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# Evaluation of Video Modeling and In Situ Training to Teach Gun Safety Skills to Individuals with Autism Spectrum Disorder

Kelsey Lynn Morgan
*University of South Florida*, kelsey.morgan@me.com

# Evaluation of Video Modeling and In Situ Training to Teach Gun Safety Skills to Individuals with Autism Spectrum Disorder

by

Kelsey Morgan

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Major Professor: Raymond G Miltenberger, Ph.D.
Kimberly Crosland, Ph.D.
Timothy Weil, Ph.D.

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## Abstract

Currently, there is no known research on teaching gun safety skills to individuals with developmental disabilities. Research has shown that children typically engage in gunplay behaviors if they find a firearm. These behaviors can lead to unintentional firearm injuries and even death, especially for young children. Previous research has shown the success of video modeling for teaching various skills to individuals with autism. This study examined the effectiveness of video modeling for teaching gun safety skills to three children with autism spectrum disorder, and found that video modeling was effective for one participant, but in situ training was needed to promote maintenance. For a second participant, IST was effective for skill acquisition and maintenance. Finally, a modified IST procedure was effective for a third participant when implemented by a trainer but not when implemented by his mother.

# Evaluation of Video Modeling and In Situ Training to Teach Gun Safety Skills To Individuals with Autism Spectrum Disorder

According to the Centers for Disease Control and Prevention (CDC) in 2007, firearm injuries accounted for the death of 38 children, ages one through nine. The CDC also reported over 329 non-fatal injuries in children less than 10 years of age in 2007. Eber, Annest, Mercy, and Ryan (2004) reported that, between the years 1993 and 2000, 143 children under age 14 were killed each year by firearms and 1222 were injured each year by firearms as a result of a child playing with and accidentally discharging a firearm. Most of these injuries and deaths from firearms resulted from children playing with firearms they found in the home (DiScala & Sege, 2004). Research by Jackman, Farah, Kellerman, and Simon (2001) showed that when children find guns, they often play with them, in many cases pulling the trigger. Other researchers have reported similar findings showing that children are likely to play with guns they find in the home (Eber et al., 2004; Hardy, Armstrong, Martin, & Strawn, 1996). Fortunately, a number of programs have been developed to teach children safety skills they need when they find a gun (Gatheridge et al., 2004; Himle, Miltenberger, Gatheridge, & Flessner, 2004; Miltenberger et al., 2004).

Firearm safety programs are aimed at teaching a child what to do if a firearm is found in his or her home or in a neighbor's home, because almost 76% of unintentional firearm injuries and deaths are sustained in a home (DiScala & Sege, 2004). Hardy et al. (1996) found that 65% of children, ages 4 to 6 years, reported that they had already seen a real gun, however, only 33% of their parents reported that their child is aware that they own a gun and has been allowed to handle it. Azrael, Miller, and Hemenway (2000)

found that 21% of gun owners store their guns loaded and 9% store them loaded and unlocked. Also, Hardy et al. interviewed parents and found that 32% did not believe their children would play with a firearm if they found one. However, Hardy et al. tested children by assessing their behavior when they found a gun and, of the 70 children assessed, 37 played with the gun. Furthermore, only one of the children actually discontinued play to alert a parent of the safety threat. Based on the results of these studies, it is clear that guns sometimes are not stored safely in the home and that when children find guns they often play with them. Therefore, it is important for children to learn the safety skills that will keep them safe when they find a gun.

The main programs that have been implemented to teach gun safety skills are the Eddie Eagle Gun Safe Program, Behavior Skills Training (BST), and In-Situ Training (IST) (Gatheridge et al., 2004; Himle, Miltenberger, Gatheridge, et al., 2004**)**. Each of these programs teaches three safety skills for the child to use upon finding a gun – don't touch it, get away, and tell an adult. These safety skills were scored on a 3 point scale (0=touched the gun, 1= did not touch the gun, 2= did not touch the gun and immediately left the room, 3= did not touch the gun, left the room, and told and adult).

In 1988, the National Rifle Association (NRA) started a program called the Eddie Eagle GunSafe Program. According to the NRA, more than 21 million children in 50 states have received training with the Eddie Eagle Program. However, from 1988 to 2007, the percentage of firearm deaths only decreased by .4%. In 1988, firearm-related injuries accounted for more than 1.9% of unintentional injuries in individuals under age 10, and in 2007, they accounted for 1.5% (Centers for Disease Control and Prevention, 2010). In 2004, Himle, Miltenberger, Gatheridge, et al. (2004) evaluated the Eddie Eagle

Program and assessed 4 and 5 year old children's safety skills through verbal assessments, role play assessments, and in situ assessments. On average, the children could describe the safety skills following training, but could not execute the safety skills during role play or in situ assessments. During an in situ assessment, the adult planted a disabled firearm in the environment and measured the child's behavior when the child found the gun without knowing that an assessment was taking place. Gatheridge et al. (2004) reported similar findings showing that the Eddie Eagle program was not effective in teaching safety skills with 6 and 7 year olds. Clearly, more effective techniques to teach gun safety skills are needed.

