USING AN INSTRUCTIONAL PACKAGE TO TEACH CARDIOPULMONARY RESUSCITATION WITH AUTOMATED EXTERNAL DEFIBRILLATOR TO COLLEGE STUDENTS WITH DEVELOPMENTAL DISABILITIES

by

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This dissertation was prepared under the direction of the candidate's dissertation advisor, Dr. Charles Dukes, Department of Exceptional Student Education, and has been approved by the members of her 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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Adults with developmental disabilities may not learn the safety skills needed to maintain the safety of those within their communities. Basic life-saving skills are valued by community members and increase independent and integrated living and employment opportunities. This study used an instructional package consisting of modeling, task analysis, and simultaneous prompting to teach college students with developmental disabilities a basic life-saving skill, specifically how to perform cardiopulmonary resuscitation (CPR) with the use of an automated external defibrillator (AED). Phase 1 of the study used the instructional package to teach the students to perform CPR. Once mastered, Phase 2 of the study taught students to use an AED, incorporating it into the CPR chain. Results showed that the students' accuracy with the tasks increased after the introduction of the instructional package, generalized to a novel environment, and maintained once the instructional package was removed. Implications and future research are discussed.

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CHAPTER 1: INTRODUCTION AND REVIEW OF LITERATURE

Individuals with developmental disabilities (DD) have significant challenges that impact both intellectual functioning (learning, reasoning, problem solving) and adaptive behavior, which affects a variety of skills required daily for independent living (American Association on Intellectual and Developmental Disabilities, 2018). They may also have challenges expressing their wants and needs as well as difficulty with self-care and self-help skills (Center for Disease Control, 2017). According to Mechling (2008), "by nature of their disabilities, persons may lack judgment and skills to recognize, avoid, or escape dangerous situations and the communication skills to report situations or crimes against them" (p. 311), leaving these individuals more susceptible to harm. Due to this, safety skill instruction for individuals with DD is just as important as communication and social skills instruction (Collins, Wolery, & Gast, 1992; Mechling, 2008).

It has been a long-standing goal in special education and related fields to prepare individuals with DD to be active, contributing members of the community. More recently, a measure of independence is partially defined by one's ability to practice certain safety skills. Knowledge and mastery of safety skills increases self-determination and independence (Mechling, 2008). Although the importance of safety skills is acknowledged, training of these skills is often overlooked by parents and teachers (Dixon, Bergstrom, Smith, & Tarbox, 2010). There is limited focus in schools on safety skills. For example, Agran and Krupp (2010) surveyed parents of students with DD. The

researchers discovered that most parents in the sample (93%) believed safety skill instruction was very important for their children, however, only 19% of children ever had safety skill instruction included in their individualized educational programs (IEP). Teachers may also be hesitant to address safety skills due to the current focus on academic skills and standards-based curriculum (Agran, Krupp, Spooner, & Zakas, 2012).

There are several ways to ensure one is safe and knowledgeable of the associated skills. Generally, the suite of skills intended to keep one safe might be conceptualized using two broad classes of skills: (a) accident prevention and (b) emergency response (Collins et al., 1992; Dixon et al., 2010; Ozkan, 2013). The following sections will discuss the afore mentioned classes of safety skills, as well as instructional techniques that have proven effective to teach safety skills to students with DD.

Safety Skills

Safety skills refer to a variety of skills needed to maintain physical wellbeing, including routines such as crossing a street, contacting emergency services, and responding to a house fire (Collins et al., 1992; Dixon et al., 2010; Garcia, Dukes, Brady, Scott, & Wilson, 2016). Clees and Gast (1994) defined social safety skills as both verbal and nonverbal behaviors that may be either preemptive or reactionary in nature. Clees and Gast's (1994) definition of social safety skills can be extended and thought about as part of a safety skill continuum. Safety skills, whether social or not, can be divided into two different classes: (a) preventive safety skills and (b) responsive safety skills. Preventive safety skills are intended to stop/hinder harm and necessary to *prevent* an emergency from happening. There are several common examples, such as looking both

ways before crossing the street, or holding a knife by the handle. Responsive safety skills include different classes of actions (*responses*) to a variety of emergencies and are necessary to respond appropriately to such situations. Some examples of responsive safety skills are treating a cut with ointment and a bandage, or exiting a building in the event of a fire.

Preventive safety skills. Preventive safety skills are skills taught to prevent harm that may be caused by humans, animals, or objects in a variety of settings. This set of skills requires individuals to identify and assess the threat and then to take appropriate action to avoid harm. The individual must identify the presence of a safety threat, whether it be an object in the environment (e.g., a knife, a lighter, an intersection) or another being (e.g., a stranger, a dog), and avoid contact with the threat (Miltenberger, 2008). Miltenberger (2008) classified three different preventive safety skills, effective in most threatening situations: (a) identifying the threat and avoiding contact with it, (b) escaping from the threat, and (c) informing an adult about the threat. Informing an adult of the threat, such as a loaded firearm or an open fence around a pool, is an important step in preventive safety skills because it ensures the removal of threat through adult intervention.

Responsive safety skills. Responsive safety skills are skills taught to minimize harm that is currently occurring due to humans, animals, or objects in a variety of settings. This set of skills requires individuals to recognize harm that is presently happening, and respond with behavior(s) intended to minimize the potential harm. The individual must identify the emergency or threatening situation in progress, respond appropriately, and if necessary, inform another individual of the situation. A situation in

progress involves an active threat that cannot be easily removed, such as a bleeding cut, a fire alarm, or an unresponsive person on the floor. Once the situation in progress has been identified, the individual then needs to choose a response to the threat (e.g., first aid, emergency exit, or calling emergency services). Once the individual has responded appropriately, an adult should be informed of the previous situation. Examples include basic life-saving skills, such as first aid and cardiopulmonary resuscitation (CPR).

Teaching Safety Skills

Despite a scarcity of safety skills in the school curriculum for students with DD, researchers have determined some effective methods of instruction for safety skills such as fire safety, pedestrian skills, telephone skills, home accident prevention, lures from strangers, emergency use of telephones, and first aid. The use of technology, behavior skills training, and other instructional packages focusing on skill modeling and practice have all proven to be effective teaching methods to increase safety skill acquisition. Popular methods of instruction will be discussed in this section.

In recent years, researchers have explored the use of technology to teach safety skills. Video modeling has been used to teach numerous safety skills including pedestrian skills (Branham, Collins, Schuster, & Kleinert, 1999) and social safety skills (Spivey & Mechling, 2016). Computerized behavior skills training (CBST) has been used to teach abduction prevention, fire prevention, and poison safety to young children with DD (Vanselow & Hanley, 2014). Self, Scudder, Weheba, and Crumrine (2007) examined the impact of a virtual reality computer program compared to a visual treatment package to teach fire safety and tornado safety skills to students with DD, finding both were equally as effective. Honsberger (2015) taught individuals with autism

pedestrian skills using video modeling and in-situ video prompting. Technology is frequently used to teach safety skills because it can provide the student with safe, but realistic, exemplars of dangerous stimuli (Mechling, 2008). Technology also facilitates consistent repetition of cues, increasing the student's likelihood of mastering a new skill.

Behavior skills training (BST) consists of four components: (a) instruction, (b) modeling, (c) rehearsal, and (d) feedback (Miltenberger, 2008). BST has been used effectively to teach many safety skills including gun safety (Himle, Miltenberger, Flessner, & Gatheridge, 2004; Jostad, Miltenberger, Kelso, & Knudson, 2008), declining lures from strangers (Summers et al., 2011), and fire safety (Houvouras & Harvey, 2014; Rossi, Vladescu, Reeve, & Gross, 2017). BST is an effective method to teach safety skills because it requires the student to perform the safety skill in the presence of the teacher, who can immediately provide corrective feedback based on the student performance (Rossi et al., 2017). In-situation (in-situ) training is often used with BST to provide the student with a chance to practice the skill and receive feedback in a naturalistic setting with the dangerous stimulus present (Himle et al., 2004).

