
RESEARCH BRIEF

Effects of an Intruder Crisis Drill on Children's Knowledge, Anxiety, and Perceptions of School Safety

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Abstract. In response to calls to evaluate the effectiveness of school crisis drills, this study examined the effects of children's crisis drill participation on their knowledge, skills, state anxiety, and perceptions of school safety. Using a between-subjects, post-test only design, 74 students in the fourth, fifth, and sixth grades participated in an intervention (training session plus intruder drill) or a placebo control condition and completed measures about knowledge of drill procedures, state anxiety, and perceptions of safety. The intervention group attained higher post-test scores of knowledge; however, there were no group differences in state anxiety or perceptions of school safety. Observations indicated the intervention group acquired the skill of safe relocation during the drill. Findings suggest that drills implemented according to best practice may have the potential to increase short-term knowledge and skill acquisition without subsequently altering anxiety or perceived safety.

Although schools are among the safest places for youth to congregate (DeVoe, Peter, Noonan, Snyder, & Baum, 2005), it is necessary for schools to be prepared should a crisis event occur. School crisis drills are a widely advocated crisis prevention and preparedness

strategy (U.S. Department of Education, Office of Safe and Drug-Free Schools, 2003), which involve student practice of behaviors needed to respond safely to life-threatening situations (Brock & Jimerson, 2004). Although some crisis drills (e.g., fire drills) have

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been practiced in schools for nearly a century, schools today must be prepared to respond to a broad range of events and practice drills accordingly. Schools practice five main drill procedures: evacuation, reverse evacuation, lockdown, shelter-in-place, and duck-cover-hold. These basic procedures are then used to practice drills specific to individual crisis scenarios, such as a nuclear disaster, severe weather (e.g., tornado), natural disaster (e.g., tsunami), bomb threat, or intruder.

Despite the historical presence of school crisis drills, there is a dearth of empirical research in this area. Because of this, controversy exists over whether students should participate in drills. It has been argued that student participation is necessary to increase the chances a student will be able to react quickly and survive a real crisis (Pitcher & Poland, 1992; Skiba et al., 2000). Research suggests children can acquire safety knowledge about cardiopulmonary resuscitation (Lester, Donnelly, Weston, & Morgan, 1996) and natural disasters (Ronan, Johnston, & Daly, 2001) through educational programming. In addition, it has been shown that children can acquire behavioral safety skills through participation in simulated emergencies similar to fire drills (Jones & Randall, 1994) and through behavioral skills training and role-play simulations (Miltenberger et al., 2005). Research has yet to explore drills that prepare students for situations where a perpetrator threatens the safety of students, such as an intruder drill.

The role of anxiety and safety perceptions in crisis drill participation also remains unexplored. Literature suggests that the threat of crisis events can negatively affect children's anxiety levels (Fremont, 2004) and that some children become scared when thinking or talking about natural hazards (Ronan et al., 2001). The integration of anxiety reduction training programs with fire drill simulations has proven effective in reducing children's preexisting fire-related fears (Jones & Randall, 1994), but the degree to which participation in drills and simulations elicit anxiety is unknown. The lack of research in this area has left questions about whether drills induce fear

and/or jeopardize feelings of security at school (e.g., Skiba et al., 2000).

This study compared the impact of a treatment (i.e., training session plus intruder drill) versus a placebo control on children's knowledge of intruder drill procedures, state anxiety, and perceptions of school safety. In addition, the extent to which the treatment condition led to mastery of behavioral procedures was examined. The treatment condition was developed based on best practice guidelines to facilitate learning and to take precautionary measures to prevent students and staff members from becoming fearful. It was hypothesized that the treatment group, but not the control group, would attain knowledge of the drill procedures. It was also expected that the treatment group would master the behavioral procedures. Finally, we hypothesized there would be no group differences in anxiety or safety perceptions.

Method

A between-subjects post-test only control group design (Campbell & Stanley, 1963) was used to assess differences between a treatment group and a placebo control group. This design was selected because, when used with random assignment, it has fewer threats to external validity (e.g., testing, interaction) than a pretest-post-test design (Campbell & Stanley, 1963; Kazdin, 1992).

