Training Peer Mentors in Reinforcement and Modeling with Prompting (RaMP): Using Mixed Reality Simulation to Encourage Social Reciprocity Skills in Adolescents with Autism Spectrum Disorder

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TRAINING PEER MENTORS IN RaMP

Training Peer Mentors in Reinforcement and Modeling with Prompting (RaMP):

Using Mixed Reality Simulation

to Encourage Social Reciprocity Skills in Adolescents with Autism Spectrum Disorder

by

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A Dissertation Submitted to the Graduate Faculty of Kennesaw State University in Partial Fulfillment of the Requirements for the Degree of DOCTOR OF EDUCATION IN SPECIAL EDUCATION

KENNESAW, GEORGIA

2020
TRAINING PEER MENTORS IN RaMP

Abstract

Children diagnosed with autism spectrum disorder (ASD) can face many challenges, including limited ability in social reciprocity, nonverbal communication, and restrictive and repetitive behaviors and interests as a result of the disorder (APA, 2013). This hinders their ability to build and maintain friendships in the same manner as their typically developing peers and affects their interactions, speech and language abilities, and emotional regulation (Whitman & DeWitt, 2011). Peer Mentors (PMs) are trained to support the development of these skills as part of the Peer Mediated Instruction and Intervention (PMII) evidence-based practice (EBP). However, an explicit training program is not always evident nor is the opportunity for purposeful practice prior to working with the children with ASD. Further, a gap in literature exists regarding training adolescent PMs. The purpose of this study was to determine if when PMs receive explicit instruction in the reinforcement and modeling with prompting (RaMP) training program they become more adequately prepared to encourage social reciprocity skills from adolescents with ASD. The additional mixed reality simulation (MRS) platform provided the practice component. A multiple baseline single subject design was implemented to determine that the proposed RaMP training program was in fact effective across three PM participants. The study supports the need for an explicit training program for PMs. Each PM not only increased in their fidelity of the RaMP skills, but they also maintained and were able to generalize the skills taught even after the support was withdrawn.

Keywords: peer mediated intervention and instruction, peer mentors, autism spectrum disorder, evidence-based practices, modeling, reinforcement, prompting, mixed reality simulation
TRAINING PEER MENTORS IN RaMP

Training Peer Mentors in Reinforcement and Modeling with Prompting (RaMP):

Using Mixed Reality Simulation
to Encourage Social Reciprocity Skills in Adolescents with Autism Spectrum Disorder

Jasmine V. Sadler

Dissertation Chair: Kate Zimmer
Committee Members: Melissa K. Driver
Katie Bennett
TRAINING PEER MENTORS IN RaMP

DEDICATION

I dedicate this dissertation to the children. All the ones that I have worked with and those I have yet to know. The children with disabilities and those without. The children that just wanted a best friend, someone they could talk to and share their life with. And the children that wanted to be that friend. Those that begged me to work with my students. There are so many of you. Your hearts are huge, and your love is great. Please never stop. For you are our future, a generation that sees every person as able instead of disabled. And aims to build acceptance.

To my peer mentors – Sarah, Abby, Cooper, and Donovan - you are incredible! The love and compassion you have shown is beyond my wildest expectations. You have far exceeded the scope of this study by continuing this practice and compelling me to start a peer mentoring business based on your desire. Acceptance Peer Mentoring is all because of you!

And also a special thanks to Jackson, always willing to be my #1 participant and his Mom, Jenny, who has not only offered years of cheerleading my ideas, but also worked to recruit my participants because she believes wholeheartedly in what I was aiming to achieve.

“For individuals with autism to succeed in this world, they need to find their strengths and the people that will help them get to their hopes and dreams. In order to do so, ability to make and keep friends is a must. Among those friends, there must be mentors to show them the way.”

– Bill Wong
ACKNOWLEDGEMENTS

There are a great number who deserve my acknowledgement. This pathway to receiving a terminal degree has been quite the journey and not without its trials and tribulations. However, I have remained steadfast in the knowledge that "I Can Do All Things Through Christ Who Strengthens Me" (Philippians 4:13) with my Father by my side.

First and foremost- my biggest supporter, my son, Donovan. He has only ever known his mom to be a student. In his 16 years, I have been enrolled in college all but a couple, and he has watched me receive degree after degree, always gleaming with pride. He learned to be independent from a young age and to wait patiently when I had a deadline. He taught me early on that children can be taught to understand and work with those with disabilities. He was always open and accepting of my many students we would visit. Donovan believed in me even when I didn’t believe in myself. It was only fitting that he was my first trained mentor. It is no surprise that he holds the position of instructor in his Boy Scout troop.