Other instructional packages have also been used to teach safety skills. The behavioral performance of the skill is integral to learning the skill (Mechling, 2008). Matson (1980) found that discussion alone was not enough to teach fire safety skills; the participants needed to practice the skill to learn it. Thus, several studies intentionally included behavioral practice of the target skill. Garcia et al. (2016) used modeling and rehearsal to teach young children with DD how to evacuate a building in the presence of a fire alarm. Batu, Ergenekon, Erbas, and Akmanoglu (2004) used most-to-least prompting to teach pedestrian skills to students with DD. Simulations have shown to be

an effective teaching method when it is not possible to perform live (in-vivo) training. Due to scheduling and budgeting constraints, simulations may be an acceptable way to teach skills that would be better taught in the natural environment (Mechling, 2008). Simulations are also beneficial when teaching safety skills due to possible dangerous scenarios. Simulations have been used to teach multiple skills, including pedestrian skills (Collins, Stinson, & Land, 1993), response to lures of strangers (Gast, Winterling, Wolery, & Farmer, 1992), fire safety (Jones, Kazdin, & Haney, 1981), and basic life-saving skills. The simulation studies focusing on basic life-saving skills will be discussed in more detail in the coming section.

Simultaneous prompting is a response prompting strategy used to promote efficient instruction of both discrete and chained tasks for students with disabilities (Snell & Brown, 2006). During simultaneous prompting, the instructor "delivers the target stimuli and control prompt simultaneously" (Rao & Kane, 2009, p. 245). This prevents the student from making any errors when learning the task. Simultaneous prompting is efficient for classroom teachers to use because it does not require the instructor to create a hierarchy of prompts, it reduces instructional time, and it limits the student error (Rao & Kane, 2009; Singleton, Schuster, Morse, & Collins, 1999). Simultaneous prompting has been used with a wide age range of students with developmental disabilities (Waugh, Alberto, & Frederick, 2011). It has been used to teach daily living skills such as setting the table (Batu, 2008), opening a locker with a key (Fetko, Schuster, Harley, & Collins, 1999), handwashing (Parrott, Schuster, Collins, & Gassaway, 2000), making juice from frozen concentrate (Schuster & Griffin, 1993), dressing oneself (Sewell, Collins, Hemmeter, & Schuster, 1998), independent living and leisure skills (Dollar, Fredrick,

Alberto, & Luke, 2012), vocational skills (Collins, Terrell, & Test, 2017) and shopping in the community (Tekin-Iftar, 2008). Simultaneous prompting can provide the behavioral practice the student requires to learn the skill (Mechling, 2008), while limiting student errors (Rao & Kane, 2009).

Teaching Safety Skills: Basic Life-Saving Skills

There have been numerous interventions aimed at teaching students of all ages Basic Life-Saving (BLS) skills. Procedures for teaching BLS skills include: individual training (Spooner, Stem, & Test, 1989), interactive story-telling (Marchand-Martella, Martella, & Marchand, 1991), backward chaining (Gast et al., 1992), peer teaching and tutoring formats (Marchand-Martella, Martella, Agran, Salzberg, Young, & Morgan, 1992), small group instruction (Timko & Sainato, 1999), peer and self-video modeling (Ergenekon, 2012; Ozkan, 2013), literacy-based behavior interventions (Kearney, Brady, Hall, & Honsberger, 2017) and other modeling and rehearsal procedures (Christensen, Marchand-Martella, Martella, Fiechtl, & Christensen, 1993; Christensen, Lignugaris-Kraft, & Fiechtl, 1996). The following sections will discuss the different instructional techniques used with differing age groups of students with disabilities to teach BLS skills, as well as the study outcomes.

Preschool students. Christensen et al. (1993), Christensen et al. (1996), and Timko and Sainato (1999) used various instructional procedures to teach preschool students to seek adult assistance when injured. Christensen et al. (1993) taught four preschool children with developmental disabilities to seek adult assistance through instructor modeling, followed by student practice, paired with immediate feedback. All participants quickly acquired the skill. Christensen et al. (1996) also used an instructor

model, followed by student practice, paired with immediate feedback to teach six preschool students with developmental disabilities to find an adult when injured. However, this group of researchers was curious about the effect of observational learning on untrained students. They only directly trained three students; the other three students were trained through observational learning. All six students in the study learned the skill. Timko and Sainato (1999) expanded the observational learning research with this young population. These researchers worked with nine preschool students. Students were taught in triads how to seek adult assistance when injured. Training was conducted with one target learner and two observational learners. All participants were successful in mastering the skill.

Elementary students. Ergenekon (2012), Marchand-Martella, Martella, Agran, et al. (1992), Marchand-Martella, Martella, Christensen, Agran, and Young (1992), and Ozkan (2013) used various instructional procedures to teach elementary school children how to treat cuts, abrasions, and minor burns. Ergenekon (2012) used a peer-video model followed by student practice and adult feedback to successfully teach three students with autism to treat minor cuts, abrasions, and burns on themselves and on the researcher's body. Marchand-Martella, Martella, Agran, et al. (1992) had peers with mild intellectual disabilities teach four students with moderate intellectual disabilities how to treat a cut, abrasion, or minor burn on themselves. The students generalized the skill to their homes after they mastered the skill in school. Marchand-Martella, Martella, Christensen, et al. (1992) taught four students to treat an abrasion through social modeling by training on puppets and on themselves. Social modeling involved three steps: modeling by instructor, participant practice, and a probe. Participants mastered

the skill and could generalize the skill to different body parts on themselves and others. Ozkan (2013) compared peer-video modeling to self-video modeling to teach elementary aged students to treat cuts and burns on another person. Ozkan found the videos to be equally effective.

High school students. Gast et al. (1992), Kearney, Brady, Hall, and Honsberger (2017), and Spooner et al. (1989) used various instructional procedures to teach high school students varying basic life-saving skills. Gast et al. (1992) used a small-group orientation lecture and five-second time delay to teach four students with moderate disabilities how to treat minor cuts, burns, and insect bites. Students mastered treatment of themselves and successfully generalized treatment to another person. Kearney, Brady, Hall, and Honsberger (2017) used a peer-mediated literacy-based behavioral intervention to teach four students with autism how to treat a minor cut on another person. All students acquired the first aid skill, and the skill maintained after removal of the intervention. Spooner and colleagues (1989) found group discussion and individual training to be effective when teaching three students with moderate intellectual disability to call 911, apply a bandage to a minor cut, and help someone who is choking.

All the above studies used various instructional packages to teach basic life-saving skills to individuals with developmental disabilities. However, none of the instructional packages contained simultaneous prompting or focused on effective practices for teaching adults to perform BLS skills. CPR is a basic life-saving skill, but the empirical research on instructional strategies to teach CPR is mostly limited to typically developing schoolchildren.

Cardiopulmonary Resuscitation

Sudden cardiac arrest strikes 55 out of every 100,000 people in the United States each year (Plant & Taylor, 2013). The survival rate of adults who experience cardiac arrest outside of a hospital setting is less than 10%, however, a victim of cardiac arrest is two to four times more likely to survive if cardiopulmonary resuscitation (CPR) is delivered immediately (Plant & Taylor, 2013). CPR is the action of placing the heel of the hand over the sternum and compressing the area at a rate of 100-120 beats per minute with a compression depth of five to six centimeters (Khan & Weston, 2014). The chest compressions manually push the heart, pumping blood throughout the body, which circulates oxygen to vital organs (Khan & Weston, 2014). The American Heart Association (AHA) (heart.org) has been training citizens in basic life-saving skills, such as CPR, since the 1970's. In 2011, AHA published a statement recommending CPR training as a requirement for high school graduation, but this is not a common practice in most states (Cave et al., 2011).

Plant and Taylor (2013) conducted a literature review to determine what methods of CPR training have shown success with children and adolescents. Forty-eight articles were classified and analyzed. The chief finding of the literature review was that CPR could be taught effectively to students of varying ages. Plant and Taylor found that students aged 12-20 were better equipped to perform well on written tests than younger children, but children as young as four-years-old could conclude if a person was unconscious and/or breathing irregularly, help the person into a recovery position, open the person's airway, and call emergency services. Traditional CPR training uses video and/or instructor demonstration and hands-on manikin practice. All studies analyzed by

Plant and Taylor used either the traditional demonstration with hands-on practice or implemented an online training package that used video instruction and did not allow for any behavioral practice of the skill. Students performed the skill better after traditional training rather than online training. Plant and Taylor's discussion recommended using hands-on practice for the physical tasks and repetition of the skills to teach CPR skills to students.

