FIRE SAFETY SKILLS TRAINING FOR INDIVIDUALS WITH SEVERE AND PROFOUND MENTAL RETARDATION

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Fire Safety Skills Training for Individuals with Severe and Profound Mental Retardation

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The Supervisory Committee certifies that this ***disquisition*** complies with North Dakota State University's regulations and meets the accepted standards for the degree of

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ABSTRACT

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The statistics surrounding fire injury and death in the United States are staggering. Literature concerning fire safety has focused largely on children, but persons with mental retardation also are in need of fire safety training as they are highly vulnerable to fire injury and death. The purpose of this research was to evaluate behavioral skills training procedures for teaching individuals with severe and profound mental retardation to exit their residence upon hearing a smoke detector. Fire safety skills training involved giving instructions, modeling, prompting, and corrective feedback. Assessments took place in the participants' group homes with the participants unaware that an assessment was taking place. Following training, it was anticipated that the participants would be able to initiate exiting behaviors within 10 seconds following the activation of a smoke detector and exit the building within 30 seconds of initiating exiting behaviors. The results showed that one participant out of seven met these criteria following training. However, data gathered on the level of prompts needed for participants to exit the building showed that some individuals exited the building with a less intrusive level of prompting from staff.

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INTRODUCTION

The statistics surrounding fire injury and death in the United States are staggering. Fire departments in the United States respond to nearly 2 million fire calls per year which contribute to thousands of deaths, tens of thousands of injuries, and billions of dollars lost, making the U.S. fire problem one of great national importance (United States Fire Association, 2004a). According to USFA (2004a), on a per capita basis, the U.S. fire problem is one of the worst in the industrial world. To put these statistics into context, in the United States the annual losses from floods, hurricanes, tornadoes, earthquakes, and other natural disasters combined average just a fraction of those from fires (USFA, 2004a).

Furthermore, statistics show that one- and two-family dwellings, where 73 percent of the population lives, dominated the residential fire picture in 2001: with 73 percent of fires, 78 percent of deaths, 67 percent of injuries, and 76 percent of dollar loss (USFA, 2004a). Considering the fact that more and more persons with disabilities are leaving large group homes and institutions and moving into residential apartments and small residential houses, it is necessary that they know the proper fire safety skills that will keep them safe in case of a fire. Moreover, without the constant care of numerous staff persons inherent to larger institutions and group homes, teaching these skills becomes even more important.

Structures equipped with smoke alarms or automatic extinguishing systems (AESs)-most often sprinkler systems-are thought to account for a significant part of the decrease in reported fires and deaths over the past two decades (USFA, 2004a). Smoke alarms have increased people's chances of surviving a fire by cueing them to the occurrence of a fire. However, the only way a smoke or fire alarm can increase a person's chances of surviving a fire is if the sound of the alarm has stimulus control over the behavior of leaving the

building. Although the sound of a smoke alarm evokes the behavior of exiting the building for most typically functioning individuals, the alarm may not have stimulus control over exiting behavior of young children or individuals with severe and profound mental retardation. Therefore it is important to teach fire exiting skills to these individuals who are at a greater risk for injury and death due to fires.

In 2001, fires injured an estimated 2,900 children and killed nearly 600 children under the age of 15 (USFA, 2004a). Understandably, the younger the child, the greater the risk he or she will be injured or killed by a fire. Children under age 5 are 40 percent more likely than the general population to die in a fire (USFA, 2004a). Barillo and Goode (1996) found that children between the ages of 2 and 4 years had the highest fatality rate in a three-year period accounting for 10.6 percent of all fatalities in their study. Furthermore, Mori and Peterson (1986) noted that preschoolers appear to be the group most vulnerable to injury due to their developmental limitations in dealing with stressful or dangerous situations. Considering these statistics, it is important not only to educate our nation's children about fires but to teach them fire-safety skills as well.

Although children have received much attention in the literature in terms of fire injury statistics and fire emergency skills, there are other populations of people considered highly vulnerable to fire injury and death. According to the USFA (2004b) people with limited physical and cognitive abilities are at a higher risk, in terms of death and injury, than other groups when it comes to fires. People with disabilities may suffer from a variety of limitations or problems that affect fire safety, including: 1) sensory problems such as deafness and blindness; 2) mobility problems such as the need for a wheelchair; and 3) intellectual problems such as mental retardation (Levin & Nelson, 1981).

Fire safety information has been taught to children and individuals with mental retardation which has resulted in increases in their levels of fire safety knowledge following training (Matson, 1980; McConnell, Leeming, & Dwyer, 1996; Mori & Peterson, 1986). These studies show the potential gains that can be made in knowledge concerning fires and fire-safety. Furthermore, McConnell et al. (1996) claim that their findings demonstrate that educational programs have a definite promise for increasing the probability of a child living through a home-fire emergency or avoiding one altogether. However, the problem with making this statement is the fact that having knowledge of fire-safety skills does not mean people will use the knowledge they have gained to take action in escaping a dangerous fire situation.

This problem has been demonstrated with other safety skills showing that increases in knowledge do not necessarily correspond to increases in skills or the use of these skills (Gatheridge et al., 2004; Himle, Miltenberger, Gatheridge, & Flessner, 2004; Lumley, Miltenberger, Long, Rapp, & Roberts, 1998; Miltenberger et al., 1999; Olsen-Woods, Miltenberger, & Foreman 1998). Too often researchers do a disservice to children or individuals with mental retardation by educating them on safety issues rather than teaching them the actual skills needed to keep themselves safe and subsequently testing those skills in simulated situations (e.g. Himle & Miltenberger, 2004; Roberts & Miltenberger, 1999). What is needed are specific fire-safety training programs designed to teach and evaluate actual fire-safety skills, and not just knowledge of what to do in case of a fire emergency.

Everybody should learn the safety skills necessary to survive a fire. Fires do not discriminate when it comes to injuries and death; anyone can be affected. Thus, it is necessary to teach fire safety skills to help keep people safe in the event of a fire

emergency. Numerous research projects have sought to teach fire safety knowledge to children (McConnell et al., 1996; Mori & Peterson, 1986) as well as individuals with mental retardation (Matson, 1980). Furthermore, actual fire safety skills have been taught to children (Jones, Kazdin, & Haney, 1981a; Jones, Kazdin, & Haney, 1981b; Jones, Ollendick, McLaughlin, & Williams, 1989), and individuals with mental retardation (Bannerman, Sheldon, & Sherman, 1991; Jones & Thorton, 1987; Katz & Singh, 1986; Rae & Roll, 1985; Shields, Smyth, Boyce, & Shilcok, 1999).

Although all of these studies have focused on teaching people in vulnerable populations how to stay safe in the case of a fire emergency, the one common flaw in many of these studies is the lack of a naturalistic assessment. In some studies, training focused on teaching fire safety skills and then assessed knowledge of what to do in case of a fire, but did not assess the actual skills (Katz & Singh, 1986; Matson, 1980; McConnell et al., 1996; Mori & Peterson, 1986; Risley & Cuvo, 1980). In other studies researchers trained the necessary fire safety skills to avoid injury and death and then assessed the skills while a researcher prompted the fire safety behaviors (Jones et al., 1981a; Jones et al., 1981b). Some researchers tried to make assessments as natural as possible by having unannounced fire drills but failed to structure the assessments in a way that ensured the participants were completely blind to the fact that they were being assessed (Bannerman et al., 1991; Jones et al., 1989; Jones & Thornton, 1987).

