feedback similar to a rehearsal session in BST.

In a recent study, Campanaro et al. (2022) extended the ICT literature by training behavior therapists to implement BST with graduate students of behavior analysis to teach them a DTI protocol. The behavior therapists and graduate students were referred to as trainers and trainees, respectively. The computerized training consisted of a description of BST, video models with multiple exemplars, and interactive activities (i.e., questions based on the videos). The trainers completed the computer-based training once they watched all the videos and completed the questions correctly. The researchers measured the extent to which the trainers performed the steps correctly during posttraining sessions with confederates. The trainers’ performance was also assessed during generalization probes which consisted of delivering BST to teach trainees to conduct the DTI protocol with confederates. Further, the researchers measured correct implementation of the DTI protocol by the trainees. All trainers demonstrated an increase in procedural integrity during posttraining probes with confederates following the computer-based training and their performance generalized to posttraining probes with trainees. Another finding of this study was that trainees’ performance of a DTI protocol increased following BST implemented by the trainers. Although this study demonstrated the efficacy of a computer-based training program for teaching trainers to use BST to teach trainees how to
implement DTI with confederates, the researchers did not include a measure of the trainees conducting DTI with a child with ASD.

A noteworthy limitation of the ICT literature is the lack of data on the clients (e.g., children with ASD) receiving training by the staff or parents who participated in the ICT (Fisher et al., 2020; Gerencser et al., 2018; Higbee et al., 2016; Rosales et al., 2018). Although some studies set up post-training sessions with children with ASD (e.g., Geiger et al., 2018; Gerencser et al., 2018; Higbee et al., 2016), most ICT studies have focused on trainer fidelity to behavior analytic procedures without including a post-training session with a child or a measure of the child’s behavior. Several studies measured trainer and child behavior during the training program (Gerencser et al., 2017; McCulloch & Noonan 2013; Wainer & Ingersoll, 2013). For example, Gerencser et al. (2017) investigated an ICT program to teach parents how to use activity schedules with their children with ASD. In addition to collecting data on the percentage of training components implemented correctly by the parents, the authors included a secondary dependent variable that included a measure on how proficient that child was in following the activity schedule for independent play. In another example, Wainer and Ingersoll (2013) investigated the feasibility and efficacy of a computer-based training program to teach undergraduate students and parents to conduct reciprocal imitation training with children with ASD. Behavioral measures included fidelity of implementation of the imitation program and rate of the child’s imitative responses during baseline and intervention. McColloch and Noonan (2013) developed a computerized training program to teach paraprofessionals how to implement mand training with their students with ASD. The authors collected data on spontaneous mands exhibited by the child with ASD during each baseline and intervention session implemented by the paraprofessional. Although correct implementation of behavior change programs by the
trainer is important, the impact on the child’s behavior is equally important. For this reason, studies evaluating ICT to train professionals or parents to conduct a behavior analytic program should also measure the behavior of children who receive training.

In conclusion, ICT is a promising approach to teaching various behavior analytic programs to educators, parents, and undergraduate students. Technology-based trainings such as ICT make behavior analytic interventions more accessible and efficient (Gerencser et al., 2020). ICT is an effective approach for teaching various skills and can incorporate some interactive components of BST (Scott et al., 2018). However, researchers have not explored ICT to teach professionals providing services to children with ASD to conduct safety skills training. Given the efficiency and accessibility of ICT, it is important to determine whether ICT can be effective for training behavior analysts to conduct safety skills training with their clients with ASD. Furthermore, measuring the client’s safety scores during behavior analyst-implemented training is important to evaluate the impact on the clients. Although research shows that parents and teachers can learn to teach safety skills to children, no research has been conducted thus far for teaching behavior analysts (or behavior analysts in training) to conduct safety skills training. Furthermore, only three studies in the safety skills literature have established the effectiveness of training manuals (Carroll-Rowan & Miltenberger, 1994; Gross et al., 2007; Novotny et al., 2020). Given that safety skills training for children with ASD is often overlooked (Tekin-Iftar et al., 2021) and the majority of behavior analysts provide services to individuals with ASD (BACB, 2021), researchers should evaluate strategies for teaching behavior analysts to conduct safety skills training with a focus on technology-based methods that are efficient and accessible. The use of ICT is one such method that should be evaluated. Therefore, purpose of this study was to develop and assess the content and technical adequacy of the ICT program for safety
skills (Phase 1), evaluate the effectiveness of ICT for training practitioners to implement an enhanced safety skills training program with their clients (Phase 2), and evaluate practitioner-implemented safety skills training for their clients with ASD (Phase 3).
CHAPTER TWO: PHASE 1: ICT DEVELOPMENT AND EXPERT EVALUATION

METHOD

Participants

Participants in Phase 1 were experts in safety skills training and behavior analysis practitioners.

Expert Review Group

We recruited three experts in safety skills and BST to validate the content in the ICT modules. We selected these experts based on their background in research related to safety skills training. The inclusion criteria included individuals who (a) had a PhD degree and (b) had at least three publications related to safety skills and BST in peer reviewed journals. We sent a recruitment email that briefly described the study to individuals who met these inclusion criteria. Expert reviewers received two links to access (a) the ICT modules and (b) a questionnaire via Qualtrics. Expert 1 was a Board Certified Behavior Analysts – Doctorate® (BCBA-D®) and a clinical director of an agency that provided behavior analytic services to individuals with ASD. She held a PhD in applied behavior analysis (ABA) and published four articles in peer reviewed journals. Similarly, Expert 2 was a BCBA-D® and a clinical director of an autism agency. She held a PhD in ABA and had published seven articles in peer reviewed journals related to teaching safety skills. Finally, Expert 3 possessed the same credentials as the other two experts and held an Associate Professor position in a Department of Pediatrics at an academic institution. She published four studies in peer reviewed journals on safety skills training.
**Practitioner Review Group**

We recruited three practitioners to assess the ease of implementation of the ICT modules. The inclusion criteria for practitioner reviewers included individuals who were (a) credentialed by the Behavior Analysis Certification Board (BACB), Inc.® as a Board Certified Behavior Analyst (BCBA®) or BCBA-D® and (b) worked in settings that provided behavioral services to clients with ASD. To recruit practitioner reviewers, we sent emails to local behavior analysts describing the study and the role of a reviewer. Behavior analysts who responded were sent two links to access (a) the ICT modules and (b) a questionnaire via Qualtrics. All three participants were BCBAs who worked at local agencies that provided behavior analytic services to individuals with ASD.

**Materials**

The ICT modules included PowerPoint presentations with audio, videos with audio narration, self-guided practice opportunities, and competency assessments. The three major themes covered in the ICT were an introduction to safety skills training, enhanced BST, and in situ assessment and IST. We divided the computerized training into 12 modules: (a) pre-test, (b) introduction to training safety skills, (b) materials required for training safety skills, (c) brief preference assessment (d) instructions, (e) modeling, (f) rehearsal and feedback, (g) setting up an assessment, (h) implementing in situ assessments, (i) data collection, (j) in situ training, and (k) post-test (see Appendix A for program structure). We developed the training videos using a variety of software applications (e.g., Microsoft PowerPoint®, iMovie®, and Camtasia®). We designed the ICT modules and made them accessible using an online learning management system (i.e., Canvas by Instructure®). We developed the content of the modules by using best practice from the safety skills literature based on how to train safety skills to children with ASD.
The pre-test and post-test were in the first and last modules and included a combination of multiple-choice and true or false questions to assess the practitioners’ knowledge of safety skills training before and after training. The ten questions in the pre-test and post-test were identical. Throughout this section, we will use the terms training module and lesson interchangeably. Each training module was structured so that the viewer first contacted the instructional content, then a video example, and finally embedded self-guided practice opportunities that were referred to as “Knowledge Checks.” The lessons consisted of two or three self-guided practice opportunities in the form of multiple-choice questions. We embedded videos within each module except for the pre-test and post-test modules. These videos depicted examples of correct performance for all skill components in relevant lessons. Following each lesson, we added a competency assessment related to the specific content area. Similar to procedures in Pollard et al. (2014), we included a combination of factual and application questions for all competency assessments. We developed two other modules within the ICT program (i.e., Module 0 and Resources Module) that contained general information. For example, Module 0 consisted of information related to the structure of the ICT program whereas the Resources Module provided websites for where a practitioner may be able obtain a replica gun or empty pill capsules to be used for training. For the content evaluation by the expert group, we sent a Qualtrics link consisting of questions on a rating scale that related to the content within the ICT modules (see Appendix B). Along with the Qualtrics link, we provided the expert reviewers access to the ICT modules. We also provided the practitioner group a Qualtrics link to questions consisting of rating scales and access to the ICT modules, however, unlike the expert group, their questionnaire addressed the usability of the ICT modules (see Appendix C).
**Data Collection**

The expert and practitioner respondents completed questions pertaining to the content and ease of implementation respectively. Additionally, the questionnaires included open-ended questions that allowed the experts and practitioners to provide specific feedback for the ICT modules. The participants scored each question using a 5-point Likert scale (e.g., 1 = strongly disagree to 5 = strongly agree). We averaged the scores for each item per group of respondents (see Tables 1 and 2). These scores and feedback helped determined the revisions that were needed for specific questions.

**Procedures**

To recruit the expert reviewers for Phase 1, we sent an email that stated the overall purpose of the study and asked the reviewers if they would be willing to review the ICT modules and respond to questions related to the validity of the content within the modules. The practitioner reviewers received a similar email stating the overall purpose of the study and asked if they would be willing to review the ICT modules and answering questions related to the ease of implementation. Experts and practitioner reviewers who were willing to assist received access to the ICT modules and Qualtrics links to the relevant questionnaire. We asked all reviewers to complete the questionnaire within 2 weeks. For reviewers who did not complete the questionnaire after 2 weeks, we sent a reminder email to prompt completion. For reviewers who completed the questionnaire, we sent an email thanking them for their assistance. We reviewed the feedback from the expert and practitioner reviewers to determine the ICT components that needed to be modified or eliminated. For example, if a question had an average of 3 (neutral) or below (disagree or strongly disagree), we evaluated that specific component. In our review of their feedback, we found one component for which the expert reviewers provided a score lower
than a 3 \( (M = 2.33) \). Specifically, for Module 2, which introduced safety skills training, the reviewers recommended that we emphasize the importance of practicing the skill multiple times while receiving feedback. Further, the questionnaires included open-ended questions wherein the reviewers could provide additional comments about the training program. We reviewed these comments and incorporated their feedback to finalize the ICT program for Phase 2. These changes are depicted in Table 3.
CHAPTER THREE: RESULTS

Table 1 depicts the expert reviewers’ overall ratings for each item in the Expert Questionnaire. The mean scores for 25 items on the questionnaire range from 2.33 to 5 (M = 4.5) suggesting that the expert reviewers rated the ICT positively overall. The ratings on the pre- and post-tests ranged from 4 to 5 (M = 4.67) suggesting that the expert reviewers’ opinion was that these tests sufficiently sampled the skills needed for training and assessing safety skills. Next, the expert reviewers were presented with items related to Module 2; scores ranged from 2 to 5 (M = 4.17). For one item in Module 2 related to the importance of active learning approaches for teaching safety skills the mean score was 2.33 for which the reviewers provided recommendations to modify this item. Based on this rating, we modified the module to emphasize the importance of multiple rehearsals with feedback during training. The overall rating on the descriptions of the materials required to conduct BST for safety skills (Module 3) was 5, indicating that no change was needed. For Module 4, the expert reviewers’ scores ranged from 3 to 5 (M = 4.33) with no score below 3 thus no items were recommended for change. For modules describing all components of BST (Modules 5, 6, and 7) the expert reviewers’ scores ranged from 3 to 5 (M = 4.61) indicating that modifications were not required for these items. Further, the scores for Modules 8 and 9 related to arranging and implementing in situ assessments ranged from 3 to 5 (M = 4.67). Finally, the scores for Modules 10 and 11 (data collection and IST) ranged from 3 to 5 (M = 4.56).