BST and IST are currently the most effective methods to teach gun safety skills (Himle, Miltenberger, Gatheridge, et al., 2004; Gatheridge et al., 2004; Miltenberger et al., 2004, 2005. 2009). Himle, Miltenberger, Gatheridge, et al. detailed BST to include four main features: instruction, modeling, rehearsal and feedback. Instruction includes describing the safety skills and the situations in which the participant needs to use the skills. Modeling involves a trainer engaging in the appropriate behaviors when finding a gun. The next step, rehearsal, allows each child a chance to engage in the safety skills upon finding a firearm. Most importantly, immediately following the safety behaviors praise and corrective feedback are given. If the child does not engage in the appropriate behaviors, the child is given feedback and then allowed to rehearse the behavior in the scenario again. Rehearsal is done until the child engages in the safety skills without assistance. Himle, Miltenberger, Gatheridge, et al. showed BST to be superior to Eddie Eagle for teaching safety skills to young children. The rehearsal along with immediate

praise and corrective feedback are the elements of BST that researchers credit for the success of the program.

In situ training involves placing the child in a naturalistic setting where the threat will occur and then providing on-the-spot training if the skills are not executed. In gun safety skills training, the child would be placed in a naturalistic setting where a disabled handgun has been intentionally left. For in situ training, confederates are either watching surreptitiously or there is a hidden camera placed in the room. When the child finds the gun and fails the assessment (by touching the gun or not leaving the area), the confederate then enters the room and turns the assessment into a training session by reminding the child of the appropriate behaviors and requiring the child to rehearse the appropriate behaviors numerous times. In situ training is one of the most effective tools for improving generalization because it acts as an instance for reinforcement for the correct behavior in a natural setting (Miltenberger et al., 2005).

Gatheridge et al. (2004) used BST successfully to teach gun safety skills to 6 and 7 year olds. In this study, the authors used self-report, role-play and in-situ assessments to evaluate BST and the Eddie Eagle program. The participants who received BST, on average scored at or above a 2.6 on self-report, role-play and in-situ assessments. Those participants who were in the Eddie Eagle condition, on average, scored: a 2.5 on the self-report assessment, a 2 on the role-play, and a .73 on the in-situ assessment. The .73 during the in-situ assessment was not significantly better than the control group who scored on average a .34 during the in-situ assessment. Furthermore, of those participants in the Eddie Eagle condition, none met criterion following training and in the BST condition, eleven of the fifteen participants met criterion following training. This

research shows that, although individuals who participate in Eddie Eagle are able to describe the safety skills and act out the skills during role plays, when assessed without their knowledge in naturalistic settings they are unable to perform the safety skills. Also, it suggests that BST is a more effective method to teach safety skills because the children are able to engage in the safety skills not only during self-report and role-play assessments but also during the in-situ assessments.

Miltenberger et al. (2004) and Himle, Miltenberger, Flessner, and Gatheridge (2004) showed that BST is successful for some children but that IST is needed to teach safety skills when BST had previously been unsuccessful. In these studies 4 and 5 year olds (Miltenberger et al., 2004) and 6 and 7 year olds (Himle, Miltenberger, Flessner, et al., 2004) received three sessions of BST to teach gun safety skills. Following BST, less than half of the participants exhibited the safety skills during in situ assessments. For the other participants, when IST was implemented following the failure of BST, the children demonstrated the safety skills (although one participant required an extra incentive). The results of Himle, Miltenberger, Flessner, et al. and Miltenberger et al. demonstrated that BST is not always effective and that IST is effective following the failure of BST for teaching safety skills.

Other research also has demonstrated that IST is effective when used in conjunction with BST (Miltenberger et al., 2005), when used following the Eddie Eagle program (Kelso, Miltenberger, Waters, Egemo-Helm, & Bagne, 2007), or when used by itself and does not follow the prior use of BST or Eddie Eagle (Miltenberger et al., 2009). The results of these studies suggest that IST is the most effective procedure for teaching safety skills to prevent gunplay. Similar results have been reported showing the

effectiveness of IST for teaching abduction prevention skills as well (Johnson et al., 2005, 2006).

Although research shows that BST and IST are effective for teaching gun safety skills to children, no research has been published on teaching gun safety skills to children with developmental disabilities (DD). However, research has shown that children with DD, including those diagnosed with autism, can acquire other safety skills, including abduction prevention (Gunby, Carr, & Leblanc, 2010). Gunby et al. (2010) taught abduction-prevention skills to three children with autism using behavior skills training (BST) and in situ feedback. Although BST and in situ training (IST) have been shown to be extremely effective in teaching typically developing individuals a wide range of safety skills, the research with individuals diagnosed with autism is far more limited. Other researchers have taught children with developmental disabilities skills to avoid stranger abduction (Gast, Collins, Wolery, & Jones, 1993), skills to seek assistance when lost (Taylor, Hughes, Richard, Hoch, & Coello, 2004), and pedestrian skills (Batu, Ergenekon, Erbas, & Akmanoglu, 2004).