As noted earlier, there is a gap in the research with BLS skills related to health and safety instruction. Specifically, there has been only one empirical study conducted teaching individuals with DD to perform the basic life-saving skill of CPR. This current study is designed to extend the work by Kearney, Brady, Dukes, and Downey (2017) that taught college students with intellectual disability to perform hands-only CPR. Thus, the next logical step in safety skill instruction is teaching individuals with DD how to perform CPR coupled with the use of an Automated External Defibrillator (AED).

Significance of the Study

Through the years, researchers have honed effective instructional practices to teach necessary safety skills to individuals with DD. However, one life-saving skill has received little attention in the special education literature: CPR. The main cause of death in the United States for adults 40 and older is sudden cardiac arrest (Sudden Cardiac Arrest Foundation, 2016). Immediate CPR with AED use can drastically increase the likelihood of survival after cardiac arrest. Almost 900,000 adults with developmental disabilities live with their aging parents (Braddock et al., 2015). It is possible that a trained adult with a developmental disability could save the life of a caregiver, friend, or other member of the community. Thus, knowledge of basic first aid and

cardiopulmonary resuscitation (CPR) can empower individuals with DD with a life-saving skill.

Problem Statement

The purpose of this study was to determine whether an instructional package consisting of modeling, task analysis, and simultaneous prompting was effective in teaching college students with developmental disabilities (DD) to perform cardiopulmonary resuscitation (CPR) with the use of an automated external defibrillator (AED).

Research Questions

The research questions addressed in this study were:

1. Will an instructional package consisting of modeling, task analysis, and simultaneous prompting be effective in teaching college students with DD to perform CPR with an AED?
2. If mastered, will CPR and AED skills generalize to a novel setting?
3. If mastered, will students maintain CPR and AED skills after the instructional package is removed?

CHAPTER 2: METHOD

This chapter describes the method and procedure that were used to examine the effectiveness of an instructional package consisting of modeling, task analysis, and simultaneous prompting to teach individuals with DD how to perform CPR coupled with an AED. The sections included in this chapter are as follows: participants, setting, independent variable, dependent variable, interobserver agreement, treatment fidelity, procedure, data collection, data analysis, design, and social validity.

Participants

Students were recruited from the Academy for Community Inclusion at Florida Atlantic University (FAU), a postsecondary program for adults with intellectual disability (ID). The college students targeted for this study met the following criteria:

1. enrolled at the Academy for Community Inclusion (ACI) at FAU
2. aged 18 or older
3. have an eligibility of ID
4. agreed to participate (consent obtained from parent\guardian if appropriate)
5. attended on campus activities a minimum of three times a week
6. enrolled in or completed *Health Fitness for Life,* a class offered at the Academy for Community Inclusion, and
7. nominated by an ACI teacher.

Nominations for students to participate were requested from the ACI teachers based on attendance, willingness, and satisfactory performance in current coursework. Objectives of the class, *Health Fitness for Life,* included demonstration of basic knowledge and techniques of health and fitness appraisal and demonstration of knowledge of the strategies and specific techniques to enhance one's health and fitness status. This class incorporated various health and fitness assessments as well as physical activity into the curriculum.

Three students with DD (aged 19-23) who were enrolled in ACI participated in this study. The three college students who participated were all diagnosed with an intellectual disability as their primary eligibility category on their most recent psychological evaluations. All students completed high school with a certificate of completion (instead of a standard diploma), and all had at least two semesters of participation in college courses leading to a post-secondary *certificate in supported employment*. Although all students were age 18 or older, no student was his/her own legal guardian, and all required parent consent to participate. See Table 1 for a summary of student demographics.

Table 1. *Participant Characteristics*

Student (Age)	**Assessment Data**	**Diagnosis**	**Reading Level**
Lola (19)	KBIT: 70 *JOBS: OSD* Performance = 80 Support = 76	Intellectual Disability	Recognition grade 6th; Comprehension grade 6th
Mark (23)	KBIT: 61 *JOBS: OSD* Performance = 84 Support = 72	Intellectual Disability/ Autism Spectrum Disorder	Recognition grade 8th; Comprehension grade 8th
Larissa (22)	KBIT*:* 63 *JOBS: OSD* Performance = 87 Support = 83	Intellectual Disability/ Cerebral Palsy	Recognition grade 8th; Comprehension grade 8th

Note: *KBIT-2 = Composite IQ from the Kaufman Brief Intelligence Test- Second Edition* (Kaufman & Kaufman, 2004). *JOBS: OSD = Job Observation and Behavior Scale: Opportunity for Self Determination* (Brady, Rosenberg, & Frain, 2006). For adults in competitive, supported, and sheltered employment, the mean composite score for Quality of Performance = 77.99; the mean composite score for Type of Support required to achieve that performance = 76.17.

Setting

All sessions were conducted on the Jupiter campus of Florida Atlantic University. Training sessions were conducted in a conference room in the Education building. The conference room was roughly 35x20 feet, contained a large rectangular table, and several chairs. The room also contained a projector system and television, but these pieces of technology were not used during the study. The only people present during each training session were the student, researcher, and an occasional secondary data collector for procedural fidelity and interobserver agreement purposes. The AED training unit, gloves, and face shields, were kept in the break area, within a visible distance from the sink. The

break area was roughly 12x6 feet and contained a refrigerator, sink, and counter space. Generalization sessions were conducted in the Burrow, a recreation room located in the Student Services building, approximately 250 yards from the Education building. The Burrow is roughly 150x150 feet, and always had students and staff unaffiliated with the study present using the lounge area or pool tables. In the Burrow, the AED training unit, gloves, and face shields were kept on a counter, next to the sink in the back of the room. Three of the investigators in this study are certified as CPR and first aid instructors or instructor trainers by the American Safety and Health Institute (ASHI).

Independent Variable

The independent variable was an instructional package consisting of modeling, task analysis, and simultaneous prompting. The first phase, the CPR task, was taught using the following instructional sequence: (a) the researcher modeled the behavior chain while the student watched, then (b) the researcher and the student practiced the chain together using simultaneous prompting, facing each other, step-by-step, using two separate manikins. Mastery was determined by correct performance of all steps in the task analysis with 93% accuracy for three sessions in a row.

Once the student mastered CPR, a second baseline phase was introduced to determine the knowledge the student had of using an AED. After a low and stable second baseline, the next phase introduced AED use. The AED task was taught using the following instructional sequence: (a) the researcher demonstrated the behavior chain while the student watched, then (b) the researcher and the student practiced the chain together using simultaneous prompting, facing each other, step-by-step, using two separate manikins. Mastery was determined by correct performance of all steps in the

task analysis with 93% accuracy for five consecutive sessions. One CPR manikin was needed during all baseline and generalization sessions and two manikins were needed during all intervention sessions. See Appendix A for researcher script of sessions.

Dependent Variable

The dependent variables were: (a) the percentage of steps in the CPR task analysis performed correctly and independently by the student and (b) amount of time (minutes and seconds) it took for the student to complete the chain. A researcher-made data sheet was used to record the percentage of steps performed correctly and independently by the students (on a manikin). Additionally, errors were recorded to report error patterns: (a) out of sequence error, and (b) performance error.

The CPR task analysis was adapted from American Safety and Health Institute (ASHI) 2016 guidelines:

1. Assess the scene
2. Attempt to wake victim and check for signs of life
3. Tell someone to call 911 and identify location
4. Retrieve gloves and face shield
5. Put on gloves
6. Put face shield on manikin
7. Open airway and give two rescue breaths
8. Provide 30 chest compressions (researcher says: “he’s still not breathing”)
9. Open airway and give two rescue breaths
10. Repeat 30 chest compressions (researcher says: “he’s breathing now”)
11. Take face shield off

12. Place person in recovery position
13. Remove gloves and throw in trash
14. Wash hands with soap and water.

The CPR with AED task analysis had 24 steps:

1. Assess the scene
2. Attempt to wake victim and check for signs of life
3. Tell someone to call 911 and identify location
4. Retrieve gloves and face shield
5. Put on gloves
6. Put face shield on manikin
7. Open airway and give two rescue breaths
8. Begin chest compressions (30)
9. Open airway and give two rescue breaths
10. Repeat chest compressions (30) (researcher says: "he's still not breathing")
11. Get AED
12. Open case
13. Open shirt on manikin
14. Attach pad to right side of chest
15. Attach other pad to left side
16. Turn on AED
17. Tell everyone to "stand clear", let AED analyze
18. If shock is advised, tell everyone to "stand clear"

19. Push SHOCK button (researcher says: “he’s breathing now”), listen for AED direction
20. Put AED away
21. Take face shield off
22. Place person in sitting up position
23. Remove gloves and throw materials away
24. Wash hands with soap and water.