Table 2 summarizes the overall ratings for each item in the Practitioner Questionnaire. The means scores for 10 items on the questionnaire range from 3 to 5 (M = 4.39) indicating that
the practitioner reviewers rated the ICT program favorably. The first four items were related to BST, in situ assessment, IST, and data collection procedures as described in the ICT modules. The rankings for these items ranged from 4 to 5 ($M = 4.5$). These data suggest that the practitioner reviewers agreed on the procedures being described sufficiently in the training program. Next these reviewers rated whether the active responding opportunities and quizzes tested their knowledge of the content within the ICT modules. For this item, the raters’ scores ranged from 3 to 5 with a mean score of 4.33. Items 6 and 7 were related to the implications in clinical practice for which the practitioner reviewers rated both items favorably (range 4 to 5; $M = 4.5$) suggesting that they believed this training will have a positive impact in practice. The final three items of the questionnaire asked the reviewers to rate whether the ICT was user friendly, the information presented in the ICT was clearly organized, and the videos were well done. For these items, the scores ranged from 3 to 5 ($M = 4.22$). Overall, the expert and practitioner reviewers rated the ICT positively and provided written suggestions for further changes. Upon completing the requested modifications, we evaluated the final ICT program with practitioners in Phase 2.

**Table 1**

*Expert Reviewer (ER) Ratings*

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<td>1. The questions in the pre-test sufficiently sample the skills needed for training and assessing safety skills.</td>
<td>5</td>
<td>4</td>
<td>5</td>
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<td>2. Module 2 clearly explains the importance of safety skills for physical safety threats.</td>
<td>5</td>
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Table 1 (Continued)

3. Module 2 clearly explains the importance of teaching the three safety responses. 5 5 4 4.67

4. Module 2 clearly explains the importance of active learning approaches for teaching safety skills. 2 3 2 2.33

5. Module 2 clearly explains the importance of in situ assessments. 5 4 5 4.67

6. Module 3 accurately describes all materials required to conduct BST for safety skills. 5 5 5 5

7. Module 4 accurately describes how to conduct a single trial preference assessment. 3 5 5 4.33

8. The video in Module 4 clearly depicts correct implementation of a single trial preference assessment. 5 3 5 4.33

9. Module 5 clearly explains the instructions component of BST. 4 5 5 4.67

10. The videos in Module 5 clearly depict correct implementation of the instructions component of BST. 4 5 5 4.67

11. Module 6 clearly explains the modeling component of BST. 4 5 5 4.67

12. The video in Module 6 depicts correct implementation of the modeling component of BST. 4 5 5 4.67

13. Module 7 clearly explains the rehearsal and feedback components of BST. 4 5 3 4

14. The videos of Module 7 clearly depict the correct implementation of the rehearsal and feedback components of BST. 5 5 5 5

15. Module 8 clearly explains the importance of setting up an in situ assessment. 5 5 4 4.67

16. Module 8 clearly outlines the steps involved in setting up an in situ assessment. 5 5 5 5
Table 1 (Continued)

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<tbody>
<tr>
<td>17. Module 9 clearly explains the steps involved in implementing an in situ assessment.</td>
<td>3</td>
<td>5</td>
<td>5</td>
<td>4.33</td>
</tr>
<tr>
<td>18. The videos in Module 9 clearly depict correct implementation of an in situ assessment.</td>
<td>4</td>
<td>5</td>
<td>5</td>
<td>4.67</td>
</tr>
<tr>
<td>19. Module 10 clearly explains the importance of data collection when conducting safety skills training.</td>
<td>5</td>
<td>5</td>
<td>4</td>
<td>4.67</td>
</tr>
<tr>
<td>20. Module 10 clearly describes the safety scores.</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>21. The videos in Module 10 clearly depict the safety responses.</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>22. Module 11 clearly explains the importance of conducting in situ training after a failed in situ assessment.</td>
<td>5</td>
<td>5</td>
<td>3</td>
<td>4.33</td>
</tr>
<tr>
<td>23. It is important to include in Module 11 a discussion of in situ training after a failed in situ assessment.</td>
<td>5</td>
<td>5</td>
<td>4</td>
<td>4.67</td>
</tr>
<tr>
<td>24. The videos in Module 11 clearly depict correct implementation of in situ training.</td>
<td>4</td>
<td>3</td>
<td>4</td>
<td>3.67</td>
</tr>
<tr>
<td>25. The questions in the post-test sufficiently sample the skills needed for training and assessing safety skills.</td>
<td>5</td>
<td>4</td>
<td>5</td>
<td>4.67</td>
</tr>
</tbody>
</table>

Mean scores: 4.44, 4.64, 4.53

Note. Ratings for each questionnaire item are shown under columns ER 1, ER 2, and ER3. The mean is the average rating score for the items across the expert reviewers. A 5-point Likert scale was used with 1 = strongly disagree; 2 = disagree; 3 = neutral; 4 = agree; 5 = strongly agree. ER = expert reviewer.
Table 2

Practitioner Reviewer (PR) Ratings

<table>
<thead>
<tr>
<th>Item</th>
<th>PR 1</th>
<th>PR 2</th>
<th>PR 3</th>
<th>M</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I believe the BST procedure was described clearly enough in the ICT that I could now implement BST to teach safety skills to my client with ASD.</td>
<td>4</td>
<td>4</td>
<td>5</td>
<td>4.33</td>
</tr>
<tr>
<td>2. I believe the in situ assessment procedure was described clearly enough in the ICT that I could now implement an in situ assessment with my client with ASD.</td>
<td>4</td>
<td>5</td>
<td>5</td>
<td>4.67</td>
</tr>
<tr>
<td>3. I believe the in situ training procedure was described clearly enough in the ICT that I could now implement an in situ training with my client with ASD.</td>
<td>4</td>
<td>4</td>
<td>5</td>
<td>4.33</td>
</tr>
<tr>
<td>4. I believe the data collection procedure was described clearly enough in the ICT that I could now collect data on my client’s performance during an in situ assessment.</td>
<td>5</td>
<td>5</td>
<td>4</td>
<td>4.67</td>
</tr>
<tr>
<td>5. The active responding opportunities and quizzes adequately tested my knowledge of content within the ICT modules.</td>
<td>3</td>
<td>5</td>
<td>5</td>
<td>4.33</td>
</tr>
<tr>
<td>6. The ICT with help practitioners implement safety skills training with their clients with ASD.</td>
<td>4</td>
<td>5</td>
<td>5</td>
<td>4.67</td>
</tr>
<tr>
<td>7. The ICT will have a positive impact in clinical practice related to training safety skills to children with ASD.</td>
<td>4</td>
<td>4</td>
<td>5</td>
<td>4.33</td>
</tr>
<tr>
<td>8. The ICT is user friendly.</td>
<td>4</td>
<td>4</td>
<td>5</td>
<td>4.33</td>
</tr>
<tr>
<td>9. The information presented in the ICT is clearly organized.</td>
<td>4</td>
<td>4</td>
<td>5</td>
<td>4.33</td>
</tr>
<tr>
<td>10. The videos presented in the ICT are well done.</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>Mean scores</td>
<td>3.9</td>
<td>4.4</td>
<td>4.9</td>
<td></td>
</tr>
</tbody>
</table>

Note. Ratings for each questionnaire item are shown under columns PR 1, PR 2, and PR 3. The mean is the average rating score for the items across the practitioner reviewers. A 5-point Likert scale was used with 1 = strongly disagree; 2 = disagree; 3 = neutral; 4 = agree; 5 = strongly agree. PR = practitioner reviewer.
Table 3

Modifications to ICT Based on Reviewers’ Feedback

<table>
<thead>
<tr>
<th>Module</th>
<th>Item Modified</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Add statement about pre-requisite skills.</td>
</tr>
<tr>
<td>2</td>
<td>Emphasize importance of practicing skills multiple times and getting feedback.</td>
</tr>
<tr>
<td>4</td>
<td>Clarify that the preference assessments should occur immediately before BST.</td>
</tr>
<tr>
<td>5</td>
<td>Include in the instructions component of BST that the client can report the firearm to a caregiver, babysitter, grandparent, etc.</td>
</tr>
<tr>
<td>7</td>
<td>Include a statement about how the practitioner can ensure that they are able to see the client not touch the firearm during the fading procedure.</td>
</tr>
<tr>
<td>7</td>
<td>Change “criteria” to “criterion”</td>
</tr>
<tr>
<td>9</td>
<td>Add voice over that in situ training should be initiated after an incorrect response and that the content will be covered in Module 11.</td>
</tr>
<tr>
<td>10</td>
<td>Clarify the explanation for why touching the firearm results in a score of 0 even if the other skills were completed correctly.</td>
</tr>
<tr>
<td>7</td>
<td>Add a compilation of all behavioral skills components into one video.</td>
</tr>
<tr>
<td>12</td>
<td>Include the post-test passing score within the instructions.</td>
</tr>
<tr>
<td>Other</td>
<td>Remove timing for all competency assessments and tests.</td>
</tr>
<tr>
<td>Other</td>
<td>Proofread all slides for writing errors.</td>
</tr>
</tbody>
</table>

Note. Items requested for modification that involved all modules are referred to in the table as other.
CHAPTER FOUR: PHASE 2: EVALUATION OF INTERACTIVE COMPUTERIZED SAFETY SKILLS TRAINING WITH PRACTITIONERS

