TEACHING INDIVIDUALS WITH AUTISM SPECTRUM DISORDER SAFE PEDESTRIAN SKILLS USING VIDEO MODELING WITH IN SITU VIDEO PROMPTING

by

Toby Honsberger

A Dissertation Submitted to the Faculty of
The College of Education
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Doctor of Education

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This dissertation was prepared under the direction of the candidate’s dissertation advisor, Dr. Cynthia L. Wilson, Department of Exceptional Student Education, and has been approved by the members of his supervisory committee. It was submitted to the faculty of the College of Education and was accepted in partial fulfillment of the requirements for the degree of Doctor of Education.

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ABSTRACT

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Title: Teaching Individuals with Autism Spectrum Disorder Safe Pedestrian Skills Using Video Modeling with In Situ Video Prompting
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Autism spectrum disorder (ASD) affects 1 in every 68 children. Individuals with ASD have deficits in social, communication and behavioral skills which put them at a higher risk of injury and death than their typically developing peers. Parking lots are environments that present a number of potentially dangerous situations. Pedestrian skills, due to reliance on subtle cues and quick problem solving, can be especially difficult for individuals with ASD to master. The present study used a multiple probe design across participants to examine the effectiveness of a video modeling intervention with in situ video prompting feedback to teach five individuals with ASD to safely navigate a parking lot. Results of the study revealed that all five participants rapidly acquired the targeted skills and the skills were maintained in the absence of the video intervention at one week and two week intervals. Suggestions for further applications of the intervention package and implications for safety instruction are also offered.
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CHAPTER 1: INTRODUCTION

The Centers for Disease Control and Prevention (CDC) estimates that one in every sixty-eight children have been identified with ASD, which includes one in every forty-two boys. This prevalence has increased over the last twelve years from one in one-hundred fifty in 2002 (Interagency Autism Coordinating Committee, 2014). ASD begins before a child turns three years old and can be sometimes identified as early as 18 months or younger. ASD is a life-long condition – however the symptoms of the condition may improve over the individual’s life span. The presence of ASD occurs equally in all racial, ethnic, and socioeconomic groups (Centers for Disease Control and Prevention, 2012).

There are two broad categories that ASD is defined by which are also commonly used as diagnostic criteria for the disorder. Deficits in social communication and social interactions are the first common symptom of ASD. This may manifest itself as an individual displaying difficulty sharing interests of others, or not initiating or reciprocating social interactions with others. The second deficit exhibited by individuals with ASD is displaying repetitive patterns of behaviors and exhibiting restricted interests and activities. These deficits may consist of stereotypic or repetitive motor movements or vocalizations, a strong desire to adhere to routines or rituals, abnormal intensity in the focus or intent on objects or activities of interest, and hyper or hypo sensitivity to sensory aspects in one’s environment (e.g., light, sound, smells, textures etc.; American Psychiatric Association, 2013). An individual with a diagnosis of ASD may exhibit all or some of the above indicators at varying degrees.
Autism Spectrum Disorder and Safety Skills

Injuries are the leading cause of death and disability in children in the United States (US) and Canada (Federal Interagency Forum on Child and Family Statistics, 2006). Additionally, millions of American children are injured each year and survive, often with life-long health, social and/or financial burdens (CDC, 2009). Children with ASD and other developmental disabilities have an increased rate of injury than that of their typically developing peers (Lee, Harrington, Chang, & Connors, 2008). Jain et al. (2014) report that children with ASD are 12% more likely to experience injury than those children without ASD. It is also known that children with mental or developmental disabilities such as ASD are more likely to experience nonfatal injury with greater severity than typical peers (Xiang, Stallones, Chen, Hostetler, & Kelleher, 2005).

Over fifty percent of individuals with ASD exhibit a behavior known as elopement or wandering (i.e., leaving an area or safe proximity of a caregiver without supervision, or permission; Law & Anderson, 2011). Dangerous elopement behavior often exposes individuals with ASD to unsupervised environments/situations in which they may lack the necessary skills to keep themselves safe. A survey of 121 parents of individuals with developmental disabilities by Agran and Krupp (2010) revealed that 93% of parents felt that implicit instruction of safety skills was very important for their children. However, only 19% of those same parents reported that safety skill instruction had ever been included on their child’s individual education programs (IEP). Ivey (2007) surveyed teachers of students with ASD and discovered that the sampled teachers reported that the most important outcome for their students was safety. Shavelle and colleagues validate parents’ and teachers’ concerns with a study which reveals that
children with ASD or intellectual disability are three times more likely to drown than compared to their typically developing peers (Shavelle, Strauss, & Picket, 2001). Similarly, Mouridsen, Brønnum-Hansen, Rich, and Isager (2008) found the mortality rate for individuals with ASD to be two times higher when compared to the same aged and sex Danish population.

Hazards associated with traffic are present in virtually all environments including home and school; rural and urban. Individuals with pedestrian skill deficits need only make a single error to experience dire consequences. The US Department of Transportation reports that in 2010 4,280 pedestrians were killed in traffic related crashes in the United States and another 70,000 pedestrians were injured (Department of Transportation, National Highway Traffic Safety Administration [NHTSA], 2012). Individuals with ASD often have poor pedestrian skills due to their insensitivity to subtle environmental cues and deficient problem solving in unfamiliar environments (Goldsmith, 2009; Josman, Ben-Chaim, Friedrich, & Weiss, 2008). In addition to basic street-crossing risks, parking lots present a plethora of dangerous situations for pedestrians which require a unique set of skills to be able to navigate safely. A study in Montgomery County, Maryland revealed that over 23% of pedestrian-automobile accidents during a five year span in that county occurred in parking lots (Stark, 2012). Thus, teaching personal safety skills is recognized as an integral component for individuals with ASD and other developmental disabilities – considered by many as important as teaching communication, motor, or social skills (Collins, Wolery, & Gast, 1991).
**Natural Environment Teaching**

Traditional teaching technologies are commonly not effective for individuals with ASD (Green, 2001). An obstacle experienced when teaching safety skills to individuals with ASD is that skills taught in contrived classroom settings are often not displayed within the natural setting. Mechling (2008) maintains that for safety skills to be functional they must be generalized across the settings and situations in which they will be required to be exhibited and consequently safety skills instruction must evaluate generalization to the natural environment.

Gast, Collins, Wolery, and Jones (1993) found that students did not generalize the skills taught in a classroom setting to safely respond to the abduction lures of strangers until they received instruction in the natural environment. In 1980, Matson compared two instructional methods to teach individuals with intellectual disabilities safe street crossing: classroom instruction and instruction at a constructed intersection on the hospital grounds. Matson found instruction in the natural setting to be more effective. In another study about teaching safety skills to children, Himle, Miltenberger, Flessner, and Gatheridge (2004) assessed a commercial gun safety program for 4 and 5 year old children. The researchers found that the children could describe the safety skills following the program but could not display the skills during in situ assessments. Collins, Stinson, and Land in 1993 discovered that there were little to no effects when safety skills were taught in a simulated classroom environment before in vivo instruction in the natural environment as compared to in vivo instruction alone.

Teachers are presented with the quandary of how to teach safety skills while providing the experience of natural settings in which the skill will be required to be
displayed and keeping the individual safe while doing so. Research has shown training and/or providing feedback within the natural environment to be effective to generalize targeted skills beyond training situations and maintain in follow up sessions (Gatheridge et al., 2004; Miltenberger et al., 2004). This natural environment training and feedback is commonly called in situ or in vivo training. In situ training typically involves placing an individual in the environment where the skill would be naturally displayed and then providing on-the-spot training if the proper skills are not performed. The potential advantage of training in vivo, or in situ, is if the skill is demonstrated in the actual environment that it needs to be displayed, then it is apt to persist within that environment post training (Dixon, Bergstrom, Smith, & Tarbox, 2010).

**Video Modeling**

Video technology is a possible means for providing lifelike examples of difficult to simulate or dangerous situations. Mechling (2008) suggests that the use of video technology shows promise when teaching safety skills by providing real-life examples of dangerous situations or situations that may be hard to simulate. But use of this technology for safety skill instruction remains relatively unexplored. Instructional video technology includes video modeling, which involves watching a model perform a comprehensive skill then completing the skill afterwards, and video prompting, which involves watching a short video segment and immediately carrying out the specific modeled behavior before viewing the next segment (Mechling, 2008).