Currently the CDC reports an estimated 1 in every 110 live births in the United States has Autism Spectrum Disorder. According to the Diagnostic and Statistical Manual of Mental Disorders (American Psychiatric Association, 2010), Autism Spectrum Disorder (ASD) is a disorder whose symptoms include lasting deficits in social interactions and communication across settings, and peculiar or repetitive behavior, interests, or activities. These symptoms begin during early childhood and cause impairment in day-to-day life (American Psychiatric Association, 2010). Because ASD is predominately a social disorder, a substantial amount of research has been done to

improve individuals' social behaviors, including teaching: conversational speech, perceptive taking, peer directed social language skills, social interactions, complex social sequences, and expressing empathy (Charlop & Milstein, 1989; LeBlanc et al., 2003; Maione & Mirenda, 2005; Nikopoulos & Keenan, 2004, 2007; Schrandt, Townsend, & Poulson, 2009). However, no research has been conducted on teaching gun safety skills to individuals with ASD.

Godish and Miltenberger (2010) evaluated for the first time the effectiveness of using video modeling to teach abduction prevention skills to individuals with ASD. All four participants acquired the safety skills and only one individual needed IST to maintain the behaviors during follow-up assessments. Video modeling previously had only been evaluated for teaching abduction prevention skills to typically developing children and was unsuccessful (Poche, Yoder, & Miltenberger, 1988). Abduction prevention skills are similar to the skills taught for preventing injury from guns. Both sets of safety skills include: avoiding the immediate safety threat, leaving the immediate area, and telling an adult about the threat.

In light of the success by Godish and Miltenberger (2010) in teaching abduction prevention skills to children with ASD using video modeling, and based on the success of video modeling to teach a range of other skills to children with ASD (Charlop & Milstein, 1989; Charlop-Christy, Le, & Freeman, 2000; LeBlanc et al., 2003; Maione & Mirenda, 2005; Nikopoulos & Keenan, 2004, 2007), video modeling may be a successful intervention for teaching gun safety skills as well. Therefore, the purpose of this study was to evaluate video modeling for teaching gun safety skills to children with autism spectrum disorder. Furthermore, considering the success of in situ training in previous

research, the second purpose of this study was to evaluate IST for teaching gun safety skills if video modeling was not successful.

## Method

### Participants

Participants were three 6 year olds with an autism spectrum disorder (ASD) diagnosis. Two of the participants were recruited through a flyer that was sent to local agencies in the community that provide ABA therapy. One of the participant's parents contacted the researcher after another participant's mother mentioned the research to her.

Steven was diagnosed with PDD-NOS at age 4 and was currently receiving 15 hours a week of ABA therapy at a local behavioral clinic for children with ASD. He lived at home with his parents, older brother, twin sister, and younger sister. His verbal behavior included tacts, mands, and intraverbals. He followed multi step instructions by his parents and typically did not require any prompting. He was in a general education classroom with an individualized education plan. He was also currently receiving 120 min a week of speech therapy at school. He scored a 108 on the communication domain of the Vineland-II parent/caregiver rating form. The Vineland-II parent/caregiver rating form was given to each participant's parent and is scored in a three scale-rating format. The form provides a standard score, with a mean of 100, and a standard deviation of 15. He was not on any medications at the time of the study. Steven's parents did not have any guns in their home, and reported that Steven had never seen nor handled a firearm before and never had any safety skills training on firearm avoidance.

Adam was diagnosed with autism at age 3. He was currently receiving 15-20 hours of in-home ABA therapy a week. He lived at home with his parents, an older

sister, and his fraternal twin brother. He used tacts and impure mands with his mom, the primary implementer of the treatment; however, he also engaged in pure mands and intraverbals with his ABA therapist. He followed one-step instructions from his parents, and multi-step instructions when his therapist was present. He scored a 95 on the communication domain of the Vineland-II parent/caregiver rating form. During the initial interview with his primary caregiver, his mother, she claimed he followed instructions without physical guidance, however, over the course of the study, it was observed that mom generally placed little to no demands on Adam, and when she did, full physical prompts were generally needed for him to comply with a low preference task. It was observed that, when his mom presented a demand, he generally required high levels of prompting, including physical, to engage in the task. However, when his ABA therapist presented a demand, he generally required no or minimal verbal prompts. His behavior therapist placed frequent demands on Adam and he engaged in the low preference tasks with extremely low latency and generally no prompts. His therapist seemed to function as a discriminative stimulus for compliance and verbal behavior and his mother was either a neutral stimulus or an S-delta for both verbal behavior and compliance with low preference tasks. Adam's parents did not have any guns in their home, and reported that Adam had never seen or handled a firearm before, and never had any safety skills training on firearm avoidance.

