

*TEACHING SAFETY SKILLS TO
CHILDREN TO PREVENT GUN PLAY*

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Research has shown that children often engage in gun play when they find a firearm and that this behavior is often involved in unintentional firearm injuries. Previous research has shown existing programs to be ineffective for teaching children safety skills to reduce gun play. This study examined the effectiveness of a behavioral skills training (BST) program supplemented with in situ training for teaching children safety skills to use when they find a gun (i.e., don't touch, leave the area, tell an adult). Eight 4- to 5-year-old children were trained and assessed in a naturalistic setting and in a generalized setting in a multiple baseline across subjects design. Results showed that 3 of the children performed the skills after receiving BST, whereas 5 of the children required supplemental in situ training. All children in the study learned to perform the skills when assessed in a naturalistic setting and when assessed in a generalization setting. Performance was maintained at 2- to 8-week follow-up assessments.

DESCRIPTORS: safety skills, prevention, children, behavioral skills training

Approximately half of the homes in the United States contain firearms (Wiley & Casey, 1993). With 20% to 52% of these firearms stored loaded or unlocked (Farah, Simon, & Kellerman, 1999; Hemenway, Solnick, & Azrael, 1995; Senturia, Christoffel, & Donovan, 1994; Wiley & Casey, 1993), the potential for serious injury when a firearm is discovered and handled by a child is great. The risk of serious injury or death is documented by recent research showing that when young children find guns, they are likely to play with them (Jackman, Farah, Kellerman, & Simon, 2001). The most recent statistics compiled by the Centers for Disease Control and Prevention (2001) show that over 1,500 children were unintentionally injured or killed by firearms in the United States each year between 1993 and 1998. Although there are many ways in which these injuries may have been inflicted, studies have shown that a high percentage

involved gun play by one or more children. Grossman, Reay, and Baker (1999), for example, reported that 57% of the 65 injuries they investigated involved gun play. Wintemute, Teret, Draus, Wright, and Bradford (1987) examined 88 cases of unintentional firearm deaths in children and found that gun play was involved in 75% of the accidents.

Despite this statistic, few investigations have evaluated the effectiveness of programs designed to teach children appropriate safety skills to use when they find a firearm. The few investigations that have been conducted have shown existing programs to be ineffective for teaching safety skills, or the skills taught have not generalized beyond the study conditions. For example, Hardy, Armstrong, Martin, and Strawn (1996) observed and recorded the behavior of 4- to 6-year-old children before and after an education-based intervention designed to teach children about the dangers of guns and what to do should they ever find one. In this study, the experimenters and a local police officer presented the children with infor-

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mation regarding the dangers of firearms and instructed the children not to touch guns and to tell an adult immediately if they ever found one. Unfortunately, this instructional approach failed to decrease the children's gun-play behavior. More recently, Hardy (2002) evaluated the effectiveness of a "skills building" approach for teaching gun-safety skills to children. The goal of the program was to teach children to discriminate between real and toy guns, to resolve problems without resorting to the use of aggressive behavior, and to make safe decisions (including not touching and telling an adult should they ever find a firearm). Although the exact procedures used to teach these skills are unclear from the study, the children were no less likely to touch or handle a firearm after participating in the program.

In another recent study, Himle, Miltenberger, Gatheridge, and Flessner (2004) evaluated the National Rifle Association's Eddie Eagle gun safety program (Level 1) (1993), a commercially available gun-safety program for children ages 4 to 6 years. Himle *et al.* found that the education-based approach of the Eddie Eagle program was successful for teaching children to verbally reproduce the target message (stop/don't touch/leave the area/tell an adult) when asked what they would do if they found a gun. However, the children were not significantly better than no-treatment controls at performing the skills when they found a gun during a role play or when they were assessed without their knowledge in a realistic situation. In the same study, Himle *et al.* evaluated the effectiveness of a behavioral skills training (BST) program to teach children the same safety skills to use when they found a firearm. Small groups of 2 to 5 children were trained for 15 to 20 min each day for 5 days. During each training session, the trainer modeled the correct performance of the safety skills, the children practiced performing

the safety skills, and the trainer provided corrective feedback for incorrect performance and descriptive praise for correct skill performance. In addition to using this active learning approach, Himle *et al.* used realistic training materials (e.g., a disabled firearm) and multiple training scenarios in an attempt to promote generalization and to ensure that the children used the skills outside the setting in which the training was conducted. Himle *et al.* found that the BST program was successful for teaching the children not only to verbally reproduce the safety message but also to perform the skills (as measured by role plays). Unfortunately, however, the children did not use the skills when placed in realistic situations in which they did not know they were being tested.