Future research in the area of teaching fire safety skills to vulnerable populations needs to tailor the training protocol to the population being trained in terms of the participants' mental and physical capacities. Furthermore, and of utmost importance, assessments need to be structured in the most naturalistic way possible. That is, the

assessments must present a seemingly real fire emergency (an activated smoke detector or fire alarm) and occur without the participants' knowledge that an assessment is being conducted. Researchers disadvantage their participants by teaching the knowledge and skills that can save their lives and then assessing those skills with researchers present or with prompts from staff. Researchers will never know if the skills taught will generalize in the event of a real fire emergency if assessments continue in this manner. What is needed is a type of assessment in which the participant is completely blind to its occurrence, no prompts are provided for correct behavior from researchers or staff, and the assessment is conducted in the most realistic manner possible (e.g. Gatheridge et al., 2004; Himle & Miltenberger, 2004; Roberts & Miltenberger, 1999). Therefore, the purpose of this study was to evaluate behavioral skills training procedures for teaching individuals with severe and profound mental retardation to exit their residence upon hearing a fire alarm when they are unaware that an assessment is taking place.

METHOD

Participants

Seven participants were selected from local group homes on the basis of a diagnosis of Severe or Profound Mental Retardation by history. One participant in this study had a diagnosis of Mental Retardation with the severity unknown but estimated to be in the in the range of moderate to severe. Both male and female participants were involved in the study. The participants' legal guardians were given a clear description of the study and only those individuals whose guardians gave consent participated in the study. The North Dakota State University Institutional Review Board as well as the participating agencies approved this study prior to the start of any assessments or training. The names and any indentifying information was changed to protect the identities of all the participants involved in this study.

Setting

Training and assessments took place in the participants' bedroom or in non-occupied areas of the group home (i.e., living room or kitchen without staff or other residents present).

Target Behaviors

The fire safety skill taught was to immediately engage in exiting behaviors until safely out of the building upon hearing a smoke detector or fire alarm. Data were collected on (a) the latency to respond to the activation of a smoke detector by initiating exiting behaviors and (b) the duration of time to safely exit the building following the activation of a smoke detector. The exiting behavior was defined as rising from a chair or bed or terminating an activity and walking toward and out of an exit. The goal was for participants

to initiate exiting behavior within 10 seconds of hearing an alarm and to leave the building within 30 seconds of initiating exiting behavior.

Data Collection

The effects of the training procedures were evaluated at the participants' group homes during researcher-initiated fire drills. These *in situ* assessments were conducted during baseline, following training, and at a 2-week follow-up. *In situ* assessments in smaller group homes were carried out in such a manner that an experimenter entered the group home without the knowledge of the participant and hid in close proximity to the participant to observe his or her response to the activation of a smoke detector. Once staff and the experimenter were hidden from the participant, the experimenter activated the smoke detector and a stopwatch. The experimenter recorded the latency to respond with exiting behaviors to the activation of the smoke detector. The experimenter also recorded the duration of time elapsed from the activation of the smoke detector to the participant arriving safely outside.

Researcher-initiated fire drills in larger group homes consisted of two portable smoke detectors being set off simultaneously in the participant's group home without the participant's knowledge that an assessment was taking place. Staff hid from the participant prior to the experimenters entering the testing area and activating the smoke detectors. Before entering the assessment situation both experimenters simultaneously started their stopwatches. Experimenter 1 hid in close proximity to the participant but without the participant's knowledge. Experimenter 2 took a position by the closest exit to the participant. When both experimenters were in position and when 120 seconds had elapsed on the stopwatch, the experimenters activated their smoke detectors and restarted the

stopwatches. Experimenter 1 watched the participant while staying hidden and recorded the latency to respond with existing behaviors to the activation of the smoke detector. Once the smoke detectors were activated, Experimenter 2 left the activated smoke detector near the doorway and proceeded to a hidden location outside until the participant came outside. Experimenter 2 recorded the duration of time elapsed from the activation of the smoke detector to the participant arriving safely outside.

Interobserver Agreement

In the smaller group homes, the experimenter was the primary observer involved in the assessments. A second researcher observed the assessment from a hidden location and recorded the latency to respond with exiting behaviors and duration of time elapsed until safely outside following the activation of a smoke detector. In the larger group homes, experimenter 1 and 2 served as primary observers of the assessments. A third researcher observed the assessment from a hidden location and recorded the latency to respond with exiting behaviors and duration of time elapsed until the participant was safely outside following the activation of the smoke detectors. In both large and small group homes there was a blind observer in at least 25% of the assessments. Percentage of agreement for latency was calculated by dividing the smaller latency to respond with exiting behaviors by the larger latency and multiplying by 100. Percentage of agreement for duration to exit was calculated by dividing the smaller duration of time elapsed until the participant was safely outside by the larger duration and multiplying by 100.

Experimental Design

A multiple baseline across subjects design was used to evaluate the effectiveness of the fire safety training.

Procedures

Baseline. During the baseline phase, *in situ* assessments took place three to five times prior to the start of training. Assessments were carried out in the manner described previously. Latency to respond and duration were recorded in seconds. Smoke detectors remained activated until the participant arrived safely outside or until three minutes had elapsed and the participant had not initiated exiting behaviors. At either point, experimenters stopped the smoke detectors and brought the participant back to where he or she had started. If the participant initiated exiting behaviors prior to the three minute limit, he or she was allowed an additional minute to exit the building before the smoke detectors were turned off. No feedback was given to the participants following an assessment during the baseline phase.

Behavioral skills training. Training sessions began with a short description of what to do in case the participant heard a smoke detector. Following a simple verbal instruction, the experimenter activated the smoke alarm while saying "_____ (participant's name), FIRE, GET OUT!" The first trial consisted of the experimenter modeling the correct behaviors for the participant. Each subsequent trial involved the experimenter using the least intrusive prompt necessary to get the participant to exit the building with the experimenter. The prompt order was *verbal* (i.e., "lets get out", "come on"), *gestural* (i.e., waving to the participant to follow, pointing to an exit), *simple physical* (i.e., slight tug on sleeve or arm), and *complete physical guidance* (i.e., taking the participant by the hand or arm and guiding him or her outside). Training sessions lasted 20 min or until 10 trials were completed. Prompts were faded over trials so that the least intrusive prompt was used to get the participant to initiate exiting behaviors and safely make his or her way outside. Each

participant was verbally reinforced through praise, social interactions (such as high fives and pats on the back), and a tangible reinforcer (toys, edibles, or drinks) once they made it safely outside during each trial. The tangible reinforcer was previously selected by each participant and was used to help strengthen the exiting behavior.

In situ training. *In situ* assessments as described earlier were conducted following the third training session. Without the participant's knowledge, experimenters activated a smoke detector and assessed the latency and duration of their exiting behaviors. If the participant failed to initiate with an exiting behavior within 10 seconds following the activation of a smoke detector, the *in situ* training phase was implemented. If the participant initiated exiting behaviors within the 10 second time limit, he or she was allowed an additional 30 seconds to safely exit the building. If the participant had not made it safely outside within the additional 30 seconds, *in situ training* commenced. *In situ training* occurred when a researcher turned an assessment session into a training session. The purpose of the *in situ training* was to promote generalization when the skills failed to generalize from training sessions to naturalistic assessment situations. If the participant failed to initiate exiting behaviors within 10 seconds or complete exiting behavior within 30 seconds, *in situ training* consisted of an experimenter activating a smoke alarm without being seen by the participant and jumping into the assessment situation while saying "_____ (participant's name), FIRE, GET OUT!" The experimenter then used the least intrusive prompt necessary to get the participant safely outside. *In situ training* included four trials in which the experimenter assisted the participant using the least intrusive prompts necessary to get him or her to safely exit the building upon hearing the smoke detector. *In situ training* sessions were continued until the participant had met training

criteria (initiating exiting within 10 seconds and leaving the building with 30 seconds) for 3 consecutive assessments.