Jason was diagnosed with autism at age 3. At the time of testing, he did not have a verbal repertoire, however, he has since acquired tacts, mands, and intraverbals. He did have frequent echoic behaviors, but was able to follow multi step commands independently. He scored a 100 on the communication domain of the Vineland-II

parent/caregiver rating form. Jason lived at home with his parents and younger sister. He was enrolled in the local public school, where he was in an ASD classroom, and received speech therapy through the school. He was also on .75 mg of risperidone per day, which was started prior to baseline and continued throughout the study. Jason was reported to have extremely aggressive behaviors, which included: hitting and punching his parents and teachers, and throwing tangibles at various people and into walls, however, the aggressive behavior was not observed during any assessment or treatment session. His parents also reported that they have multiple handguns in the home. They reported they always keep the weapons locked and reported, to their knowledge, that Jason had not ever seen or had any access to any gun. He also never had any instructions on what to do if he finds a gun.

**Settings**

Baseline assessments, video-modeling sessions, in situ training, and follow-up assessments were all conducted in the participants' homes.

**Materials**

Three videos were made by the first author that contained six scenarios each of an individual finding a handgun, immediately leaving the area, and telling an adult about the gun. The models were three different boys, who ranged in ages from 6 to 8 years old. The videos included three different sized handguns that were placed in various locations around the house to promote generalization during training. On the first video, the start of each scenario included a verbal prompt of each safety skill. The verbal prompts were as follows: "Watch closely as Johnny walks into his parent's bedroom and finds a gun. He does not touch it, and right away leaves the room to tell his mom or dad." On the

second video, the first three scenarios included the verbal prompt, however, the three subsequent scenes did not. On the third and final video, no verbal prompts were included. For each scenario, after the child entered the room with the gun, the scene paused and a narrator asked the participant what the child in the video should do. The video included a 10 s pause to allow the participant to answer and then the narrator said, "If you said, not to touch the gun, leave the room, and tell his parents, you are correct! Now let's watch." If the participant did not answer, or answered incorrectly, the participant's parent was coached to prompt the child. Following the interactive component, the video then showed an example of the model engaging in the appropriate behavior, and receiving praise from their parents for notifying them of the threat.

Three handguns of various sizes were used during the assessments. The police department disabled all handguns used for assessment and training. A video baby monitor was also used to collect data during baseline, intervention and follow up assessments. The video monitor not only allowed the research and parent to take accurate data, it also allowed the parent and researcher to appropriately intervene with in situ training, when necessary.

**Target Behaviors**

The safety skills consisted of three behaviors that were executed when the participant found the gun; do not touch it, leave the room, and tell and adult. The target behaviors exhibited upon finding a gun were scored on a 0 to 3 point scale. A 0 was given if the child touched any part of the handgun. A 1 was given if the participant did not touch the handgun, but did not leave the immediate area within 10 s of seeing the gun. The participant received a 2 if he did not touch the gun and left the area within 10 s

of seeing the gun, but did not tell a parent or adult about the gun. If the participant did not touch the gun, left the area within 10 s, and informed a parent or adult of the handgun, he received a 3.

Data also were collected on the participants' responses to the videos. Frequency data were collected on the following behaviors: number of verbal prompts used to get the child to sit down in front of the video screen, number of correct responses following the narrator's questions, number of incorrect responses, and the number of verbal prompts given to the participant during the interactive components of the video.

**Assessment**

In-situ assessments were conducted during baseline, after each exposure to the video during intervention, and at various increments for follow up assessments. For two of the participants, in situ assessments were also done following the implementation of in situ training. All assessments were conducted in the participant's home. Without the child's knowledge, the parent placed a handgun in an obvious location (on a table) and set up the video monitor to unobtrusively observe the child's behavior in the presence of the gun. The parent asked the participant to go to the room for some reason (e.g., to receive his or her afternoon snack). Each assessment was different from prior assessments in location or reason for sending the child to the room.

**Interobserver Agreement**

Interobserver agreement (IOA) data were collected during all phases of the study. The parent of the participant acted as the primary observer and scored the child's behavior on the 4-point scale. The researcher acted as the secondary observer and, following the presentation of the video, the researcher left the home and then returned

without the knowledge of the child. IOA was calculated by dividing the number of agreements on the three target behaviors by number of agreements plus disagreements then multiplying by 100. IOA data were collected at each session during each phase and the parent and researcher had 100% agreement on all assessments.

**Research Design**

A multiple baseline across participants design was used to show the effects of video modeling to teach gun safety skills. Following baseline, video modeling was implemented. For two of the three participants, criterion was not met following video modeling; therefore, in situ training was implemented. Criterion level was met when the participant scored a 3 on three consecutive assessments.