My first degree was earned after nine long years. I did not take the easy way, instead I dropped out of school - twice - earned my GED and enrolled in classes. Many helped pull me through - my mother searching for schools, majors, and scholarships. My friend - Ryan Gregersen- who brought me a computer for my first college class in 2000 and Donovan’s Papa who bought me another one in 2006. Donovan’s babysitter - Linda - that watched him for $10 a day while I attended class. My brothers - Terran and Andy - who would come pick up Donovan even though they had no idea what to do with a little person. They fed him graham crackers and cheese slices, and he had a blast. Diane Gibbons - my manager when I worked part-time as a bank teller, who arranged my schedule so that I could always be off for classes. And Iris Cooper - who treated D like her own child. My amazing friend - Amie Tumbling - for keeping me sane and lighthearted in some of the hardest moments. My first school principal - Marilyn Mitchell-
Wilson - who allowed me the opportunity to work with special education students and develop a lifelong passion. My collaborating teacher - Gale Lyons - who taught me what it meant to hold the highest expectations for all children. It is only fitting that Kennesaw bestowed my first degree in 2009 and also my final one in 2020.

Once I became a teacher, I had the honor of knowing many great people who demonstrated how to be an impassioned instructor and a compelling leader. I still cite my first Lead Teacher - Jaime Davies - on her plethora of knowledge as I now lead other teachers. Laura Giordano - my mentor early on - with her wise ways, she showed me how to be a beacon of hope. Angela Landis and Tiffany Denson - who loved children more than I thought was capable. Thank you for your constant encouragement. I want to also acknowledge my former principal - Veronica Williams - for she saw my vision and passion for advocating for students with disabilities and a more inclusive community, thus offering me ample opportunity to grow at Chesnut along with my AP, Lloyd McFarlane. It was there that I completed a technology and interactive based small group (TIBS) study, earning my specialist degree. And then also implemented my first peer mentoring sessions, through a club I called ‘Acceptance’. I also want to acknowledge Caitlin Hardy and Takeshia Gyles - who carried on my heart project when I was promoted.

My cohorts – Dr. Osman Khan, Dr. Cleo Iliescu, Dr. Karmen Binion, and soon to be Dr. Artese McCrae. You guys rock! I have been enamored with your research since the beginning, am so proud of each of you and cannot wait to see what the future holds for us all.

Of course, none of this would ever even be possible without my dissertation committee:
Dr. Kate Zimmer - you believed in me from the very first time we spoke, offering to take me on as your mentee as you offered acceptance into the doctorate program. One of the many meaningful assignments you gave was to join an educational organization. Little did I know that by joining the Council for Exceptional Children that I would soon be awarded the Georgia Teacher of the Year and an all-expense paid trip to DC to advocate for special education legislature. You fielded countless calls, texts, emails, and even calmed me down when I decided to change my topic several times. We talked on weekends, holidays, breaks, and even with the kids joining in. You offered me the opportunity to work as a Graduate Research Assistant in the AVATAR Lab, thus inciting the concept for my study. You taught me how to write a literature review. Thank you for everything. You are a hard person to please, and I only hope I have met your expectations with this dissertation.

Dr. Melissa Driver - you are an amazing support and I am so lucky to have you in my corner. Your class when we wrote and submitted an article was the foundation for this study. Thank you for guiding me along the way and pressing on me to uncover the topic I wanted to share. I appreciate your kind letters of recommendation as well. It feels good to know that someone believes in what you are doing as much as you do. Thank you for the long hours you have put into ensuring my work is both seen and heard.

Dr. Katie Bennett - you were able to take my jumble of ideas and formulate coherent plans for them. That first planning session when we sat on the floor after I presented at the CEC Conference and hashed out everything that I hoped to achieve will forever be ingrained in my memory. You heard my heart and organized it into a study. Changing my timeframe, participants, and methodology hasn’t been easy, but you were there, analyzing how to best achieve the desired results. Thank you for your time and energy and creativity.
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CHAPTER 1
INTRODUCTION