Effective teaching practices for individuals with ASD abound in the literature including the use of video modeling. In 2009, the National Autism Center published a National Standards Report which sought to establish a set of standards for effective,
research-validated educational and behavioral interventions for individuals with ASD. Within this report, video modeling was one of eleven treatments that were determined to be “established”, that is treatments with compelling scientific evidence to show the intervention is effective for individuals with ASD (Wilczynski et al., 2009). Video modeling utilizes visually cued instruction, a powerful learning strategy for children with ASD, combined with modeling, a frequently studied effective intervention (Akullian & Bellini, 2007). Research has shown that skills learned via video modeling generalize across different people, settings and conditions and that the skills acquired through video modeling can be maintained for extended periods following the intervention (Akullian & Bellini, 2007; Charlop-Christy, Le, & Freeman, 2000; Dowrick, 1999). This utility of video modeling is particularly important for individuals with ASD due to their difficulties transferring skills from one setting to another (Akullian & Bellini, 2007). Video modeling has been shown to be effective at teaching a wide variety of skills including; play, social, and communication skills (Akullian & Bellini, 2007; Ayres & Langone, 2005; Charlop-Christy et al., 2000; MacDonald, Clark, Garrigan, & Vangala, 2005; Nikopoulos & Keenan, 2003).

Statement of the Problem

Unintentional injuries are the leading cause of death and disability in children. Preventable circumstances continually take the lives and/or severely harm our children at disturbing rates. With such a high prevalence of children with ASD in our society today, a population that is being injured and dying at a significantly higher rate than typically developing children, there is a critical need to develop interventions to keep these individuals safe. To help keep children, including those with ASD safe, it is imperative
our society put extensive effort into prevention of these avoidable incidents. There are inherent risks involving vehicles and pedestrians. The relative mass of vehicles and the speeds at which they travel make meetings between vehicles and pedestrians dire. The environment where pedestrians and vehicles most commonly intermingle is parking lots – making pedestrian safety in parking lots of utmost importance. A parking lot is full of subtle cues requiring quick problem solving to navigate safely – this required repertoire of skills are common deficits in children with ASD putting this population at a high risk in such an environment.

Past research in the field of exceptional student education and ASD has identified empirically based interventions proven effective for individuals with ASD. Instructional technologies such as video modeling, behavior skills training and natural environment training each have been demonstrated effective in teaching individuals with ASD new skills. Current research continues to fine tune and further develop these strategies in new and innovative ways so as to help more children on the autism spectrum. Advances in technology have provided the ability to bring interventions like video modeling into the natural environment. An intervention which was previously limited by its reliance on large video playback equipment, video modeling can now be implemented to provide in situ training and feedback in the natural environment. Issues such as pedestrian safety for individuals with ASD can now be addressed via video modeling with in situ feedback within the natural environment.

**Purpose of the Study**

The present study sought to combine the benefits of training within the natural environment and the use of video technology to determine if the use of video modeling
with in situ video prompting would be effective in teaching individuals with ASD safe pedestrian skills in a parking lot. This study also examined whether such skills would be demonstrated in the absence of the video model after training. In addition, the present study explored whether skills learned would be maintained without a video over time.

**Research Questions**

1. Will video modeling with in situ video prompting be effective in teaching individuals with ASD the skills necessary to safely navigate a parking lot?
2. Will individuals demonstrate the skills learned via the video technology intervention in the absence of the video model?
3. Will these skills maintain over time after the video modeling intervention is removed?

**Definitions**

*Autism Spectrum Disorder (ASD)*: a group of developmental disabilities that are characterized by significant social, communication, and behavioral challenges.

*Behavior Skills Training*: an instructional package which includes instruction, modeling, rehearsal and feedback to teach new skills.

*Confederate*: an adult member of the research team who assists in a study without the participant(s) being aware of the adult’s involvement.

*Discriminative Stimulus*: a stimulus in the presence of which a particular response will be reinforced (an initial instruction).

*In Situ/in Vivo Assessment*: an evaluation of a participant’s behavior in a natural setting when the participant is unaware he or she is being evaluated.
**In Situ/In Vivo Training**: instruction provided within the environment that the target skill will be expected to be performed.

**Maintenance**: a measure to determine if an acquired behavior is performed after a passage of time following an intervention.

**Probe**: a data point collected in the absence of an independent variable.

**Radburn Principle**: an international urban planning standard which prioritizes pedestrian safety by separating vehicle paths from pedestrian paths.

**Safety Skills**: behaviors that may be preventative, to avoid potentially dangerous situations, or reactive, to allow escape from present dangerous situations.

**Video Modeling**: involves an individual watching the performance of a target behavior via video and then given the opportunity to perform the observed skill.

**Video Prompting**: involves an individual watching the performance of an individual step of a task analyzed target behavior via video then given the opportunity to perform the observed step.
CHAPTER 2: LITERATURE REVIEW

This chapter presents a review of the existing literature relevant to this study. After a general overview of literature pertaining to safety and pedestrian skills for individuals with ASD and other developmental disabilities, the chapter discusses previous research that has examined the use of video modeling to teach general safety skills. Next, this chapter synthesizes research that has looked at teaching individuals with developmental disabilities pedestrian skills. The chapter concludes with identification of the gaps that exist in the literature when it comes to using video technology to teach persons with ASD pedestrian skills, namely parking lot safety.

The safety of individuals, with or without ASD, is inherently important in our society, consequently a number of studies have been published on teaching a variety of safety skills. Of these peer reviewed studies available, teaching safety skills to individuals with ASD and other developmental disabilities are present to a smaller degree in the literature. Similarly there are relatively few studies examining natural environment training and in situ feedback. Studies examining means to teach individuals with ASD pedestrian skills are also present in the literature, mostly skills associated with crossing the street (Batu, Ergenekon, Erbas, & Akmanoglu, 2004; Collins et al., 1993; Josman, et al., 2008; Marchetti, McCartney, Drain, Hooper, & Dix, 1983; Matson, 1980; Page, Iwata, & Neef, 1976; Pattavina, 1992). The majority of these studies either examined the effectiveness of classroom type instruction when applied to the natural environment or compared the effectiveness of classroom instruction to that of natural environment
instruction. Studies teaching individuals with ASD pedestrian skills demonstrated in a parking lot were not found within the literature.

**Video Modeling Safety Skill Instruction**

Video technologies, video modeling, and video prompting have been well established within the literature as effective practices for teaching skills to individuals with ASD (Wilczynski et al., 2009). An instructional technology that uses visual instruction and modeling, video modeling has been well researched with individuals with ASD to teach, generalize and maintain skills through its usage (Akullian & Bellini, 2007; Charlop-Christy et al., 2000; Dowrick, 1999). Despite this evidence for its effectiveness and the recommendations that video technology lends itself to teaching safety skills (Mechling, 2008), the use of video modeling to teach safety skills, including pedestrian skills (to individuals with ASD or otherwise) is not readily found within the literature.

Only seven studies were found in the literature that examined the effectiveness of video modeling to teach safety skills to children. These studies focused on a variety of different safety skills including gun safety, abduction prevention, avoiding poisons, and crossing the street. The effectiveness of the video modeling to teach these safety skills varied, most often some form of in situ training and/or feedback were required for the participants to demonstrate the targeted skills in real-life situations. The limited studies found in the literature and their results are presented in the next section of this chapter.

Gunby, Carr, and Leblanc (2010) used video modeling as a component of a behavior skills training treatment package. A multiple baseline across participants was used to examine the effectiveness of teaching three boys with autism ages 6, 7, and 8 abduction prevention skills. Gunby and colleagues utilized a behavior skills training
intervention package which included verbal instruction, video modeling, live modeling, and rehearsal with familiar adults and strangers. After skills were acquired following behavior skills training, researchers tested to see if the skills would be demonstrated outside of the classroom, when a stranger attempted to have a child leave with them. These abduction lures were presented through-out the school. In situ feedback was provided in the event that the participant did not perform the skills with 100% accuracy. In situ feedback consisted of one of the researchers presenting themselves to the situation when a participant did not perform the targeted skills following the abduction lure. The researcher would review the targeted skills that should have been displayed and have the participant model those skills in that natural environment. After in situ feedback sessions, all participants performed the targeted skills during subsequent abduction probes. Additionally, one participant had a probe taken within the community and was able to demonstrate the target skills.