METHOD

Participants

We recruited three practitioners who were BCBAs. Practitioners were eligible to participate if they (a) provided behavior analytic services, (b) had a client who met the child participant eligibility criteria, and (c) had no experience conducting research or training in the area of safety skills. We recruited the BCBAs from center and home-based behavior analytic programs via email, social media platforms, and word-of-mouth. The researcher met with BCBAs who were interested in participating to discuss the study and whether they had an eligible client (see recruitment description in Phase 3). Before proceeding, we required that informed consent be obtained from the BCBA and their client’s family. Emilia was a 36-year-old Hispanic/Latino female who had 8 years of experience as a BCBA working with individuals with ASD. Maeve was a 31-year-old Caucasian female who had 6 years of experience as a BCBA working with individuals with ASD. Jodi was a 35-year-old Caucasian female who had 5 years of experience as a BCBA working with individuals with ASD. All three participants had no prior experience implementing a safety skills training protocol. Hereafter, when describing our methods, we will refer to these participants, as practitioners. Emilia, Maeve, and Jodi’s clients were Nila, Luca, and Amari respectively.
Settings and Materials

Baseline, ICT, and post-ICT with actor sessions all took place at a university setting. The location contained a seating area with two sofas, two sofa chairs, three side tables, one coffee table, and one large round table with multiple chairs. The researcher conducted baseline and post-ICT sessions by contriving a typical home setting with a living room, dining area, and adjacent room. Each of these locations was labeled as such during sessions. During baseline and post-ICT sessions, the researcher provided a bin that consisted of the following items: a disabled gun, six items to be used in a preference assessment (e.g., coloring pencils, a coloring book, a toy car, a slinky, an iPad, etc.), a notepad, and a pen. The researchers conducted all ICT sessions in a room at the university that contained a rectangular table with multiple chairs. During ICT sessions, the researcher provided the practitioner with a laptop, pair of headphones, note pad, and pen. The 12 training modules were accessible on a computer with internet connection. Each module included (a) audio narration (b) video models, (c) self-guided practice opportunities, and (d) competency assessments. For sessions wherein the practitioners implemented training and assessment sessions with their client, we conducted these at the clients’ homes.

Dependent Measures and Data Collection

The primary dependent variable was practitioner fidelity to safety skills training procedures (see Appendix D). Practitioner fidelity was defined as the extent to which practitioners carried out safety skills training procedures as trained in the ICT modules. We assessed practitioners’ fidelity using a task analysis (TA) and reported it as a percentage. We calculated the percentage of steps completed correctly by dividing the number of correct steps by the total number of steps in the TA and multiplying by 100. We scored the steps on the TA as correct, incorrect, or not applicable. The TA consisted of 39 items divided into four main
components; single trial preference assessment, BST, in situ assessment, and IST. Data collection varied depending on the type of session implemented. For instance, not all sessions required the practitioner to carry out IST. If the client actor touched the gun during an in situ assessment, thus scoring a 0 and requiring IST procedures, fidelity for that component was assessed. Whereas, if the client actor did not touch the gun, moved away from it, and reported it to the parent actor during an in situ assessment, thus scoring a 3, IST was not required and fidelity for this component was scored as “NA.” We collected data on fidelity to safety skills training during baseline and post-ICT sessions. Further, we collected data on secondary measures during training sessions such as the time required to complete the ICT modules with passing scores on all competency assessments, pre- and post-tests scores, the number of attempts to pass the ICT program, and the number of modules the practitioners were required to repeat (see Table 4). We included the time the practitioners spent reviewing content to pass the individual modules and the ICT program in the total duration to complete the full training program. We converted the pre- and post-tests scores to a percent to compare knowledge-based performance before and after the training. Participants completed the training program when they achieved a passing score of 100% for each competency assessment and 90% for the post-test.

**Interobserver Agreement**

We collected interobserver agreement (IOA) data by having a secondary observer independently view video recordings of the sessions. We calculated IOA by determining the number of steps that the observers agreed on and dividing them by the number of relevant steps in the TA and then multiplied by 100 to obtain a percentage. We obtained IOA data for practitioner fidelity for 100% of baseline and post-ICT for Emilia, 100% of baseline and post-ICT for Maeve, and 90.91% of baseline and 66.66% of post-ICT for Jodi. The mean IOA scores
were 94.37%, 94.61%, and 96.88% respectively. We were unable to collect IOA data during Emilia’s, Maeve’s, and Jodi’s implementation with their clients.

**Procedural Integrity**

We scored procedural integrity live during all ICT sessions for all practitioners. We collected data by scoring “yes” or “no” for each step. For the purpose of researcher integrity of the procedures, we assessed the following six components: (a) researcher provided general instructions about the ICT session (as per script), (b) laptop present and turned on, (c) legal pad and pen available for practitioner, (d) researcher logged into ICT modules, (e) researcher set timer when practitioner was ready to begin the module, and (f) researcher stopped timer when the practitioner indicated that they completed the modules (see Appendix E). We calculated procedural integrity by computing the sum of “yes,” scores for each step, dividing by the total number of steps and converting into a percentage. We calculated IOA data for 100% of sessions with all practitioners for which we obtained scores of 100% across all sessions.

**Social Validity Questionnaire**

Following completion of the study, we distributed a social validity questionnaire to all practitioners. The questionnaire evaluated their opinions of the ease of implementation and how likely they were to incorporate the training program in their practice. Practitioners were asked to complete the questionnaire using an online link by Qualtrics. The questionnaire consisted of 10 questions using a 5-point Likert scale (see Appendix F).

**Actor Scripts**

During baseline and post-ICT sessions, practitioners conducted safety skills training with actors who played the role of a client with ASD. We recruited four undergraduate and graduate students who were completing coursework in behavior analysis. The actors consisted of two
males and two females, ages 21 to 26. We trained these four actors on specific scripts related to the four safety scores (see Appendix G). For example, during a post-ICT session, we asked them to act out a client who will touch the gun, not walk away, and not report the gun. To ensure the actors engaged in the correct responses, the first author trained them using components of BST. We used a competency checklist to assess their ability to engage in the correct responses for each safety score category (see Appendix H). All actors performed at 100% accuracy across three consecutive trials, demonstrating proficiency with the scripts.

**Experimental Design and Procedures**

We used a nonconcurrent multiple baseline design across practitioners to evaluate the effects of the ICT on practitioner fidelity to implement enhanced safety skills training procedures. This study consisted of baseline with actors, post-ICT with actors, and implementation with the client. To determine when to introduce the ICT modules for each practitioner, we monitored baseline data paths for stability. Before intervening on subsequent panels, we monitored the data for effects with each introduction of the intervention.

**Pre-Baseline**

Three days prior to the first baseline session, the researcher sent an email to the practitioner with the relevant sections from two peer-reviewed articles related to safety skills training including conducting in situ assessment and IST (Morosohk & Miltenberger, 2022; Novotny et al., 2020). We asked the practitioners to review the information from the peer-reviewed articles. Further, the practitioners were informed that they had the option to bring notes from the articles to baseline sessions. We did not provide any further instructions on how to conduct safety skills training.
**Baseline**

During baseline, we implemented all sessions with two actors; one serving as a client with ASD and one serving as a parent. When assessing fidelity of the procedures, the client actor used one of four different safety response scripts to simulate potential client responses (see Appendix G). The researcher selected a safety response script to be used prior to each session and informed the client actor without the knowledge of the practitioner. Upon entering the contrived setting, the researcher asked the practitioner to sit on a couch while aspects of the sessions were reviewed (e.g., recording, introducing the research assistants, etc.). Thereafter, the researcher provided the following instructions:

During this session, you will be training X who is playing the role of a client with ASD. X will be playing the role of a parent. You will be training your client firearm safety skills. We would like to see how much you learned about teaching and assessing safety skills by reading the articles about them. You can approach the procedures using your notes or from what you remember, whatever you prefer. You may not use the articles. You may use any materials in the bin provided to you. After you complete training, you will set up an assessment to evaluate the effects of your training. In this space, there is a living room, a dining table, and an adjacent room. Use the materials, this space, the parent actor, and the client actor as you see fit. When you think you have completed the session, please state that you are finished. Do you have any questions?

They did not receive any additional instructions or feedback on their performance. After addressing questions, the researcher began recording the session. Once the session was complete, the research set up the next session thus at least two sessions took place in one day. Sessions
continued until the data showed a stable pattern. For each practitioner, we calculated an average of the percentage of correct responses to determine if the practitioner will proceed to intervention. We established our exclusionary criterion to be at an average score above 60%. All three of our practitioners scored below 60% therefore they proceeded to the ICT phase.

*Interactive Computerized Training*

Following baseline, the researcher scheduled time for the practitioner to complete the ICT modules in a conference room located within the university. The researcher assisted the practitioner to create a Canvas account thereby making the training modules accessible. Once the practitioner was ready to begin, the researcher delivered the following instructions:

- You will review materials about training and assessing safety skills. The program consists of 12 modules. Two of these modules are pre- and post-tests. The program will begin with an overview. Every instructional module will end with a brief quiz. Please raise your hand after you complete each quiz. You do not need to raise your hand after questions presented within videos. I will inform you on how you will proceed. You will need to achieve a passing score of 100% to proceed. You may need to complete the quiz more than once. I will be present to record the duration of this session. I will not be able to answer any questions about the content or the quizzes. I will be able to assist with any technical difficulties. You may pause the videos to take notes at any time. Do you have any questions? (The researcher paused for questions). If you are ready, you may begin.

- As stated in the instructions, researchers were present however, our role was to provide a laptop with internet connection, assist with creating a Canvas account, open the training
program, collect procedural fidelity data, and collect secondary data (e.g., measure the time required for the practitioners to complete the modules, record pre- and post-tests and competency assessments scores, etc.). The ICT began with a program introduction (i.e., Module 0), wherein the practitioner watched a video that provided general information about the structure of the training modules and information related to taking notes throughout the ICT program and pre- and post-tests. Each training module contained lessons and competency assessments. Each lesson was a video that consisted of instructional content, examples of the skills, and embedded self-guided practice opportunities (i.e., Knowledge Checks). The questions presented in the competency assessments and the self-guided practice opportunities did not overlap. Each lesson consisted of one to three self-guided practice opportunities in the form of multiple-choice and true or false questions. The practitioner received feedback for correct and incorrect responses. For example, if the practitioner selected an incorrect response, a message appeared in red that stated the response was incorrect and a green check mark appeared next to the correct response. Once the practitioner reviewed the entire lesson, they were directed to complete a competency assessment (for Modules 2 to 11). For example, after they watched the lesson about how to implement the instructions component of BST (Module 5), they then answered five questions related to this content. If the practitioner responded correctly on all questions in the competency assessments (i.e., 5 out of 5; 100%), the researcher was present to check their score and direct them to proceed to the next module. However, when an incorrect response was recorded, the researcher directed the practitioner to the start of the lesson where they could contact the content again and retake the quiz. We did not answer any questions about the training content.