RESULTS

Figure 1 represents data gathered for the latency to respond with exiting behaviors to an activated smoke detector for Group home 1 (Lori, Deanna, and Rick).

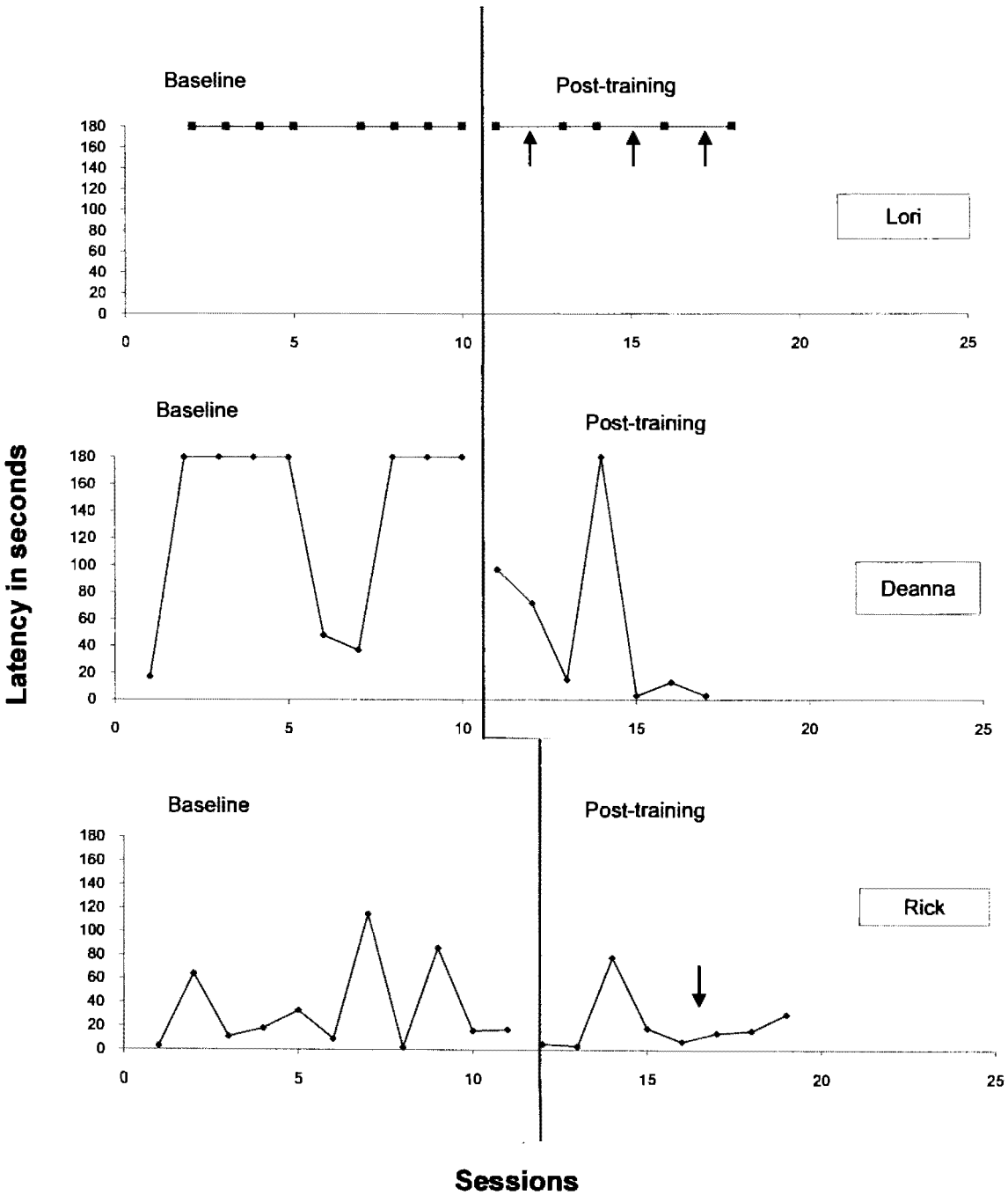

Figure 1. Latency to respond with exiting behaviors for Group 1.

During baseline, Lori did not initiate exiting behaviors when a smoke detector was activated. Following training, Lori still did not initiate exiting behaviors during her first assessment, so *in situ training* was implemented during the next post-training assessment. The arrows on Figure 1 indicate each time Lori received *in situ training.* Following these additional *in situ training sessions*, Lori still did not initiate exiting behaviors when a smoke detector was activated without her prior knowledge.

Deanna initiated exiting behaviors during 3 of the 10 baseline assessments; however, she did not initiate exiting behaviors within 10 seconds following the activation of the smoke detector. Following training, post-training assessments show that Deanna significantly decreased the amount of time it took to initiate exiting behaviors following the activation of the smoke detector. Figure 1 shows she did not initiate exiting behaviors during one of the post training assessments. However, *in situ training* was not implemented after it was determined that she did not hear the smoke detector; the researcher waited until another day to do another assessment of whether she would meet training criteria. Deanna met the training criteria on the next 3 consecutive post training assessments in which she initiated exiting behaviors within 10 seconds following the activation of a smoke detector.

Rick initiated exiting behaviors in all 11 of the baseline assessments. Furthermore, Rick initiated within 10 seconds from the activation of a smoke detector in 3 of the 11 baseline assessments. Post training assessments show that Rick initiated exiting behaviors within 10 seconds following the activation of a smoke detector in 4 of 8 assessments.

Figure 2 shows total duration of exiting behaviors exhibited by Group home 1. The arrows on Figure 2 represent each time *in situ training* was implemented.