Participants

Children. The sample included 74 students (males = 34, females = 40; 22 fourth-graders, 32 fifth-graders, and 20 sixth-graders) from an elementary school in a suburban school district in upstate New York. Participants ranged from 8 to 11 years of age ($M = 10.01$, $SD = 0.75$). Approximately 68% of the sample described their ethnicity as Caucasian. The remaining students reported their ethnicity as Asian American (8.1%), African American (4.1%), Native American (1.4%), or "Other" (13.5%); 5% of the sample left the ethnicity question blank. Within the treatment group, 15 of 39 students (38%) indicated they had previously participated in a "Code Blue

Drill" (i.e., an intruder drill). In the control group, 8 of 35 students (23%) indicated that they had participated in such a drill, yet these students did not know that this term referred to an intruder drill. One reason an intruder drill was chosen for the study was because the school did not practice this drill. The school's crisis plan did include lockdown drill procedures, which likely accounted for the treatment group's endorsement of prior participation.

Treatment leaders. The first author led the treatment condition. Four graduate research assistants in school psychology who were naive to the research questions assisted in this study. Two assistants were assigned to each condition. In the treatment condition, both collected behavioral observations and assisted in survey administration. One assistant led the placebo control condition, while another collected behavioral observations and assisted with surveys. Before the study, the first author trained research assistants on their specific responsibilities. In the training, the first author role-played the steps of each condition, provided information on affective signs of anxiety in children, and taught the three research assistants who collected behavioral data to record data on observation forms.

Materials

Lesson plans. A lesson plan for the treatment group was developed to teach the steps of an intruder drill, which is a form of a lockdown drill that prepares a school for when a person presents a safety threat, such as possessing a gun (Virginia Department of Criminal Justice Services, Virginia Center for School Safety, & Virginia Department of Education, Office of Compensatory Programs [VDOE], 2001; see Table 1). The lesson plan was developed by reviewing best practice recommendations for school crisis drills (Poland, 1993; VDOE, 2001); empirically supported behavioral and cognitive behavioral techniques for training children in emergency skills (e.g., Jones & Randall, 1994); and research on teaching practical skills through task analysis. The plan included objectives of the intervention (e.g., to increase knowledge of

Table 1
Procedural Steps of an Intruder Crisis Drill

Step
1. A designated intruder drill code (e.g., Code Blue) is announced by a teacher to the classroom or by a staff member over the school intercom.
2. Teachers and adults direct students in hallways into classrooms.
3. Teachers lock doors.
4. Teachers shut off all lights and close the blinds or curtains.
5. Students remain quiet, listen to their teacher's directions, and move to a safe corner or wall not visible through the door or window.
6. Teachers direct students who are in an unsafe area of the room to a safe corner or wall not visible through the door window.
7. Teachers take attendance.
8. After remaining in silence, a designated individual (e.g., the school resource officer or principal) knocks on the door telling the teacher to open the door.
9. The classroom remains silent and the teacher does not open the door.
10. Many minutes pass, usually 5 to 20 minutes, and someone (e.g., school resource officer or principal) unlocks the door to tell the class the drill is over.
11. Students remain silent and seated waiting for teacher directions until the teacher indicates it is safe to stand up and talk quietly.

Note. Adapted from Virginia Department of Criminal Justice Services, Virginia Center for School Safety, and Virginia Department of Education, Office of Compensatory Programs (2001), *The Virginia Educator's Guide for Planning and Conducting School Emergency Drills* (p. 7), Richmond, VA: Virginia Department of Education. This document is in the public domain.

the steps of an intruder crisis drill); considerations that were to be attended to during the intervention session; and a detailed outline of the treatment procedures. The outline included the following: (a) a statement of the purpose or rationale to be given to the participants (i.e.,

"This drill helps you prepare for situations when something inside or outside the school is unsafe. In these cases, the safest place for you to be is in your classroom or another room in the school building"); (b) the steps of the lesson (i.e., verbal teaching of drill steps, modeling of steps, group practice of steps with feedback and correction from the treatment leader, and drill participation without feedback from the treatment leader); (c) steps for survey administration; and (d) instruction for a debriefing that involved teaching cognitive behavioral anxiety reduction techniques that could be used to reduce anxiety during crisis drills (e.g., breathing exercises, self-control statements).