See Appendix B for CPR and CPR with AED data sheets.

Interobserver Agreement

Interobserver Agreement (IOA) data were collected between 35% and 46% of the sessions, depending on availability of participants and secondary data collector. IOA data were collected during baseline, intervention and follow-up. The observer was a graduate student in the College of Education and trained to use the researcher-made data sheets prior to the beginning of the study. The observer was also an ASHI certified CPR instructor. The training for the IOA observer involved the observer watching a video of the researcher performing the behavior chain (without any students present). The observers then practiced using the data sheets while watching the video, and discussed the scores with the researcher. No disagreement was noted during the training session. During each session, observers stood behind and to the side of the students so they could observe the students’ performance, but could not observe each other. Observer agreement was determined by totaling the number of steps on each task analysis recorded the same, dividing that by the total number of steps on the task analysis, and then

multiplying by 100. Data reported in the results section are from the primary data collector. A summary of IOA data for each student is reported in Table 2.

Table 2. *IOA Summary Data*

Student	Percent of Sessions	Percent Agreement
Lola	35%	97%
Mark	41%	100%
Larissa	46%	100%

Treatment Fidelity

Data were collected on treatment fidelity during intervention sessions. Fidelity data were collected on the occurrence or non-occurrence of necessary researcher behaviors during intervention sessions. Fidelity data were collected for 50% of the training sessions with the protocol being followed with 100% fidelity. The training for the fidelity observer involved the observer watching a video of the researcher performing the behavior chain (without any students present). The observer practiced using the data sheets while watching the video, then discussed the scores with the researcher. No disagreement was noted. See Appendix C for fidelity checklists.

Procedure

Approval from the university institutional review board was obtained prior to conducting the study.

Baseline. During baseline, the student was asked to perform CPR on a manikin with no prompting or further instruction. The student and researcher walked into the room, saw the manikin on the floor, and the researcher said "Look (pointing at manikin), I don't think he's breathing, can you do CPR?" The student's performance was observed during several sessions. The decision to move from baseline to intervention occurred

after at least three data points demonstrated a low rate of accurate skill performance. There was one generalization probe during baseline for each student.

Intervention. During intervention, the first teaching session began with the researcher saying, "We are going to learn how to do CPR. First, I will show you and then we will practice together. Look, (pointing at manikin) I don't think he's breathing, I'm going to do CPR." The CPR task was taught using the following instructional sequence: (a) the researcher demonstrated the behavior chain while the student watched, then (b) the researcher and the student practiced the chain together using simultaneous prompting, facing each other, step-by-step, using two separate manikins. The rest of the teaching sessions began with a data collection probe; the researcher and student entered the room and seeing the manikin on the floor, the researcher said, "Look (pointing at manikin), I don't think he's breathing, can you do CPR?" and collected data on how many steps were performed independently and accurately, as well as how long it took the student to complete the chain. The teaching session took place after the data collection probe, with the researcher demonstrating the chain followed by the simultaneous prompting procedure. During simultaneous prompting, the researcher started the behavior chain by saying, "What's first in CPR?" and followed immediately with a verbal prompt for the step (e.g., "Assess the scene") and practiced the behavior with the student. The researcher then asked, "What's next?" and repeated the procedure for each step in the task analysis. Up to two teaching sessions took place a day, but data were only collected during the probe, which occurred prior to the first teaching session of the day. After 93% accuracy for three sessions in a row, the second baseline was implemented, followed by the second phase of the intervention with the AED.

Prior to the second phase of intervention, the researcher took three to four probes to determine each students' proficiency with an AED. These probes served as a second baseline measure before the CPR plus AED phase, as well as a follow-up measure for the CPR-only task. During the CPR plus AED intervention, the first teaching session began with the researcher saying, "We are going to learn how to use an AED when performing CPR. First, I will show you, then we will practice together. Look, (pointing at manikin) I don't think he's breathing, let's do CPR with the AED." The AED task was taught using the following instructional sequence: (a) the researcher demonstrated the behavior chain while the student watched, (b) the researcher and the student practiced the chain together using simultaneous prompting, facing each other, step-by-step, and using two separate manikins. Once the AED was introduced into the chain, only one manikin was used during the simultaneous prompting procedure to limit the amount of directions emitted from the AED. The rest of the teaching sessions started with the researcher and student entering the room and seeing the manikin on the floor, the researcher said, "Look (pointing at manikin), I don't think he's breathing, let's do CPR with the AED" and collected data on how many steps were performed independently and accurately. The teaching session took place after data collection, the researcher demonstrated the chain followed by the simultaneous prompting procedure. During simultaneous prompting, the researcher started the behavior chain by saying, "What's first in CPR with AED use?" and followed immediately with a verbal prompt for the step (e.g., "Assess the scene") and practiced the behavior with the student. The researcher then asked, "What's next?" and repeated the procedure for each step in the task analysis.

Follow-up. During follow-up, the student was asked to perform CPR with an AED on a manikin with no prompting or further instruction. The student and researcher walked into the room, saw the manikin on the floor, and the researcher said, "Look (pointing at manikin), I don't think he's breathing, can you do CPR with an AED?" The student's performance was observed during two sessions, between seven and 17 days after the last intervention session.

Generalization. The generalization sessions followed the same procedure as the baseline sessions, but took place in a different setting to determine if the student could generalize the skills to a different environment. During generalization sessions, there was no teaching provided; the researcher said, "Look (pointing at manikin), I don't think he's breathing, can you do CPR?" and collected data on how many steps were performed independently and accurately and how long it took the student to complete the chain. There was one generalization probe during baseline, one generalization probe during Phase 1 of intervention, one generalization probe during AED baseline, one generalization probe during Phase 2 of intervention, and one generalization probe during follow-up. All materials required to complete the skill (gloves, face shield, and AED) remained in the same location throughout the study.

Data Collection

Data were collected with a researcher-made data sheet. Each behavior was marked as correct or incorrect. To reach mastery, 93% of the steps needed to be performed correctly for five consecutive sessions. Data were collected at the beginning of each session, prior to the researcher demonstrating the CPR chain, to avoid immediate practice effects. The data were converted to percentages for graphing. For example, the

task analysis for performing CPR had 14 steps and during baseline zero steps performed accurately, the first data point would be recorded at 0% on the first day. After training, if six of the 14 steps were performed accurately then the data point would be at 43% for the day. Data were also collected on the amount of time (minutes and seconds) it took for the student to complete the chain.

Data Analysis

Data were graphed and analyzed using both visual analysis and two methods for establishing an effect size. Phase changes were made after a visual analysis based on the level and trends of individual data points. Effect size was calculated using percentage of non-overlapping data (PND), which has been the most commonly used effect size estimate for single-subject research over the last three decades (Scruggs & Mastropieri, 2013). This method is appropriate to use for baselines that do not show outliers (Rakap, 2015). PND was determined for each student's baseline and intervention differences, as well as baseline and follow-up differences. The effectiveness ratings were based on criteria generated by Scruggs and Mastropieri (2013), who defined interventions as (a) *highly effective* when 90-100% of data do not overlap with baseline, (b) *moderately effective* when 70-90% of data do not overlap with baseline, (c) *minimally effective* when 50-70% of data do not overlap with baseline, and (d) *ineffective* when 50% or more of data overlap with baseline. A post-hoc analysis of Tau-U was also calculated to determine true effect size. Tau-U provided an effect size based on the weighted average of each student's baseline and intervention differences (Parker, Vannest, Davis, & Sauber, 2011). The Tau-U web-based calculator was used for this analysis (Vannest, Parker, Gonen, & Adiguzel, 2016).