Additionally, when the practitioner had technology issues, we were available to assist. After the practitioner reviewed all the training modules, they completed a post-test. Practitioners
who did not score 100% were given an opportunity to review the modules and re-take the post-test. In this case, we did not require the practitioners to re-take the competency assessments in the modules. To pass the training program, all practitioners were required to score 100% on the post-test. Overall, the program was designed to teach practitioners how to conduct enhanced BST, how to set up in situ assessment, collect data, and conduct in situ training (see Program Structure in Appendix A).

**Post-ICT Assessments with Actor**

We conducted assessments within one week of the practitioners completing the ICT modules. These assessments were identical to baseline sessions. The researcher provided the following instructions:

> Before we begin, I would like to ask you if you reviewed the safety skills training materials prior to coming to this session. During this session, you will be training X who is playing the role of a client with ASD. X will be playing the role of a parent. You will be training your client firearm safety skills. We would like to see how much you learned about teaching and assessing safety skills from the computer training program. You can approach the procedures using your notes from the computer training program or from what you remember, whatever you prefer. Use the materials, this space, the parent actor, and the client actor as you see fit. After the assessment, please take some time to reflect on your performance during each of the assessments. If you feel as though you did not perform to the best of your abilities, you can review the modules now, review them later on your own time, or proceed without reviewing the modules and come back for another assessment. Do you have any questions?
We used a checklist to assess fidelity to safety skills training procedures (see Appendix D). Assessments included scenarios in which the client actor performed all the safety responses and scenarios in which they did not perform the safety responses and the practitioner was required to implement IST. We arranged for IST to occur for at least one out of three sessions or once per phase. Similar to baseline conditions, we instructed the client actor on which safety response script to follow. The researcher provided the client actor with a note card that consisted of one of four safety scores (i.e., 0, 1, 2, or 3). For example, if the note card specified a score of 0, then the client actor touched the gun during assessments arranged by the practitioner. The parent actors’ role was to follow any instructions provided by the practitioner. In other words, the parent actors were not required to engage in any pre-determined behaviors. We did not provide performance feedback to the practitioners during or following post-ICT assessments.

After completion of the session, the researcher instructed the practitioner to reflect on their performance and allowed them to review the training modules if they believed they did not perform well. The practitioners had the option to review their notes and the training materials after each session or on their own time. Further, the practitioners could opt out of reviewing their notes or the training materials and proceed with sessions. After the first session, we asked the practitioners to self-report whether they contacted the materials again and the duration of each review. Criterion performance was achieved when their fidelity was 90% or higher across three consecutive sessions. Once the practitioner met the criterion with a client actor, they implemented one session of enhanced-BST, in situ assessments, and IST (if needed). We collected data for practitioner fidelity to safety skills training procedures with their respective clients.
CHAPTER FIVE: RESULTS

Three practitioners completed the ICT modules. Figure 1 depicts results for Emilia (upper panel), Maeve (middle panel), and Jodi (bottom panel). During baseline, the results for Emilia demonstrated low fidelity to the safety skills assessment and training TA; an average of 9.72% (range 8.11% - 10.71%). Following ICT, Emilia completed 65% of the steps on the TA correctly during the first assessment with the client actor. Emilia’s performance increased to an average of 95.67% across 3 consecutive sessions (range 91% - 100%). For the last two sessions, the client actor scored below 3 and Emilia implemented IST correctly. Emilia scored a 96.77% during the training and assessment session with her client, Nila.

During baseline, Maeve’s results show low fidelity to the assessment and training procedures across five sessions with an average of 10.57% (range 7.14% to 13.5%). Following the ICT modules, Maeve demonstrated high fidelity across three sessions with an average of 95.45% (range 90.91% to 100%). During one of these sessions, Maeve was required to implement IST and did so correctly. She obtained a score of 100% during the session that the client actor scored below 3. Maeve implemented the safety skills protocol with 96.3% fidelity with her client, Luca.

The results for Jodi are depicted in the bottom panel indicating that she demonstrated low fidelity during baseline with an average of 4.5% (range 0% to 10.34%). After experiencing the ICT, Jodi implemented the procedures with high fidelity at an average of 94.43% (range 90.91% to 96.55%). Following the post-ICT phase, Jodie implemented the procedures with 90.91%
fidelity with her client, Amari. Data for secondary measures are summarized in Table 4. Total training time ranged from 92 min, 39 s to 117 min, 45s.

The social validity results are summarized in Table 5. All practitioners agreed or strongly agreed that they would be able to incorporate the ICT modules within clinical practice (Item 3; \( M = 4.33 \)). Further, they all agreed or strongly agreed that the ICT prepared them to implement the safety skills training protocol (Item 4; \( M = 4.66 \)). However, only one practitioner rated items related to the accessibility of the ICT and the time required to complete the modules positively (Items 2 and 5). Two of the practitioners rated these items as neutral and disagree. Overall, the practitioners believed that it was easy to implement the BST and in situ assessments with their clients (\( M = 4 \) and \( M = 4.33 \) for Items 6 and 8 respectively). Finally, all practitioners rated the items related to their willingness to implement the safety skills protocol with other clients and whether they would recommend an ICT approach to other practitioner positively (\( M = 4.33 \) and \( M = 4.66 \) for Items 9 and 10 respectively). Overall, the practitioners performed the safety skills training protocol with high fidelity. Further, the practitioners socially validated the ICT program. Following successful completion of the post-ICT assessments, the practitioners implemented the enhanced safety skills training protocol with their respective clients and we evaluated the effects of their training in Phase 3.

Table 4

*Results of Secondary Data Collected During ICT*

<table>
<thead>
<tr>
<th>Secondary measures</th>
<th>Emilia</th>
<th>Maeve</th>
<th>Jodi</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duration</td>
<td>117 min 45 s</td>
<td>92 min 39 s</td>
<td>103 min 37 s</td>
</tr>
<tr>
<td>Pre-test score</td>
<td>50%</td>
<td>50%</td>
<td>40%</td>
</tr>
</tbody>
</table>
Table 4 (Continued)

<table>
<thead>
<tr>
<th></th>
<th>100%</th>
<th>90%</th>
<th>100%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post-test score</td>
<td>100%</td>
<td>90%</td>
<td>100%</td>
</tr>
<tr>
<td>Attempts to pass ICT</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Repeated modules</td>
<td>6, 9</td>
<td>8, 9</td>
<td>4, 11</td>
</tr>
</tbody>
</table>

*Note.* Repeated modules indicate the specific modules that the practitioners were required to redo because they did not score 100% on the competency assessments. ICT = interactive computerized training.

Table 5

*Practitioner Scores for Social Validity Questionnaire*

<table>
<thead>
<tr>
<th>Item</th>
<th>Emilia</th>
<th>Maeve</th>
<th>Jodi</th>
<th>M</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I think it is important for my clients to receive safety skills training</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>2. I think that the ICT methods are accessible to practitioners in clinical settings.</td>
<td>3</td>
<td>2</td>
<td>5</td>
<td>3.33</td>
</tr>
<tr>
<td>3. I think that I would be able to incorporate the ICT modules within a clinical setting.</td>
<td>4</td>
<td>4</td>
<td>5</td>
<td>4.33</td>
</tr>
<tr>
<td>4. This interactive computerized training prepared me to implement an enhanced BST program with my client.</td>
<td>4</td>
<td>5</td>
<td>5</td>
<td>4.66</td>
</tr>
<tr>
<td>5. Completing the interactive computerized training did not take too much of my time.</td>
<td>2</td>
<td>3</td>
<td>5</td>
<td>3.33</td>
</tr>
<tr>
<td>6. It was easy to implement the enhanced BST program with my client.</td>
<td>2</td>
<td>5</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>7. I like the safety skills protocol used to teach my client.</td>
<td>4</td>
<td>5</td>
<td>5</td>
<td>4.66</td>
</tr>
<tr>
<td>8. It was easy to implement an in situ assessment with my client.</td>
<td>4</td>
<td>5</td>
<td>4</td>
<td>4.33</td>
</tr>
</tbody>
</table>
### Table 5 (Continued)

<table>
<thead>
<tr>
<th></th>
<th>Emilia</th>
<th>Maeve</th>
<th>Jodi</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>9. I would be willing to implement enhanced BST and in situ assessments with my other clients.</td>
<td>5</td>
<td>4</td>
<td>4</td>
<td>4.33</td>
</tr>
<tr>
<td>10. I would recommend an interactive computerized training approach to other practitioners.</td>
<td>4</td>
<td>5</td>
<td>5</td>
<td>4.66</td>
</tr>
</tbody>
</table>

*Note.* Ratings for each questionnaire item are shown under columns Emilia, Maeve, and Jodi. The mean is the average rating score for the items across the practitioners. Items were rated using a 5-point Likert scale; 1 = strongly disagree; 2 = disagree; 3 = neutral; 4 = agree; 5 = strongly agree.
Figure 1

Percentage of Steps Correct for Practitioners’ Fidelity to ICT

Note. Closed circles represent in situ assessments without implementation of in situ training, open circles represent in situ assessments with implementation of in situ training, and closed squares represent sessions with clients in their respective homes. BL = baseline. Post-ICT = post-interactive computerized training.
CHAPTER SIX: PHASE 3: EVALUATION OF AN ENHANCED SAFETY SKILLS TRAINING PROTOCOL WITH CLIENTS WITH ASD

METHOD

Participants, Settings, and Materials

For Phase 3, we recruited children ages 4 to 12 who had an ASD diagnosis and met the following criteria: (a) had no prior exposure to safety skills training that involved active approaches, (b) had an imitative repertoire, (c) were able to follow simple directions, (d) had the ability to report a scenario, and (e) had a preference for tangibles. Three children met these criteria; Nila, Luca, and Amari. Nila was a 5-year-old girl diagnosed with ASD who spoke in full sentences and was able to follow complex instructions. Luca was a 6-year-old boy diagnosed with ASD. He communicated in simple sentences and was able to follow simple instructions. Amari was a 10-year-old boy diagnosed with ASD and had a strong verbal repertoire that closely resembled his peers. Nila, Luca, and Amari had all been receiving ABA services for 2, 4, and 2 years respectively. We conducted a pre-screening assessment to examine whether the client was able to report an event experienced in one room to an adult located in a different room. For example, the clients were instructed to play in one room then entered a different room where an adult asked them what they were doing to which they responded that they were playing with a toy. We recruited clients from center and home-based ABA programs from the practitioners’ place of employment (i.e., the practitioners who participated in Phase 2). Before beginning baseline sessions with the practitioner in Phase 2, the practitioners and researcher identified a client who met the eligibility criteria for Phase 3 and we obtained informed consent from their
caregivers. For this phase, we conducted all sessions in the clients’ homes. The materials the
materials required to complete sessions were a gun, a camera, and preferred tangibles. Notably,
all clients’ caregivers selected gun as their preferred training safety stimulus.