Beck, Miltenberger, and Ninness (2009) examined the effectiveness of a commercially available safety video to avoid abduction. A multiple baseline design across participants was used to evaluate the effectiveness of the commercially available video to teach individuals to avoid abduction. Participants were five girls and one boy, 6 to 8 years of age, all typically developing. Participants watched the video *The Safe Side* which outlined behaviors to keep a child safe and prevent abduction by a stranger. One week after watching the video, participants were provided opportunities to demonstrate the skills via in situ assessments. An example of an in situ assessment consisted of the participants being presented with situations where a stranger approached the participant in the community and tried to engage him or her in a conversation when his or her
parents were not present to determine if they would demonstrate the skills taught in the safety video. These in situ assessments revealed that none of the participants were able to demonstrate the target skills. Researchers then provided in situ training sessions to the participants, providing feedback and training in the environment after unsuccessful responses to the lures. Following in situ training sessions, all participants were able to perform the targeted skills including follow up maintenance probes. *The Safe Side* video examined in this study was a 42 minute, informational, educational video which included modeling of skills. Although not a traditional video modeling intervention which explicitly demonstrates concise, specific skills, the authors of this study suggest the usage of a video alone was not sufficient to teach targeted skills unless practiced in the natural environment.

Godish (2010) used video modeling to teach four males, 7 and 8 years old, to resist abduction lures from a stranger. Participants were taught to exhibit three behaviors when presented with a lure; say “no,” walk/run away, and tell a trusted adult. All four participants mastered the skills outlined within the video models and two of the four maintained those skills in follow-up sessions. One participant received in situ training in follow up sessions but still maintained variable results demonstrating targeted skills in some sessions, but actually leaving with the stranger in others – researchers hypothesized these results were more due to compliance issues than skills acquisition issues. The fourth participant in the study dropped out before follow up sessions were conducted.

King (2014) used video modeling to teach four children, two boys and two girls each 6 years old with ASD, the skills required to avoid poison hazards. Videos portrayed six different scenarios of a child coming into contact with a poison and the appropriate
response (e.g., finding an open prescription bottle, finding pills in a plastic bag). Video modeling alone was not effective to teach the targeted skills, however, when in situ training was implemented, three of the four participants acquired the skills. The fourth participant required an additional reinforcement contingency, involving access to a preferred activity (computer) following the demonstration of skills to continue to perform the skills successfully. Three of the four participants maintained the skills at one, three and five week follow up probes.

Morgan (2012) examined the utility of video modeling to teach gun safety to three six year old boys with ASD. A multiple baseline design across participants was used to evaluate the effectiveness of the video modeling intervention teaching the participants to not touch the gun, leave the room, and tell an adult. Video modeling was successful in teaching one participant the targeted skills but required in situ training during the follow-up session to maintain the skill. For the second participant, in situ training was needed to successfully demonstrate the skill and for maintenance of the skill. The third participant required a modified in situ training procedure to acquire the skills and to maintain them.

One of only two studies found within the literature using video technology to teach pedestrian skills included the usage of educational videos within an instructional package to teach safe pedestrian skills (Phillips & Todman, 1999). The researchers taught pedestrian skills to thirty children with intellectual disabilities, aged 10 to 16 years old. The instructional package presented included board games, progress reports, educational videos, and in vivo activities conducted by either a caregiver or a service provider. The study compared the participants’ knowledge and performance of
pedestrian skills when delivered by a caregiver versus a service provider and found those who received training led by a caregiver performed better.

The second study addressing pedestrian skills used a video which depicted the decision making variables necessary to be able to cross a street. Steinborn and Knapp (1982) taught a 10 year old girl with ASD the various skills necessary to cross a street at an intersection. The specific skills addressed were stopping at an intersection, responding correctly to traffic signals, looking both ways before crossing a street, and remaining within the crosswalk. Intervention consisted of training the participant to use a doll to cross a model intersection, and video recordings of cars approaching or not approaching were used to teach her proper judgment before crossing the street. Additionally, the participant was required to verbally state the steps she was performing in the model intersection as she completed them. The training package was effective in teaching the participant the targeted skills, the skills were generalized to a natural environment street, and maintained at one month and two month follow ups.

Of the seven studies reviewed, six examined the effectiveness of the video model intervention when applied to the natural settings. Of those six studies, five required the use of some in situ training to have the skills taught via the videos to be demonstrated in the natural environment. The results of these reviewed studies suggest that video modeling alone, that is, without incorporating in situ training, is not sufficient to teach generalized safety skills.

Despite the recent advancement in technology, making video easier to develop and use, there appears to be a shortage of the use of video modeling to teach pedestrian skills, or safety skills in the literature. It should be noted, however, that most of the
research found that used video modeling to teach safety skills to individuals with ASD or other disabilities was in the form of recent dissertations (i.e., Godfish, 2010; King, 2014; Morgan 2012). This may suggest these and other studies that are utilizing this technology to teach safety skills will soon be adding to the published literature.

**Pedestrian Safety Skill Instruction**

A thorough search of the literature resulted in very few studies that used video modeling or video prompting to teach pedestrian skills of any kind. However, there are a number of studies in the literature that have addressed the teaching of pedestrian skills using other instructional strategies.

One of the first behavioral studies conducted with individuals with developmental disabilities addressing pedestrian skills was by Page et al. in 1976. Page and colleagues taught five males with intellectual disabilities basic pedestrian skills in a classroom. The researchers constructed a model in the classroom environment to simulate city traffic conditions. The participants were taught five skills necessary for crossing a street. Skills targeted were recognizing an intersection, pedestrian light skills, traffic light skills, and two different conditions involving a STOP sign. Throughout the study, probes were taken on performance on the simulated model as well as in real-life traffic conditions. A multiple baseline design across behaviors and subjects revealed that after classroom training, each participant exhibited appropriate street crossing skills in the natural environment of city traffic conditions.

Marchetti et al. (1983) sought to compare the simulation training developed by Page et al. (1976) with training in the natural environment. The study taught 18 adults with intellectual disabilities pedestrian skills associated with crossing the street.
Participants were assigned to two groups, one which received instruction within a classroom setting using models and the other group received instruction within the community on actual intersections. The specific skills targeted for acquisition were crossing at an intersection with no lights, crossing at an intersection with pedestrian lights, crossing with a stop sign, and crossing with traffic lights. The group which received the instruction within the community showed significant increase in skills via a pre-test post-test comparison, however, the group receiving instruction within the classroom did not reveal any significant change.

In 1980, Matson utilized a group design study which compared teaching procedures for pedestrian skills with thirty adults with intellectual disabilities in an institution. Subjects were randomly assigned into one of three groups; a no-treatment control group, which received no instruction on pedestrian skills during the three months of training; an individual classroom training group, which utilized movable figures on a model of an intersection; and an independence training group, which used social reinforcement and the use of a mock intersection on the hospital grounds. Baseline data were collected on sign recognition, pedestrian performance within the mock intersection on the grounds of the hospital and pedestrian performance skills generalized to the community. After three months of training, Matson found that the independence training group, which trained on the mock intersection on the hospital grounds, performed significantly better than the other two groups. The classroom training group, which practiced with moveable figures on a model intersection, did make significant gains when compared to the control group which received no pedestrian training at all.
Batu, Ergenekon, Erbas, and Akmanoglu (2004) examined the effectiveness of most to least prompting with five individuals with developmental disabilities aged 7 to 15 years old to teach three different pedestrian skills associated with crossing the street. The skills targeted for increase were using an overcrossing, using pedestrian lights, and crossing a road without facilitators. Instruction took place in a simulated intersection constructed in the school gymnasium. Using a multiple probe across behaviors experimental design, the authors concluded the most to least prompting was effective in teaching the pedestrian skills. Additionally, the subjects in the study generalized the skills learned to actual city traffic.

Pattavina (1992) taught a child with a developmental disability the skills to cross a street successfully utilizing photographs of desired behaviors and verbal rehearsal within the natural environment to teach the targeted skills. Skills were maintained during follow up probes and also generalized to novel streets. Interestingly, Pattavina’s study is one of the few found within the literature that trained exclusively within the natural environment.

In 1993, Collins et al. conducted a study that compared in vivo training and in vivo training with simulation prior to training in the natural setting. The author taught eight participants with developmental disabilities ages 10 to 19 years old to cross streets and use a public pay phone using a progressive time delay procedure. Simulation conditions were conducted in the participant’s special education classroom and in vivo training sessions were conducted in the community on the street at the entrance of the school. The study used a modified multiple probe design across participants. The researcher maintained that although results were mixed on the effectiveness of the time
delay intervention, it was more efficient for some participants than others. The study indicated that pre-teaching the skills in a simulated situation did not increase performance or inhibit performance during the in vivo instruction within the natural environment.