Design

A multiple probe design across participants was be used to determine the effects of the instructional package. This design used multiple probes during baseline to prevent extended inaccurate practice of the chain prior to intervention (Kennedy, 2005). The staggered beginning of the intervention demonstrated that the changes experienced were a result of the intervention rather than chance. Generalization probes during each phase of the multiple probe design demonstrated whether students could generalize skills to a novel setting.

Social Validity

A social validity assessment was used to determine student and community member perceptions of the study. The instruments used were adapted from Kearney, Brady, Hall, and Honsberger (2017). Students were asked a total of five questions about their perceptions regarding the importance of the goals and the appropriateness of the procedures used. Four certified CPR instructors were shown a video of the students demonstrating the task after they had achieved mastery. Each video and the accompanying social validity instrument were emailed to the instructors. Each instructor viewed and rated the videos individually and returned the completed social validity instrument to the investigator. The instructors were asked a total of eight questions to determine the functionality of the skill. The instructors must have taught at least one CPR certification course to participate in the social validity assessment. Results were analyzed by calculating means for each item. See Appendix D for social validity assessments.

CHAPTER 3: RESULTS

The effects of the instructional package on individual student performance are shown in Figure 1. A summary of performance changes within each phase is shown in Table 3.

CPR Baseline

During CPR baseline, data remained low and stable, with no student accurately completing any of the steps in the CPR routine. Lola did not initiate any steps during baseline. Mark attempted some steps in the task analysis, but did not complete any steps correctly. Larissa did not attempt any steps in the task analysis during baseline.

CPR Intervention

When the instructional package consisting of modeling, task analysis, and simultaneous prompting was introduced, all participants began to steadily complete the routine with more accuracy. Lola was able to complete 50% of the steps correctly after her first teaching session, requiring a total of six training sessions to reach mastery. Mark jumped to 79% accuracy after the first teaching session and reached mastery of the CPR chain, in both the training environment and the generalization environment, after a total of five training sessions. Larissa's first performance after the teaching session was seven percent accurate, but jumped to 79% accuracy on her second session. She required six training sessions to reach mastery.

AED Baseline

After each student reached mastery criteria for the CPR task, a second baseline phase was introduced for the AED task. No instruction was given during this phase. Each student was asked to perform CPR with an AED. All students completed the CPR chain with 100% accuracy, but no students attempted any steps in the AED chain during baseline. This phase also served as a maintenance phase for CPR.

CPR+AED Intervention

When the instructional package, similar to the package used to teach CPR, consisting of modeling, task analysis, and simultaneous prompting was introduced, all students steadily increased their accurate skill performance. Lola required six training sessions to reach mastery criteria. Mark reached 100% accuracy after two training sessions and reached mastery criteria after five training sessions. Larissa required six training sessions to reach mastery criteria.

Follow-up

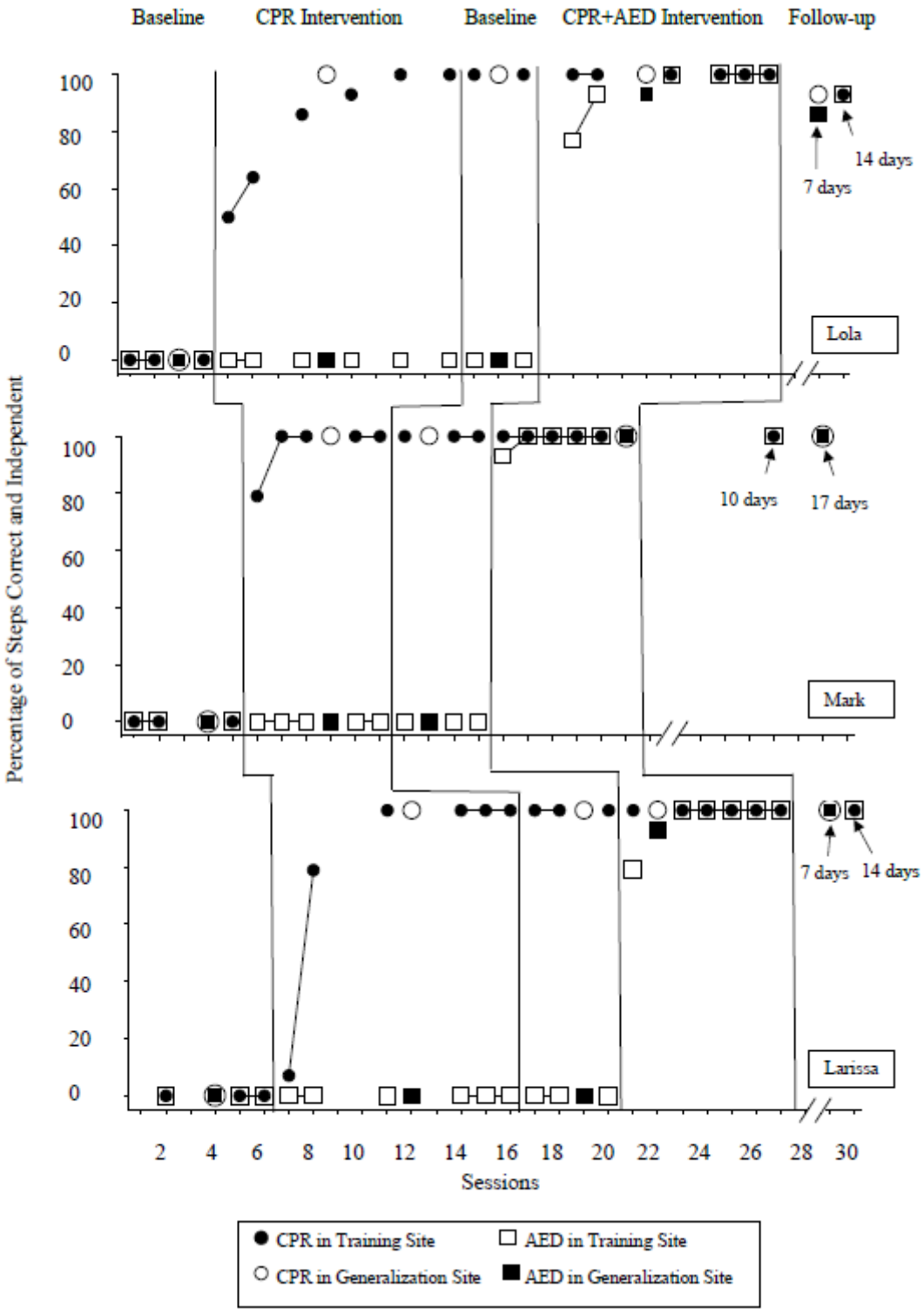
Upon the removal of the instructional package, Lola's skill accuracy decreased slightly to 92% after 14 days. Mark's skill accuracy remained stable at 100% 10 days after the last intervention session. Larissa's performance also remained stable at 100% 14 days after the removal of the instructional package.

Generalization

During CPR baseline, students were unable to accurately complete the behavior chain in the training environment or in the generalization environment. During CPR intervention, all students were able to perform this skill with 100% accuracy in the generalization environment. During AED baseline, all students correctly performed the

CPR-only chain, but no student attempted any steps in the AED chain in the generalization environment. During the CPR+AED intervention, students demonstrated some variability in their skills in the generalization environment. Lola performed the CPR-only chain with 100% accuracy and the AED chain with 92% accuracy in the generalization setting. Mark performed both the CPR-only and the AED chain with 100% accuracy in the generalization session. Larissa performed the CPR-only chain with 100% accuracy and the AED chain with 92% accuracy in the generalization session during this phase. During follow-up, Lola completed the CPR-only chain with 92% accuracy and the AED chain with 86% accuracy in the generalization setting seven days after the removal of the intervention package. Mark and Larissa both completed the CPR-only and the AED chains with 100% accuracy in the generalization setting. Mark's probe took place 17 days after the removal of the intervention package and Larissa's probe took place seven days after the removal of the intervention.