**Data Collection**

During in situ assessments, the researcher arranged a seemingly real scenario that
consisted of finding a disabled gun. The client’s caregiver instructed their child to go to a
designated room or location and engage with an activity that was already set up. The gun was
planted in this location for the client to find. There was no adult present in this room during this
time. The assessment simulated a real scenario in which a client encountered the gun. Thus, the
client had no knowledge of the assessment. Researchers observed the client’s performance
surreptitiously. Clients who did not leave the room within 30 s were asked to move to another
room. The researchers then removed the gun without the knowledge of the client. In situ
assessments that occurred during post-enhanced BST included preferred tangibles contingent on
correct responses. Researchers conducted all in situ assessments during the baseline condition.
The practitioner conducted the first in situ assessment following post-enhanced BST and the
researcher, thereafter, conducted the remaining in situ assessments.

We collected data on the following target behaviors: (a) did not touch the gun, (b) moved
away from the area in which the gun was located, and (c) reported the gun to a trusted adult. The
researchers collected data in-person or by watching footage from a home camera. We measured
the client’s responses to the gun in in situ assessments using a 4-point scale. We coded the safety
responses as follows: (a) 0 = touched the gun, (b) 1 = did not touch the gun but did not leave the
area within 10 s of entering the room, (c) 2 = did not touch the gun, left the area within 10 s of
entering the room, but did not report the gun to an adult, or (d) 3 = did not touch the gun, left the

60
area within 10 s of entering the room, and reported the gun to an adult within 30 s. Reporting the incident to an adult was defined as the client vocally stating “gun” in the proximity of the adult. We collected data on a sheet where the observers recorded the occurrence or nonconcurrence of the safety skills (see Appendix I). Further, the practitioners were required to conduct one training session and one assessment session with their clients following baseline.

**Interobserver Agreement**

Similar to procedures in Phase 2, we collected IOA data by having a secondary observer independently view live sessions in-person or via a home security camera. We calculated IOA by dividing the number of agreements by the number of agreements and disagreements. An agreement was defined as both the primary and secondary observers recording the occurrence or nonconcurrence of a safety response. A disagreement was defined as any discrepancies between the reports by the primary and secondary observers. We obtained IOA data for client’s safety responses for 50% of baseline and post-BST for Amari, 92.31% of baseline, post-BST, and follow-up for Nila, and 92.86% of baseline, post-BST, and follow-up for Luca. The mean IOA scores for Amari, Nila, and Luca was 100%, 91.67%, and 100% respectively.

**Social Validity and Side Effects Questionnaires**

We administered a social validity and side effects questionnaire to all caregivers (see Appendix J). The social validity questionnaire consisted of seven questions with six of them using a 5-point Likert scale. The questionnaire assessed their opinions of the outcomes of the safety skills training program and how likely they were to recommend it to other parents. Finally, we distributed a side effects questionnaire to the caregivers to assess any potential observed changes in their child’s behavior after safety skills training. This questionnaire consisted of three questions using a 5-point Likert scale and one open-ended question asking them to describe any
changes they may have observed. Side effects questionnaires are commonly used in safety skills research due to the potential adverse effects that may occur after experiencing safety threats during in situ assessments (Johnson et al., 2005).

**Experimental Design and Procedures**

For Phase 3, we used a nonconcurrent multiple baseline design across clients to evaluate the effectiveness of enhanced BST implemented by practitioners and IST implemented by the researchers. This study consisted of baseline, post-enhanced BST and IST, and follow-up phases.

**Baseline**

For this condition, we arranged in situ assessments and observed the sessions via live video in another location. The client did not receive feedback or any programmed consequences during baseline. Researchers conducted all baseline sessions.

**Enhanced BST**

This condition consisted of the practitioner training the client using enhanced BST which consisted of the traditional BST components (i.e., instructions, modeling, rehearsal, and feedback), preferred items determined from a single trial multiple stimulus without replacement preference assessment, and a proximity fading procedure adapted from Morosohk and Miltenberger (2022). Before beginning the training session, the practitioner conducted a brief preference assessment consisting of a single trial. The practitioner presented at least four to six tangibles such as edibles, toys, and activities to the client. The practitioner instructed the client to select an item. The item that was selected first was used during the feedback component of enhanced BST contingent on correct responses. To begin training, the practitioner described what the client should do when they encounter a gun. That is, the client should not touch the gun, move away, and report it to a parent. Next, the practitioner demonstrated these three skills in the
presence of the gun. That is, the practitioner identified the gun, did not touch it, left the room, and reported it to the parent actor. After this demonstration of the skills, the practitioner set up a scenario and asked the client to perform the safety responses. A proximity fading procedure was embedded within BST wherein the practitioner systematically decreased their proximity to the client during the reporting component of the safety skills responses. First, the practitioner remained next to the client as they engaged in the safety skills. Then the practitioner exited the room and provided the client with an opportunity to practice the skills. In this way, the client could no longer see the practitioner while they engaged in the correct skills. Finally, the client practiced the skills across three different scenarios until the client performed all three safety responses correctly without the practitioner present. Sessions wherein the client engaged in the correct skills, the practitioner delivered praise along with a preferred tangible. Further, sessions wherein the client engaged in the incorrect responses, the practitioner delivered verbal corrective feedback and instructed the client to continue practicing the skills.

**Post-Enhanced BST and IST**

Within 30 min of training, the practitioners conducted the first in situ assessment to assess the clients’ skills in the presence of the gun. If the client performed the correct safety responses during this assessment, the practitioner delivered praise and a tangible. If the client scored below a 3 during this assessment, the practitioner began implementing IST immediately. That is, the practitioner turned the assessment into a training session by requiring their client to practice the skills until mastery was achieved. Specifically, the practitioner informed their client of the skill that was performed correctly (if any) and how the client should respond to the gun. After the instructions were provided, the practitioner practiced the skill with the client until criterion performance was achieved. To complete IST, the client demonstrated the safety skills
across three consecutive role-plays. Upon completion of this session, the practitioner was not required to conduct further assessments. The researchers scheduled an in situ assessment 1 to 3 days later and conducted all subsequent in situ assessments. These procedures (in situ assessments and IST if needed) repeated until the client responded correctly in the presence of the gun across three consecutive in situ assessments. Procedures during IST varied for Luca and Nila because both clients failed multiple assessments. Specifically, Luca continued to touch the gun for three consecutive sessions following enhanced BST. Therefore, we implemented a variation of the IST procedure whereby practice sessions closely resembled in situ assessments. That is, we simulated an in situ assessment and instructed the caregiver to provide the instruction (e.g., “go have your snack at the table”). The researcher did not provide the verbal prompt “show me what you would do when you see a gun,” instead, modeling and gentle physical guidance were incorporated if needed to engage in the safety skills. During these rehearsals, the researcher and caregiver were not present. If the client performed the correct skills, the researcher reinforced these responses with praise and a tangible. As part of this modification to the training procedures, we set up in situ assessment at 15- and 30-min intervals following IST beginning at session four during Post-BST for Luca.

**Follow-Up**

Following the final post-enhanced BST sessions, the researcher conducted in situ assessments at 2- and 4-weeks. The researcher delivered a tangible contingent on correct safety responses. If a client scored below a 3 during a follow-up session, the researcher conducted IST and scheduled an in situ assessment 30 min later.
CHAPTER SEVEN: RESULTS

The results for Amari (upper panel), Nila (middle panel), and Luca (bottom panel) are shown in Figure 2. The upper panel shows that Amari engaged in all three of the safety responses during the initial baseline session however, when the researchers conducted a second baseline session, he scored a 0. Following training, Amari scored a 3 across three consecutive sessions. During a 4-week follow-up probe, Amari scored a 3.

During baseline, Nila touched the gun in every assessment. Following a post-BST session, Nila did not touch the gun and moved away from it, however she failed to report the gun to her caregiver. Because she did not score a 3, her BCBA, Emilia, initiated IST. During the second in situ assessment a few days later, Nila did not touch the gun but failed to walk away and report the incident to her caregiver. The researcher immediately initiated IST and scheduled another in situ assessments wherein she scored a 3. However, Nila scored a 2 during subsequent sessions. Thereafter, Nila scored a 3 across three consecutive sessions in the Post-BST phase. During 2- and 4-week follow-up probes, Nila scored two 3s.

Luca’s data are depicted in the bottom panel. He touched the gun during the first two baseline sessions, scored a 1 in the third assessment, and for his last assessment, Luca scored another 0. When his BCBA, Maeve, implemented enhanced BST and IST, his performance did not increase in the first post training assessment. The researcher then conducted IST twice and there was no improvement in performance. Once the researcher implemented the modified IST procedures, Luca’s score increased to 1 indicating that he did not touch the gun but failed to move away and report the incidence. Luca’s score for subsequent sessions increased to 3 and
maintained during his 2-week follow-up. However, during his 4-week follow-up session, he touched the gun thus scoring a 0. The researcher then conducted IST and set up another in situ assessment 30 min later. Luca’s performance increase to a score of 3.