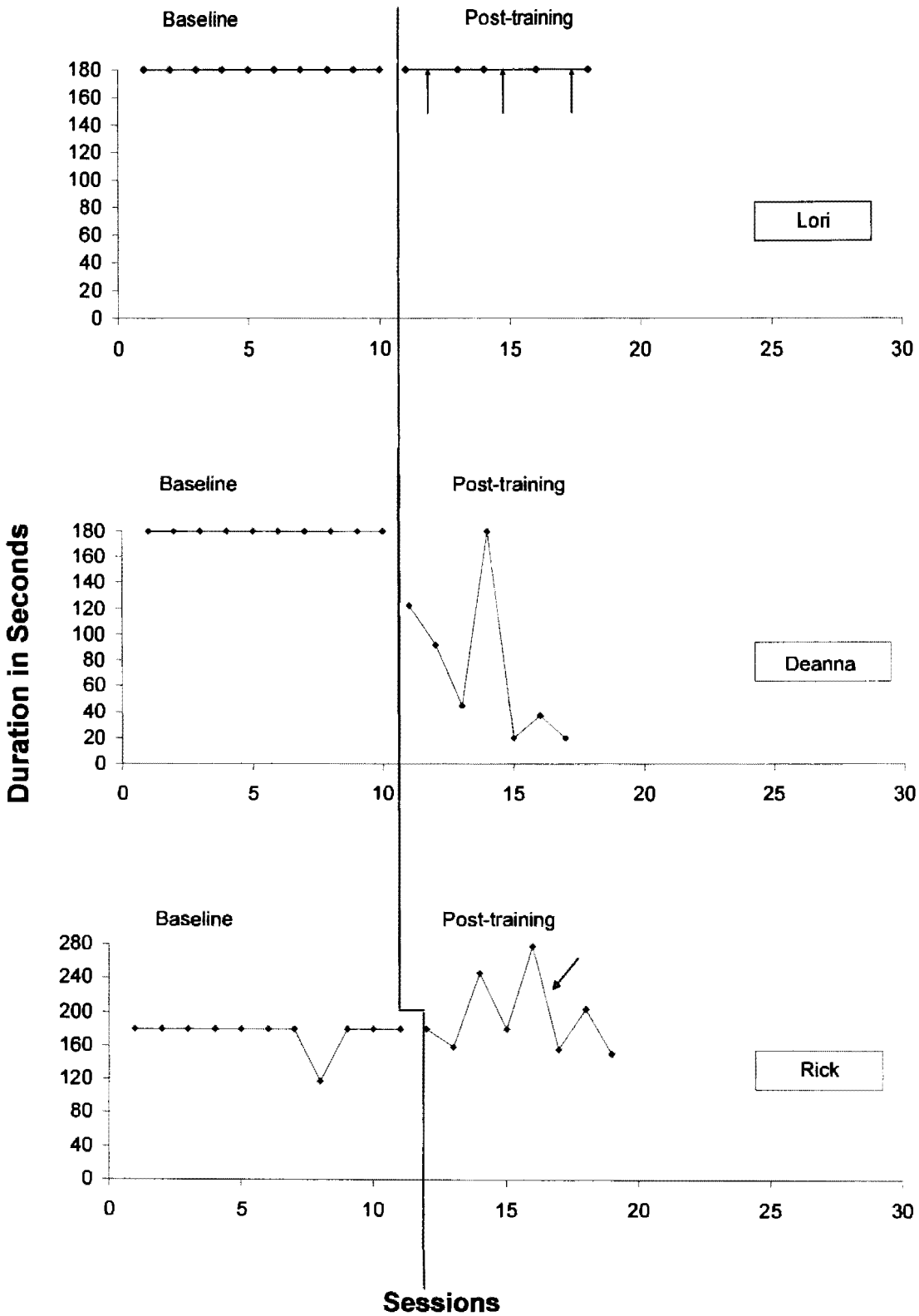

Figure 2. Duration of time to exit building for Group 1.

During all baseline assessments and post-training assessments Lori did not exit the building within 180 seconds on any occasion. After 3 additional training sessions, Lori still did not safely exit the building within 180 seconds following the activation of a smoke detector. Deanna's data represented on Figure 2 show that Deanna did not safely exit the building within 180 seconds during any baseline assessment. However, post-training assessments indicated that Deanna exited the building on 6 of 7 assessments.

As previously mentioned, during one post-training assessment Deanna did not exit the building within 180 seconds, but it was determined that she most likely did not hear the smoke detector, so an assessment was scheduled for another day and *in situ training* was not implemented. Deanna exited the building upon the activation of a smoke detector in under 40 seconds on three consecutive post-training assessments, which met the training criteria.

Figure 2 also indicates that Rick exited the building before 180 seconds had elapsed once during baseline assessments. Following training, it was determined that should Rick initiate exiting behaviors and make a reasonable effort to find a exit, he would be allowed more time to exit the building, due to his limited mobility. Following the intervention, during the first post-training assessment Rick did not exit the building within 180 seconds nor did he make a reasonable effort to exit at that time; thus, the smoke detector was turned off. *In situ training* was then planned for the next assessment; however Rick exited the building within 180 seconds on this assessment. In Rick's third post-training assessment he was making a reasonable effort to exit the building at the 180 second cutoff, so he was allowed more time to exit; he did so in 240 seconds. During the fourth post-training assessment, Rick did not exit within 180 seconds and at that time he was not making an

effort to exit the building, thus the smoke detectors were turned off and an *in situ training* session was scheduled for the next visit, assuming he did not exit the building at that time. For the fifth assessment, Rick was making an effort to exit the building after 180 seconds, thus he was given extra time to exit, during which he did exit. However, an *in situ training* was scheduled for the next visit to help improve his time to exit the building. The arrow on Figure 2 on Rick' graph indicates that an *in situ training* took place. The last three data points on Rick's graph indicate that Rick did exit the building within 180 seconds on two of the three assessments and was allowed slightly more time on one assessment since he was making an effort to exit when 180 seconds had elapsed.

Figure 3 represents data on the level of prompting required during training and *in situ training* for the participants in Group home 1 to exit the building upon hearing a smoke detector. Data were collected on a 4-point scale to indicate the level of prompting needed for the participant to exit the building. A zero indicates that the participant exited the building independently after the activation of a smoke detector. A one indicates that the participant needed only a verbal prompt to exit the building. A two indicates that the participant needed both a verbal and a gestural prompt, and a three indicates that the participant needed verbal, gestural, and physical prompts to exit the building.

At the start of training, Lori needed physical prompts to exit the building when she heard a smoke detector. Approximately halfway through training, Lori exited the building at some times needing just a verbal prompt but still needing gestural and physical prompts at other times. By the end of the third training session, Lori was able to exit the building with only verbal prompts four times in a row.

