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Peer Tutoring To Prevent Firearm Play:
Acquisition, Generalization, and Long-Term Maintenance of Safety Skills

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Abstract

Hundreds of accidental injuries and deaths to children occur annually in the United States as a result of firearm play. Behavioral skills training (BST) and *in-situ* training (IST) have been found to be effective in teaching children the skills to use if they find a firearm, but training requires substantial time and effort. The current study examined the use of peers as tutors as a potential way to decrease the time and resources needed to teach these safety skills to youngsters. Peer trainers conducted BST and IST with other children. Children taught by the peer trainers acquired the safety skills and demonstrated them in naturalistic situations in which the skills were needed. Furthermore, all of the peer trainers acquired and maintained the skills. These results support the use of peer tutoring for teaching safety skills to other children.

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Hundreds of American children are killed or injured each year in firearm accidents. Many of these casualties are the consequence of children playing with firearms they have found in the home (e.g., Eber, Annest, Mercy, & Ryan, 2004). Thus, interventions aimed at children should teach skills to prevent gun play. Investigations by Miltenberger and colleagues (Gatheridge et al., 2004; Himle, Miltenberger, Flessner, & Gatheridge, 2004; Himle, Miltenberger, Gatheridge, & Flessner, 2004; Miltenberger et al., 2004; Miltenberger et al., 2005) have demonstrated the success of behavioral skills training (BST) and *in-situ* training (IST) in teaching children these safety skills. Although BST and IST are effective, their implementation takes extensive time and trainer resources. Consequently, these programs are not practical for teaching large numbers of children. The use of peers as tutors has the potential to make safety skills training programs accessible to more children.

Peer tutoring has been used broadly to deliver instruction in a variety of areas, including academic, social, and behavioral skills (e.g., Anhalt, McNeil, & Bahl, 1998; Flood, Wilder, Flood, & Masuda, 2002; Fueyo & Bushell, 1998; Gumpel & Frank, 1999; Pigott, Fantuzzo, & Clement, 1986; Trovato & Bucher, 1980). The positive results demonstrated in the literature have clear implications for the use of peer tutoring to teach skills to children to prevent firearm injury. If a teacher may train a few children who in turn may train many peers, more children may receive training. The current study investigated the use of peer trainers to teach children the skills needed to prevent firearm play.

The four goals of the present study were: a) to teach children to train other children in firearm safety skills; b) to demonstrate the acquisition of the skills by the children taught by peer

trainers; c) to demonstrate the maintenance of the skills in the peer trainers; and d) to assess the long-term effects of training.

Method

Participants and Settings

Six 6- and 7-year-old children were recruited from a local daycare / after-school program to serve as peer trainers. Six 4- and 5-year-old children, hereafter called the students, were recruited to be tutored by the peer trainers. Training sessions and assessments were conducted at various sites within the facility (e.g., in a classroom, in the hallway, in the director's office). As a measure of generalization, additional assessments were conducted at the children's homes with parental permission.

Materials, Target Behaviors, Assessment, and Interobserver Agreement

Four disabled handguns were provided for research purposes by the local police department and were used for assessment of the children's skills. An exact replica of a handgun, made of plastic, was used in peer-directed training sessions. The participants' responses upon finding a gun were coded on a scale from 0 to 3 as follows: 0 = the participant touched the firearm; 1 = the participant did not touch the firearm; 2 = the participant did not handle the firearm and left the area within 10 s of discovering the firearm; and 3 = the participant did not touch the firearm, left the area, and immediately reported the firearm to an adult. In the *in-situ* assessments, the researcher set up a situation in which the participant found a firearm in his or her natural environment while alone and unaware that assessment was occurring. For example, a gun was placed near drawing materials, and the child was asked to sit at the table and color a picture as the teachers talked outside the room.

The researcher conducting the assessment and the teacher or parent served as observers at the time of assessment. The observer noted whether the child saw the gun during the assessment. If a child did not see the gun, the assessment was not scored and another assessment was conducted at a later time. At least one-third of assessments across baseline and training phases were videotaped and the responses were scored independently by trained observers. Interobserver reliability was calculated by dividing the number of agreements (i.e., the number of responses assigned the same score by both observers) by the summed number of agreements and disagreements. Interobserver agreement was 97%.