**Procedures**

Once the parent contacted the researcher about the study, the researcher scheduled a meeting with the parent. In the meeting, the researcher briefly described the study and gave the consent forms to the parent. The researcher collected the signed consent form from the parent after 24 hours. During the meeting with the parent, the researcher spent a few minutes discussing various aspects of the current setting with the parent to determine if the child had the appropriate verbal repertoire for the study. The researcher asked the parent how his or her child would respond to various questions, such as: holding a water bottle and asking the child "what am I holding?" or engaging in an activity (e.g., playing a toy piano) and asking, "what am I doing?" These questions were asked to see if the child could describe events occurring in his environment. At the end of the meeting, baseline assessments were scheduled.

**Baseline**. In-situ assessments were conducted multiple times prior to intervention until stable responding was shown for each participant. During baseline, no feedback or other consequences were given to the participant. At the end of baseline, the researcher coached the parent on how to prompt the child to answer the narrator's questions in the video and when and how to praise the child during the video.

**Interactive video modeling.** Three times in one week, the researcher delivered the video to the participant's parent and asked the parent to have the child watch the video. The child watched the video in a room free from other distractions with no other people present except for the parent and researcher, who collected data on child and parent behavior while the child watched the video. Following each question posed by the narrator, the parent stopped the video and allowed the child time to answer the question. The child was prompted if he or she did not respond to the narrator's question within 5 s. Following the correct response, the parent played the video, in which the narrator provided the correct response. If the child answered incorrectly, the parent prompted the child, and asked the question again until the child answered the correctly. If the child did answer correctly, the parent provided praise.

After watching the video, within the hour (but no sooner than 45 min), the child was instructed to enter a specific room where a disarmed handgun had been left. With the use of a baby monitor, the parent and the researcher watched the child's behaviors from another room. If the child scored a 3, immediately after the child informed the parent of the threat, the parent delivered appropriate praise. These procedures were repeated two times on separate days and, if the child did not receive a score of 3 in three consecutive assessments, in-situ training was implemented. Following the second

assessment, if the child had not scored a 3 the researcher trained the parent to implement IST following the next assessment if the child again did not score a 3. However, if the participant had gained a skill during the video modeling phase, and there was an increasing trend from baseline, another assessment was conducted within three days of the third exposure to the video. If the participant did not score a three during that assessment, in situ training was immediately implemented. The criteria to implement IST were as follows: if the child scored two 3s and then anything else, another assessment occurred, if the child scored one 3 and then two scores of anything else, IST was implemented, and if the child scored a 3 on the first and third assessment, but not on the second assessment, a further assessment occurred. For further assessments, decisions to continue assessments or implement IST were made according to the following criteria: if the participant received a 3, assessments continued until three consecutive scores of a 3 occur, however, if the child received anything other than a 3, IST was implemented.

**Parent in-situ training.** In situ training is a technique used to teach an individual the safety skills in a naturalistic setting following the failure to use the safety skills during an in situ assessment. The parent observed the in-situ assessment surreptitiously and if the child did not engage in the safety skills, the parent immediately turned the assessment into a training session. The parent entered the room, found the child in the presence of a firearm, and had the child rehearse the appropriate behaviors. If the child engaged in the safety skills during the in situ assessment, in situ training was not conducted. In situ assessments and trainings were repeated until criterion was met; the child scores a 3 for three consecutive assessments. The researcher collected treatment fidelity data during

each in-situ training session and provided specific feedback to the parent following each training session.

**Expert in-situ training.** One participant, Adam, did not exhibit the target behaviors following video modeling or the standard in situ training implemented by his mom. It was hypothesized that his noncompliance with rehearsals during in situ training was attention maintained problem behavior due to the observation that he engaged in similar attention maintained problem behavior with his mom on a regular basis. Therefore, the researcher had the participant's behavior therapist implement in situ training with an added component - extinction (no attention or access to tangible reinforcers contingent on refusing to engage in the target behaviors) and the addition of primary reinforcers (the choice of edibles) as a consequence for complying with the demand to rehearse the safety skills. The behavior therapist who conducted in situ training was enrolled in a master's degree program in applied behavior analysis and worked with the participant, individually, in the home as part of her practicum training.

**Follow up assessment.** The researcher assessed the maintenance of the behaviors at 1 week, 3 weeks, and 5 weeks following the end of the treatment phase. The follow up assessments were the same as the in-situ assessments conducted during baseline and intervention. Prior to each assessment, the researcher reviewed with the parent the appropriate consequence and IST techniques. If the participant scored less than a 3 during any follow-up assessments, in-situ training was implemented and another follow up assessment was conducted within three days.

## Results

The results for the three participants are shown in Figure 1. Steven's data are in the top panel. He met criterion through the video modeling alone, and although his behaviors did not maintain at the one-week follow up assessment, following one in situ training session, he performed the safety skills at 3 and 5 week follow up assessments. The other two participants acquired the three target behaviors through in situ training, with Jason meeting criterion and maintaining the performance at 1, 3, and 5 week follow up assessments.