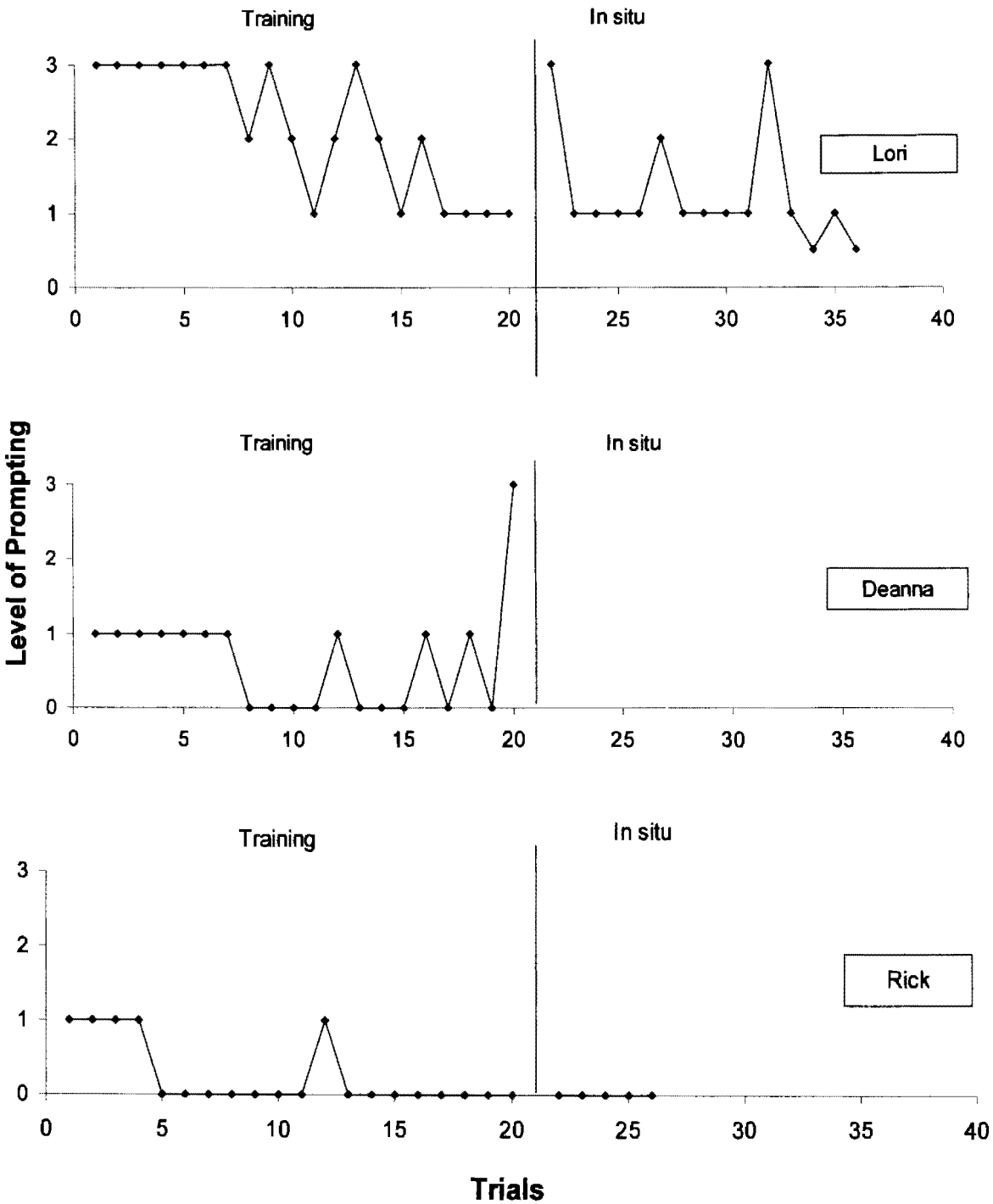

Figure 3. Level of prompting required to exit building for Group 1.

Following training, Lori needed physical prompts twice, a gestural prompt once, and only a verbal prompt 10 times to exit the building. By the end of project, Lori started to exit the building when she saw a trainer enter the room to start prompting (indicated in Figure 3 as a score of .5).

Deanna only needed verbal prompts from the beginning of training. As training continued, Deanna was exiting the building independently to the sound of the smoke detector. However, she did need at least a verbal prompt on 4 occasions. Deanna's last training prompt point shows that she needed a physical prompt to exit the building before post-training assessments began. Once post-training assessments started, Deanna did not receive further training, thus prompting data were not collected.

Figure 3 shows that at the start of training Rick needed a verbal prompt to exit the building when he heard a smoke detector. After the first four trials, Rick independently exited the building when he heard the smoke detector during all trials but one. Following training, Rick received one session of *in situ training*. During this additional training, Rick independently exited the building upon the activation of the smoke detector.

Figure 4 represents data of the latency to respond to the activation of a smoke detector unannounced to the participants in Group home 2. During baseline, Scott initiated exiting behaviors in two of three assessments; however, he did not initiate within 10 seconds following the activation a smoke detector. None of the other participants initiated exiting within 180 seconds. Following training, it was determined that the participants from Group 2 were in need of further training, so instead of a post-training assessment, an *in situ training* session was immediately implemented. Each arrow indicates three separate times in which *in situ training* was implemented.

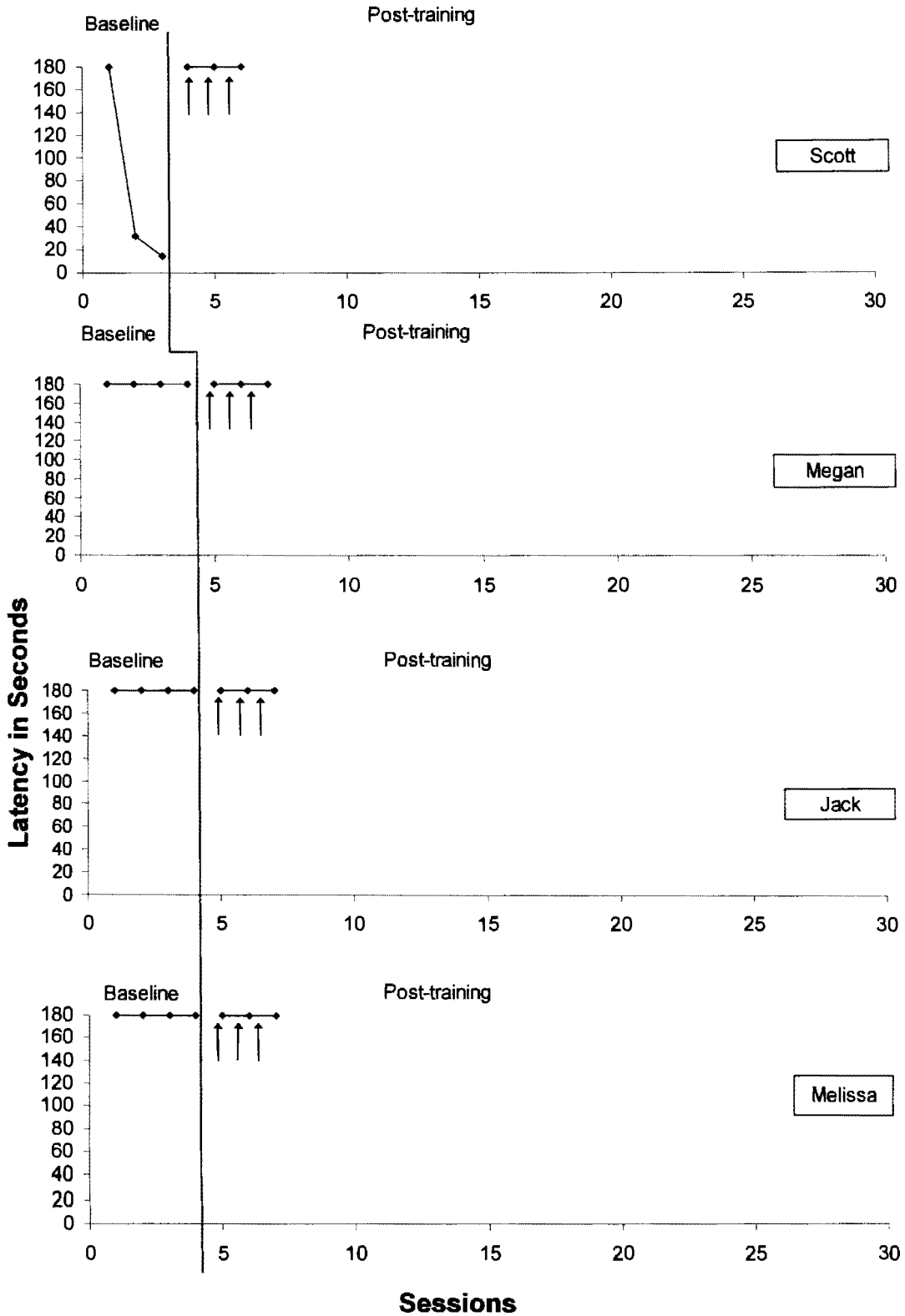

Figure 4. Latency to respond with exiting behaviors for Group 2.