The BST program used by Himle *et al.* (2004) had limitations that may account for the failure of the children to use the skills in naturalistic situations. First, the study conducted training in groups of children, limiting the number of times each child was allowed to rehearse the skills and the number of training exemplars used with each child. Second, the study used a prearranged number of training sessions and did not assess skill acquisition over time. Using such procedures does not allow evaluation of individual differences in the number of training sessions required to teach each child the safety skills. Finally, the study did not incorporate techniques such as *in situ* training (training in the test situation) that have been shown to be effective for promoting the generalized use of skills in realistic situations (Miltenberger *et al.*, 1999).

The purpose of the current study was to evaluate the effectiveness of a BST program that included one-on-one training, repeated measures of skill acquisition, and strategies to promote the generalization of skills (e.g., *in situ* training) for teaching firearm safety skills to children.

METHOD

Participants and Setting

Children were recruited from a local preschool in a metropolitan area of approximately 80,000 people. Administrators at the preschool delivered consent forms to the parents of each 4- and 5-year-old child who attended the preschool. Follow-up telephone conversations were then provided for all parents who expressed interest in participating but who wanted additional information regarding the study. All children whose parents returned signed consent forms were eligible to participate. Eight children (5 girls and 3 boys), ages 4 and 5 years, participated. At the time of the study, 3 children (Karl, Lisa, and Stuart) were 4 years old, and 5 children (Sandy, April, Cindy, Anders, and Jackie) were 5 years old.

Training was conducted in a room at the school that the child did not frequently visit. The room contained chairs, tables, bookshelves, a closet, desks with drawers, and cupboards. All baseline and posttraining assessments were conducted in a separate room in which the child played occasionally. This room contained only a shelf supplied with various toys and school materials (e.g., paper, books, and writing utensils). Generalization of skills was assessed at the child's home.

Target Behaviors and Data Collection

The targeted safety skills were (a) not touching the firearm, (b) leaving the immediate area of the firearm, and (c) telling an appropriate adult about the presence of the firearm. Touching the firearm was defined as the child making contact with the firearm with any part of his or her body or with any object (e.g., a toy) resulting in the displacement of the firearm. Leaving the area involved the child removing himself or herself from the room in which the firearm was located within 10 s of seeing the firearm.

Telling an adult was defined as the child voluntarily reporting to an adult that he or she had found a firearm within 10 s of leaving the room. Participants' performances were given the following numeric values: 0 = *touched the firearm regardless of subsequent responses*, 1 = *did not touch the firearm but did not leave the room or tell an adult*, 2 = *did not touch the firearm and left the room but did not tell an adult*, 3 = *did not touch the firearm, left the room, and told an adult*. A second observer independently scored 25% of the videotapes and issued a numeric value for the child's performance. Interobserver reliability was 100%.

Prior to each assessment, a disabled firearm (obtained from the local police department) was placed on a shelf in a preschool room, and a hidden videocamera was placed so that the child's behavior around the firearm could be recorded. The placement of the camera allowed us to determine whether the child actually saw the firearm in the assessment session. The firearm was placed in a different location in the room in each subsequent assessment for a particular child. Each child was told that the experimenter was a teaching assistant and that they were going to do some work together. The experimenter then told the child to play in the room (with the firearm and hidden camera) while he or she prepared some work in a different room. No other children were present in either of these rooms. The child was left to play in the room for 5 min. The experimenter then retrieved the child and conducted 10 min of schoolwork with him or her. If the child left the room and reported that he or she found a firearm, the child was praised for telling, assured that the firearm did not belong there and that it must have been misplaced, and told that it would be taken care of. The experimenter then retrieved the firearm and locked it in a case out of the child's sight. The experimenter and the child then engaged in 10 min of

schoolwork together. On some occasions, the experimenter took the child to the room when no firearm was present so the child did not always see a firearm in the room.

Procedure

A multiple baseline across subjects design was employed. Following baseline assessments, BST was implemented and further assessments were conducted. If a child did not achieve a score of 3 for three consecutive assessments following behavioral skills training, *in situ* training was conducted.

Baseline. One to four baseline assessments were conducted in the preschool setting as described above.