Josman et al. (2008) sought to teach six children with ASD street crossing skills using a “desktop street-crossing virtual environment” and then to ascertain whether those skills would be generalized to an actual real world street crossing situation. The six participants with ASD were assigned to an experimental group while six typically developing children, similar in age and gender, were assigned to a control group. Performance crossing a street was scored for participants within the virtual environment program and a pedestrian safety checklist was used to measure the performance crossing the street in a protected real sidewalk before and after virtual reality intervention. The participants with ASD were able to learn to successfully use the virtual reality program and showed a substantial improvement when crossing a street in a virtual environment and significant improvements compared to the control group. When it came to generalizing the skills learned via the virtual reality environment to the real world environment, only three of the six participants with ASD made significant improvements in their ability to cross the real world street after the virtual reality intervention.

The aforementioned studies indicate there is a clear gap in the literature when it comes to using video technologies to teach safety skills to individuals with ASD and an absence of any literature on teaching the skills to navigate a parking lot to individuals with ASD. The availability, ease of use of video technology, and its effectiveness in teaching other skills to individuals with ASD support the need to examine the use of this technology to determine its effectiveness in teaching individuals with ASD the essential
parking lot safety skills that all individuals should have within their repertoire. This study sought to do just that and therefore add to the existing literature on teaching safety skills to individuals with ASD.
CHAPTER 3: METHODS

This chapter describes the methods and procedures used to conduct the current study which examined the effectiveness of a video modeling technique to teach individuals with ASD how to safely navigate a parking lot. The sections included in this chapter are as follows: the participants, setting, principle for safe parking lot navigation, dependent variable, experimental design, and procedures.

Participants

Participants in this study were five high-school aged individuals with a diagnosis of ASD. Participants, four males and one female, were 16 to 21 years of age and attended a public charter high school specifically for students with ASD. All participants received exceptional student education services and were working towards special high school diplomas. All participants communicated verbally and could follow one step verbal instructions from an adult.

Criteria for participant selection included individuals who could attend to a video for up to two minutes (the approximate length of the video model), and individuals who displayed generalized imitation skills, that is, were able to imitate a variety of behaviors displayed by another person across a variety of settings. Participants were identified via an assessment survey of classroom teachers to determine who possessed the prerequisite skills and who had exhibited elopement or wandering behavior in the past. The survey provided to teachers can be found in Appendix A. Additionally, teachers were then asked which identified individuals had skills that would enable him or her to potentially be
independent within the community and whose inability to safely navigate a parking lot may prohibit community independent functioning. This last query of the teachers narrowed the field of potential participants to five individuals who (a) possessed the prerequisite skills; (b) had a propensity to wander in a parking lot environment; (c) also possessed a skill set that would allow them to be independent within the community if not for unsafe behavior in parking lots.

Table 1

*Characteristics of Participants*

<table>
<thead>
<tr>
<th>Participant</th>
<th>Age</th>
<th>Gender</th>
<th>Race/Ethnicity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participant One</td>
<td>16</td>
<td>Male</td>
<td>Hispanic</td>
</tr>
<tr>
<td>Participant Two</td>
<td>21</td>
<td>Male</td>
<td>Caribbean</td>
</tr>
<tr>
<td>Participant Three</td>
<td>18</td>
<td>Female</td>
<td>Hispanic</td>
</tr>
<tr>
<td>Participant Four</td>
<td>17</td>
<td>Male</td>
<td>Caucasian</td>
</tr>
<tr>
<td>Participant Five</td>
<td>18</td>
<td>Male</td>
<td>Caucasian</td>
</tr>
</tbody>
</table>

**Setting**

The setting for the study was the staff parking lot of the charter high school which the students attended. The parking lot of the school is designed such that cars are parked front first into parking spaces at a 90 degree angle to the main school building or a fence adjacent to the building. There are spaces for 20 cars parked front first at a 90 degree angle to the building and spaces for 26 cars parked front first at a 90 degree angle to the adjacent fence. There is a 4 foot space between the front of the cars and the building for someone to walk and a 6 foot space between the front of the cars and the fence for someone to walk. Each parking space is 10 feet wide, which leaves 4 to 5 feet of space
between each car for pedestrians. The roadway between the rows of parked cars is approximately 28 feet wide. There is a standard painted crosswalk which spans the width of the roadway from the fence side of the parking lot to the entrance to the school on the building side of the parking lot. A sign indicating the location of the crosswalk is situated in front of the parking spaces on the fence side of the parking lot.

The parking lot has a single entry/exit that was blocked off during baseline and treatment conditions with 8 large orange traffic cones to ensure zero traffic activity, guaranteeing the safety of participants during the study. The total length of the parking lot from the blocked off entrance to the fence at the end of the lot is 280 feet. A “safety zone” was identified 25 feet from the barricaded entrance to the parking area. If a participant entered this zone he/she would be physically stopped and the session would be terminated. Both baseline and treatment conditions included the presence of an additional confederate, an adult member of the research team who was positioned in the safety zone in front of the barricaded entrance to the parking lot to prevent elopement and to further ensure participant safety.
A Principle for Safe Parking Lot Navigation

The Radburn Principle (Stark, 2012) is a widely used international urban planning standard which prioritizes pedestrian safety by separating vehicle paths from pedestrian paths. A common application of this principle is the use of the “centerwalk” in parking lots, a dedicated walking isle running the length of the parking lot which leads directly to the destination avoiding vehicular paths except for having to cross the roadway at a crosswalk. Although many parking lots are designed with the Radburn Principle in mind, the safety principles can also be applied to parking lots not designed in that manner. A typical parking lot not utilizing the Radburn Principle has consistent environmental characteristics including space between the front of cars that spans the parking lot length ways and a final destination which may be located on the same side or opposite side of
the roadway. The National Highway Traffic Safety Administration (2013) provides a set of general guidelines for pedestrians when navigating a parking lot. The recommendations put forth by the National Highway Traffic Safety Administration for the safe navigation of a parking lot by pedestrians are:

1. Use walkways or sidewalks when available to navigate the length of the parking lot.
2. Cross the roadway at crosswalks or at 90 degrees directly in front of the desired entry way.
3. If necessary, walk in the roadway at least five feet from the bumpers of cars.
4. Walk slowly, never running.
5. Stop and look both ways to ensure the absence of oncoming traffic when walking from between parked cars.

Taking into consideration these recommendations set forth by the National Highway and Traffic Safety Administration as well as the tenets taken from the Radburn Principle, the present study established the following steps for safe navigation of a parking lot:

1. The individual walks to the front of a car parked front first in a parking spot.
2. The individual walks in front of parked cars parallel to the parking lot until he/she is adjacent to the destination (this may or may not include the presence of a crosswalk).
3. The individual walks between two parked cars until he/she arrives at the car’s rear bumpers.
4. The individual looks to their right for oncoming traffic.
5. The individual looks to the left for oncoming traffic.

6. The individual slowly walks from between the parked cars across the roadway to their desired destination (in the crosswalk if applicable).

Figure 2 Procedure for Navigating the Parking Lot

**Dependent Variable**

The dependent variable in the present study was a task analysis which delineated the specific steps of safely navigating the charter school’s parking lot. The task analysis was developed based on the Radburn Principle and the recommendations from the National Highway Traffic Safety Administration. The task analysis consisted of 10 steps:

1. Open the vehicle door.
2. Exit the vehicle.

3. Close the vehicle door.

4. Walk to the front of the vehicle.

5. Walk parallel to the roadway in front of the cars to the crosswalk sign.

6. Walk between two cars to the crosswalk.

7. Stop at the rear bumpers of the cars.

8. Look to the right for cars in the roadway.

9. Look to the left for cars in the roadway.

10. If no cars are present in the roadway, cross the roadway slowly in the crosswalk.

Step 8 and step 9 could be interchanged as to the order in which they were performed. That is, a participant may look left first, then right; or right first, then left before crossing the roadway. All other steps were required to be performed in the order they appeared on the task analysis.