Three caregivers completed the social validity and side effects questionnaires. The results are depicted in Table 6. All caregivers strongly agreed on the importance of teaching their children safety skills ($M = 5$) and the way the training was carried out ($M = 5$). Further, all caregivers reported that they were pleased their children participated in the current study ($M = 5$) and would recommend safety skills training to other parents ($M = 5$). When asked whether the study was time-consuming, one caregiver rated this item as strongly disagree and two caregivers rated this time as neutral ($M = 2.33$). For the three items on the side effects questionnaire, two caregivers rated the items related to their child being more hesitant to interact with random household materials as agree while one caregiver rated this item as strongly disagree ($M = 3$). The next item was related to whether their child was more likely to express concern about personal safety, one caregiver rated this item as strongly disagree and two caregivers rated this item as neutral ($M = 2.33$). The final item asked caregivers to rate whether their child was more likely to talk about their fear of finding safety threats; two caregivers stated that they agreed while one caregiver strongly disagreed ($M = 3$).
Table 6

Clients' Caregiver Scores for Social Validity and Side Effects Questionnaire

<table>
<thead>
<tr>
<th>Item</th>
<th>Amari</th>
<th>Nila</th>
<th>Luca</th>
<th>M</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. It is important to me that my child learns how to stay safe when they encounter a physical safety threat such as a firearm, a poisonous substance, or a lighter.</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>2. I am satisfied with the way training was conducted with my child.</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>3. I am pleased that my child participated in the study.</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>4. I am pleased with what my child has learned related to safety skills.</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>5. I would recommend this training to other parents.</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>6. The study took up a lot of my time.</td>
<td>3</td>
<td>1</td>
<td>3</td>
<td>2.33</td>
</tr>
<tr>
<td>7. Compared to before this study, my child is now more hesitant to interact with random household items.</td>
<td>1</td>
<td>4</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>8. Compared to before this study, my child is now more likely to express concerns about personal safety.</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>2.33</td>
</tr>
<tr>
<td>9. Compared to before this study, my child is now more likely to talk about their fear of finding safety threats.</td>
<td>1</td>
<td>4</td>
<td>4</td>
<td>3</td>
</tr>
</tbody>
</table>

Note. Client participant names are depicted in the table. Numbers under columns with client participant names show the ratings provided by their caregivers for each questionnaire item. The mean is the average rating score for the items across the practitioner reviewers. Items were rated using a 5-point Likert scale; 1 = strongly disagree; 2 = disagree; 3 = neutral; 4 = agree; 5 = strongly agree.
Figure 2

Client’s Safety Scores During Baseline, Post-BST, and Follow-up Phases

Note. Closed circles represent in situ assessments across baseline, post-BST, and follow-up phases. The first session following BST was conducted by their respective practitioners. BST = behavioral skills training.
CHAPTER EIGHT: DISCUSSION

The present study showed that behavioral researchers and practitioners socially validated an ICT developed by the first author to teach behavior analysts to conduct safety skills training. The researchers rated the content highly and the practitioners rated the ICT highly as well. Further, this study found that the ICT program was effective for teaching BCBAs to conduct safety skills training and in situ assessments with their clients. All practitioners completed the ICT successfully and performed the skills to criterion during assessments with actors. Notably, all the practitioners then implemented the safety skills training and assessment protocol accurately with their clients. These findings extended the ICT literature by demonstrating that, following training, BCBAs can successfully implement a safety skills training protocol with their clients. Previous research has focused on evaluating ICT with educators (Gerencser et al., 2018; Higbee et al., 2016), parents (Gerencser et al., 2017), and undergraduate students (Rosales et al., 2018). Recently, Campanaro et al. (2022) investigated computer-based instruction to teach behavior therapists how to implement BST with trainees. However, participants in this study did not hold a certification in behavior analysis. To our knowledge, no other study has evaluated ICT as a training approach for behavior analytic skills with individuals who hold a BACB credential.

Another way that our study extended ICT research was by measuring outcomes with the clients after they received safety skills training from their BCBAs. Most ICT studies report data on fidelity to the behavior change procedures by the trainer with an actor playing the role of a learner (e.g., Gerencser et al., 2017; Pollard et al., 2014; Rosales et al., 2018). By taking this approach to assessing the effects of training, the researchers were able to ensure that the trainees
were implementing procedures with a high degree of proficiency. However, few ICT studies (e.g., Gerencser et al., 2017; McCulloch & Noonan, 2013; Wainer & Ingersoll, 2013) included a measure of child behavior to demonstrate the effects of the training. Several researchers noted this lack of data on child behavior as a limitation of their studies (Fisher et al., 2020; Nosik et al., 2013; Pollard et al., 2014; Rosales et al., 2018). The present study addressed this limitation by collecting and reporting data on the client’s behavior before and after they received enhanced BST.

Consistent with the research on safety skills training (e.g., Gunby & Rapp, 2014; Novotny et al., 2020), BST implemented by the practitioners was not effective for all children in this study, even though it was implemented with high fidelity. For instance, Luca’s performance did not change even after his BCBA conducted enhanced BST with high fidelity with him. Repeated sessions of modified IST increased his performance such that he no longer touched the gun, moved away from it, and reported it to his parent. These results are consistent with other studies (e.g., Johnson et al. 2005; Sanchez et al. 2015) for which the initial interventions were not effective and a delay in skill acquisition was observed. For example, Sanchez et al. (2015) evaluated an abduction prevention program using BST and IST with young adults with NDD. It took six sessions post-training for one of their participants (see Michael’s data) to execute the safety skills. In the present study, Nila’s safety score increased during the first in situ assessment following enhanced BST conducted by her BCBA, however her performance was variable across several sessions. We observed an increase in her safety score only after we implemented IST. These findings were not surprising given the number of studies showing BST is not consistently effective for teaching safety skills (Gunby & Rapp, 2014; Miltenberger et al., 1999; Sanchez et al., 2015). Yet, the literature has shown that when BST is ineffective, IST increases performance
of safety skills (Gunby & Rapp, 2014; Miltenberger et al., 1999; Sanchez et al., 2015). That is why the current study taught participants to conduct both BST and IST. This was evident for both Luca and Nila, their performance increased after repeated sessions of IST. Following completion of the study, Luca’s mother and the BCBA expressed that they intended to continue with frequent assessments to ensure maintenance of the skill. Because the BCBA acquired the skills to implement in situ assessments and IST through her participation in our study, we expect that she would be able to execute the assessments and IST (when needed) competently.

Although Luca and Nila did not demonstrate all safety responses after experiencing enhanced BST, an important outcome of the current study was that their BCBAs implemented the procedures with high fidelity with their clients. The foci of the present study were whether the BCBA could demonstrate the skills in a contrived setting with an actor and, ultimately, in a natural setting with their client. As such, our findings suggest that the ICT was an effective approach for training BCBAs how to implement safety skills training with their clients. Further, these findings indicate that BCBAs may not have the skills to implement BST for safety skills as shown by their low performance during baseline assessments. In fact, one of our participants, used DTT rather than BST to train the client actor the safety skills when her performance was assessed during baseline conditions. Although DTT has been shown to be effective for skill acquisition programs (Smith, 2001), executing safety skills in the natural environment requires active learning; repeated rehearsals and feedback sessions. The very low percentage of correct performance by all of the practitioners in baseline suggests that BCBAs may need to expand their repertoire related to teaching skills to individuals with ASD.

The current study highlights another important consideration when training safety skills to children. Successful safety skills training is more about promoting generalization than skill
acquisition. Researchers have found that children often are able to perform the safety skills during role-play assessments but fail to perform the skills during in situ assessments when the child has no knowledge of the assessment (e.g., Gatheridge et al., 2004; Himle, Miltenberger, Flessner, & Gatheridge, 2004). In our study, the participants performed the skills correctly during repeated rehearsal trials yet failed to do so during in situ assessments, potentially an indication of faulty stimulus control. The results of this and previous research suggests that stimulus control during training needs to be investigated. Rehearsal trials during BST consist of stimuli such as the presence of a trainer who provides verbal prompts to execute the skills. For example, during the rehearsal component of BST and IST, the trainer presents the gun and states, “I want you to show me what you are going to do when you see a gun” while standing in proximity to the gun. These stimuli are not present during in situ assessments when a child finds a gun while they are alone. Thus, the behaviors demonstrated in training are not under the appropriate stimulus control needed to generalize to in situ assessments. The fact that stimuli controlling the safety responses during training are not present during in situ assessments provides a potential explanation for why BST has been shown in the literature to be inconsistently effective (Baruni & Miltenberger, 2022).

Although the current study employed a fading procedure wherein the behavior analyst was taught to gradually remove themself from the room during rehearsals until the child executed the skills while alone in the room, the behavior analyst provided a verbal prompt to engage in the safety skills. One solution could be to implement BST from the outset such that it closely resembles in situ assessments. To do this, researchers should identify the discriminative stimuli in the training environment (e.g., trainer presence and instructions) and remove or systematically fade these stimuli from training sessions. Ultimately, the goal should be for the
child to successfully execute the skills during rehearsals without the presence of the trainer or
delivery of the instructions. Future research should evaluate different variations of the rehearsal
component within BST (e.g., trainer absent versus trainer present, verbal prompts versus no
verbal prompts).

The present study was the first to evaluate ICT with behavior analysts for training safety
skills to their clients with ASD. Given the prevalence of unintended injuries and fatalities
amongst the NDD population, BCBAs should include safety skills training in their interventions
for this population. To do this, BCBAs need to have the skills to design, implement, and monitor
safety skills training and assessment programs. Baruni and Miltenberger (under review)
conducted a survey study to obtain the opinions and to determine the practices of behavior
analysts and behavior technicians related to teaching safety skills. They found that 55% of
behavior analysts reported using behavioral interventions to teach safety skills to at least one of
their clients with NDD indicating that 45% of behavior analysts do not employ any form of
behavioral interventions to teach safety skills. Of the 55% of behavior analysts who have taught
safety skills to at least one client, 67% reported using BST to teach safety skills. Yet, a limitation
cited by the authors was that the survey did not ask questions related to how the behavior
analysts assessed the effects of training. Another interesting finding from the aforementioned
study is that lack of expertise was selected as the second highest barrier to using behavioral
interventions for safety skills training. These data suggest the importance of developing and
evaluating training programs, such as the ICT evaluated in the current study, to ensure behavior
analysts have access to an effective training program to teach them the skills to train safety
responses.
There are several limitations that warrant discussion. First, as indicated in the social validity questionnaire, the practitioners did not believe that the ICT program was accessible to behavior analysts in clinical practice. Increasing the accessibility of safety skills training is important if we are to have a meaningful impact in clinical practice. One approach is to raise awareness about the significance of incorporating safety skills training in behavioral programming. Another approach may be to organize continuing education learning events where an ICT program for safety skills can be disseminated to a wider audience. By doing so, behavior analysts will be given opportunities to acquire the skills and train the staff they supervise. Future research should continue to evaluate approaches to making safety skills training more accessible in clinical practice. Investigating the ICT approach to train groups of behavior analysts and behavior analysts in training may make these procedures even more efficient and accessible.

Another potential limitation of the study is that the practitioners were allowed to complete the post-ICT assessments with written prompts (i.e., notes) they created while participating in the ICT. We do not know the extent to which these behavior analysts would be able to perform high levels of fidelity had they not had access to these written prompts during assessments. It is important to note that the practitioners were given the opportunity to use written prompts during baseline sessions. Two of the practitioners (Emilia and Maeve) participated in baseline sessions with their notes yet still demonstrated low fidelity. Thus, we do not attribute the increase in performance to the written prompts during post-ICT assessments. Allowing behavior analysts to refer to notes during assessments is consistent with what occurs in practice when behavior analysts refer to protocols while conducting assessments and interventions with their clients.
Another limitation worth noting is the lack of experimental control depicted in the client participants’ data. As evident in Figure 2, there was no change in Luca’s data for several sessions while Nila was in the post-BST phase. Further, we did not extend baseline for Amari making it unclear if his performance would have remained at a score of 0, without training. Nevertheless, he touched the gun during the second in situ assessment, and to avoid prolonged and repeated exposure to the gun, we opted to intervene. Although including a measure of the outcomes for the clients was important, these data were of secondary interest in the current study. Of greater interest was the fidelity of implementation by the practitioners with their clients. A final limitation that warrants discussion is that the ICT did not teach the behavior analysts strategies to problem solve when encountering data similar to those of Nila or Luca. That is, for the current study’s purpose, the practitioners were expected to conduct a single in situ assessment and one in situ training session if needed. The researcher then continued assessing the client participants’ behaviors and implementing IST until the mastery criterion was reached. The researchers also developed and implemented a modified procedure for IST but did not include the behavior analysts as implementers in the revised training protocol because this was beyond the scope of the study. The practitioners would benefit from learning how to carefully plan and execute modified procedures when the initial procedures fail to promote the safety skills.