Training. A BST program consisting of instruction, modeling, rehearsal, and praise or corrective feedback was used to train the children not to touch the firearm, leave the room, and tell an adult. Each child was trained individually by experimenters not involved in the assessments. Two 30-min training sessions were conducted initially on separate days. If the child did not achieve a score of 3 during assessment, up to three more booster training sessions were provided. In a booster session, the skills were reviewed and practiced. During the instruction component, the trainer discussed the dangers of firearms and why it is important that children do not touch them. The trainer then described the first safety skill (don't touch). After providing instructions, the trainer modeled the behavior by approaching a disabled firearm (obtained from the local police department), stopping before touching it, and saying "don't touch." The child then approached the firearm and refrained from touching it while saying "don't touch" aloud. The trainer delivered praise each time the correct response was performed. If a child did not engage in the response or engaged in the response incorrectly, the trainer corrected the error, modeled the appropriate response again, and the child

again practiced the correct response. This procedure was repeated until the child correctly performed the target response five consecutive times. The same procedure was used to teach the "leave the area" and "tell an adult" responses.

Once each child had correctly performed the entire response chain, he or she was required to practice the response in a variety of scenarios. These scenarios, tailored to each child's family situation and home description, included the child finding a gun in a drawer, a closet, a bookshelf, a kitchen shelf, on a chair, in or by the garbage, lying on the ground, and on a table. For each training trial, the trainer provided a verbal scenario corresponding to the placement of the gun (e.g., "Pretend you are at home playing in your parent's bedroom while your mom and dad are downstairs watching television. Pretend I am your dad. I am going to ask you to get a book from the closet and bring it to me."). The trainer then issued the request or instruction to the child (e.g., "Please get me the red book from my closet"). Prior to this, the trainer had placed a prop (e.g., a red book) and a disabled firearm in a closet in the training room such that when the child complied, he or she found the gun. The child practiced with several instructions, props, and settings. In addition, the child practiced reporting to a variety of adults (e.g., an unfamiliar researcher, a teacher, a familiar administrator) and practiced finding a variety of disabled firearms (all handguns) that differed in size, shape, and color. The child executed the skills correctly in five different scenarios in each training session.

Throughout training, descriptive praise was delivered for all correct responses, and corrective feedback was delivered and additional rehearsals were performed for incorrect or incomplete responses. A training session continued until the child engaged in the correct safety skills five consecutive times.

In situ training. Children who did not perform the safety skills to criterion during assessment sessions after the initial training plus two to three booster sessions received in situ training. The session started in an identical fashion to an assessment session; however, if the child did not immediately return to the room where the experimenter (the simulated teaching assistant) was located and report the firearm, the trainer entered the room, pointed out the firearm, and conducted a training session. In this training session, the trainer modeled what the child should have done, instructed the child to rehearse the response, and provided corrective feedback for mistakes or descriptive praise for correct responding. The child then returned to the work room with the experimenter and engaged in 10 min of schoolwork.

Generalization. Generalization of the skills was assessed in a simulated situation in the child's home. These assessments involved prearranging a situation similar to those used in the assessments described above. The specific situation and instructions were tailored to the individual's home setting. In addition, for each generalization assessment, a novel experimenter and the child's parent were present. If the child did not perform the skills to criterion, an in situ training session was conducted in the home.

RESULTS

During baseline, participants' scores varied from 0 to 1 (Figure 1). Half of the participants (Sandy, April, Anders, and Jackie) touched the firearm during at least one of their baseline assessments. Although the remaining participants (Karl, Lisa, Stuart, and Cindy) did not touch the firearm during baseline, none of them left the area or reported finding a firearm to an adult.

Following BST, 3 participants (Karl, Stuart, and Jackie) achieved criterion per-

formance (three consecutive scores of 3) in assessments. Jackie scored 3 following the two initial training sessions; Karl required one booster session and Stuart required two. For 5 of the participants (Sandy, Lisa, April, Cindy, and Anders), BST did not result in criterion performance and in situ training was implemented. Following in situ training, these participants (with the exception of Cindy) achieved criterion performance, and their responding was maintained in all subsequent assessments. Cindy's performance decreased at one point during the study; however, an additional in situ training session was sufficient for her to resume criterion responding.

Once criterion performance was established for several consecutive assessments, 6 children received a generalization assessment (Sandy and Lisa moved away from the area before generalization assessments could be conducted). Generalization assessments were conducted 2 weeks to 2 months after each child's last training session. All children who received generalization assessments performed at criterion levels. Anders was the only child who received two generalization assessments. On the first occasion, he failed to report finding the firearm to an adult. During a later generalization assessment, however, he performed the skills correctly.

