

TEACHING PRESCHOOL CHILDREN TO AVOID POISON HAZARDS

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We evaluated the effectiveness of group safety training and in situ feedback and response interruption to teach preschool children to avoid consuming potentially hazardous substances. Three children ingested ambiguous substances during a baited baseline assessment condition and continued to ingest these substances following group safety training. In situ feedback and response interruption resulted in a decrease in opening ambiguous containers; this decrease was maintained when ambiguous novel containers were presented and when assessments occurred in a novel setting and with a novel experimenter. For 2 children, these gains were also maintained during a brief follow-up period. Twelve children did not ingest ambiguous substances prior to training, and group safety training did not evoke inappropriate ingestion.

DESCRIPTORS: behavioral skills training, modeling, poison prevention, safety

Unintentional poisoning remains one of the leading causes of injury for children younger than 6 years (National Center for Injury Prevention and Control, 2003). Although caregiver training can reduce poison hazards, home inspections have revealed that hazards remain following training (e.g., Barone, Green, & Lutzker, 1986; Lutzker, Bigelow, Doctor, & Kessler, 1998). Children are also at risk for poisoning when toxins are repackaged into non-child-resistant containers (Aschoff, 2004) or when they visit homes that have not been poison proofed. One well-publicized case in Massachusetts involved a child who was accidentally poisoned when he consumed weed killer stored in a plastic jug that resembled a spring water container (Lavoie, 2005).

Existing programs aimed at teaching children to avoid poisons have focused primarily on children's responses to clearly identifiable poisons (e.g., marked with Mr. Yuk stickers; Vernberg, Culver-Dickinson, & Spyker, 1984), and the effects of these interventions have been

evaluated through children's responses to questionnaires (e.g., Globe, Johnson, Conant, & Frausto, 2004; Liller, Craig, Crane, & McDermott, 1998). The purpose of the current study was to extend research on poison prevention by evaluating children's behavior in an assessment designed to safely mimic a situation in which ambiguously packaged but potentially hazardous substances were present. The development of our assessment condition and training procedures was informed by the behavioral skills training literature (e.g., Himle, Miltenberger, Flessner, & Gatheridge, 2004; Johnson et al., 2006; Miltenberger et al., 2004).

METHOD

Participants

Fifteen typically developing preschool children (aged 3 to 5 years) were recruited from a university-operated program whose curriculum did not address poison prevention.

Assessment

Children's responses to potential poison hazards were measured during a baited assessment. Five-minute sessions were conducted in a room (7 m by 10 m) equipped with a one-way window and attached observation area. Portable partitions were used to create a three-sided space (2.5 m by 2.5 m) that was visible from

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the observation area. The area contained a child-sized chair and table on which two toys were placed. Two containers were placed on the table to mimic conditions associated with accidental poisoning; one (e.g., Ziploc bag, pill box) contained small candies resembling pills and a second (e.g., a clear plastic bottle) contained plain water or water with food coloring. We covertly observed responses to ambiguous containers and substances that children had not received permission to manipulate or consume. After entering the partitioned room with the child, the experimenter placed a small snack (e.g., cookie on a paper plate, grape juice in a paper cup) in front of the child, stated that she was going to set up an activity, pointed to the snack, and suggested that the child eat the snack while waiting. The experimenter left the partitioned area for 5 min and prepared the activity outside the child's visual field. If the child left the partitioned area, the child was guided back and prompted to wait. If the child attempted to speak to the experimenter, he or she was instructed to wait while the experimenter set up materials. After 5 min, the experimenter entered the partitioned area and asked the child to join her in a 5-min activity.

Target Behaviors, Materials, and Data Collection

Trained observers recorded the frequency of opening the container and asking permission, and the duration of inappropriate ingestion. Opening was recorded when the lid was removed from a container or the Ziploc seal was broken, and asking was recorded if the child asked to eat or drink from the containers. Inappropriate ingestion was recorded when the contents of an ambiguous container passed the plane of the lips or if an opened bottle was tilted against the lips. Frequency and duration of child responses were recorded to provide the clearest description of contact with the substances, but any ingestion of ambiguous substances is potentially dangerous. Interobserver agreement was assessed for a mean of 53% (range, 40% to 67%) of sessions (parti-

tioned into 10-s intervals), and observers' data were compared for each interval. The smaller number (or duration) of responses was divided by the larger, averaged across intervals, and multiplied by 100% to obtain a percentage agreement score. Mean agreement across children was 98% (range, 81% to 100%) for opening containers, 100% for asking permission, and 98% (range, 81% to 100%) for inappropriate ingestion.

Procedure

Baseline. Children were covertly observed in the baited assessment condition (described above) prior to any training.