The present study was the first to our knowledge to evaluate an ICT program with behavior analysts to teach safety skills, specifically to their clients with ASD, thus contributing to the existing ICT literature. Within the safety skills training literature, there is evidence to show that manualized approaches for teachers and parents are effective (Carroll-Rowan & Miltenberger, 1994; Gross et al., 2007; Novotny et al., 2020). To our knowledge, this study is the first to assess a training program for behavior analysts specifically to teach safety skills to their
clients with ASD. Thus, future studies may replicate and extend this work with a larger number of behavior analysts. Future research should also further evaluate an ICT program to include refined analytic skills as it relates to safety skills training and assessment when the prescribed intervention fails to produce positive outcomes.
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APPENDICES
## APPENDIX A: PROGRAM STRUCTURE

<table>
<thead>
<tr>
<th>Module</th>
<th>Instructional Content</th>
<th>Learning Component</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Pre-test</td>
<td>Combination of multiple-choice and true or false questions sampled from each module</td>
<td>Competency check</td>
</tr>
</tbody>
</table>

### Getting Started

<table>
<thead>
<tr>
<th>Module</th>
<th>Instructional Content</th>
<th>Learning Components</th>
</tr>
</thead>
</table>
| 2. Introduction to training safety skills | Prevalence of injury due to safety threats  
Safety responses  
BST effectiveness  
In situ assessment importance  
Quiz 1 | PowerPoint presentation with audio  
Video models  
Self-guided practice opportunities  
Competency check |
| 3. Materials required for training safety skills | Safety threat item  
Camera  
Mobile phone  
Data sheet  
Item from preference assessment  
Activity for in situ assessment | PowerPoint presentation with audio  
Self-guided practice opportunities  
Competency check |

### Enhanced BST

<table>
<thead>
<tr>
<th>Module</th>
<th>Instructional Content</th>
<th>Learning Components</th>
</tr>
</thead>
</table>
| 4. Brief preference assessment   | Single trial preference assessment  
Preparing materials  
Arranging items in front of client  
Providing instructions  
Selecting preferred item  
Quiz 2 | PowerPoint presentation with audio  
Video models  
Self-guided practice opportunities  
Competency check |
<table>
<thead>
<tr>
<th></th>
<th>Instructional Content</th>
<th>Learning Components</th>
</tr>
</thead>
</table>
| 5. Instructions | Telling client about safety responses  
Telling client when to respond  
Telling client importance of responses  
Quiz 3 | PowerPoint presentation with audio  
Video models  
Self-guided practice opportunities  
Competency check |
| 6. Modeling | Showing the video model  
Telling client how the child in the video responded correctly  
Pausing video to allow client to respond  
Quiz 4 | PowerPoint presentation with audio  
Video models  
Self-guided practice opportunities  
Competency check |
| 7. Rehearsal and Feedback | Providing realistic scenario  
Instructing client to act out safety skill in response to scenario  
Providing praise and tangible for correct responding  
Providing behavior specific feedback for incorrect responses  
Practicing three times  
Quiz 5 | PowerPoint presentation with audio  
Video models  
Self-guided practice opportunities  
Competency check |

In Situ Assessment and IST

Module | Instructional Content                                                                 | Learning Components                                      |
|-------|--------------------------------------------------------------------------------------|----------------------------------------------------------|
| 8. Setting up an assessment | Must be within 30 min of BST  
Emphasizing important of client not being informed of assessment  
Identifying scenario to be used  
Identifying the activity that the client will engage in when exposed to safety threat  
Planting safety threat in specific location | PowerPoint presentation with audio  
Video models  
Self-guided practice opportunities  
Competency check |
### Setting up the camera
- Exiting the location
- Quiz 6

| 9. Implementing situ assessment | Instruct client to enter location alone and engage in activity | PowerPoint presentation with audio
|                              | Correct responses result in praise and tangible                | Video models
|                              | Incorrect responses result in in situ training                  | Self-guided practice opportunities
|                              | Quiz 7                                                        | Competency check

| 10. Data collection | Safety scores (e.g., 0, 1, 2, 3) | PowerPoint presentation with audio
|                 | Making data-based decisions for IST                             | Self-guided practice opportunities
|                 | Quiz 8                                                        | Competency check

| 11. In situ training | Praise for correct response | PowerPoint presentation with audio
|                      | Instruction for what client needs to do correctly             | Self-guided practice opportunities
|                      | Practice the skill three times                                 | Self-guided practice opportunities
|                      | Quiz 9                                                        | Competency check

<table>
<thead>
<tr>
<th>Module</th>
<th>Instructional Content</th>
<th>Learning Component</th>
</tr>
</thead>
<tbody>
<tr>
<td>12. Post-test</td>
<td>Combination of multiple-choice and true or false questions sampled from each module</td>
<td>Competency check</td>
</tr>
</tbody>
</table>
Interactive computerized training (ICT) incorporates technology into a self-paced training package. The critical features of an ICT program are slides with audio, written text, graphics, video examples of the target skill, competency assessments, and interactive activities or self-guided practice opportunities. ICT is commonly divided into modules and these components are embedded within the modules. The modules that you reviewed consisted of instructional content presented via PowerPoint presentations with audio, video models, self-guided practice opportunities, competency assessments.

In this questionnaire you will rate the components for each of the ICT modules you reviewed. Please answer the statements as openly and honestly as possible. If you select 1 (strongly disagree), 2 (disagree), or 3 (neutral) you will be asked to provide written feedback in the space provided.

Thank you for taking the time to review the ICT modules for training practitioners to train safety skills to their clients with ASD and for completing this questionnaire.

1) Module 1: Pre-test
   a. The questions in the pre-test sufficiently sample the skills needed for training and assessing safety skills.

   | Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |

2) Module 2: Introduction to training safety skills:
   a. Module 2 clearly explains the importance of safety skills for physical safety threats.

   | Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |

   b. Module 2 clearly explains the importance of teaching the three safety responses.

   | Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
c. Module 2 clearly explains the importance of active learning approaches for teaching safety skills.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
</table>

d. Module 2 clearly explains the importance of in situ assessments.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
</table>

3) Module 3: Materials required for training safety skills
   a. Module 3 accurately describes all materials required to conduct BST for safety skills.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
</table>

4) Module 4: Brief preference assessments
   a. Module 4 accurately describes how to conduct a single trial preference assessment.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
</table>

   b. The video in Module 4 clearly depicts correct implementation of a single trial preference assessment.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
</table>

5) Modules 5: Instructions (BST)
   a. Module 5 clearly explains the instructions component of BST

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
</table>

   b. The video in Module 5 clearly depicts correct implementation of the instructions component of BST.
6) Module 6: Modeling (BST)
   a. Module 6 clearly explains the modeling component of BST.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
</table>

   b. The video in Module 6 clearly depicts correct implementation of the modeling component of BST.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
</table>

7) Module 7: Rehearsal and feedback (BST)
   a. Module 7 clearly explains the rehearsal and feedback components of BST.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
</table>

   b. The videos in Module 7 clearly depicts the correct implementation of the rehearsal and feedback components of BST.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
</table>

8) Module 8: Setting up an in situ assessment
   a. Module 8 clearly explains the importance of setting up an in situ assessment.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
</table>

   b. Module 8 clearly outlines the steps involved in setting up an in situ assessment.
9) Module 9: Implementing an in situ assessment
   a. Module 9 clearly explains the steps involved in implementing an in situ assessment.
   b. The videos in Module 9 clearly depict correct implementation of an in situ assessment.

10) Module 10: Data collection
   a. Module 10 clearly explains the importance of data collection when conducting safety skills training.
   b. Module 10 clearly describes the scoring of the safety responses.
   c. The videos in Module 10 clearly depict the safety responses.

11) Module 11: In situ training
   a. Module 11 clearly explains the importance of conducting in situ training after a failed in situ assessment.
b. It is important to include in Module 11 a discussion of in situ training after a failed in situ assessment.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
</table>

c. The videos in Module 11 clearly depicts correct implementation of in situ training.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
</table>

12) Module 12: Post-test

a. The questions in the post-test sufficiently sample the skills needed for training and assessing safety skills.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
</table>

Do you have any other feedback about the components of the interactive computerized training you reviewed?
APPENDIX C: PRACTITIONER QUESTIONNAIRE: EASE OF IMPLEMENTATION

Interactive computerized training (ICT) incorporates technology into a self-paced training package. ICT is commonly divided into modules and these components are embedded within the modules. The modules that you reviewed consisted of instructional content about how to train and assess safety skills for children with autism spectrum disorder (ASD).

In this questionnaire you will rate the different aspects of training and assessing safety skills for children with ASD. Please answer the statements as openly and honestly as possible. If you select 1 (strongly disagree), 2 (disagree), or 3 (neutral) you will be asked to provide written feedback in the space provided.

Thank you for taking the time to review the ICT modules for training practitioners to train safety skills to their clients with ASD and for completing this questionnaire.

1) I believe the BST procedure was described clearly enough in the ICT that I could now implement BST to teach safety skills to my client with ASD.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
</table>

2) I believe the in situ assessment procedure was described clearly enough in the ICT that I could now implement an in situ assessment with my client with ASD.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
</table>

3) I believe the in situ training procedure was described clearly enough in the ICT that I could now implement an in situ training with my client with ASD.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
</table>

4) I believe the data collection procedure was described clearly enough in the ICT that I could now collect data on my client’s performance during an in situ assessment.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
</table>
5) The active responding opportunities and quizzes adequately tested my knowledge of content within the ICT modules.

6) The ICT will help practitioners implement safety skills training with their clients with ASD.

7) The ICT will have a positive impact on clinical practice related to training safety skills to children with ASD.

8) The ICT is user friendly.

9) The information presented in the ICT is clearly organized.

10) The videos presented in the ICT are well done.