Procedure

Peer trainers and students were assessed prior to training. Following baseline assessment, the peer trainers were trained by the researcher to teach the safety skills to students using BST. Following training by the researcher, peer trainers were assessed in a naturalistic situation (*in-situ* assessment). After demonstrating competence (a score of 3), the peer trainers used BST techniques to train students. The students were assessed throughout training to measure the acquisition and maintenance of the safety skills. Students received two initial training sessions and up to three booster sessions following failed assessments (a score less than 3). If students did not perform the safety skills in a subsequent assessment, their peer trainer conducted IST. After conducting BST with students, the peer trainers were reassessed. The students experienced a number of follow-up *in-situ* assessments up to 12 months following training.

Baseline. Baseline was the same for trainers and students. The researchers contrived situations such that each participant found a firearm in his or her natural environment while alone. Participants were not debriefed following assessments.

BST (trainers). Trainers were taught in pairs as the researcher modeled a training session and one trainer mimicked her actions while the second trainer acted as the student. The researcher taught the peer trainer to talk briefly to the student about the dangers of firearms and to tell the student what to do if he or she ever finds a gun (i.e., “Stop. Don’t touch. Leave the area. Tell an adult.”). Next, the researcher taught the peer trainer to model the safety behaviors for the student. The researcher placed a replica firearm in the room, approached it, and demonstrated the safety behaviors, while verbalizing her actions. The peer trainer then had the opportunity to model the safety behaviors for the student and provide praise and corrective feedback while the student performed the safety behaviors. Following the rehearsal of the chain of behaviors, the researcher taught the peer trainer to present several scenarios in which the student should perform the safety behaviors (e.g., finding a firearm in a classroom, finding a firearm on the playground, finding a firearm in the kitchen) and provide praise and corrective feedback contingent upon the student’s behavior.

The peer trainers rehearsed the training sessions until they could complete a simulated session without prompting from the researcher. The total time spent coaching each peer trainer to conduct BST sessions ranged from 90 to 115 min ($M = 102.5$ min). The two trainers whose students required IST also received a 5-min practice session prior to the first assessment in which IST might be needed.

BST (students). Peer trainers taught students individually using the behavioral skills training procedures of instruction, modeling, rehearsal, and feedback described above. Training sessions were videotaped or observed from a distance by a researcher to assess the fidelity of implementation of the training. All trainers conducted training according to the protocol.

In-situ training (IST). During IST, the trainer (until that time unseen by the student) interrupted a failed assessment (i.e., an assessment in which the student found a firearm but did not complete the chain of safety responses) and turned the assessment into a training session. The trainer provided corrective feedback on the student's performance and required the student to rehearse the skills five times.

Results

Peer trainers

Four of the six peer trainers touched a found firearm on at least one occasion during baseline assessments (see Figure 1). Following BST for trainers (plus one IST session for Abby and Julia), peer trainers demonstrated the safety skills correctly in naturalistic assessments and began training students. After student training had been completed, all six peer trainers demonstrated maintenance of the safety skills.

Students

Student scores in baseline assessments ranged from 0 to 1, with 3 of the 6 students touching the firearm in at least half of their assessments (see Figure 2). None of the students left the area in which the firearm was found (a score of 2) nor alerted an adult to its presence (a score of 3) during baseline. After two initial BST sessions and one to two booster sessions, three students (Kelly, Mike, and Gabe) achieved criterion responding (i.e., they performed the safety skills in *in-situ* assessments on three consecutive occasions). The remaining three students (Chris, Erin, and Emma) achieved criterion responding following BST and two IST sessions conducted by the peer trainer. However, Chris failed to use the skills when assessed at home following peer IST. Although he refused to engage in IST with the researcher following the assessment, he nonetheless exhibited the skills in subsequent assessments, including an

assessment at his home. Gabe failed to use the skills at his home during a follow-up assessment. After IST with the researcher, he performed the skills in a subsequent assessment at his home. Similarly, Emma received one IST session from the researcher when the skills failed to generalize to the home setting. Emma subsequently performed the skills in her home and in a location at the after-school program not associated with training or assessment, demonstrating that IST in each situation was not necessary for the skills to generalize to a novel environment.