Following the third *in situ training* session, a post-training assessment was conducted. As Figure 4 shows, none of the participants initiated exiting behaviors when a smoke detector was activated, so three additional but separate *in situ training* sessions were implemented.

Following the third *in situ training* session, a post-training assessment was conducted again and still none of the participants initiated exiting behaviors. Thus, three additional *in situ training* sessions were implemented and a post-training assessment was conducted following the third *in situ training* session. Again, none of the participants from Group home 2 initiated exiting behaviors.

Figure 5 represents data collected on the duration of time elapsed from the activation of a smoke detector until the participants were safely outside the building for Group home 2. During baseline assessments, none of the participants in Group home 2 exited the building following the activation of a smoke detector. Following training, three additional *in situ training* sessions were implemented before a post-training assessment was conducted (represented by an arrow on the graph).

The first post-training assessment revealed that none of the participants exited the building upon the activation of a smoke detector, thus three more *in situ training* sessions were implemented, and followed by another post-training assessment. Still, after six additional *in situ training* sessions, none of the participants exited the building following the activation of a smoke detector; therefore, three additional *in situ training* sessions were implemented followed by a post-training assessment. After nine additional *in situ training* sessions, the participants from Group home 2 did not exit the building.

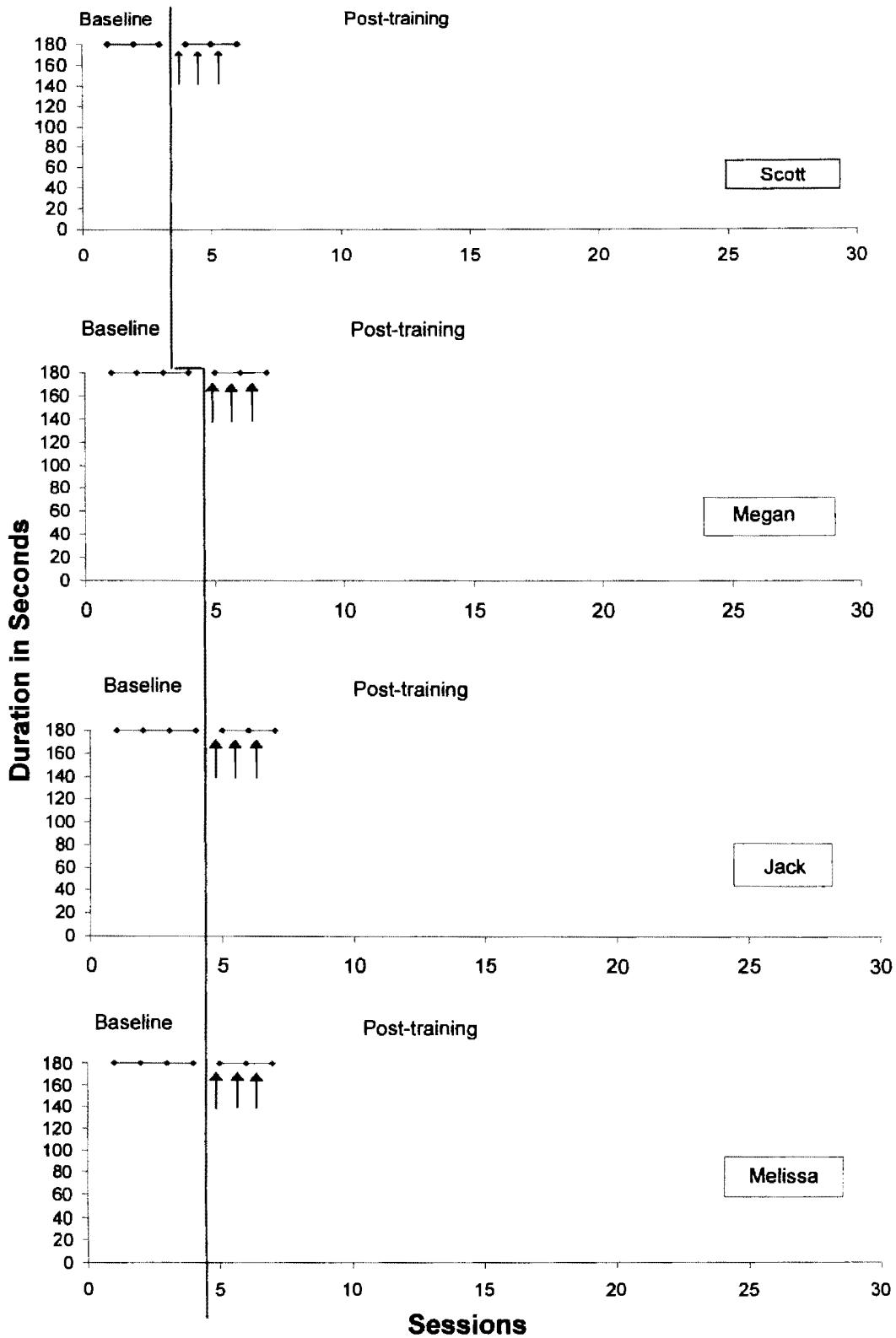

Figure 5. Duration of time to exit building for Group 2.

Figure 6 represents prompting data collected during training and *in situ training* sessions for Group home 2. At the start of training, Scott needed physical prompts to exit the building to the sound of a smoke detector. As training continued, Scott needed gestural or physical prompts on most trials but needed only a verbal prompt on 2 trials. During *in situ training*, Scott needed physical prompts in all but one trial in which it took only a verbal prompt to get him to exit the building. Megan, at the beginning of training, needed physical and gestural prompts but by the tenth trial only needed gestural and verbal prompts to exit the building. During *in situ training*, Megan needed gestural prompts on three trials, but only needed a verbal prompt on all other trials, including her last six trials. During both training and *in situ training*, Jack needed physical prompts to exit the building upon the activation of a smoke detector on all trials. Finally, Melissa needed physical prompts at the start of training but by the end of training she needed physical prompts at times and gestural prompts the other times. Following training, Melissa needed a gestural prompt once and all other trials she needed physical prompts to exit the building following the activation of a smoke detector.

The overall interobserver agreement for latency and duration is reported in a percentage. For Group home 1, there were 34.69% of sessions with interobserver agreement for latency with a range of 26.32%-47.06% across participants. For Group home 1, there were 37.25% of sessions with interobserver agreement for duration with a range of 26.32%-58.82% across participants. For Group home 2, there were 92.59% of sessions with interobserver agreement for latency with a range of 66.67%-100% across participants. For Group home 2, there were 92.59% of sessions with interobserver agreement for duration with a range of 66.67%-100% across participants.