Figure 1. *Student Use of CPR and AED Skills Across All Settings*



Post Hoc Analysis and Effect Size

A post-hoc analysis of the findings using percentage of non-overlapping data (PND) indicated that the instructional package was very effective based on standards described by Ledford, Wolery, and Gast (2014) and Scruggs and Mastropieri (2013). Mark's PND between baseline and intervention was 100%; between baseline and follow-up Mark's PND also was 100%, indicating the intervention was very effective. Lola's PND between both baseline and intervention and baseline and follow-up was 100%, indicating a very effective intervention. Between baseline and intervention as well as baseline and follow-up, Larissa's PND was 100%, indicating the impact of the intervention was very effective. The post-hoc analysis using the Tau-U results showed an overall effect size of 1.0 for the CPR intervention as well as the AED intervention. Although this suggests a robust effect size across the students (Parker et al., 2011), it should be noted that this analysis did not include data reported during the follow-up observations. Table 3 summarizes performance changes across phases and effect sizes. Analysis did not include data reported during the follow-up observations.

Table 3. *Performance Changes Across Phases and Effect Sizes*

Participant	CPR Intervention	CPR+AED Intervention	Follow-Up CPR	Follow-Up AED
Lola				
Mean	82%	95%	93%	90%
Range	(50-100%)	(77-100%)	(93%)	(86-93%)
Effect size	100% Highly Effective	100% Highly Effective	100% Highly Effective	100% Highly Effective
Mark				
Mean	96%	99%	100%	100%
Range	(79-100%)	(93-100%)	(100%)	(100%)
Effect size	100% Highly Effective	100% Highly Effective	100% Highly Effective	100% Highly Effective
Larissa				
Mean	81%	97%	100%	100%
Range	(7-100%)	(79-100%)	(100%)	(100%)
Effect size	100% Highly Effective	100% Highly Effective	100% Highly Effective	100% Highly Effective

NOTE: Effect size reported as percentage of non-overlapping data (PND) by comparing Baseline to Intervention, and Baseline to Follow-up.

Social Validity

The social validity assessment measured certified CPR instructors' perceptions of the students' ability to perform CPR with the use of an AED on a four-point scale with choices including *Strongly Agree* (4), *Agree* (3), *Disagree* (2), *Strongly Disagree* (1), and an unscored *Not Sure* option. Overall, the certified CPR instructors believed (a) the pacing of compressions was appropriate (3.0 of 4.0), (b) the depth of the compressions was accurate (3.25), (c) students used AED correctly (3.0), (d) students accurately completed CPR with AED use (3.0), and (e) this skill is important for students with DD to know (3.9). All respondents strongly agreed they would recommend this intervention for other adults with DD (4.0). The CPR instructors had varied responses regarding if (a)

students' hands were placed on the correct area of the body (3.125), and if (b) students opened the airway correctly and provided adequate rescue breaths (2.5). The social validity data were collected by sharing a video of students performing the chain and then having CPR instructors complete an accompanying survey. Lola's guardian did not consent to her being videotaped, so the social validity data from the professionals only addressed Mark and Larissa's performance. See Table 4 for CPR professionals' social validity responses by participant.

Student beliefs about their CPR skills were overwhelmingly positive. The student social validity assessment was comprised of a four-point scale with choices including *Absolutely* (4), *Kind of* (3), *Not really* (2), and *No way* (1). Students reported that they (a) know how to do CPR with an AED (3.67 of 4.0), (b) are willing to do CPR with an AED (4.0), (c) want to learn other first aid skills and routines (4.0), (d) think CPR with an AED is an important skill to learn (4.0), and (e) like the way they learned CPR (4.0).

Table 4. *CPR Professionals' Social Validity Responses by Participant*

Question	Mark (Count)	Larissa (Count)
The pacing of compressions was appropriate.	Agree (4)	Agree (4)
The depth of compressions was accurate.	Strongly Agree (1) Agree (4)	Strongly Agree (1) Agree (3)
The student's hands are placed on the correct area of the body.	Agree (3) Disagree (1)	Strongly Agree (2) Agree (2)
The student opened the airway correctly and provided adequate rescue breaths.	Agree (1) Disagree (3)	Agree (3) Disagree (1)
The student used the AED correctly.	Strongly Agree (1) Agree (1) Disagree (1) Strongly Disagree (1)	Strongly Agree (2) Agree (2)
The student accurately completed CPR with AED use.	Strongly Agree (1) Agree (1) Disagree (2)	Strongly Agree (1) Agree (3)
This skill is important for students with DD to know.	Strongly Agree (3) Agree (1)	Strongly Agree (4)
I would recommend this intervention for other adults with DD.	Strongly Agree (4)	Strongly Agree (4)

CHAPTER 4: DISCUSSION

The purpose of this study was to determine whether an instructional package consisting of modeling the behavior chain, task analysis, and simultaneous prompting was effective in teaching college students with DD to perform CPR with AED use. This study also wanted to establish whether the acquired skills would generalize to a novel setting, and maintain after the instructional package was removed. All students who received the instructional package mastered CPR and CPR with the AED. All students were able to generalize the newly acquired skills to a novel setting, and the skills maintained after the intervention was removed. This is only the second known empirical study using an instructional procedure to teach adults with DD how to perform CPR.

All students mastered both CPR and CPR with AED use with 100% accuracy, requiring between six and seven sessions during each phase to reach mastery criteria. These results are encouraging; this is only the second study that has successfully taught adults with DD a CPR routine (Kearney, Brady, Dukes, & Downey, 2017). Students have proven capable of acquiring this life-saving skill and should be given the opportunity to learn, even though some caregivers assume older students with disabilities "are incapable of learning" safety skills (Agran & Krupp, 2010, p. 304).

Examining the results from this study, Mark and Larissa both mastered all steps in task analysis, and could maintain the accurate pace of 100-120 beats per minute when

performing CPR. Lola's pacing while performing chest compressions varied and her latency between hearing the discriminative stimulus "I don't think he's breathing, can you do CPR?" and beginning chest compressions was greater than the other two students. Although she accurately completed all the steps in the task analysis, it is possible Lola may not respond as efficiently in an emergency situation as Mark or Larissa. As discussed earlier, the CPR instructors that completed the social validity assessment had some concerns regarding the resuscitation breaths and use of the AED, particularly for Mark. Perhaps future studies should lessen the focus on the use of an AED and resuscitation breathing. Hands-only CPR is being popularized by the AHA due to its effectiveness at saving a life and it's two simple steps: call 911, then push hard and fast. Hands-only CPR does not require resuscitation breathing or an AED.

Normative data were collected to determine an average amount of time it would take someone CPR certified and familiar with the task analysis to complete the chain. Two researchers involved in the study were timed while completing the task analysis. The combined average time it took for them to complete the chain was 230 seconds, or three minutes and 50 seconds. Lola's average time for her last three intervention data points was 424 seconds, or seven minutes and four seconds. Mark's average time across his last three intervention data points was 416 seconds, or six minutes and 56 seconds. Larissa's average time for her last three intervention data points was 389 seconds, or six minutes and 29 seconds. Mark and Larissa took about three minutes longer, and Lola more so, than the normative sample. During sudden cardiac arrest, any CPR action is beneficial, future researchers may wish to increase efficiency to have greater impact on a victim's survival rate.

Limitations

When analyzing these results, the following limitations should be kept in mind. During the generalization probes, the materials needed to complete the tasks were within eyesight of the manikin. It is not known what students would have done if they did not see the materials needed for the task. Also, the researchers did not assess whether the students were successful in keeping the materials needed to complete the chain (face shield and gloves) sterile. Keeping gloves and face shields sterile after they are removed from packaging is an expectation for citizen responders who apply first aid, but researchers did not address this during the intervention training.

Future Research

First and foremost, future research should center on the acknowledged limitations. Students should be trained explicitly how to keep themselves safe, for example not approaching someone if they are in an unsafe area and only calling 911, or refraining from providing resuscitation breaths to a stranger without a face shield or gloves. Future research should focus on proper student responses if the required materials are not available. Future research should also focus on why the use of sterile materials are important for both the responder and the victim and document whether students keep the materials sterile.

Additional research may focus on generalization of CPR skills. These students were able to demonstrate the skill in the Burrow, but performing the skill on a soccer field or in the parking lot may be more difficult. Researchers may also want to focus on other types of generalization; perhaps the person providing the verbal cue is different each time or the script is varied. This would give a more realistic measure of applying

the skills to the 'real world'. Future studies should also have extended time between the removal of the intervention and follow-up probes, ideally looking at the maintenance of the skill months after intervention has ended rather than weeks.