Peer Mediated Instruction and Intervention (PMII) is an evidence-based practice (EBP) where similar aged peers receive training to support children with disabilities. PMII has shown positive results in encouraging social communication and interactions in children diagnosed with ASD from age 3-22 (National Autism Center [NAC], 2009; Griffin, Sam, & AFIRM Team, 2016), regardless of the extent of the training program. However, these studies rarely incorporate an opportunity for these individuals to purposefully practice the learned skills before beginning the intervention. In addition, to date, there is no study using a mixed reality simulation program to train peer mentors. Therefore, the purpose of this study was to examine if a specific training program for peer mentors in reinforcement and modeling with prompting (RaMP) using the research based Autism Focused Intervention Resources (AFIRM) modules (Sam, Griffin, & AFIRM Team, 2015) could further support PMII by building a solid foundation of skills that Peer Mentors (PMs) could maintain. This dissertation will review the challenges of ASD, the specific RaMP EBPs, and the inclusion of MRS as a platform for purposeful practice. Additionally, a multiple baseline single subject design across participants (Baer, 1968; Horner, Carr et al., 2005; Watson & Workman, 1981) was utilized to analyze the effects of the training and across three student dyads to determine if there was an increase in the fidelity of implementation following the RaMP training program.

Autism Spectrum Disorder

ASD is a neurodevelopmental disability that affects the brain development, which is seen through challenges in social interactions, verbal and non-verbal communication, and restrictive and repetitive behaviors and interests. These characteristics are seen through difficulty in daily functioning and relating to others (National Institute of Mental Health [NIMH], 2018). ASD is a
developmental disability category that falls under the Developmental Disabilities Assistance (DDA) and Bill of Rights Act of 2000 which classifies a developmental disability as a disability that affects the person mentally or physically and limits their major life functions indefinitely (DDA, 2000).

Autism was first discovered by Dr. Leo Kanner in 1943 when he studied a group of children that were previously thought to be schizophrenic or feeble minded (Kanner, 1943). Dr. Kanner conducted a case study with 11 children, eight boys and three girls, and found that they exhibited many similar characteristics, including an inability to relate to others and develop a social awareness. In addition, the children would focus on particular objects and portray a desire for consistency, having difficulty with change or transitions. Language varied among the participants, some spoke using rote memorization, others used echolalia, some were delayed, and 3 were non-communicative (Kanner, 1943). Echolalia is the term that refers to when the person repeats words, phrases, songs, movies, books etc. that was heard, either immediately or delayed after some time has passed (NAC, 2018; NIMH, 2018).

Kanner referred to the disability first as Kanner’s Syndrome and then later as Early Infantile Autism (Kanner & Eisenberg, 1956; Wing, 1993). Concurrently, Hans Asperger was studying a group of children that displayed the same characteristics, although they did not have as great of language or adaptive impairments, nor intellectual difficulties (Asperger, 1944). He named those affected as having an Asperger Syndrome (AS). Although his research would not surface in an English translation until 1991 (Asperger, 1991), Kanner also began to notice a deviation in the children he was observing based on intellectual ability. These characteristics laid the foundation for the current criteria of ASD as defined in the *Diagnostic and Statistical
Manual of Mental Disorders (5th ed.; DSM-5; American Psychiatric Association [APA], 2013), which include limited social interactions and restrictive interests or repetitive behavior.

**ASD on the Rise**

In 2004, when the Individuals with Disabilities Education Improvement Act of 2004 was revised, ASD was listed as a low incidence disability (United States, 2011). Since then, the number of children diagnosed with ASD has significantly increased (Baio, 2018). The cause of ASD is unknown, but research points to a combination of genetic and environmental factors (NAC, 2018). Children that are deemed high risk are those that have a family member that has been diagnosed with ASD, older parents, low birth weight, and those with genetic or chromosomal disorders (CDC, 2019; NIMH, 2018).

During 2000-2002, the number of people diagnosed with ASD was one in 150, this increased dramatically between 2010-2012, to 1 in 68 (Baio, 2018). Currently, the Center for Disease Control and Prevention ([CDC], 2020) reports statistics of the disorder and the trends that have followed since its emergence. As it stands today, approximately a 1-2% of people in Asia, Europe, and North America are diagnosed with ASD, which is an average of 1 in 54 children are born with the disorder (CDC, 2020). They also report that boys are also at greater risk and are 4 times more likely to be diagnosed with ASD than girls (CDC, 2020).

Over the years, the DSM has changed the way that autism is defined. Previously, autistic disorder, childhood disintegrative disorder, Asperger’s syndrome (AS), and pervasive developmental disorder - not otherwise specified (PDD-NOS) were four separate conditions with four separate criteria to diagnose them, and literature would specify which diagnosis a child held. Today, the DSM-V (2013) uses Autism Spectrum Disorder (ASD) as a singular diagnosis that encompasses autism, as well as the previous disorders of AS and PDD-NOS, so the literature
included within this paper examines studies that indicate all three. The rise in the number of children diagnosed with ASD may be in part to the revised DSM-5 encompassing previously separate diagnosis (APA, 2013), the streamlined diagnosis process (NIMH, 2018) and the creation of diagnostic tools (CDC, 2020).