To assess content validity, the lesson plan was reviewed by three experts selected based on their membership on national task forces or committees that develop best practice crisis prevention strategies, including drills. They were asked to provide information on (a) whether the lesson and drill were consistent with what would occur in a typical school, (b) whether the drill reflected best practice, and (c) whether any components should be adapted or added. All experts indicated that the lesson plan was realistic and reflected best practices; no changes were recommended.

The control group lesson plan was created in the same manner as the treatment group, but was specific to teaching the task of origami and did not include partaking in an intruder drill. The lesson outlined steps for the following: (a) teaching the history of origami and basic folding techniques (Nakano, 1986); (b) practice of origami folds with feedback from the placebo control leader; (c) independent creation of origami figures; (d) completion of the postmeasures; and (e) a debriefing.

Observation forms. Two observation forms were used to record (a) the number of students who moved from their desks to a safe area of the room within 2 min; (b) how long students remained silent during the 7 min time span of the drill; and (c) descriptors of students ceasing participation in the drill or ex-

periencing emotional upset (e.g., facial expressions).

Postmeasure of knowledge acquisition. Five questions were developed to probe students' knowledge of the drill procedures. Questions were related to components of the lesson plan and the steps of an intruder drill (e.g., "When Code Blue is announced this means I need to [a] exit the room, [b] move against a wall that is out of sight from the door window, [c] move close to the windows, [d] line up at the door"). A total knowledge acquisition score was obtained by calculating the percentage of the five questions answered correctly.

State-Trait Anxiety Inventory for Children (STAIC; Spielberg, 1973). The STAIC is a standardized self-report scale designed for children in fourth through sixth grades. It is comprised of two separate scales (20 items each) measuring distinct anxiety concepts: state (A-State) and trait (A-Trait) anxieties. The A-State Scale, used in this study, includes statements measuring transitory anxiety states or consciously perceived feelings of worry that vary over time in intensity and fluctuation. Items are rated on a 3-point Likert scale from 1 (*absence of anxiety*) to 3 (*high level of anxiety*). Raw scores are converted to T scores ($M = 50, SD = 10$). The A-State Scale yields high internal consistency, ranging from .78 to .87. As would be expected when measuring a transitory construct, test-retest reliability is moderately low, ranging from .31 to .47. Construct validity has been established through meta-analyses (Seligman, Ollendick, Langley, & Baldacci, 2004), but these relate primarily to the A-Trait Scale because similar childhood measures of state anxiety have not been developed.

Postmeasure of perceptions of school safety. After obtaining permission to adapt two existing measures of school safety, the School Violence Anxiety Scale (Reynolds, 2003) and the School Crime Supplement to the National Crime Victimization Survey (National Center for Education Statistics and Bureau of Justice Statistics, 2001), a 10-item

measure was created. The School Violence Anxiety Scale is one of three battery components that make up the Reynolds Bully Victimization Scales for Schools (Reynolds, 2003) that is designed to measure students' anxiety specifically related to the safety of the school environment as a function of potential school violence. The School Violence Anxiety Scale has high criterion, convergent, and discriminant validity when compared to scales of the Beck Youth Inventories of Emotional and Social Impairment (Beck, Beck, & Jolly, 2001). The School Crime Supplement is a national survey that assesses student perceptions and reports of victimization, crime, violence, safety, and the general climate in their schools.

The postmeasure included items consisting of statements assessing students' thoughts, feelings, physiological reactions, and behaviors related to their experiences during and after participating in the drill (e.g., "Participating in school drills made me feel safe today"). Students responded on a 5-point Likert rating scale ranging from 0 (*very false*) to 4 (*very true*). The mean of students' ratings on all items was calculated to obtain a total perception of school safety score.