DISCUSSION

Recent research has focused on methods to increase a variety of safety skills (e.g., Gras, Cunill, Planes, Sullman, & Oliveras, 2003; Heck, Collins, & Peterson, 2001). The current study extends the existing literature on safety-skills training in several important ways. First, it provides the first experimental evidence of a program that is effective for teaching children to engage in self-protective behavior upon finding a firearm in a naturalistic setting. Prior to training, all of the children in this study lacked

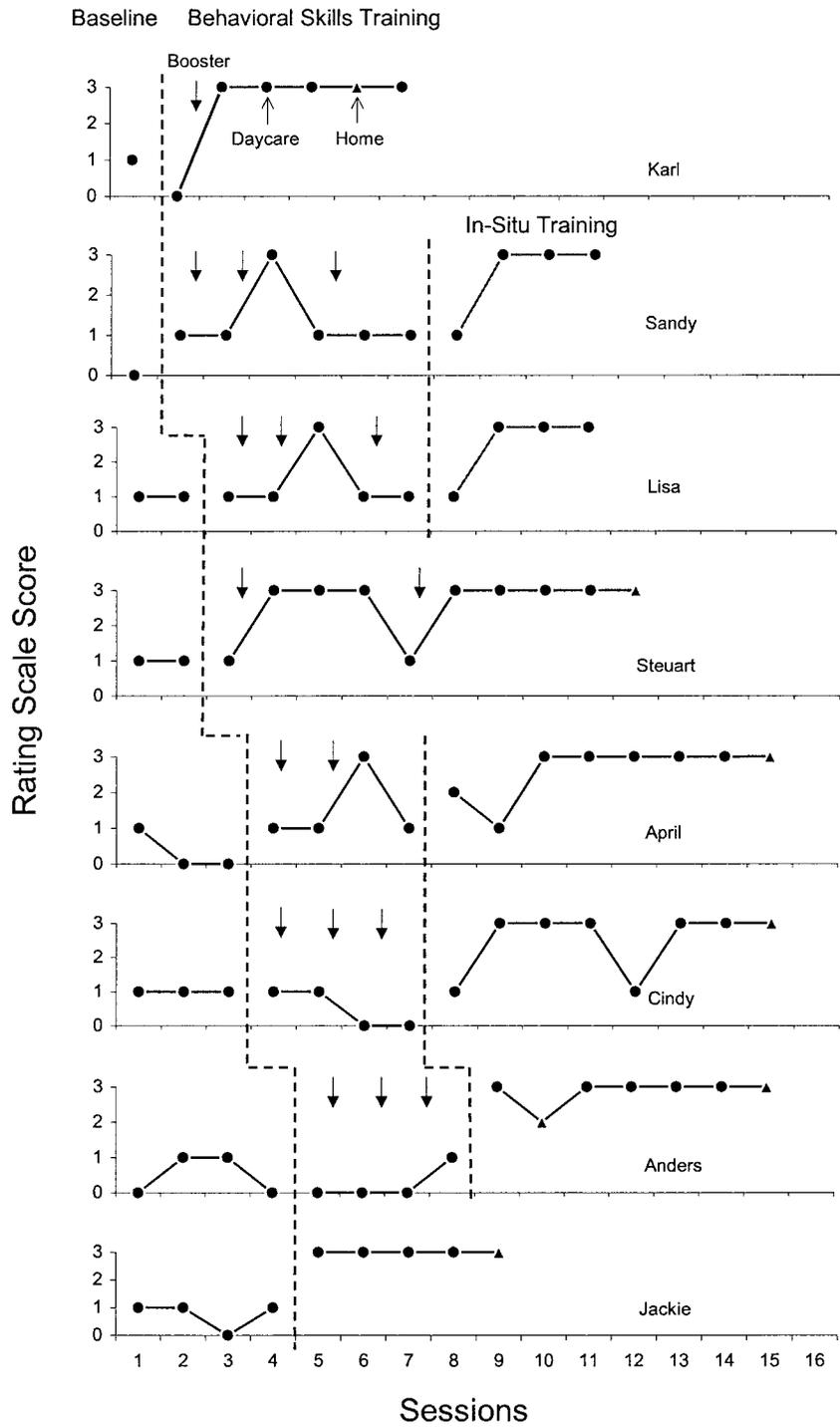


Figure 1. Each child's rating scale score during assessments conducted in baseline, behavioral skills training, and in situ training (if required) is depicted. The circles represent assessments conducted at the child's preschool, and triangles represent in-home assessments. Downward arrows in the BST condition represent training booster sessions.

the safety skills necessary to protect themselves from unintentional firearm injuries that might result from gun play or gun handling. In fact, half of the children who participated in this study handled the firearm at least once during the baseline condition, and none of the children left the area of the firearm or told an adult that they had found the gun. After BST, however, 3 of the children performed the safety skills upon finding a gun, the skills were maintained across several assessments in a natural context, and the skills generalized to a second natural environment (i.e., the home).