During both baseline assessments Steven touched the gun and scored a 0. At the assessment that followed the first video, Steven engaged in the three target behaviors and scored a 3. Steven met criterion following the third video modeling assessment, and was not assessed again until the one-week follow up. At the one-week follow up, Steven scored a 2 (did not touch the gun and got away). In situ training was immediately implemented. When Steven's mom walked with him back into the room, he immediately informed her of the gun. Another assessment was conducted within 24 hr and Steven engaged in all three target behaviors, and received a 3. Steven's behavior maintained during the 3 and 5 week follow up.

During baseline, Adam's behaviors were inconsistent. On the first and third assessment he did not touch the gun, but he did touch the gun on the second assessment. Adam scored a 1 and 0 on the first two assessments in the video modeling phase and because he scored a 2 on the third assessment a fourth assessment was conducted. In the fourth assessment, Adam touched the gun and in situ training was immediately implemented. After the first in situ training session, Adam did not touch the gun, and

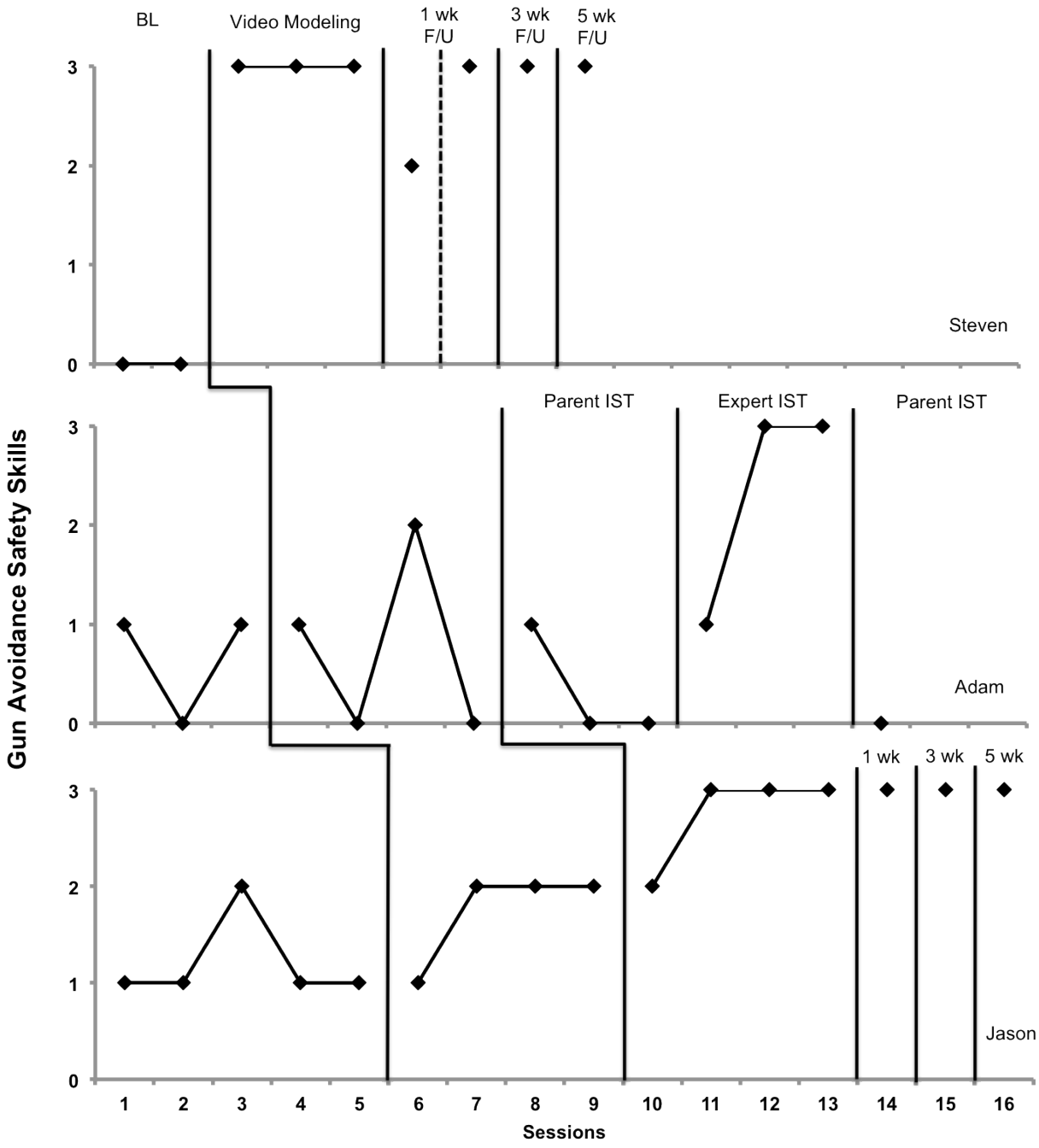


Figure 1. The safety skill scores for each participant during the in-situ assessments across baseline, video modeling, in situ training and follow-up phases

received a one. After two more in situ training sessions, Adam touched the gun and the modified procedure was implemented. Following one in situ training session provided by Adam's behavior therapist, an immediate increase in skills was observed with two scores of 3. However, when the behavior therapist was not present in the final assessment, Adam did not engage in any of the target behaviors. Following the last in situ training session, Adam's mom notified the researcher that she did not wish to continue.