The NIMH (2018) states that children can be reliably diagnosed by two years old, with most diagnosed by four, using a two-stage process: regular screenings for developmental delays and/or ASD at 18 and 24 month and if warranted, an additional evaluation by medical health professionals. This could include pediatricians, psychologists, neuropsychologists, and speech language pathologists. The assessment should include an evaluation of cognitive, language, and adaptive skills of the child. If ASD is undiagnosed when a student enters school, the special education team can evaluate a student based on marked symptoms that are being displayed. These characteristics may include not understanding non-verbal cues, such as body language and facial expression, difficulty with understanding figures of speech, such as humor and sarcasm, and forming social relationships with their peers (NIMH, 2018).

Many screening tools are available, including the: (a) Ages and Stages Questionnaires (ASQ), (b) Communication and Symbolic Behavior Scales (CSBS), (c) Parents’ Evaluation of Developmental Status (PEDS), (d) Modified Checklist for Autism in Toddlers (MCHAT), and (e) Screening Tool for Autism in Toddlers and Young Children (STAT). The most common standardized diagnostic tools to diagnose ASD are the Autism Diagnosis Interview – Revised (ADI-R), Autism Diagnostic Observation Schedule – Generic (ADOS-G), Childhood Autism Rating Scale (CARS), and the Gilliam Autism Rating Scale – Second Edition (GARS-2) (CDC, 2019). Having these screening tools readily available assist in early diagnosis and can lead to families receiving early intervention as a result of these tools.
Challenges of ASD

The revised DSM-5 (APA, 2013) lists five criteria used to assist in ASD diagnosis: (a) impaired social communication and interactions, (b) repetitive behaviors, (c) early symptoms, (d) significant impairment, and (e) the inability to be explained by intellectual disability. ASD is considered a spectrum disorder due to the wide variety of symptoms and levels of severity that are seen throughout this population (NIMH, 2018). Similar challenges that people with ASD face are difficulties with social reciprocity, nonverbal communication, and restrictive and repetitive behaviors and interests (APA, 2013). These characteristics can affect the person’s ability to successfully navigate through life in work, school and relationships, with varying levels of severity.

Social Interactions

Typically developing children learn to communicate with others at an early age, yet those on the autism spectrum have difficulty with social communication and social interactions (NAC, 2009). The first criterion characteristic when diagnosing an individual with ASD is an impairment in social communication and social interactions that can be seen across multiple contexts, including school, home, and work (APA, 2013). This is characterized by a lack of social reciprocity, such as initiating and maintaining conversations by asking and answering questions and making appropriate comments (Carpenter, 2013).

Nonverbal Communication

ASD is further characterized by deficits in nonverbal communication, including not: orienting towards a person, maintaining appropriate proximity and eye contact, looking/coming when called, and using nonverbal gestures or cues for communication, such as waving (Carpenter, 2013). Also termed Joint attention, this is the sharing of attention between a child
and another child, or an object (Yang et al., 2003). Having difficulty with joint attention can hinder social communication as this skill is imperative for these types of interactions (Whalen, Schreibman, & Ingersoll, 2006).

**Restrictive and Repetitive Behaviors and Interests**

A person with ASD may also be characterized as displaying stereotypic and repetitive movements, such as clapping, twisting, flapping, rocking, swaying, spinning, or picking (Carpenter, 2013). Repetitive speech is another attribute of a person with ASD (APA, 2013). This can be evidenced by the use of echolalia or refer to the person using the same set of idiosyncratic phrases (Carpenter, 2013). Additionally, individuals with ASD may face challenges with transitions or changes and have a preference for maintaining schedules without participating in spontaneous activities (Halle et al., 2016). Additionally, a person with ASD may have an aversion to loud noises, refusal to eat particular foods, and rigid thought patterns (NIMH, 2018). Often, people with ASD become fixated on objects or interests. They also may be highly interested in lights, textures, smells, or movements (APA, 2013).

These deficits in social interactions, nonverbal communication, and restrictive and repetitive behaviors can pose difficulty in developing and maintaining relationships and making friends (APA, 2013). As a result of these challenges, the students are often ostracized and bullied in adolescence (Humphrey & Symes, 2010; De Boer et al., 2012; De Boer & Pijl, 2014). To overcome these barriers, early intervention can be implemented to help in an individual become more successful in their day to day lives.