It should be noted that within the present study, there were never cars present in the roadway. This variable was purposefully omitted to ensure the safety of the participants and to maintain the focus of instruction on the steps involved in navigating a parking lot. Due to the absence of moving vehicles, this study did not address the discrimination skills required to cross a roadway with cars. Also, participants were not required or prompted to wear seatbelts while in the vehicle as their presence in the vehicle was not to travel but only to sit in the vehicle to record the vehicle data as a part of their vocational duties.
Each step in the task analysis was scored correct (+) or incorrect (-) on a task analysis data sheet by data collectors. The data sheet utilized by data collectors is located in Appendix B. Correct responding was based on whether the participant performed the step independently and accurately within 30 seconds of the discriminative stimulus or the previous step. In each session, data were collected by the lead researcher. Definitions depicting accurate performance of each step are outlined in the following table:

Table 2

<table>
<thead>
<tr>
<th>Task Analysis Step</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open the door of the vehicle</td>
<td>The participant lifts the handle of the vehicle door and slides the door backwards until it is opened far enough for the participant to exit.</td>
</tr>
<tr>
<td>Exit the vehicle</td>
<td>The participant gets out of car, goes through the car door and into the parking lot.</td>
</tr>
<tr>
<td>Close the vehicle door</td>
<td>From the outside of the vehicle the participant returns the vehicle door back to the fully shut position.</td>
</tr>
<tr>
<td>Walk to the front of the vehicle</td>
<td>The participant walks from the exited door to the front bumper of the vehicle.</td>
</tr>
<tr>
<td>Walk parallel to the roadway in front of the cars to the crosswalk sign</td>
<td>The participant walks in front of all parked cars parallel to the roadway towards the crosswalk, stopping forward progress within 10 feet of the crosswalk sign.</td>
</tr>
</tbody>
</table>
Table 3

*Task Analysis Steps Definitions (continued)*

<table>
<thead>
<tr>
<th>Task Analysis Step</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Walk between two cars to the crosswalk</td>
<td>The participant walks toward the roadway between the two cars leading to the crosswalk entrance.</td>
</tr>
<tr>
<td>Stop at the rear bumpers of the cars</td>
<td>The participant comes to a complete stop within one foot (12 inches) on either side of the rear bumpers of the parked cars.</td>
</tr>
<tr>
<td>Look to the right for cars in the roadway</td>
<td>The participant turns his or her head to the entrance of the parking lot, to the right.</td>
</tr>
<tr>
<td>Look to the left for cars in the roadway</td>
<td>The participant turns his or her head to the rear of the parking lot, to the left.</td>
</tr>
<tr>
<td>If no cars are present in the roadway,</td>
<td>The participant proceeds at a regular walking pace within the boundaries of the crosswalk, for the length of the crosswalk towards the entrance of the school.</td>
</tr>
</tbody>
</table>

**Experimental Design**

The present study utilized a single subject design via a multiple probe across participants - a variation on the multiple baseline design outlined by Horner and Baer (1978). A multiple probe research design typically seeks to demonstrate the effectiveness of an independent variable across two to four behaviors, environments, or participants. This design differs from the multiple baseline design in that as instead of collecting
baseline data simultaneously for each behavior, participant, or environment, baseline probes are measured intermittently. Horner and Baer suggest baseline probes be conducted (a) initially on each of the training steps; (b) again on each step in the sequence after criterion is met on any training step; (c) just prior to introduction of the independent variable.

In this study, the multiple probe design was used instead of a more traditional multiple baseline, to avoid extended baseline sessions and thus decrease the number of instances participants were exposed to the potentially unsafe environment of the parking lot. Initial baseline data were collected for all participants in the study, that is, data on their performance of the dependent variable in the absence of any treatment variables. When the first participant achieved a stable or deteriorating baseline trend, he or she was exposed to the independent variable treatment condition (video modeling). Based on the recommendations made by Gast, 2010, criteria to achieve stable responding in baseline and intervention conditions was established as 75% of the last four data points in the series falling within 20% of the median. After the first participant established stable responding in treatment, the second, third, and fourth participants had baseline probes taken to ensure there was not any improvement in the dependent variable in the absence of the independent variable. When it was determined that the second participant’s baseline probes revealed stable responding, the second participant began treatment. When the second participant achieved stable responding in treatment, the third and fourth participants had a baseline probe taken before the third participant began treatment. This pattern continued until each of the five participants had been exposed to the independent variable. Additionally, approximately one week and two weeks after each participant
achieved stable responding in the treatment condition, that is, he/she had “no-video probes” taken to determine if the skills acquired in the treatment condition, in the presence of the independent variable were able to maintain over time without the presence of the video model.

**Procedures**

Pre-baseline, baseline, intervention, and maintenance sessions were delivered by the lead researcher or the school’s behavior analyst. The behavior analyst received training by the lead researcher on the procedures outlined below.

**Pre-baseline.** To make the repeated trip with the researcher to the school van a natural, functional activity, each participant was initially taught to complete a vocational job. Job duties included recording the mileage and indicating the fuel level of the school van on a “Van Monitoring Log” included in Appendix C. Mileage and fuel levels were electronically displayed on the van’s dashboard. This vocational job was introduced to make the repeated trips to the school van with the researchers a natural, functional activity. Participants were prompted to enter the rear door on the driver’s side of a school van pulled up to the door of the school and sit in the seat behind the driver’s seat. The researcher would then park the van in a vacant parking space on the fence side of the parking lot to the right of the school entrance. This procedure was established to ensure the researcher did not model correct or incorrect pedestrian navigation of the parking lot by walking to a parked vehicle. After putting the van in PARK, the researcher provided the participant with a three-ring binder containing the Van Monitoring Log. Following the participant recording the required information on the form, the researcher took the binder, turned off the ignition of the van and delivered the discriminative stimulus “Okay.
Let’s go.” The instruction, “Okay. Let’s go,” was chosen to be generalizable to as many settings as possible (e.g., school, store, home). The participant then had the opportunity to navigate the parking lot to return to the school building. The researcher always remained within one arm’s length of the participant at all times to prevent elopement from the area.

**Baseline.** During baseline sessions, after the delivery of the initial instruction, the researcher did not provide any further prompts or direction. The participant was allowed to navigate the parking lot independently with no further instruction or prompts. If the participant did not respond after thirty seconds of the initial instruction, or if the participant did not emit any response (i.e., sat or stood still) for 30 seconds during the process, the researcher delivered the instruction “Okay. Let’s go.” again. The researcher would only intervene if the participant moved into the unsafe zone of the parking lot by physically stopping the participant and terminating the session. Additionally, if the participant did not arrive at the main building doors within two minutes, the researcher was to terminate the session. Session termination involved the researcher providing physical prompts to guide the participant back to the vehicle, drive the vehicle up to the door of the school and provide physical guidance to have the participant exit the vehicle and enter the building. This termination process was to be implemented to avoid any learning of targeted skills by way of prompts provided by the researcher in the absence of the independent variable, consistent with previous research examining the effects of an independent variable on a behavior chain (Bennett, Gutierrez, & Honsberger, 2013; Cannella-Malone et al., 2006; Sigafoos et al., 2007). During all conditions, the location of the parked vehicle was varied slightly from session to session to avoid rote responding.
based on repetitive location. A random rotation of six parking spaces to the right of the crosswalk was determined by space availability from session to session. All conditions, including baseline also consisted of the use of three different vehicles (two different models of mini vans), two different researchers, and sessions conducted during varied times of the day (between 9:00am and 2:00pm). Each of the above variables were not controlled for, but were based on availability of students, researchers, parking spaces, vehicles, etc. Baseline data were recorded on the dependent variable, the number of steps performed correctly within the task analysis.

**Intervention.** The independent variable in the study was a video model of the components involved in safely walking in a parking lot (outlined above) and when necessary, in situ video prompting as corrective feedback if the skills were not performed accurately. Video modeling commonly involves demonstration of targeted behaviors by way of a recorded sample of the behavior (Akullian & Bellini, 2007). The individual in the video was an adult performing the targeted behaviors in a slow deliberate manner with a voice-over narrative description of the skills being demonstrated (Mechling & Collins, 2012; Smith, Ayres, Mechling, & Smith, 2013). The video was shown from the first-person perspective, that is, from the perspective of the individual performing the task (Schreibman, Whalen, & Stahmer, 2000). The recorded video model was shown to participants on a tablet while he or she was seated in the vehicle with the doors closed. Immediately upon completion of watching the video, the researcher took the tablet from the participant and delivered the discriminative stimulus, “Okay. Let’s go.” The participant was then given the opportunity to perform the scripted behaviors observed on the video. Similar to the baseline condition, in the intervention condition the researcher
remained behind the participant within an arm’s length during navigation of the parking lot. If the participant made an error according to the task analysis, the researcher physically stopped the participant by placing a hand on his or her shoulder and showed him or her a video clip of the specific step not demonstrated correctly. An error included no response for more than thirty seconds, engaging in a behavior that was not outlined within the task analysis, or engaging in a behavior outlined within the task analysis out of sequence. In situ video prompting was delivered without verbal prompts. The researcher had the specific video clips of the task analysis steps easily available on the tablet to immediately access when necessary. For example, on the step ‘Stop at the rear bumper of the cars,’ if the participant did not stop, the researcher placed a hand on the participant’s shoulder to physically stop him or her and immediately showed the video clip of the model stopping at the rear bumper of the cars. If, after receiving the in situ video prompting, the participant still did not perform the targeted step, the researcher terminated the session. Session termination followed the same procedures outlined within baseline; physically guiding the participant back to the vehicle, driving to the main building doors, exiting the vehicle and entering the school. Data were collected on whether or not each step in the task analysis was successfully completed independently.