In baseline assessments, Jason, scored a 1 for four assessments (assessments 1, 2, 4, 5), however, on the third assessment he left the room and received a 2. After Jason initially watched the video, he scored a 1. After watching the video a second and third time, Jason scored a 2 for three consecutive assessments and in situ training was implemented. After two in situ training sessions Jason independently engaged in all three target behaviors, and met criterion. Follow up data were collected 1 week after criterion was met and all three target behaviors maintained.

As seen in Table 1, during the first video, Steven answered one question wrong, and only needed one verbal prompt to engage in the appropriate response. During the second and third video, Steven answered all the questions correctly and required no prompting. During the video modeling phase, Adam required no prompting to sit down and watch any of the videos, however, he did require a high level of verbal prompts to engage in the correct responses to the questions in the video. Data were not taken on correct or incorrect responses or number of prompts needed to verbally recall the safety skills during the first video. During the second and third videos, data were collected on his behaviors. During the second video, he only answered one question correctly, and required eight verbal prompts to engage in the correct response for the five questions he

Table 1.
*The responses of participants during the implementation of the video.*

| Participant's name / Video Number | # of Prompts to go to the Video | # of correct answers | # of verbal prompts | # of incorrect answers |
|---|---|---|---|---|
| Steven | | | | |
| Video 1 | 0 | 5 | 1 | 1 |
| Video 2 | 0 | 6 | 0 | 0 |
| Video 3 | 0 | 6 | 0 | 0 |
| Adam | | | | |
| Video 1 | 0 | n/a | n/a | n/a |
| Video 2 | 0 | 1 | 8 | 5 |
| Video 3 | 0 | 2 | 7 | 4 |
| Jason | | | | |
| Video 1 | 5 | 2 | 4 | 4 |
| Video 2 | 0 | 4 | 2 | 2 |
| Video 3 | 0 | 5 | 1 | 1 |

missed. During the third and final video, Adam answered two questions correctly and required seven verbal prompts to correctly answer the four other questions.

As seen in Table 1, Jason required five verbal prompts to sit down in front of the television to watch the first video, and only answered the last two scenarios correctly. He required a prompt during each of the first four scenarios; however, he only needed one verbal prompt to engage in the correct answer. During the second and third videos, Jason's engagement behaviors were much higher. He required no initial prompts to sit down and watch the video, and got four and five questions correct, respectively. Again, after one verbal prompt, for the incorrect responses, he was able to engage in the correct response.

**Treatment Integrity**

The researcher scored the parent's behavior during the in situ training to determine the level of treatment integrity. During in situ training, treatment integrity was 100% for Jason and Steven, but was much lower for Adam. Treatment integrity data were taken for three of the parent-implemented in situ trainings and one of the expert implemented in situ trainings. During the parent implementation, the integrity was 66%, 58% and 58%, respectively. When the expert was present, the treatment integrity was 100%.

## Discussion

The purpose of the current study was to evaluate the effectiveness of video modeling to teach gun safety skills to three individuals with autism spectrum disorder. Results showed that video modeling was an effective technique for one individual, but not for two others. Further research should be done to expand on these findings by; a)

identifying the characteristics of participants most likely to benefit from video modeling and b) investigating the conditions under which video modeling is most likely to be effective for teaching safety skills. The results of this investigation also showed that parent implemented in situ training was effective for one participant and that therapist implemented in situ training was effective for one participant after parent implemented in situ training failed.

Although the three participants each showed different results, the researchers believe it to be partly a result of the differences in the three participants and their level of active and correct responding as they watched the video. Steven, who answered seventeen of the eighteen questions for the three videos correctly, acquired the three target behaviors following the video alone. However, the other two participants who had lower rates of correct responding, did not acquire the skills through video modeling. Adam, who was unable to reach criterion before he was removed from the study, required the highest frequency of verbal prompts and achieved the lowest level of correct responding. As discussed in the initial information about the participants, Adam did not frequently engage in low preference tasks unless physically prompted by mom. He was prompt-dependent with his mom but not with his behavior therapist, which could have been a variable accounting for the lack of success of implementation by mom and the researcher. Furthermore, when the procedures were implemented by his behavior therapist, he correctly engaged in all three target behaviors, strengthening the hypothesis that his mother and the researcher did not have stimulus control, but his behavior therapist did.