A second important finding in this study is that not all children required the same number of training sessions to acquire the safety skills and use those skills in natural environments. In addition, this study demonstrated that training that utilizes multiple exemplars to promote generalization does not guarantee that children will perform the skills when placed in a novel environment, and additional generalization procedures (e.g., in situ training) may be needed to promote generalization. In this study, 5 of the children (Sandy, Lisa, April, Cindy, and Anders) required in situ training to perform the skills in a natural context. One explanation for this is that the initial training was not sufficient for the natural context to exert stimulus control over the behavior. Behavioral skills training supplemented with in situ training, however, achieved this stimulus control because training was conducted in the actual environment in which the skills are to be performed. This finding stresses the importance of training programs that incorporate individualized training that includes assessments in realistic contexts and in situ training for those children who need it. A second explanation for the failure of BST is that the children did not leave the room upon finding a gun because the teacher's instruction to wait in the room exerted stimulus control over the children's behavior.

The in situ training session then taught the children that it was okay to leave the room when finding a firearm even though they had been instructed to wait there.

The current study has limitations that warrant discussion. First, generalization assessments were conducted from 2 weeks to 2 months following training and were not conducted for 2 of the children. Although all of the children performed the skills when unknowingly tested in their homes (with the exception of Sandy and Lisa, who did not receive the in-home assessment), it would have been advantageous to obtain 2-month follow-up assessments for all of the children. Unfortunately, the children's school circumstances (e.g., summer vacation, changing schools) and family obligations (e.g., vacations, relocating) prevented us from obtaining these follow-up assessments for all of the children.

A second limitation is that each child was assessed when he or she was alone. It is unclear whether the child would have performed the skills if placed in a situation with other children present. Future research should examine this issue, especially in older children for whom peer pressure may become a factor that competes with the performance of the skills.

A third possible limitation is the small number of data points in baseline, including two baselines of just one data point (Karl and Sandy). We decided to keep baselines short to limit the number of times the children were exposed to the firearms before training. In addition, because none of the 11 children assessed in baseline conditions in our previous study engaged in any safety skills and none of the children with repeated baseline assessments in the current study showed any improvement as a result of repeated assessments, we were confident that one data point would be representative of these 2 participants' skills, especially in the

context of repeated assessments for the other 6 participants.

A final limitation is that the children were always assessed in the same room in the school, even though the firearm placement was varied. It would have been better to assess the children's skills in a wider variety of locations. Unfortunately, practical considerations prevented such assessments.

As a final note, the pattern of responding by Stuart merits attention. Stuart's performance regressed after three consecutive perfect scores following BST. On this occasion, he failed to leave the area or tell an adult when he found the firearm. Follow-up interviews with administrators at the day-care center revealed that Stuart had been reprimanded by one of his teachers for talking about guns in school, possibly explaining his reluctance to perform the skills he had been taught. To address this problem, Stuart's next booster session focused on discriminating between "talking" about guns and "telling" about guns. In addition, he again rehearsed the skills until he had performed the skills correctly five consecutive times. This additional booster session proved to be sufficient for Stuart's performance to return to criterion level, and his behavior was maintained for the duration of the study. In addition, this incident highlights two important considerations for developing safety-skills training programs. First, it might be important to include a training component that teaches the child to discriminate between appropriate and inappropriate situations for talking about guns. The protocol we used did not typically employ such training, and the situation that resulted may have undermined Stuart's training had the issue not been addressed. Second, when training safety skills, it is imperative to train adults on how to react to inappropriate and appropriate talk about guns. All of the teachers involved in this study had been told to provide praise if the child told them that they

had found a gun, but none of the teachers had been told how to address inappropriate gun-related talk in school. Had the teacher in this situation been trained on how to react to Stuart's inappropriate gun talk, this situation might have been avoided. Future research should evaluate various factors (such as teacher and parent training) that will optimize safety-skills training for preventing gun play.

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STUDY QUESTIONS

1. On what two dimensions were the participants' behaviors scored, and how were the data quantified?
2. Describe each of the components that comprised the initial behavioral skills training program.
3. Describe the setup of the training area prior to each assessment.
4. How was generalization of safety skills assessed?
5. What procedures were used in the behavior skills training program to promote generalization to the natural setting?
6. Describe the in situ training that was used in the study.
7. Summarize the results.
8. What explanations did the authors provide to account for the failure of the initial behavioral skills training with 5 of the participants? What feature of the initial training results is not entirely consistent with the authors' second explanation?

Questions prepared by Natlie Rolider and Leah Koehler, University of Florida