Procedure

Recruitment process. Recruitment began following approval of the study by the institutional review board. Teachers distributed informational letters and parental consent forms to all fourth-, fifth-, and sixth-graders in the first week of school. The forms were sent out a week later in a second recruitment attempt. The classroom with the most returned forms, signed or unsigned, was rewarded with a pizza party.

Group assignment. To approximate an average class size, two treatment conditions and two placebo control conditions were conducted. At the school's request, students were separated into groups by class schedules. This resulted in the combination of fourth- and sixth-graders within one group and fifth-graders within another group. Students were then randomly assigned to a treatment or placebo

control group. To control for threats to validity that might have occurred from history and interactions between the treatment and placebo control groups (Kazdin, 1992), Treatment Group 1 and Control Group 1 ran concurrently, followed by Treatment Group 2 and Control Group 2, which also occurred simultaneously. Students in the treatment condition participated in the procedures outlined in the treatment lesson plan. The condition lasted 75 min (lesson and drill 30 min, survey and debriefing 45 min). Students in the control condition participated in the procedures outlined in the placebo control lesson plan. This condition lasted 75 min (lesson 30 min, survey and debriefing 45 min).

Results

Preliminary analyses yielded acceptable levels of internal consistency for the STAIC A-State Scale, $\alpha = .86$, and the Perceptions of School Safety Scale, $\alpha = .81$. Independent sample *t* tests conducted for all three dependent measures revealed no significant differences between Treatment Group 1 and Treatment Group 2, as well as Control Group 1 and Control Group 2. There were also no significant differences for gender, grade, or age. Therefore, the groups were collapsed into one treatment and one control group for further analyses.

Three separate analyses of variance (Treatment \times Control) were conducted with each of the dependent variables: (a) knowledge acquisition, (b) state anxiety, and (c) perceptions of school safety. Separate analyses of variance were conducted instead of a multivariate analysis of variance, because the dependent variables were three independent constructs as opposed to extractions of the same construct. Results indicated the treatment had a significant effect on knowledge acquisition ($F[1, 72] = 130.60, p < .01$), with the magnitude of the group difference being large ($\eta^2 = .65$; $M_{\text{Treatment}} = 93.84, SD_{\text{Treatment}} = 9.35$; $M_{\text{Control}} = 50.23, SD_{\text{Control}} = 21.71$). In contrast, there were no group differences in state anxiety ($F[1, 71] = 0.02, p = .89$; $M_{\text{Treatment}} = 45.13, SD_{\text{Treatment}} = 10.67$; $M_{\text{Control}} = 45.47, SD_{\text{Control}} = 10.38$) or percep-

tions of school safety, ($F[1, 70] = 1.04, p = .31$; $M_{\text{Treatment}} = 0.58, SD_{\text{Treatment}} = 0.44$; $M_{\text{Control}} = 0.70, SD_{\text{Control}} = 0.55$).

During both treatment groups, all students successfully moved to a safe location of the room in under 2 min (Treatment Group 1 = 35 s, Treatment Group 2 = 40 s). During both treatment group conditions, neither group of students was successful in remaining silent during the drill's entirety. Although silence did not occur during the 7 min of the drill, observations indicated that the noise level did significantly dampen to whispered conversations, giggling, and attempts to speak to the leader and assistants. None of the children displayed an emotionally distressed affect, verbalized distress, or ceased participation during the training session or drill. One female participant from Treatment Group 2 reported feeling upset about family stress after completing the STAIC. She attributed her upset to the content of the STAIC items, not her participation in the lesson and intruder drill.

Discussion

Results provide preliminary evidence that children can attain specific knowledge about the procedures of an intruder crisis drill through their participation in a brief training session that involves instructional components of verbal, cognitive, and behavioral techniques, followed by practice. Training led to children safely relocating, but did not result in them remaining silent during the drill. We might hypothesize children's whispering and giggling were related to their awareness that the drill was not real; this might have affected the seriousness of their participation and/or indicate the effectiveness of the treatment in thwarting negative emotional responses. In addition, the expectation to have the students sit quietly with nothing to do for an extended time period may have been unrealistic.