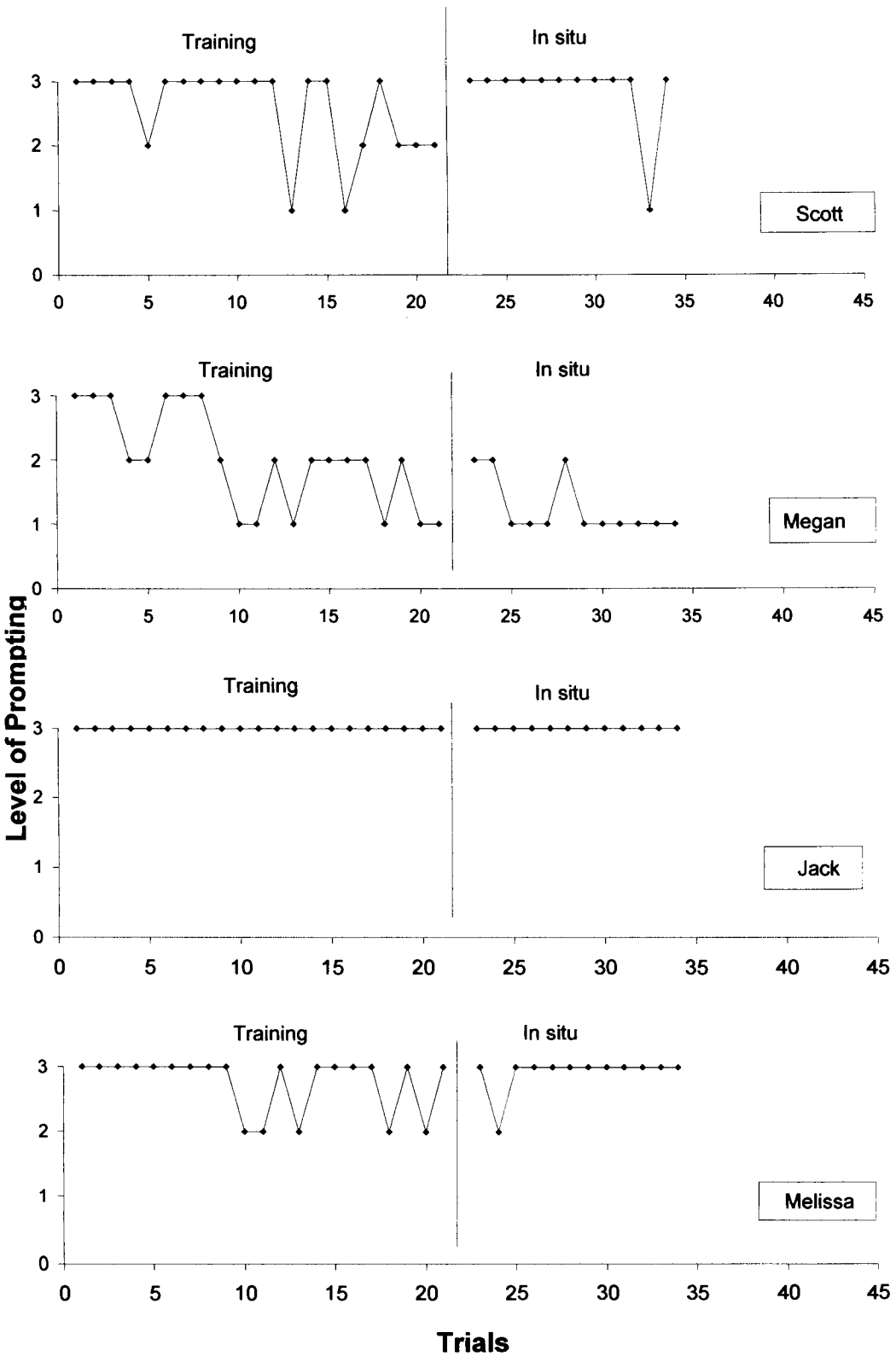

Figure 6. Level of prompting required to exit building for Group 2.

For Group home 1 there was an average of 97.6% interobserver agreement for latency with a range of 82-100%. Also for Group home 1, there was an average of 99.2% interobserver agreement for duration with a range of 92.5-100%. For Group home 2 there was an average of 99.8% interobserver agreement for latency with a range of 93.8%-100%. Also for Group home 2, there was an average of 100% interobserver agreement for duration.

DISCUSSION

The results of this study showed that one of the seven participants (Deanna) benefitted from training by learning to exit the group home in a timely fashion without prompts in response to the sound of a smoke detector. On just one occasion during the post-training phase did Deanna fail to exit the building, but it appeared that she did not hear the smoke detector during this assessment. Just before the start of the assessment Deanna shut her bedroom door and turned up her music, which may have prevented her from hearing the sound of the smoke detector.

Rick was the only other participant who may have benefited from training, but the decision in baseline to terminate recording the duration of the exiting behavior three minutes after the smoke detector was activated may have limited the conclusions that could be drawn about the effectiveness of training. Although Rick was ambulatory, he had substantial problems with walking unassisted and used a walker thus he walked very slowly. During baseline and intervention phases he always initiated exiting behaviors, although not typically within the 10 second time frame in baseline. In baseline he was moving slowly toward the exit on a number of occasions when recording was terminated after 3 minutes. As a result, the decision was made that Rick needed more time to exit the building. During the training phase, it was decided that if Rick initiated exiting behaviors and was still making an attempt to leave the building, the researchers would allow him more time without prompts from trainers to see if he did in fact independently exit the building. Because he was not given this same opportunity in baseline, it cannot be determined whether the intervention was effective for Rick.

All of the remaining participants (one from Group home 1 and all four from Group home 2) did not meet the training criteria, thus the training appeared to be ineffective in teaching these individuals to exit their residence upon the activation of a smoke detector. However, looking at the prompting data suggest the training did hold value for some of the remaining individuals in that following training less prompting from staff would be required to get these individuals to exit the group home in the event of a fire.

Lori from Group home 1 did not independently initiate exiting behaviors and never exited the building. Her prompting data show that at the start of training she needed physical prompts from the trainers to exit the building. However, by the end of training, she was initiating exiting behaviors and exiting the building with only verbal prompts from the trainers. Furthermore, by the time the study ended, Lori exited the building to the sight of the trainers when the smoke detector was activated and the trainers were entering the room to deliver prompts to the participants. If it would have been possible to continue training, it is possible that the prompts could have been faded until she initiated exiting behaviors and exited the building independently. Nonetheless, her staff now knows that in the event of a fire emergency, they might be able to tell Lori to get out of the building, whereas other residents might need physical assistance.

Megan was the other participant who required less intrusive prompting to exit the group home following training. During baseline, she required full physical guidance. Following training, she exited the building in response to a verbal prompt. Based on prompting data for Lori and Megan, it can be seen that, although not all individuals initiated exiting behaviors or exited the building independently upon hearing a smoke detector, improvements were made in reducing the level of prompts needed for some

individuals to exit the building. This is a valuable finding that has implications for staff behavior in the event of a real fire emergency. For example, if none of the individuals in Group home 2 had received training, in the case of a real fire emergency one could reasonably expect that their staff would have to physically guide each individual out of the home, as indicated during baseline assessments. Mere seconds in a real fire emergency can mean life or death to those inside. Based on the prompting data following training, one could conclude that in the event of a real fire emergency, staff may be able to verbally prompt Megan to get out while other residents might need full physical assistance. Having staff prepared with that knowledge could save time and potentially their lives in the event of a real fire emergency.

One consideration for our training effects is the severity of the diagnosis of Mental Retardation. The participants who seemed to benefit most from the training were Rick and Deanna from Group home 1. Deanna had a diagnosis of Severe Mental Retardation and Rick's severity was unknown and estimated to be moderate to severe. All of the participants at Group home 2 had a diagnosis of Profound Mental Retardation. Having limited time to conduct this study and limited access to each group home those individuals with a less severe diagnosis may have benefitted the most.

Furthermore, looking at the prompting data from those individuals diagnosed with Profound Mental Retardation may lead us to believe that if we had daily access to the group homes and had more time to continue the training and assessments we may have been able to reduce the level of prompt needed for the participant to safely exit the building or even exit independently.