**Maintenance.** Upon each participant achieving stable responding in the task analysis, probes were conducted to determine if the participants were able to complete the successful safe navigation of the parking lot without the video model. These probes were taken at one week, and two week intervals to test for maintenance of the skills. Additionally, after all participants completed the no-video maintenance sessions, probes were also taken to determine whether the participants would perform the mastered skills
under different, non-training conditions. The novel conditions examined were having the participant seated in the passenger-side seat as opposed to the training condition of the driver’s side seat, and having the van parked to the left of the crosswalk instead of the training condition which was to the right of the crosswalk. Stokes and Baer (1977) consider generalization “…the occurrence of relevant behavior under different, non-training conditions (i.e., across subjects, settings, people, behaviors and/or time) without the scheduling of the same events in those same conditions as had been scheduled in the training conditions” (p. 350). Baseline levels for these novel training conditions were not measured prior to intervention. Although participant performance within the two non-training conditions may indeed represent a generalization of acquired skills, because baseline levels of the non-training conditions were not established, these will hence forth be referred to as “novel condition probes.” Novel condition probes were conducted on the same day for all participants which represented a six week, five week, four week, three week, and two week interval following exposure to the independent variable for participants One, Two, Three, Four and Five respectively.

**Inter-observer Agreement**

Kennedy (2005) and Gast (2010) recommend inter-observer agreement data be collected to ensure reliability in at least 33% of sessions in all conditions. In the present study, a second observer collected data on the dependent variable in baseline, treatment and maintenance conditions for each participant. This second observer was most often the confederate positioned to ensure the safety of participants. The second observer collected data from a position in which they could see the participant and his or her responses while remaining relatively hidden from the sight of the participant to avoid
reactivity (this usually consisted of the second observer positioning themselves behind a tree or parked car).

**Treatment Fidelity**

During baseline and treatment conditions, data were collected by a second observer on the fidelity of the delivery of intervention. Gast, (2010) recommends treatment fidelity data be collected in at least 20% of sessions. Fidelity data were collected on the occurrence or non-occurrence of the following behaviors:

1. The presentation of the video.
2. The delivery of the initial discriminative stimulus.
3. Correct positioning behind the participant.
4. Physically stopping the participant when an error occurred.
5. Immediate delivery of the correct video prompt according to the error occurring.

The second observer collecting treatment fidelity data collected data utilizing a Treatment Fidelity Data Sheet found in Appendix D. Due to the fact the researcher conducting the sessions and the participant were positioned in a vehicle with the doors closed, the second observer could not hear whether the researcher delivered the discriminative stimulus, “Okay. Let’s go.” To mitigate this obstacle, the second observer looked for the vehicle being shut off as indication of the discriminative stimulus being delivered. Results of the inter-observer agreement and treatment fidelity are included in Chapter Four: Results.
CHAPTER 4: RESULTS

Sessions were conducted for all participants over 56 days. Each participant had from twelve to seventeen total sessions conducted including baseline, treatment, maintenance, and novel condition probe sessions.

Each of the five participants achieved stability in the baseline condition within five sessions (range 0% - 40% of task analysis steps completed correctly). Similarly, after the introduction of the independent variable each participant made rapid improvements and achieved stability in four treatment sessions with all participants scoring 100% accuracy of the dependent variable in the final three sessions. One week and two week no-video maintenance probes revealed that all participants maintained the acquired skill at 100%. During probes consisting of variations from the training situations (i.e., sitting in the passenger side seat and parking to the left of the crosswalk) each participant again achieved 100% correct responses in the task analysis. Specific results for each individual participant are described below. Figure 3, located at the conclusion of this chapter, graphically displays the results for all participants.

Participant One

Participant One achieved stability after four baseline sessions of 30% correct on the dependent variable task analysis. After being exposed to the independent variable, Participant One showed immediate improvement and achieved 100% correct on the task analysis in the first four consecutive sessions of the treatment condition. No-video maintenance probes at one week and two week intervals remained at 100% correct.
responding. Subsequent novel condition probes examining passenger seat positioning and the vehicle being parked to the left of the crosswalk also remained at 100%.

Participant Two

Participant Two achieved stable responding in the baseline condition after four consecutive sessions at 40% correct on the task analysis. After Participant One achieved stable responding in the treatment condition, and before the independent variable was introduced to Participant Two, a baseline probe was conducted with Participant Two revealing 30% correct on the task analysis. This decline in responding (from 40% to 30%) from initial baseline to the baseline probe indicated that Participant Two had not acquired any additional skills before being introduced to the treatment condition and supported the decision to introduce the independent variable to Participant Two at that time. Participant Two showed immediate improvement after being exposed to the video model increasing to 90% correct on the task analysis in his first session. In that first session, the participant required an in situ video prompt to perform the third step of the task analysis correctly (i.e., walking to the front of the car). Participant Two achieved 100% correct on the next three consecutive sessions. No-video maintenance probes at one week and two weeks showed the skills acquired in treatment condition had maintained at 100% accuracy. Novel condition probes, sitting in the passenger seat and parking to the left of the crosswalk, also remained at 100% accuracy in the task analysis for Participant Two.

Participant Three

Participant Three achieved stable responding in four consecutive sessions the first, third and fourth sessions were at 30% and the second session was at 40%. This
slight variation in responding did not affect the participant achieving stability and did not represent an improving trend. After Participant One achieved stability in the treatment condition, a baseline probe revealed Participant Three performed 20% of steps on the task analysis correctly and the baseline probe conducted after Participant Two achieved stability in the treatment condition revealed Participant Three performed 30% of the steps on the task analysis correctly. Due to the fact Participant Three had not improved in the absence of the independent variable, the decision was made to introduce Participant Three to the treatment condition at that time. After introduction of the independent variable, Participant Three improved correct responses immediately, performing 80% of the steps of the task analysis correctly in the first treatment session. The participant required in situ video prompting on two steps in the task analysis in the first session; to stop at the rear bumpers of the cars and again to cross the street in the crosswalk. The next three subsequent, consecutive sessions showed Participant Three performing 100% of the steps correctly. One week and two week no-video maintenance probes showed that the skills were maintained with 100% accuracy over that time frame. Novel condition probes where the participant was seated in the passenger’s-side seat and with the van parked to the left of the crosswalk sign also were performed at 100%.

Participant Four

In baseline, Participant Four initially did not perform any of the steps of the task analysis correctly (0%). Performance then improved in subsequent sessions to 10% then 20%, followed by a decline in the next two sessions at 10% correct on the task analysis. Stability was reached after these five baseline sessions for Participant Four. Baseline probes were conducted for Participant Four after each of the previous participants
achieved stability in their respective treatment conditions. Baseline probe performance for Participant Four was 10%, 20%, and 20% respectively following Participant One, Participant Two and Participant Three reaching stability. Since no improvement in performance was indicated in baseline probes, Participant Four was introduced to the independent variable. Upon introduction to the video model, Participant Four showed instant improvement and performed 100% of the steps on the task analysis correctly in the first four sessions. Maintenance probes in the absence of the video model were conducted at two week and three week intervals which revealed that skills were maintained with Participant Four performing 100% of the task analysis steps correctly. The variation in time intervals examining maintenance of the skills (two and three weeks as opposed to one and two weeks) was due to participant absences and holidays. Probes in the passenger-side seat and parking to the left of the crosswalk also had Participant Four performing 100% of dependent variable steps correctly.

**Participant Five**

Baseline responding for Participant Five indicated a declining trend after the second baseline sessions. Initial performance on the task analysis was 20% of steps correct, followed by 40% correct, 30% correct, 30% correct and finally 20% correct. Baseline probes were conducted following each of the previous participants achieving stability in their respective treatment conditions. The number of steps correct in the task analysis for Participant Five in baseline probes following Participant One was 30%; following Participant Two was 30%; following participant Three was 30%; and following Participant Four was 20%. Participant Five did not show any improvement in responding during baseline probes and supported the decision to initiate the treatment condition at
At that time. Upon introduction to the video model in the treatment condition, Participant Five increased correct responding of the dependent variable immediately with 80% in the first independent variable session. In that first session Participant Five required in situ video prompting on two separate steps; stopping at the rear bumpers of the cars and looking to the left for cars before crossing. In the next three subsequent sessions Participant Five correctly performed 100% of the steps on the task analysis correctly. No-video maintenance probes were conducted at one and two weeks following stable responding in the treatment condition which confirmed the maintenance of the acquired skills with Participant Five performing 100% of the steps correctly. All of the steps on the task analysis were performed correctly in the passenger-side seat novel condition probe, and the novel condition probe which had the van parked to the left of the crosswalk.