This study used an instructional package consisting of multiple components. Future studies may examine more efficient ways to teach these skills to this population. Following the direction from AHA, researchers may want to teach CPR to younger students with disabilities. Researchers may also want to lessen the duration of the behavior chain, aiming to have students complete the task analysis in a similar amount of time as a peer.

Conclusion

This study extends previous research demonstrating that college students with developmental disabilities can master basic life-saving skills (Kearney, Brady, Dukes, & Downey, 2017) by demonstrating the impact of an instructional package on adults attending a college program for students with DD. This life-saving skill has been recommended by the AHA for all community members. Students with DD in postsecondary programs are members of an integrated community, and are expected to navigate their way around campus, assimilate into the campus culture, and advocate for themselves, but necessary safety skills may have been overlooked by educators and caregivers (Dixon et al., 2010). Responding to an emergency situation, such as cardiac arrest, by administering CPR and using an AED is a desirable community safety skill. Training students in this and other basic life-saving skills will increase their independence in the community and create more integrated employment and living opportunities.

APPENDICES

Appendix A: Researcher Script Modeling CPR

Researcher Verbiage	Task Analysis Step
"I'm looking to make sure it's safe to enter the room"	Assess the scene
"Are you awake? Can you hear me?"	Attempt to wake victim
"Call 911! I'm in the XX building!"	Tell someone to call 911
"I have to go get the gloves and face shield"	Retrieve gloves and face shield
"I put on the gloves"	Put on gloves
"I put the face shield on the manikin"	Put face shield on manikin
"I tilt his head back and breathe into his mouth"	Open airway and give two rescue breaths
After compressions: "He's still not breathing"	Begin chest compressions (30)
"I tilt his head back and breathe into his mouth"	Open airway and give two rescue breaths
After compressions: "He's breathing now"	Repeat chest compressions (30)
"I take off the face shield"	Take face shield off
"I'll help him sit up"	Place person in sitting up position
"I throw my gloves, face shield, and other trash away"	Remove gloves
"I go wash my hands"	Wash hands with soap and water

Appendix B: Researcher Script Modeling CPR with AED

Researcher Verbiage	Task Analysis Step
"I'm looking to make sure it's safe to enter the room"	Assess the scene
"Are you awake? Can you hear me?"	Attempt to wake victim
"Call 911! I'm in the XXX building!"	Tell someone to call 911
"I have to go get the gloves and face shield"	Retrieve gloves and face shield
"I put on the gloves"	Put on gloves
"I put the face shield on the manikin"	Put face shield on manikin
"I tilt his head back and breathe into his mouth"	Open airway and give two rescue breaths
After compressions: "He's still not breathing"	Begin chest compressions (30)
"I tilt his head back and breathe into his mouth"	Open airway and give two rescue breaths
After compressions: "He's breathing now"	Repeat chest compressions (30) (researcher: "He's still not breathing")
"I have to get the AED"	Get AED
"I open the case"	Open case
"I turn on the AED"	Turn on AED
"I take his shirt off"	Remove shirt from manikin
"I put this pad on his chest"	Attach pad to right side of chest
"I put this pad on his side"	Attach other pad to left side
"I plug the cord in"	Plug pad connector into AED
"Stand clear"	Tell everyone to "Stand clear", let AED analyze
"Stand clear"	If shock is advised, tell everyone to "Stand clear"
"I push the shock button" "I listen for the AED direction" After shock push: "He's breathing now"	Push SHOCK button
"I put away the AED"	Put away AED

“I take off the face shield”	Take face shield off
“I’ll help him sit up”	Place person in sitting up position
“I throw my gloves, face shield, and other trash away”	Remove gloves
“I go wash my hands”	Wash hands with soap and water

Appendix C: Data Collection Sheet CPR Data Sheet

Student _____ Date _____ Observer _____

Time start: _____ Time stop: _____

Error Key: O = out of sequence P = performance

	Correct		Error Type:	
1. Assess the scene	Y	N	O	P
2. Attempt to wake victim and check breath	Y	N	O	P
3. Tell someone to call 911 and say location	Y	N	O	P
4. Retrieve gloves and face shield	Y	N	O	P
5. Put on gloves	Y	N	O	P
6. Put face shield on manikin	Y	N	O	P
7. Open airway and give two rescue breaths	Y	N	O	P
8. Begin chest compressions (30)	Y	N	O	P
(researcher: "He's still not breathing")				
9. Open airway and give two rescue breaths	Y	N	O	P
10. Repeat chest compressions (30)	Y	N	O	P
(researcher: "He's breathing now")				
11. Take face shield off	Y	N	O	P
12. Place person in recovery position	Y	N	O	P
13. Remove gloves	Y	N	O	P
14. Wash hands with soap and water	Y	N	O	P

Total steps correct:

Percentage:

Appendix D: Data Collection Sheet AED Data Sheet

Student _____ Date _____ Observer _____

Time start: _____ Time stop: _____

Error Key: O = out of sequence P = performance

	Correct		Error Type:	
1. Assess the scene	Y	N	O	P
2. Attempt to wake victim and check breath	Y	N	O	P
3. Tell someone to call 911, name location	Y	N	O	P
4. Retrieve gloves and face shield	Y	N	O	P
5. Put on gloves	Y	N	O	P
6. Put face shield on manikin	Y	N	O	P
7. Open airway and give two rescue breaths	Y	N	O	P
8. Begin chest compressions (30)	Y	N	O	P
9. Open airway and give two rescue breaths	Y	N	O	P
10. Repeat chest compressions (30) (researcher: "He's still not breathing")	Y	N	O	P
11. Get AED	Y	N	O	P
12. Open case	Y	N	O	P
13. Open shirt on manikin	Y	N	O	P
14. Attach pad to right side of chest	Y	N	O	P
15. Attach other pad to left side	Y	N	O	P
16. Turn on AED	Y	N	O	P
17. Tell everyone to "Stand clear", let AED analyze	Y	N	O	P
18. If shock is advised, tell everyone to "Stand clear"	Y	N	O	P
19. Push SHOCK button, listen to AED (researcher: "He's breathing now")	Y	N	O	P
20. Put away AED	Y	N	O	P
21. Take face shield off	Y	N	O	P
22. Place person in recovery position	Y	N	O	P

23. Remove gloves and throw materials out	Y	N	O	P
24. Wash hands with soap and water	Y	N	O	P

Total steps correct:

Percentage:

Appendix E: Fidelity Checklist CPR only

Student _____ Date _____ Observer _____

Materials present: Yes or No				
SD for data collection: "Look, I don't think he's breathing, can you do CPR?" **Yes or No**				
SD for modeling: "Now watch me" **Yes or No**		**SD for simultaneous prompting:** "Now let's practice together" **Yes or No**		
Task Analysis Step	**Modeling**	**Yes or No**	**Simultaneous Prompting**	**Yes or No**
Assess the scene	"I'm looking to make sure it's safe to enter the room"		"What's first in CPR?" and follow immediately with a verbal prompt for the step (e.g. "Assess the scene") and practice the behavior with the student.	
Attempt to wake victim	"Are you awake? Can you hear me?"		"What's next?" and immediately prompt student next step, "Attempt to wake victim"	
Tell someone to call 911	"Call 911! I'm in the XX building!"		"What's next?" and immediately prompt student next step, "Call 911, tell them I'm in XX"	
Retrieve gloves and face shield	"I have to go get the gloves and face shield"		"What's next?" and immediately prompt student next step, "Get gloves and face shield"	
Put on gloves	"I put on the gloves"		"What's next?" and immediately prompt student next step, "Put on gloves"	
Put face shield on manikin	"I put the face shield on the manikin"		"What's next?" and immediately prompt student next step, "Put on face shield"	

Open airway and give two rescue breaths	"I tilt his head back and breathe into his mouth two times"		"What's next?" and immediately prompt student next step, "Tilt his head back"	
Begin chest compressions (30)	After compressions: "He's still not breathing"		"What's next?" and immediately prompt student next step, "Do 30 chest compressions"	
Open airway and give two rescue breaths	"I tilt his head back and breathe into his mouth"		"What's next?" and immediately prompt student next step, "Tilt head back and give two more breaths"	
Repeat chest compressions (30)	After compressions: "He's breathing now"		"What's next?" and immediately prompt student next step, "Do 30 more chest compressions"	
Take face shield off	"I take off the face shield"		"what's next?" and immediately prompt student next step, "take off face shield"	
Place person in sitting up position	"I'll help him sit up"		"What's next?" and immediately prompt student next step, "Help him sit up"	
Remove gloves	"I throw my gloves, face shield, and other trash away"		"What's next?" and immediately prompt student next step, "Throw away trash"	
Wash hands with soap and water	"I go wash my hands"		"What's next?" and immediately prompt student next step, "Wash hands"	