Group safety training. All 15 children participated in two 30-min periods of safety training, which was conducted in smaller groups of 3 to 4 children based on their availability. Training consisted of verbal instructions, modeling, rehearsal, and feedback in the form of correction and praise. The experimenter explained that some things, if eaten, may make children sick. The experimenter also specified that they may only eat or drink what is given to them by an adult they know, otherwise they should ask permission. The experimenter provided the safety instruction, "always ask a grown-up you know before eating, drinking, or tasting anything," and "wait for an adult if one is not available." The experimenter then asked the children to vocally rehearse the safety instruction together and individually. Next, the experimenter repeated the safety instruction and modeled the safety skills (i.e., asked the second experimenter for permission to consume the ambiguous substances) using six different containers with a second experimenter posing as five different adults (e.g., mother, teacher). The second experimenter provided a small snack as an alternative to the contents in the ambiguous container and praised correct performance. After discussion each child was asked to demonstrate the safety skills (children were not required to state the safety instruction) while the other children watched. Each child

demonstrated the safety skills on five trials in which the second experimenter posed as five different adults and six different containers were introduced. Corrective feedback was provided for errors, whereas correct responses were praised and an alternative to the contents of the ambiguous container was provided. Role playing ended when children correctly performed the safety skills five consecutive times.

In situ feedback and response interruption. This phase was initiated following the first session after training in which a child opened the containers used in baseline. The data collector informed the experimenter of attempts to open the container via a microphone-in-ear device. The experimenter immediately entered the room, said, "Please don't eat that. I did not give it to you," took the container and closed it, and returned it to its original position to allow further opportunity for the target behavior. Thus, there was no opportunity for children to consume the ambiguous substances during this phase, and data on inappropriate consumption are reported only as a measure of integrity of the independent variable. If the ambiguous container was not opened, descriptive praise (i.e., "Thank you for eating only the snack that I gave you") was provided at the end of the session.

In situ response interruption only. To increase the practicality of the intervention, praise was withdrawn. Container opening continued to result in immediate response interruption.

Treatment extension and follow-up. Responses to six to eight novel containers (e.g., unlabeled sports drink bottle, clear plastic container with lid) were assessed by covertly observing children in the school kitchen when an ambiguous container was present on a cart next to a chair. The child was brought to the kitchen, asked to wait in the chair, and given a cookie while the experimenter did laundry. The experimenter then exited to an adjoining room, observed the child through a mirror, and responded as in the in situ response interruption condition. In a subsequent session, the child's classroom teach-

er served as a novel experimenter. Identical assessments were conducted at 1 (Kasey and Anna) and 3 months (Anna) follow-up.

Experimental Design

The effects of group safety training, in situ feedback and response interruption, and in situ response interruption only were assessed in a multiple baseline design across participants.

RESULTS AND DISCUSSION

Three of 15 children (Kasey, Anna, and Dan) did not ask permission but opened and ate from the ambiguous container during baseline (Figure 1). Each participated in a different training group and did not ask permission following group training. Kasey ingested the ambiguous substance when a novel container was introduced in Session 7 and when the original container was reintroduced in Session 8. Anna and Dan consumed the ambiguous substance in the session immediately following training. Therefore, group safety training alone was not effective for these children. These results are consistent with studies that have reported limited effects of group behavioral skills training (Himle et al., 2004; Miltenberger et al., 2004).

When feedback and response interruption were implemented in situ, Kasey and Anna attempted to open the container in only one session, and Dan experienced response interruption in three sessions. For all children, treatment gains were maintained when praise was removed and when novel items and a novel setting and experimenter were introduced. Two children showed maintenance of the effect during a brief follow-up period. Because in situ feedback was always implemented after group training, it is possible that group training was a necessary component of the intervention. In addition, it seems likely that response interruption served as a mild form of punishment for container opening; the effects of group training might be improved by role-play demonstration of this type of consequence.