**Treatment Fidelity**

Treatment fidelity data were collected in 35% of all sessions. The second observer collected data on the occurrence or non-occurrence of the researcher’s treatment behaviors resulting in a score of 100% treatment fidelity across all sessions in which treatment fidelity data were collected. The data collection forms for treatment fidelity can be found in Appendix D.

**Inter-observer Agreement**

Inter-observer agreement data were collected in 53% of all sessions. The inter-observer agreement score was 99.1% agreement between independent observers. Agreement was determined by dividing the number of agreements by the number of
agreements added to number of disagreements and multiplied by one hundred. The data for inter-observer agreement is presented in Table 3.

Table 4

*Inter-observer Agreement Results*

<table>
<thead>
<tr>
<th>Participant</th>
<th>Baseline</th>
<th>Intervention</th>
<th>Maintenance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participant One</td>
<td>Mean 100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Range 100%</td>
<td>100%</td>
<td>100%</td>
<td></td>
</tr>
<tr>
<td>Participant Two</td>
<td>Mean 100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Range 100%</td>
<td>100%</td>
<td>100%</td>
<td></td>
</tr>
<tr>
<td>Participant Three</td>
<td>Mean 96.7%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Range 90% - 100%</td>
<td>100%</td>
<td>100%</td>
<td></td>
</tr>
<tr>
<td>Participant Four</td>
<td>Mean 96.7%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Range 90% - 100%</td>
<td>100%</td>
<td>100%</td>
<td></td>
</tr>
<tr>
<td>Participant Five</td>
<td>Mean 98%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Range 90% - 100%</td>
<td>100%</td>
<td>100%</td>
<td></td>
</tr>
<tr>
<td>Total Mean</td>
<td>97.9%</td>
<td>100%</td>
<td>100%</td>
</tr>
</tbody>
</table>
Figure 3 Percent of Correct Response on Navigation of Parking Lot Task Analysis
CHAPTER 5: DISCUSSION

The purpose of the present study was to ascertain whether the use of video modeling with in situ video prompting feedback would be effective to teach individuals with ASD the skills necessary to safely navigate a parking lot. In addition, the study sought to discover if participants were able to acquire the skills of safe parking lot navigation, would the skills maintain over time without the presence of the video model prior to parking lot navigation. This chapter will discuss the results of the study in the context of existing literature as well as consider some potential limitations of the study and provide suggestions for future research in this area.

Much of the existing literature pertaining to the pedestrian safety of individuals with ASD and other developmental disabilities suggested that the most effective instruction in this area was instruction or practice that took place in the natural environment (Collins et al., 1993; Marchetti et al., 1983; Matson, 1980; Pattavina, 1992). The foundations for this notion were established over forty years ago and replications and variations that followed added credence to the importance of natural environment training. Researchers have repeatedly established video modeling as an evidence-based effective practice for teaching individuals with ASD (Wilczynski et al., 2009). This technology began to provide a needed link to span the gap between classroom instruction and natural environments via video depiction of the real world. Despite the utility of video modeling lending itself to safety skill instruction, research in the literature using video modeling to teach safety skills is sparse. Recently, however there have been
dissertation studies which have utilized video modeling technology to teach safety skills such as avoiding poisons (Morgan, 2012), gun safety (King, 2014), and abduction safety (Godfish, 2012). As technology has advanced over the past five to ten years, new avenues and means have been provided to incorporate video technology instruction. With small, powerful, portable devices, videos are now easily created, edited, and can be played in any environment. These technological advances have allowed educators and researchers to utilize the evidence-based best practice of video modeling within the natural environment maximizing its effectiveness in new and creative ways. The present study adds to the pedestrian safety literature by providing the introduction of video modeling to the natural environment to teach pedestrian skills and more specifically to teach parking lot navigation where there is a clear gap in the literature. Additionally, this study provides a new facet to the video modeling literature, implementing the technology in the natural environment with in situ video prompting feedback.

**Implications**

The present study was effective in bringing video modeling technology into the natural environment to teach the skills of safely navigating a parking lot. Two of the five participants showed immediate mastery of the skills after only one exposure to the video model. The other three participants only required a video prompt correction(s) in one session before they too demonstrated mastery of the skills in subsequent sessions. While both video modeling and video prompting have been frequently proven to be effective strategies with individuals with ASD in a variety of different areas, the present study is the first to bring the two technologies together presented as a packaged intervention. The consolidation of these two video technologies provides an individual with the opportunity
to be independent in an activity after watching the video model and presents a non-intrusive correction procedure utilizing the same video medium. This combination of video modeling with video prompting feedback may be incorporated into a plethora of different situations to teach new skills. A video modeling with video prompting intervention package may be used to teach skills within the natural environment such as vocational, life, social, or other safety skills.

Not only has the present study provided evidence for the instructional technologies utilized as effective strategies for teaching individuals with ASD, but it also has provided clear, safe steps for the safe navigation of a parking lot. The procedures outlined within this study for the safe navigation of parking lots provide a greatly needed guideline for parents and educators, not only of individuals with ASD, but for anyone who travels through a parking lot. The steps put forth in this study are different than what most are used to when walking through a parking lot. This new approach may not be perceived as efficient as common practices – which generally consist of walking within the roadway on the shortest trajectory to a destination. However, the steps outlined here provide a much safer option for parking lot navigation by keeping the pedestrian separated from potential moving vehicles. For an individual who experiences challenges with attention, difficulty recognizing subtle or subjective cues, or is easily distracted, teaching these procedures may go a long way in keeping that individual safe in a parking lot.

**Limitations**

There are some limitations to this study in its present form. Only five participants were included in the study. Although this number of participants is adequate in
demonstrating experimental control in a single subject research design, it represents only a small sampling of individuals with ASD. The results of this study demonstrate that the interventions and procedures employed were effective in teaching the targeted skills with the individuals who participated, but recognize that no one procedure will be effective for all individuals with ASD. The participants in this study communicated verbally and possessed a skill set that may enable them to be independent within the community. However, individuals with a different repertoire of skills may not experience the acquisition of targeted skills in the same manner. Similarly, participants in the current study were high school aged-students who have had numerous years of exposure to parking lots, crosswalks, traffic, etc. It is unknown if a similar intervention may be effective with individuals with ASD who are younger than the participants in this study.

The rapid acquisition of skills was a strength of the present study. This efficient mastery however, may raise the question whether the skills were learned quickly due to the intervention package or whether the skill was learned quickly because it was an easy, novel skill that could have been taught using any means of intervention. This is a question that will be discussed further in the future research considerations section. Similarly, this quick mastery of skills only provided opportunity for three participants to be exposed to the video prompting corrective feedback in one session each. Due to the apparent efficiency, it is unclear as to whether it was the video modeling intervention alone or an effective correction procedure - video prompting that was responsible for the rapid acquisition. Again, this will be discussed further in the future research section of this chapter. Although this skill may have indeed been an easy one to teach, there is no research in the literature that addresses these particular skills via other instructional
methods. Thus, this research was necessary to be the first to address these important skills.

The present study’s purpose was to examine the effectiveness of the intervention in teaching a procedure to navigate a parking lot safely. However, a very important component that was not included in this study was how the participant would react when a moving car or cars were present in the parking lot. Granted this was not the question that the study was attempting to answer, but without the element of a moving car or cars in the parking lot, the skill repertoire of safely being able to navigate a parking lot remains somewhat incomplete. This separate skill may be addressed using the presented intervention package in future research.

One of the biggest limitations to this study is that the intervention was only proven effective within the training setting. Although the training setting was a natural environment (school) parking lot, it is not known if participants would be able to generalize the skills learned to a novel parking lot with different structure. Due to the difficulty in establishing a controlled safe environment within a parking lot in the community, the researchers did not explore this variable within the present study. Similarly, the training situation was embedded within a vocational activity that each participant completed. It is unclear if the participants would generalize the learned skills outside of that routine.