Maintenance of the safety behaviors was demonstrated by Gabe during his 3-month follow-up assessment, after which he moved and was not available for reassessment. Erin and Emma continued to use the safety skills when they found firearms one year after acquiring the skills. For the remaining three students, the skills maintained at follow-up intervals of 5 to 11 months, but failed to occur to criterion in a subsequent assessment. Kelly used the skills in her 6-month follow-up assessment but failed to leave the area within 10 s of finding the firearm during the 11-month follow-up assessment (a score of 1). Mike used the skills at the 5-month follow-up, but when he discovered a firearm during his 10-month follow-up assessment, he picked it up, turned it over, then quickly set it down, ran out of the room, and reported it to an adult (and thus received a score of 0). Chris engaged in the safety behaviors through 11-month follow-up but during his 1-year follow-up assessment, he failed to report the gun to an adult (a score of 2). Kelly, Mike, and Chris each received an IST session from the researcher and resumed the use of all of the skills in the next assessment.

Discussion

Notably, all six students acquired the safety skills through training conducted by a peer. With an initial investment of less than two hours, the peer trainers were able to conduct BST and IST with little adult assistance. The results of the current study suggest that the use of peer

training has the potential to reduce the teacher time required to implement training, thus increasing the adoptability of behavioral safety skills training programs. Although the time required to train the peer trainers in the current study was not less than the time required to train individual children in previous studies, the trainers are now ready to provide training to many more students and thus the efficiency would be manifest over time as the trainers trained additional students. Therefore, the improvement in efficiency would be achieved over time and training time per student could then be much less than training time reported in previous studies.

The results of this study show long-term maintenance of the safety skills for all students (at 3 to 11 months) as well as a subsequent failure of maintenance for some students. Although some of the children did not use the skills in later assessments (thus, the length of time the skills maintained differed for each child), it is important to note that all of the children used the skills when they found real firearms in their natural environments months after they were trained. This finding suggests that long-term assessment of skills is important in order to identify maintenance failures so that booster training can be programmed when needed.

The results from this study show that peer training produced effects similar to those produced by adult trainers (Himle et al., 2004; Miltenberger et al., 2004). In research by Himle et al. and Miltenberger et al., half of the 4-7 year old participants acquired the skills with BST whereas the others needed IST before using the safety skills. In the current study, IST was required for half of the students as well.

Several limitations of the present study warrant attention. First, the short length and staggering of baselines may limit the ability of the design to demonstrate functional control. However, all six students evidenced stable responding during baseline, and showed no evidence of skill acquisition prior to BST. Second, the skills failed to generalize to the home setting for

two students (Emma and Gabe) until IST was conducted in that setting. Thus, peer training may not produce generalized responding in some cases. Finally, the skills maintained longer for some children than others. It will be important to examine in future research the factors that contribute to the duration of skill maintenance.

Further research is needed to explore additional methods to increase the likelihood that more children will receive training (e.g., programs designed for parents). Developing and evaluating efficient and effective generalization programming is also needed to promote skill use in different situations without training in every environment. Finally, future research might evaluate occasional booster training sessions months after training as a method for sustaining skill use over long periods of time.

In conclusion, the four goals of the present study were attained. First, peer trainers successfully taught other children the safety skills to use when encountering a found firearm. Second, students trained by the peer trainers performed the skills when finding firearms in naturalistic situations. Third, the peer trainers demonstrated the skills when presented with novel firearms in non-training situations. Fourth, follow-up data were obtained for more than a year, the longest follow-up period reported to date. The results of the current study are valuable in that they may enable modifications to behavioral safety skills training programs that will increase the efficiency and adoptability of those programs.