In contrast to the treatment group advantage in knowledge acquisition, the treatment and control groups did not differ in state anxiety or perceptions of school safety. Although arguments have been made that crisis drills can increase children's levels of anxiety and

fear, decrease perceptions of safety, and create a sense of threat (Grech, 1999; Skiba et al., 2000), the drill used within this study was not associated with a temporary state of anxiety or a lowered perceived sense of school safety. Instead, students participating in the drill reported feelings of anxiety and school safety similar to students who did not partake in the drill. This may suggest that when children participate in similar drills that incorporate best practice recommendations and use preventive measures to minimize a sense of threat (e.g., children were given a developmentally appropriate rationale for drill participation, dramatic props were not used, students and staff were informed a drill was occurring that was not a real crisis event), they may experience a level of anxiety and sense of safety comparable to what they feel on a typical school day.

Potential Implications

These findings suggest that crisis drills may foster students' short-term knowledge acquisition of drill procedures. It is possible that drills play a role in cultivating children's ability to respond in the same manner during a crisis event. Indeed, a primary argument for student participation in drills is that such training should foster a sense of preparedness for a quick response during a real-life crisis situation (Pitcher & Poland, 1992; Skiba et al., 2000). Schools using developmentally appropriate and best practice crisis drills might continue to do so with lessened concern that children will experience an aversive emotional reaction. Schools that currently do not practice school crisis drills or that engage students in poorly planned drills (e.g., provide children with little knowledge about the procedures of drills, use inappropriate props) should not necessarily expect the same results.

Limitations

A shortcoming of the current study is that the control group did not participate in the intruder drill and their behavioral skills were not assessed. In addition, the study did not assess the extent to which children's knowl-

edge and skill acquisition generalized to a real-life crisis response. From an experimental perspective, these limitations could be addressed by having the control group participate in the drill or enacting a realistic crisis, although such modifications raise ethical concerns. Specifically, having students participate in a drill that they have not learned or creating a realistic crisis scenario have been advised against because of the high probability of creating undue anxiety in children (Poland, 1993; VDOE, 2001). Another limitation is that this was a one-time practice opportunity assessing immediate knowledge acquisition, experiences of state anxiety, and feelings of safety. Without follow-up lessons, children's safety skill acquisition can deteriorate in the weeks to months after the original trainings (Jones & Randall, 1994). In addition, children's self-reports of state anxiety and perceptions of safety are transitory and might vary later in the day or week.

Caution should be exercised when generalizing results to other samples and populations (e.g., different age and developmental levels). Because a specific, well-detailed intruder drill was used, results should not be generalized to other drills, particularly those that do not adhere to best practice recommendations. There are also limitations related to the instruments used within this study, including the self-report nature of the surveys (e.g., reactivity), characteristics of the STAIC (e.g., normed over 30 years ago; Spielberger, 1973), and the need for further evidence of the perceptions of school safety measure's reliability and validity.

Future Research Directions

Future research should focus on the following: (a) children's long-term knowledge recognition and affective responses following participation in drills (e.g., gathering follow-up data at 1-week, 1-month, and so on); (b) experimental designs that maintain a strong research design with a control group and multiple treatment levels (e.g., Solomon Four Group Design); (c) drills conducted in intact classrooms; and (d) individual skill ac-

quisition of drill procedures when peers are not present as models. Future researchers might also consider assessing children's predisposition to anxiety, as measured by a scale similar to the STAIC A-Trait Scale (Spielberger, 1973), to determine if this affects perceptions of safety during crisis drills. Research is also needed to examine other types of drills and how drills are commonly practiced in schools.