Another consideration for the lack of treatment effects may have been the participants' prompt dependency from their staff. I was able to see each group home conduct one of their mandated fire drills in which staff activates the smoke detectors/fire alarms and then guide each individual out of the building. During the fire drill at Group home 1, Rick was the only one to leave his room and walked into the hall until a staff member guided him outside. Both Deanna and Lori waited until a staff member found them and guided them outside. During the fire drill at Group home 2, none of the participants left the room they were in or even got up from where they were sitting. They all needed the staff members to physically guide them outside. The fact that many of these individuals have been in group homes for numerous years and have experienced fire drills in this same manner may have conditioned them to wait for a staff member when they hear a smoke detector. This may be beneficial for the staff member when seeking out the individuals under their care but will only save their lives if that staff member can get to the individual.

One limitation of this study is the lack of follow-up data; it is unknown whether the skills taught during the treatment phase were maintained over time due to the lack of information collected following the study. Further research needs to been conducted in which a long term assessment of skill maintenance is assessed to determine the longevity of the treatment effects.

Another limitation of this study is the lack in the assessments of stimuli associated with real fire emergencies besides the use of smoke detectors. Smoke detectors similar to those found in both group homes were used but the researchers did not use heat, actual smoke, or a simulated fire to better imitate a real fire emergency. Due to the need to be safe

and the limited time in which to assess the participants, the possibility of including additional fire stimuli was limited.

Because the study used group homes in the local community, the main priority was that the participants initiate exiting behaviors quickly and exit the building independently or with the least intrusive prompt needed. Thus, the training used was relatively simple. Previous research in fire safety training for individuals with severe or profound mental retardation matched the complexity of training used in the current study. If the participants in the current study had been individuals with moderate and/or mild mental retardation then the complexity of the training and the skills taught during training would have been greater.

Numerous residential fires occur during the night; due to the absence of nighttime assessments in this study, questions can arise as to the generality of the safety skills trained. Due to the limited access in both group homes and the goal of keeping rapport high between the university and the residential group homes, trainings and assessments were conducted according to the group homes' schedules. Further research conducted in this area should assess the development and maintenance of treatment effects in teaching individuals with severe and profound developmental disabilities during both daytime and nighttime assessments.

Another limitation of this study was the decision to stop data collection at 180 seconds with Rick from Group home 1 during baseline. Following baseline, it was decided that due to Rick's mobility problems if after 180 seconds had elapsed Rick was still making a reasonable effort to exit the building, more time would be given before researchers intervened. Although the treatment effects cannot be compared to baseline for this reason, it is highly unlikely that during baseline assessments Rick would have exited the building

had he been given additional time. During many of the baseline assessments Rick walked pass the nearest available exit and wandered into different rooms around the group home; thus, Rick would not have met the criteria for additional time used during post-training (moving toward an exit) in these baseline assessments and would therefore not have been given additional time to exit the building.

Results of previous studies have shown that individuals with developmental disabilities can retain knowledge of fire safety skills. This study extends the previous literature by demonstrating that a behavioral skills training procedure was effective at teaching some individuals with developmental disabilities to engage in correct safety behaviors in the event of a fire, as assessed in naturalistic conditions. Furthermore, the results show that although individuals with profound mental retardation were not able to engage in the safety skills, they could be trained to respond to a less intrusive level of prompting and thus might be more likely to be saved in the event of a real fire emergency.

REFERENCES

Bannerman, D. J., Sheldon, J. B., & Sherman, J. A. (1991). Teaching adults with severe and profound retardation to exit their homes upon hearing a fire alarm. *Journal of Applied Behavior Analysis*. 24, 571-577.

Barillo, D. J. & Goode, R. (1996). Fire fatality study: demographics of fire victims. *Burns*. 22(2), 85-88.

Gatheridge, B. J., Miltenberger, R., Huneke, D. F., Satterlund, M.J., Mattern, A. R., J 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.

Himle, M., & Miltenberger, R. (2004). Preventing unintentional firearm injury in children: The need for behavioral skills training. *Education & Treatment of Children*, 27, 161-177.

Himle, M., Miltenberger, R., Gatheridge, B., & Flessner, C. (2004). An evaluation of two procedures for training skills to prevent gun play in children. *Pediatrics*, 113, 70-77.

Jones, R. T., Kazdin, A. E., & Haney, J. I. (1981a). Social validation and training of emergency fire safety skills for potential injury prevention and life saving. *Journal of Applied Behavior Analysis.* 14, 249-260.

Jones, R. T., Kazdin, A. E., & Haney, J. I. (1981b). A follow-up training emergency skills. *Behavior Therapy*. 12, 716-722.

Jones, R. T., Ollendick, T. H., McLaughlin, K. J., & Williams, C. E. (1989). Elaborative and behavioral rehearsal in the acquisition of fire emergency skills and the reduction of fear of fire. *Behavior Therapy*. 20, 93-101.

Jones, R. T. & Thorton, J. L. (1987). The acquisition and maintenance of emergency evacuation skills with mildly to moderately retarded adults in a community living arrangement. *Journal of Community Psychology*. 15, 205-215.

Katz, R.C. & Singh, N. N. (1986). Comprehensive fire-safety training for adult mentally retarded persons. *Journal of Mental Deficiency Research*. 30, 59-69.

Levin, B. M. & Nelson, H. E. (1981). Fire Safety and disabled persons. *Fire Journal*. 75(5), 35-40.

Lumley, V., Miltenberger, R., Long, E., Rapp, J., & Roberts, J. (1998). Evaluation of a sexual abuse prevention for adults with mental retardation. *Journal of Applied Behavior Analysis*, 31, 91-101.

Matson, J. L. (1980). Preventing home accidents, a training program for the retarded. *Behavior Modification*. 4(3), 397-410.

McConnell, C. F., Leeming, F. C., & Dwyer, W. O. (1996). Evaluation of a fire-safety training program for preschool children. *Journal of Community Psychology*. 24(3), 213-227.

Miltenberger, R., Roberts, J., Ellingson, S., Galensky, T., Rapp, J., Long, E., & Lumley, V. (1999). Training and generalization of sexual abuse prevention skills for women with mental retardation. *Journal of Applied Behavior Analysis*, 32, 385-388.

Mori, L. & Peterson, L. (1986). Training preschoolers in home safety skills to prevent inadvertent injury. *Journal of Clinical Child Psychology*. 15(2), 106-114.

Olsen-Woods, L., Miltenberger, R., & Foreman, G. (1998). The effects of correspondence training in abduction prevention training program. *Child & Family Behavior Therapy*, 20, 15-34.

Rae, R. & Roll, D. (1985). Fire safety training with adults who are profoundly mentally retarded. *Mental Retardation.* 23(1), 26-30.

Roberts, J., & Miltenberger, R. (1999). Emerging issues in the research on child sexual abuse and prevention. *Education & Treatment of Children*, 22, 84-102.

Shields, T. J., Smyth, B., Boyce, K. E., & Shilcok, G. W. (1999). Evacuation behaviors of occupants with learning difficulties in residential homes. *Disability and Rehabilitation.* 21(1), 39-48.

United States Fire Administration/National Fire Data Center A. (October, 2004). *Fire in the United States 1992-2001.* (Thirteenth Edition). Federal Emergency Management Agency: Department of Homeland Security.

United States Fire Administration/National Fire Data Center B. (December, 2004). *The Fire Risk to Children.* Topical Fire Research Series, Volume 4-Issue 8. Federal Emergency Management Agency: Department of Homeland Security.