References

- Anhalt, K., McNeil, C. B., & Bahl, A. B. (1998). The ADHD classroom kit: A whole-classroom approach for managing disruptive behavior. *Psychology in the Schools, 35*(1), 67-79.
- Eber, G. B., Annest, J. L., Mercy, J. A., & Ryan, G. W. (2004). Nonfatal and fatal firearm-related injuries among children aged 14 years and younger: United States, 1993-2000. *Pediatrics, 113*(6), 1686-1692.
- Flood, W. A., Wilder, D. A., Flood, A. L., & Masuda, A. (2002). Peer-mediated reinforcement plus prompting as treatment for off-task behavior in children with attention deficit hyperactivity disorder. *Journal of Applied Behavior Analysis, 35*(2), 199-204.
- Fueyo, V., & Bushell, D., Jr. (1998). Using number line procedures and peer tutoring to improve the mathematics computation of low-performing first graders. *Journal of Applied Behavior Analysis, 31*(3), 417-430.
- Gatheridge, B. J., Miltenberger, R. G., Huneke, D. G., Satterlund, M. J., Mattern, A. R., Johnson, B. M., & Flessner, C. A. (2004). A comparison of two programs to teach firearm injury prevention skills to 6- and 7-year-old children. *Pediatrics, 114*, e294-e299.
- Gumpel, T. P., & Frank, R. (1999). An expansion of the peer-tutoring paradigm: Cross-age peer tutoring of social skills among socially rejected boys. *Journal of Applied Behavior Analysis, 32*(1), 115-118.
- Himle, M. B., Miltenberger, R. G., Flessner, C. A., & Gatheridge, B. J. (2004). Teaching safety skills to children to prevent gun-play. *Journal of Applied Behavior Analysis, 37*, 1-9.
- Himle, M. B., Miltenberger, R. G., Gatheridge, B. J., & Flessner, C. A. (2004). An evaluation of two procedures for training skills to prevent gun-play in children. *Pediatrics, 113*, 70-77.

- Miltenberger, R. G., Gatheridge, B. J., Satterlund, M., Egemo-Helm, K., Johnson, B. M., Jostad, C., Kelso, P., & Flessner, C. (2005). Teaching safety skills to children to prevent gun play: An evaluation of in situ training. *Journal of Applied Behavior Analysis, 38*, 395-398.
- Miltenberger, R. G., Flessner, C. A., Gatheridge, B. J., Johnson, B. M., Satterlund, M. J., & Egemo, K. (2004). Evaluation of behavioral skills training to prevent gun play in children. *Journal of Applied Behavior Analysis, 37*, 513-516.
- Pigott, H. E., Fantuzzo, J. W., & Clement, P. W. (1986). The effects of reciprocal peer tutoring and group contingencies on the academic performance of elementary school children. *Journal of Applied Behavior Analysis, 19(1)*, 93-98.
- Trovato, J., & Bucher, B. (1980). Peer tutoring with or without home-based reinforcement, for reading remediation. *Journal of Applied Behavior Analysis, 13(1)*, 129-141.

Author Notes.

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Figure Captions

Figure 1. Trainer scores during baseline, behavioral skills training (BST), and following student training (0 = touched the firearm; 1 = did not touch the firearm; 2 = did not touch, left the area within 10 s; 3 = did not touch, left the area, told an adult). Square data points indicate assessments at the daycare site, whereas triangle data points reflect home assessments. Upward arrows indicate *in-situ* training conducted by the researcher.

Figure 2. Student scores during baseline, behavioral skills training (BST), *in-situ* training (IST), and follow-up (0 = touched the firearm; 1 = did not touch the firearm; 2 = did not touch, left the area within 10 s; 3 = did not touch, left the area, told an adult). Square data points indicate assessments at the daycare site, triangle data points reflect home assessments, and the round data point indicates a location at the daycare site not associated with training or assessment. Downward arrows indicate booster sessions conducted by the peer trainers. Upward arrows indicate *in-situ* training conducted by the researcher.