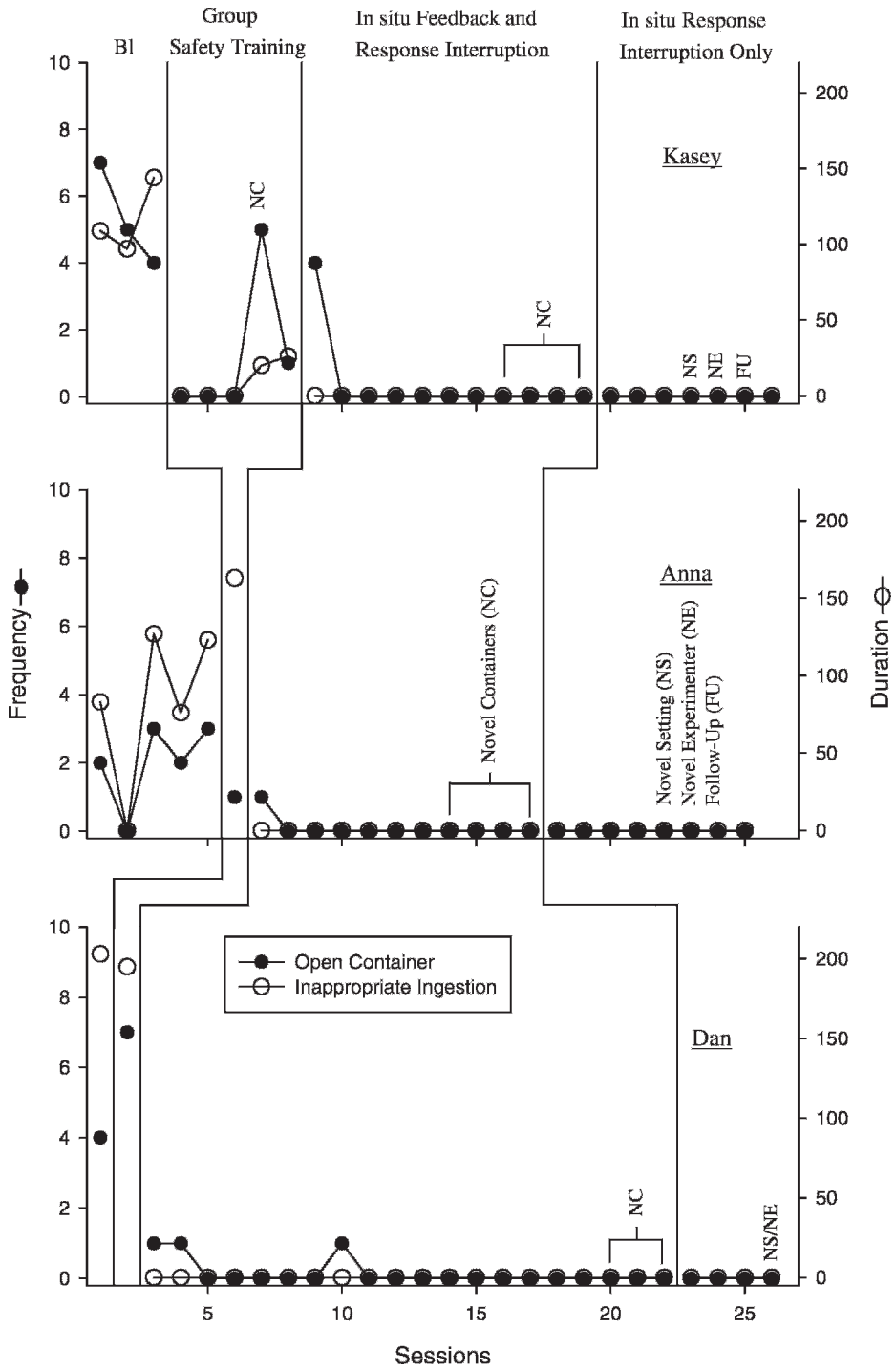


Figure 1. Frequency of opening ambiguous containers (left y axis) and duration of inappropriate ingestion (right y axis). Sessions involving the introduction of novel containers (NC), a novel setting (NS), and a novel experimenter (NE) are marked accordingly, as are follow-up (FU) sessions.

Twelve additional children (data not shown) did not ingest the ambiguous substances in baseline, although 5 of them opened the containers. They were exposed to group training to determine whether it would produce an increase in ingestion. Following training, no inappropriate ingestion occurred for any of these children during one to four assessment sessions, although 3 children opened the container. One child asked permission in baseline but not following training. Thus, no ill effects were produced by exposure to training.

Interpretation of our results is limited by the small number of sessions in some phases. Given the implications for ingesting unknown substances, we opted to minimize opportunities for children to ingest these substances. Consumption of ambiguous substances may have persisted because initial consumption exposed children to the pleasant tastes of these substances. However, this experience is likely analogous to exposure to poison hazards such as children's medications, which are manufactured to encourage child consumption. Finally, generality is limited by assessment under a narrow range of conditions, and treatment extension data cannot be considered evidence of generalization, because no baseline measures were conducted under these conditions.

Unfortunately, poison prevention interventions typically consist of brief group instruction, with few opportunities for children to practice safety skills (Globe et al., 2004; Liller et al., 1998), and measurement of knowledge but not performance of safety skills. Based on our results, this widely adopted approach appears unlikely to result in the desired performance. In the current study, children stated poison prevention rules and behaved accordingly during group training but failed to follow the same rules in the baited assessment condition. In situ assessment and training appear to be critical components of safety skills training, but the associated costs and time constraints may be

prohibitive. Future research could be directed at identifying more cost-effective forms of assessment that correlate with outcomes obtained during in situ assessment.

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