Total steps correct: Total steps correct:

Appendix F: Fidelity Checklist CPR plus AED

Student _____ Date _____ Observer _____

Materials present: Yes or No				
SD for data collection: "Look, I don't think he's breathing, can you do CPR?" **Yes or No**				
SD for modeling: "Now watch me" **Yes or No**		**SD for simultaneous prompting:** "Now let's practice together" **Yes or No**		
Task Analysis Step	**Modeling**	**Yes or No**	**Simultaneous Prompting**	**Yes or No**
Assess the scene	"I'm looking to make sure it's safe to enter the room"		"What's first in CPR?" and follow immediately with a verbal prompt for the step (e.g. "Assess the scene") and practice the behavior with the student.	
Attempt to wake victim	"Are you awake? Can you hear me?"		"What's next?" and immediately prompt student next step, "Attempt to wake victim"	
Tell someone to call 911	"Call 911! I'm in the XXX building!"		"What's next?" and immediately prompt student next step, "Call 911 tell them I'm in XX"	
Retrieve gloves and face shield	"I have to go get the gloves and face shield"		"What's next?" and immediately prompt student next step, "Get gloves and face shield"	
Put on gloves	"I put on the gloves"		"What's next?" and immediately prompt student next step, "Put on gloves"	

Put face shield on manikin	"I put the face shield on the manikin"		"What's next?" and immediately prompt student next step, "Put on face shield"	
Open airway and give two rescue breaths	"I tilt his head back and breathe into his mouth"		"What's next?" and immediately prompt student next step, "Tilt his head back and breathe"	
Begin chest compressions (30)	After compressions: "He's still not breathing"		"What's next?" and immediately prompt student next step, "Do 30 chest compressions"	
Open airway and give two rescue breaths	"I tilt his head back and breathe into his mouth"		"What's next?" and immediately prompt student next step, "Tilt head back and give two more breaths"	
Repeat chest compressions (30) (researcher: "he's still not breathing")	After compressions: "He's breathing now"		"What's next?" and immediately prompt student next step, "Do 30 more chest compressions"	
Get AED	"I have to get the AED"		"What's next?" and immediately prompt student next step, "Get AED"	
Open case	"I open the case"		"What's next?" and immediately prompt student next step, "Open case"	
Remove shirt from	"I take his shirt off"		"What's next?" and immediately prompt	

manikin			student next step, "Remove his shirt"	
Attach pad to right side of chest	"I put this pad on his chest"		"What's next?" and immediately prompt student next step, "Attach pad to chest"	
Attach other pad to left side	"I put this pad on his side"		"What's next?" and immediately prompt student next step, "Attach pad to left side"	
Turn on AED	"I turn on the AED"		"What's next?" and immediately prompt student next step, "Turn on AED"	
Tell everyone to "stand clear", let AED analyze	"Stand clear"		"What's next?" and immediately prompt student next step, "Tell everyone stand clear"	
If shock is advised, tell everyone to "stand clear"	"Stand clear"		"What's next?" and immediately prompt student next step, "Stand clear"	
Push SHOCK button	"I push the shock button" "I listen for the AED direction" After shock push: "He's breathing now"		"What's next?" and immediately prompt student next step, "Push shock button and listen for next AED direction"	
Put away AED	"I put away the AED"		"What's next?" and immediately prompt student next step, "Put away AED"	
Take face shield off	"I take off the face shield"		"What's next?" and immediately prompt student next step, "Take off face shield"	

Place person in sitting up position	"I'll help him sit up"		"What's next?" and immediately prompt student next step, "Help him sit up"	
Remove gloves	"I throw my gloves, face shield, and other trash away"		"What's next?" and immediately prompt student next step, "Remove gloves and throw trash away"	
Wash hands with soap and water	"I go wash my hands"		"What's next?" and immediately prompt student next step, "Wash hands"	

Total steps correct: Total steps correct:
Percentage: Percentage:

Appendix G: Social Validity Assessment Instructor Perceptions

Using an Instructional Package to Teach CPR with AED

Directions: Please watch the accompanying video. Then fill out of the questionnaire. Return them anonymously to Kelly Kearney.

Certified CPR Instructors' Perceptions on the Students' CPR Instruction

1. The pacing of compressions was appropriate.

   Strongly Agree Agree Disagree Strongly Disagree Not Sure

2. The depth of compressions was accurate.

   Strongly Agree Agree Disagree Strongly Disagree Not Sure

3. The student's hands are placed on the correct area of the body.

   Strongly Agree Agree Disagree Strongly Disagree Not Sure

4. The student opened the airway correctly and provided adequate rescue breaths.

   Strongly Agree Agree Disagree Strongly Disagree Not Sure

5. The student used the AED correctly.

   Strongly Agree Agree Disagree Strongly Disagree Not Sure

6. The student accurately completed CPR with AED use.

   Strongly Agree Agree Disagree Strongly Disagree Not Sure

7. This skill is important for students with DD to know.

   Strongly Agree Agree Disagree Strongly Disagree Not Sure

8. I would recommend this intervention for other adults with DD.

   Strongly Agree Agree Disagree Strongly Disagree Not Sure

Appendix H: Social Validity Assessment Student Perceptions

Using an Instructional Package to Teach CPR with AED

Directions: Ask each of the students who participated the five questions below. Begin by saying:

I'm going to ask you a series of questions. For each question, you should reply using the following scale:

Absolutely Kind of Not really No way

Allow all the students time to consider each item. Circle the response that most closely matches their answer. Provide the response scale for each of the items when interviewing the students.

Students' Perceptions on their CPR and AED Instruction

1. I know how to do CPR with an AED.

Absolutely Kind of Not really No way

2. I am willing to do CPR and use an AED.

Absolutely Kind of Not really No way

3. I want to learn other first aid skills and routines.

Absolutely Kind of Not really No way

4. CPR with an AED is an important skill for me to learn.

Absolutely Kind of Not really No way

5. The way I learned CPR was acceptable.

Absolutely Kind of Not really No way

Appendix I: Institutional Review Board Approval Letter

FAU
FLORIDA ATLANTIC UNIVERSITY

Institutional Review Board
Division of Research
777 Glades Rd.
Boca Raton, FL 33431
Tel: 561.297.1383
fau.edu/research/researchint

Charles Dukes, Ed.D., Chair

DATE:	January 10, 2018
TO:	Charles Dukes
FROM:	Florida Atlantic University Social, Behavioral and Educational Research IRB
PROTOCOL #:	1167174-1
PROTOCOL TITLE:	[1167174-1] Using an Instructional Package to Teach College Students with Developmental Disabilities Cardiopulmonary Resuscitation (CPR) with Automated External Defibrillator (AED).
SUBMISSION TYPE:	New Project
REVIEW CATEGORY:	Exemption category # *A1*
ACTION:	DETERMINATION OF EXEMPT STATUS
EFFECTIVE DATE:	January 10, 2018

Thank you for your submission of New Project materials for this research study. The Florida Atlantic University Social, Behavioral and Educational Research IRB has determined this project is EXEMPT FROM FEDERAL REGULATIONS. Therefore, you may initiate your research study.

We will keep a copy of this correspondence on file in our office. Please keep the IRB informed of any substantive change in your procedures, so that the exemption status may be re-evaluated if needed. Substantive changes are changes that are not minor and may result in increased risk or burden or decreased benefits to participants. Please also inform our office if you encounter any problem involving human subjects while conducting your research.

If you have any questions or comments about this correspondence, please contact Danae Montgomery at:

Institutional Review Board
Research Integrity/Division of Research
Florida Atlantic University
Boca Raton, FL 33431
Phone: 561.297.1383
researchintegrity@fau.edu

* Please include your protocol number and title in all correspondence with this office.

This letter has been electronically signed in accordance with all applicable regulations, and a copy is retained within our records.

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