At the conclusion of the study, after all participants had finished treatment and maintenance probes, novel condition probes were conducted to test two different non-training situations. A probe was taken with the participant sitting in the passenger-side back seat as opposed to the training condition driver’s side seat, and a probe was taken
with the van parked to the left of the crosswalk as opposed to parking to the right of the crosswalk as in the training condition. Another limitation of this study is in the procedures used to examine the spread effects of the intervention to these novel variables. Baseline levels of these novel conditions were not assessed prior to intervention, but could have been collected initially in those novel conditions to determine if the independent variable was responsible for any change. If the data had shown an increase of the targeted skills from baseline to the novel condition probes, the current study could have claimed true generalization of the skills learned.

A final limitation of the study was the procedure utilized to assess maintenance of the skills. After each participant achieved stable responding, the next data point collected was a no-video maintenance probe conducted one week after the final treatment session. Fortunately, all participants maintained the acquired skills with 100% accuracy at the one week and two week no-video maintenance probes. However, if this were not the case and any participant did not maintain the same level of responding as during the training phase, the researchers would not have been able to determine whether the decline in skills were a result of the one week passing of time or as a result of the removal of the video. A no-video probe could have been conducted immediately following stable responding to determine if the participants were able to perform the skills at the same level without the video and then had a maintenance probe conducted after the passage of the one week period.

**Future Research Considerations**

The present study opens the door for a variety of different future research opportunities. The intervention described within this study proved effective and efficient
in teaching five high-school aged individuals with ASD how to navigate a parking lot. A replication of the present study should be conducted to determine if the current procedures will again reveal similar results with similar participants. Additionally, future research could further examine what characteristics of participants are integral for this intervention package to be successful.

Future research should also examine the applicability of the instructional package to teach other skills. The use of a video modeling with in situ video prompting intervention lends itself to applications in the natural environment. This intervention could be applied within other settings outside of traditional instructional environments. Vocational settings (e.g., an office, retail store), environments where activities of daily living skills are practiced (e.g., bedroom, restroom), settings conducive to social activities (e.g., playground, cafeteria), or natural environments where other safety skills are to be demonstrated (e.g., kitchen, outdoors) may all be accessible with an intervention such as this. One particular set of skills that should be examined within a future study is that of the discrimination and decision making skills involved with crossing a street or parking lot when there are cars present in the roadway.

The present study brought together two methods of video technology which enabled a common medium for instruction and feedback into the natural environment. This intervention package proved effective in teaching the participants the targeted skills. Other subsequent research should look to examine if indeed the instructional package was responsible for the rapid change or if it was one of the individual elements of the package that was responsible with a component analysis study. Such a study would look at whether the video modeling presented in the natural environment, or the in situ video
prompting feedback, or the combination of the two were responsible for the behavior change.

An issue stated above within the limitations section was whether this instructional package was the reason for the rapid acquisition or was the novel skill introduced to the participants simply an easy one to learn. Future studies could examine the effectiveness of the intervention package compared to other research-based interventions. An alternating treatments design study could assess the effectiveness of this intervention compared to another when applied to two skills similar in difficulty level.

Perhaps the most important research that should follow the present study is one to examine the generalizability of the intervention to other settings. The present study did not seek to determine if the skills acquired would be demonstrated in another, novel parking lot within the community. This is a question that is important to answer to ascertain if the intervention package will be effective beyond the treatment environment. Similarly, it would be interesting to determine if skills acquired would be demonstrated in other routines such as participants traveling with family members or via public transportation.

The current study has taken the first steps in introducing a novel video intervention package to the literature as well as contributing much needed research on teaching individuals with ASD important pedestrian skills to demonstrate in parking lots. The author hopes that this research study has established foundations within the safety, ASD, and video modeling literature-bases which will serve as a launching point for future, related studies.
Conclusion

This study examined the efficacy of video modeling with in situ video prompting feedback to teach individuals with ASD to safely navigate a parking lot. This type of intervention package has not been addressed within the safety or ASD literature to date, nor have the skills to teach safe parking lot navigation been broached. The results of the study revealed rapid acquisition and mastery of the target skills by all participants as well as maintenance of those skills when the video intervention was removed at one week and two week probes. This research adds to the literature pertaining to teaching safety skills to individuals with ASD and to the existing video modeling literature. This research also opens the door to further investigation into the application of a video modeling with video prompting feedback instructional package in other skill areas. Additionally, and most importantly, the present study has taken another valuable step in providing parents and educators means to keep individuals with ASD safe.
APPENDICES
## Teacher - Wandering / Elopement Assessment Survey

Please check **Yes** or **No** below to answer each corresponding question.

<table>
<thead>
<tr>
<th>Student Name:</th>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Does the above individual run or walk away (elope) from adult supervision?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Does the individual wander aimlessly?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| Could the above individual’s safety be at risk due to wandering or elopement?  
(ex., elopement exposes the individual to dangers related to traffic, water, or other environmental dangers) | | |
| Can the above individual attend to a video for up to two minutes? | | |
| Does the above individual imitate a variety of gross motor behaviors displayed by another person?  
(ex., when told “Do this” then clapping your hands, the individual also claps his/ her hands) | | |
| Is the individual likely someday to be independent and unsupervised within the community? | | |
| Is the safe navigation of a parking lot a skill that will be useful for the individual to gain independence in the community? | | |
# Appendix B: Dependent Variable Data Sheet

## Dependent Variable Data Sheet

### Navigating a Parking Lot

**Participant Name:**

For each session, in the appropriate column:
- Record the date of the session
- Indicate a Baseline (BSL) or an Intervention (INT) session
- Indicate initials of the data collector
- Record a + if the participant successfully, independently performs each step of the task analysis
- Record a – if the participant does not complete each corresponding step in the task analysis
- If the participant has no response for 30 seconds – repeat the Sd (record a – and a 30 to indicate)

<table>
<thead>
<tr>
<th>Date</th>
<th>Date</th>
<th>Date</th>
<th>Date</th>
<th>Date</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>BSL or INT</td>
<td>BSL or INT</td>
<td>BSL or INT</td>
<td>BSL or INT</td>
<td>BSL or INT</td>
<td>BSL or INT</td>
</tr>
<tr>
<td>Initials</td>
<td>Initials</td>
<td>Initials</td>
<td>Initials</td>
<td>Initials</td>
<td>Initials</td>
</tr>
</tbody>
</table>

1. Open the vehicle door
2. Exit the vehicle
3. Close the vehicle door
4. Walk to the front of the vehicle
5. Walk parallel to the roadway in front of the cars to crosswalk sign
6. Walk between two cars towards the crosswalk
7. Stop at the rear bumpers of the cars
8. Look to the left for cars in the roadway
9. Look to the right for cars in the roadway
10. If no cars are present in the roadway, cross the roadway in the crosswalk slowly

<table>
<thead>
<tr>
<th>Number steps correct</th>
<th>Percent correct</th>
</tr>
</thead>
</table>
### Appendix C: Van Monitoring Log

<table>
<thead>
<tr>
<th>Van Monitoring Log</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vehicle License Plate Number:</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Date</th>
<th>Mileage</th>
<th>Gas</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>
## Appendix D: Treatment Fidelity Data Sheet

### Treatment Fidelity Data Sheet
**Navigating a Parking Lot**

<table>
<thead>
<tr>
<th>Participant Name:</th>
<th>Date</th>
<th>Date</th>
<th>Date</th>
<th>Date</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>BSL</td>
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<tr>
<td></td>
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<td>Initials</td>
</tr>
<tr>
<td></td>
<td>Part.</td>
<td>Part.</td>
<td>Part.</td>
<td>Part.</td>
<td>Part.</td>
</tr>
</tbody>
</table>

- **Presentation of the video** *(give participant tablet and play video)*: +
- **Delivery of the initial Sd** *(upon completion of the videos take tablet from participant and say “Ok. Let’s go.”)*: +
- **Proper positioning behind the participant** *(exit the vehicle and immediately walk to the rear of the vehicle to stand behind participant within one arm’s length)*: +
- **Physically stopping participant when an error occurs** *(record each instance)* *(if participant makes any error, place one hand on participant’s shoulder to physically stop forward progress)*: +
- **Proper delivery of video prompt following an error** *(record each instance)* *(within 5 seconds of the error present the correct video)*: +
- **Correct termination of the session** *(if participant does not perform correct step after video prompting – physical guidance back to vehicle, drive to doors and exit vehicle to school)*: +

<table>
<thead>
<tr>
<th>Number steps observed</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of steps correct</td>
<td>8</td>
</tr>
<tr>
<td>Percent correct</td>
<td>80</td>
</tr>
</tbody>
</table>
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