The two individuals who acquired the skills exhibited a counting behavior that was not directly taught to either individual. Each participant upon seeing the gun verbally counted out loud through the three steps. Jason would also use his fingers to count through the steps, a possible self-mediated extra stimulus prompt. This counting behavior was never observed during the assessments with Adam, the participant who needed expert implemented IST. In the first assessment following the viewing of the first video, Steven engaged in the counting behavior, however, Jason did not engage in the counting behavior until the assessment following the second IST.

In figure 1, there is one overlapping data point from baseline to video modeling for Jason. It is important to note that, throughout the study, his father was working 90 – 95 hours a week and thus was rarely home while Jason was awake. However, during the third baseline assessment his father was present in the home. Jason was told, by mom, to go into his bedroom and play with his train, however, he walked into his bedroom, grabbed the train and brought it out to show his dad. His father was not present during any other assessments. Although it is difficult to conclude this much from one data point, it is not believed that Jason actually identified a safety threat and left the room, but more likely that attention from his dad functioned as a reinforcer and Jason left the room to access the attention.

Furthermore, during the assessments with Steven when he received a 0, he only touched the gun with one or two fingers; he did not physically pick up the gun at any point. In the treatment phase, when Adam scored a 0, he physically picked up the gun and was pointing it. He seemed to already know how to hold the gun, which was not portrayed in any of the videos or during in situ training. The researchers believe he

acquired those skills from his peers, siblings and or from various television shows or movies.

The Vineland-II parent/caregiver rating form was used to access to verbal skills of each participant, however, the scores did not show significant differences between the participants. The form did not account for the spontaneous verbal behavior that is required in this study, it only asked if the individual could answer various questions correctly. It predominately focused on tacts and mands, and did not really account for the intraverbal component of language. This higher level of verbal behavior is needed to acquire rule-governed behavior, however, it was unable to be measured through a standard assessment. Further research should be done to create a standard assessment tool for calculating intraverbal behavior, to help determine inclusion/exclusion criteria for the implementation of procedures that have a rule-governed behavior component.

Future research should be done to determine the possible causes for the different pattern of results across participants, especially the lack of success with two participants. These findings are not consistent with previous research that shows repeated success in teaching individuals with autism spectrum disorder various skills through interactive video modeling (Charlop & Milstein, 1989; Charlop-Christy et al., 2000; Godish & Miltenberger, 2010; LeBlanc et al., 2003; Maione & Mirenda, 2005; Nikopoulos & Keenan, 2004, 2007). Furthermore, future research should also expand on the findings of a lack of success of the parent implemented in situ training for Adam. The findings are not consistent with previous research showing success in implementation of parent mediated in situ training (e. g., Beck & Miltenberger, 2009) but are consistent with the finding from Gross et al. (2007) showing that low treatment integrity resulted in failure of

BST and IST implemented by a parent for teaching safety skills. Future research should evaluate inclusion and exclusion criteria for success of parent mediated in situ training, such as level of prompting required by the parent for an individual to comply with a low preference task. Also, the addition of a compliance scale could be included to increase the likelihood of having participants who will benefit from these procedures.

A limitation of the current study is that the inclusion criteria could have been too broad and possibly included participants who were not high enough functioning, verbally or socially, to benefit from the interactive video modeling. Future research should expand on these findings through the replication of the procedures with multiple participants who are similar in verbal skills to Steven, and who have also been previously diagnosed with an autism spectrum disorder. Future research should also include detailed participant descriptions to behaviorally define "high functioning autism" to better expand the research on which participants are most likely to benefit from video modeling. Furthermore, inclusion of participants with varied levels of functioning might establish the level of functioning necessary to derive benefit from video modeling.

According to these findings, interactive video modeling for teaching a child with ASD to act safely when finding a gun is most successful when utilized for an individual who has average verbal skills and meets criterion for autism spectrum disorder. The results of the current study and those of Godish and Miltenberger (2010) suggest a combination of the two must be present for success in teaching safety skills through video modeling. Future research should also focus on determining what behavioral characteristics of children diagnosed with autism spectrum disorder determine the success of video modeling. These behavioral characteristics (e. g., language abilities, level of

sustained attention to tasks, degree of compliance with caregiver or teacher requests, presence of escape maintained problem behaviors, history of exposure to video modeling for skill acquisition) could be evaluated in future research to determine the factors that contribute to success of video modeling.

In summary, this study is one of the few that evaluates procedures for teaching safety skills to children with autism (e.g., Gunby et al., 2010; Godish & Miltenberger, 2010; Taylor et al., 2004), and the first to target safety skills to prevent firearm injury. The results show that video modeling was effective for only one of three participants. Further research evaluating the success of video modeling is important because video modeling is an efficient training procedure that can be easily disseminated and thus made available to many children with autism. Interactive video modeling programs could be made available through schools for use by teachers or through the retail market for purchase and use by parents. Therefore, it is important to further evaluate who is most and least likely to benefit from the procedure so a) those most likely to benefit can be the targets of dissemination efforts, and b) those least likely to benefit can be directed to more intensive training procedures such as in situ training.

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