References

- Beck, J. S., Beck, A. T., & Jolly, J. B. (2001). *Beck Youth Inventories*. San Antonio, TX: The Psychological Corporation.
- Brock, S. E., & Jimerson, S. R. (2004). School crisis interventions: Strategies for addressing the consequences of crisis events. In E. R. Gerler, Jr. (Ed.), *The handbook of school violence* (pp. 285-332). New York: Haworth Reference Press.
- Campbell, D. T., & Stanley, J. C. (1963). *Experimental and quasi-experimental designs for research*. Boston: Houghton Mifflin Company.
- DeVoe, J. F., Peter, K., Noonan, M., Snyder, T. D., & Baum, K. (2005). *Indicators of school crime and safety: 2005*. NCES 2006-001/NCJ 210697. Washington, DC: U.S. Departments of Education and Justice, U.S. Government Printing Office.
- Fremont, W. (2004). Childhood reactions to terrorism-induced trauma: A review of the past 10 years. *Journal of the American Academy of Child and Adolescent Psychiatry*, 43, 381-392.
- Grech, D. A. (1999, September 13). Security drills or scares? School crisis plans make some uneasy. *The Washington Post*, p. B01.
- Jones, R. T., & Randall, J. (1994). Rehearsal-plus: Coping with fire emergencies and reducing fire-related fears. *Fire Technology*, 4, 432-444.
- Kazdin, A. E. (1992). *Research design in clinical psychology*. Boston: Allyn & Bacon.
- Lester, C., Donnelly, P., Weston, C., & Morgan, M. (1996). Teaching schoolchildren cardiopulmonary resuscitation. *Resuscitation*, 31, 33-38.
- Miltenberger, R. G., Gatheridge, B. J., Satterlund, M., Egemo-Helm, K. R., Johnson, B. M., Jostad, C., et al. (2005). Teaching safety skills to children to prevent gun play: An evaluation of in situ training. *Journal of Applied Behavioral Analysis*, 38, 395-398.
- Nakano, D. (1986). *Easy origami*. New York: Puffin Books.
- National Center for Education Statistics and Bureau of Justice Statistics. (2001). *School Crime Supplement to the National Crime Victimization Survey (SCS/NCVS)*. Retrieved March 29, 2004, from <http://www.nces.ed.gov/programs/crime/pdf/student/SCS01.pdf>
- Pitcher, G., & Poland, S. (1992). *Crisis intervention in the schools*. New York: Guilford Press.
- Poland, S. (1993). *Crisis manual for the Alaska schools*. Juneau: Alaska Department of Education.

- Reynolds, W. M. (2003). *Reynolds Bully Victimization Scales for Schools manual*. San Antonio, TX: The Psychological Corporation.
- Ronan, K. R., Johnston, D. M., & Daly, M. (2001). School children's risk perceptions and preparedness: A hazards education survey. *The Australasian Journal of Disaster and Trauma Studies, 1*. Retrieved from <http://www.massey.ac.nz/~trauman/issues>
- Seligman, L. D., Ollendick, T. H., Langley, A. K., & Baldacci, H. B. (2004). The utility of measures of child and adolescent anxiety: A meta-analytic review of the Revised Children's Manifest Anxiety Scale, the State-Trait Anxiety Inventory for Children, and the Child Behavior Checklist. *Journal of Clinical Child and Adolescent Psychology, 33*, 557-565.
- Skiba, R., Boone, K., Fontanini, A., Wu, T., Strassel, A., & Peterson, R. (2000). *Preventing school violence: A practical guide to comprehensive planning*. Bloomington: The Safe and Responsive Schools Project, Indiana Policy Center, Indiana University.
- Spielberger, C. D. (1973). *Manual for the State-Trait Anxiety Inventory for Children*. Palo Alto, CA: Consulting Psychologists Press.
- U.S. Department of Education, Office of Safe and Drug-Free Schools. (2003). *Practical information on crisis planning: A guide for schools and communities*. Washington, DC: Author.
- Virginia Department of Criminal Justice Services, Virginia Center for School Safety, & Virginia Department of Education, Office of Compensatory Programs. (2001). *The Virginia educator's guide for planning and conducting school emergency drills*. Retrieved April 13, 2004, from <http://www.dcjs.org/vcss/documents/educatorsGuideForDrills.pdf>

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