Do you have any other feedback about the components of the ICT program?
### APPENDIX D: FIDELITY CHECKLIST

<table>
<thead>
<tr>
<th>Single Trial Preference Assessment</th>
<th>Step</th>
<th>✓</th>
<th>X</th>
<th>NA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Present items in an array of 4 - 6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Instruct client to “pick one”</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Behavioral Skills Training</th>
<th>Step</th>
<th>✓</th>
<th>X</th>
<th>NA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instruction</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Tell the client what to do when they find a _____ (don’t touch, run away, tell a parent)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Tell the client they should engage in each of the behaviors whenever they see a ______</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Tell the client the importance of engaging in each of the behaviors</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Modeling</td>
<td>7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Tell the client the safety responses that were performed correctly</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Rehearsal and Feedback</th>
<th>Step</th>
<th>✓</th>
<th>X</th>
<th>NA</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>Instruct parent to go to other room</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Ask client to perform the safety skills in response to a scenario</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Begin fading procedure (stay with client in the room until one successful rehearsal)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Continue fading procedure (ask the client to rehearse the skill and exit the room)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Provide praise and tangible/edible for correct responding for each scenario</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Provide behavior specific feedback for each scenario if client responds incorrectly or misses a step</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Have client continue practicing the skills if they respond incorrectly or miss a step (practitioner out of the room)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>In Situ Assessment</th>
<th>Step</th>
<th>✓</th>
<th>X</th>
<th>NA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Setting Up</td>
<td>16</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Discuss assessment scenario (including location and activity) with parent alone</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>Instruct parent to tell the client to go to location and engage in the activity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>Instruct parent to stay in other room after they have delivered instruction to the client</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>Collect data on target behavior</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>If client does not see safety threat, instruct parent to re-present</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>If client engages in all the correct skills, provide praise and preferred tangible item (or instruct parent to deliver Sr+)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Enter assessment location if client does not engage in correct safety responses

<table>
<thead>
<tr>
<th>Step</th>
<th>Instruction</th>
</tr>
</thead>
<tbody>
<tr>
<td>22</td>
<td>Tell the client what they did correctly</td>
</tr>
<tr>
<td>23</td>
<td>Tell the client what they need to do correctly (don’t touch, run away, tell a parent)</td>
</tr>
<tr>
<td>24</td>
<td>Where client found safety threat provide the instruction: “I want you to show me what you’re going to do when you see a”</td>
</tr>
<tr>
<td>25</td>
<td>Provide praise and tangible/edible for correct responding for each rehearsal</td>
</tr>
<tr>
<td>26</td>
<td>Provide behavior specific feedback for each rehearsal if client responds incorrectly or misses a step</td>
</tr>
</tbody>
</table>

Total Number of Correct Responses:
(Across BST, in situ assessment, and IST)  
Percentage Correct:
(Number of “Yesses” / 6) x 100

APPENDIX E: PROCEDURAL INTEGRITY

Practitioner (pseudonym): ______________________
Implementer initials: _____________________
Observer initials: ________________________
Date: ___________________________

<table>
<thead>
<tr>
<th>Intervention Step</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Provides general instructions about ICT session (as per script)</td>
<td>Yes</td>
</tr>
<tr>
<td>(b) Laptop present and turned on</td>
<td>Yes</td>
</tr>
<tr>
<td>(c) Legal pad and pen available for practitioner</td>
<td>Yes</td>
</tr>
<tr>
<td>(d) Logs into ICT modules</td>
<td>Yes</td>
</tr>
<tr>
<td>(e) Sets timer when practitioner is ready to begin the module</td>
<td>Yes</td>
</tr>
<tr>
<td>(f) Stops timer when the practitioner exits the module</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Number of “Yesses”  
Percentage:  
(Number of “Yesses” / 6) x 100
APPENDIX F: SOCIAL VALIDITY QUESTIONNAIRE FOR PRACTITIONERS

1. I think it is important for my clients to receive safety skills training.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
</table>

2. I think that the ICT methods are accessible to practitioners in clinical settings.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
</table>

3. I think that I would be able to incorporate the ICT modules within a clinical setting.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
</table>

4. This interactive computerized training prepared me to implement an enhanced BST program with my client. (competency)

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
</table>

5. Completing the interactive computerized training did not take too much of my time. (time)

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
</table>

6. It was easy to implement the enhanced BST program with my client. (skill)

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
</table>

7. I liked the safety skills protocol used to teach my client. (acceptability)

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
</table>
8. It was easy to implement in situ assessments with my client. (skill)

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
</table>

9. I would be willing to implement enhanced BST and in situ assessments with my other clients.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
</table>

10. I would recommend an interactive computerized training approach to other practitioners.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
</table>

Additional comments regarding the study:
### APPENDIX G: ACTOR SAFETY SCORES AND DEFINITIONS

<table>
<thead>
<tr>
<th>Safety Score</th>
<th>Scripted Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Client actor touches the safety threat and/or carries it to be reported to the parent actor</td>
</tr>
<tr>
<td>1</td>
<td>Client actor does not touch the safety threat but does not walk away and does not report it to the parent actor</td>
</tr>
<tr>
<td>2</td>
<td>Client actor does not touch the safety, walks away but does not report it to the parent actor</td>
</tr>
<tr>
<td>3</td>
<td>Client actor does not touch the safety threat, walks away, and reports it to the parent actor</td>
</tr>
</tbody>
</table>
APPENDIX H: ACTOR COMPETENCY CHECKLIST

<table>
<thead>
<tr>
<th>Safety Score</th>
<th>Correct or Incorrect Actor Response (✓ or X)</th>
<th>Total Number of Attempts</th>
<th>Final Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Trial 1</td>
<td>Trial 2</td>
<td>Trial 3</td>
</tr>
<tr>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes/Comments:
APPENDIX I: DATA COLLECTION SHEET

Before you begin the session, a specific safety threat (e.g., disabled firearm, innocuous poisonous substance, and disabled lighter) must be identified.

Safety threat to be used during assessments: _______________________

0= Client touched the safety threat
1= Client did not touch and but stayed by the safety threat
2= Client did not touch, left the room within 10 s but did not report to an adult
3= Client did not touch, left the room within 10s, and reported to an adult within 30 s

Participant (pseudonym): _______________________

Circle One: Primary Observer or Secondary Observer

<table>
<thead>
<tr>
<th>Date</th>
<th>Initials</th>
<th>In Situ Assessment (Circle: BL/Post-BST)</th>
<th>Did the client touch the safety threat?</th>
<th>Did the client leave the room within 10 s?</th>
<th>Did the client report the safety threat to an adult within 30 s?</th>
<th>Score (0-3)</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>BL / Post-BST</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>BL / Post-BST</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>BL / Post-BST</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td></td>
</tr>
</tbody>
</table>

107
APPENDIX J: SOCIAL VALIDITY AND SIDE EFFECTS QUESTIONNAIRE FOR PARENTS

1. It is important to me that my child learns how to stay safe when they encounter a physical safety threat such as a firearm, a poisonous substance, or a lighter.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
</table>

2. I am satisfied with the way training was conducted with my child.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
</table>

3. I am pleased that my child participated in the study.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
</table>

4. I am pleased with what my child has learned related to safety skills.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
</table>

5. I would recommend this training to other parents.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
</table>

6. The study took up a lot of my time.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
</table>

7. Did you terminate your child’s participation in the study?

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
</table>

You selected “yes.” Please briefly explain why.
8. Compared to before this study, my child is now more hesitant to interact with random household items.

   Strongly Disagree  |  Disagree  |  Neutral  |  Agree  |  Strongly Agree

9. Compared to before this study, my child is now more likely to express concerns about personal safety.

   Strongly Disagree  |  Disagree  |  Neutral  |  Agree  |  Strongly Agree

10. Compared to before this study, my child is now more likely to talk about their fear of finding safety threats.

    Strongly Disagree  |  Disagree  |  Neutral  |  Agree  |  Strongly Agree

In the space provided, please describe any changes you may have observed in your child's behavior during or following the study. If you did not observe any changes, please type/write "NA."

Do you have any other comments regarding the study?
APPENDIX K: IRB APPROVAL LETTER

January 20, 2022

Dear Ms. Rasha Baruni:

On 1/19/2022, the IRB reviewed and approved the following protocol:

<table>
<thead>
<tr>
<th>Application Type:</th>
<th>Initial Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>IRB ID:</td>
<td>STUDY003702</td>
</tr>
<tr>
<td>Review Type:</td>
<td>Expedited 6 and 7</td>
</tr>
<tr>
<td>Title:</td>
<td>Evaluation of Interactive Computerized Training to Teach Practitioners to Implement Safety Skills Training</td>
</tr>
<tr>
<td>Funding:</td>
<td>None</td>
</tr>
<tr>
<td>IND, IDE, or HDE:</td>
<td>None</td>
</tr>
</tbody>
</table>
| Approved Protocol and Consent(s)/Assent(s): | • Protocol V #1_1.17.22.docx;  
• Parental Signed ICF, Version #1_1.17.22.pdf;  
• Provider Signed ICF, Version #1_1.17.22.pdf;  

Approved study documents can be found under the ‘Documents’ tab in the main study workspace. Use the stamped consent found under the ‘Last Finalized’ column under the ‘Documents’ tab.

Within 30 days of the anniversary date of study approval, confirm your research is ongoing by clicking Confirm Ongoing Research in BullsIRB, or if your research is complete, submit a study closure request in BullsIRB by clicking Create Modification/CR.

In conducting this protocol you are required to follow the requirements listed in the INVESTIGATOR MANUAL (HRP-103).

This research involving children as participants was approved under 45 CFR 46.404: Research not involving greater than minimal risk to children is presented.
Requirements for Assent and/or Permission by Parents or Guardians: 45 CFR 46.408 Permission of one parent is sufficient.

Assent is waived because it is not appropriate due to the age, maturity, and/or psychological state of the child. Sincerely,

Various Menzel
IRB Research Compliance Administrator
March 28, 2023

Raymond G. Miltenberger, Ph.D., BCBA-D
Director, Applied Behavior Analysis Program
Department of Child and Family Studies
University of South Florida
miltenbe@usf.edu

Dear Dr. Miltenberger,

I understand that one of your students recently published a paper in Behavior Analysis in Practice that was based on her dissertation proposal. The published paper is:


I further understand that Ms. Baruni has now defended her dissertation (congratulations to her!) but that you are encountering an issue because the plagiarism check is showing that content from her dissertation is otherwise published. I understand you are, therefore, in need of permission to use the published material in the dissertation.

I am writing to grant both you and Ms. Baruni—soon to be Dr. Baruni—permission to use the content from the published material in her dissertation, entitled "Development and Evaluation of Interactive Computerized Training to Teach Practitioners to Conduct Safety Skills Training."

Please let me know if there is anything else I can do to be of assistance. I wish both you and soon-to-be Dr. Baruni all the best in your research endeavors.

If there are any questions or concerns, please don’t hesitate to reach out to me at stephanie.patterson@wmich.edu.

Sincerely,

Stephanie M. Peterson, Ph.D., BCBA-D, LBA
Editor in Chief
Behavior Analysis in Practice

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