**Evidence-Based Practices**

To counteract the challenges that children with ASD face as a result of the disability, early interventions are given to children before they enter school. The term early interventions
refers to publicly funded programs that children can receive under the age of three, including speech therapy and physical therapy, for children who have a developmental delay or disability (CDC, 2019). Part C of IDEA (United States, 1986) lays the foundation for early intervention services to support families of infants and toddlers at a young age to develop needed skills, which may minimize future special education needs and increase independence. Early intervention can help with children’s physical, cognitive, communication, social emotional, and adaptive development (Dawson et al., 2010). Due to the early onset of social communication deficits, early intervention is necessary to provide a strong foundation of skills and increased opportunity for success (Mayo Clinic, 2012; Wallace & Rogers, 2010; Woods & Wetherby, 2003). Once children with ASD reach school age, special education teachers are required to provide EBPs to continue to support their development (Pearson, 2013). Although diagnostic tools and early intervention services are available to young children diagnosed with ASD, many still do not receive those services and enter school without ever receiving services. Therefore, EBPs should be implemented throughout the school environment to support these children.

Researchers, educators, scientists, and doctors have worked to discover reliable and valid practices to assist with children diagnosed with ASD (National Professional Development Center [NPDC], 2015; Wong et al., 2014). An EBP is a reliable and replicable intervention and/or instructional procedure based on empirical studies and findings. In order to be considered an EBP for ASD, the NPDC determined that an intervention must meet a set of criteria: (1) two randomized or quasi-experimental design studies, (2) five single subject design studies, or (3) one randomized or quasi-experimental and at least three single subject studies. Using this criteria, the NPDC created the Autism Focused Intervention Resources & Modules (AFIRM) to help others understand how to plan, use, and monitor EBPs for ASD (NPDC, 2015).
Through the years, policy has mandated the usage of EBPs in the school system (IDEA, 2004). There is a long history of policy that supports the use of research-based strategies. For instance, the Elementary and Secondary Education Act (ESEA) (1965) noted that teachers should use strategies backed by research. EBPs have been researched and reported throughout the years to increase specific skills such as social interactions and communication, two characteristics of ASD (APA, 2013). Public Law 94-142 (Education for all Handicapped Children Act) passed in 1975 was the predecessor for what is now known as the Individuals with Disabilities Education Act (IDEA). In 2001, No Child Left Behind (NCLB) stated that interventions should be based off “scientifically-based research” going so far as to state that federal funds would only be given to educational activities that fit the criteria of an EBP and backed by interventions that were both reliable and replicable (Lingren & Doobay, 2011; Pearson, 2013). In 2015, the Every Student Succeeds Act (ESSA) continued this research-based focus by stating schools would need to provide evidence-based interventions and through a tiered system to indicate the proven effectiveness of each practice.

The National Autism Center (NAC) published the National Standards Report (2009), that provides a detailed list of EBPs for parents, caregivers, educators, and service providers that focus on individuals with ASD. Reviewing 775 studies, the NAC (2009) determined and found that only 11 were established EBPs, with 22 showing some evidence, and 5 were considered ineffective. The NPDC reviewed 175 articles and identified 24 EBPs (Odom et al., 2010) that fit the criterion of an EBP. This work was updated in April 2015 to include analysis of research conducted from 2007 - 2014 by the NPDC (Wong et al., 2014) to include 27 total EBPs, and increase from the previous 11.
Evidence-Based Practices to Support Social Communication

ASD is a unique disability with a wide spectrum of varying characteristics displayed by individuals (NIMH, 2018). Due to this variance, there is no single intervention that can be generalized to all, and a strategy that may work with one individual with ASD may not work with another (Wong et al., 2014). The first criterion when diagnosing ASD is deficits in social communication and social interaction (APA, 2013). Since there are a multitude of interventions being used for children with ASD and due to the individualistic nature of the disability, some interventions are better suited for some and at times can require extensive research on which interventions will work best for a particular child (Whitman & DeWitt, 2011). The NPDC (2017) list the following EBPs interventions to support social communication in children ages 6-22 with ASD: Antecedent-Based Intervention (ABI), Modeling (MD), Peer Mediated Instruction and Intervention (PMII), Reinforcement (R+), Scripting (SC), Social Skills Training (SST), Technology Aided Instruction and Intervention (TAII), Video Modeling (VM), and Visual Supports (VS) (Sam & AFIRM, 2015). The AFIRM Team created modules for each of these EBPs to assist with implementing each with fidelity (Sam et. at., 2019). Thus, these modules were selected and implemented in RaMP training program for this study.

Significance of the Study

A comprehensive review of the literature yielded limited research on (a) a specific training program that is provided to peer mentors, and (b) research on the efficacy of training peer mentors in middle and high school. Further, to date there is no documented study using a mixed reality simulation (MRS) program to train peer mentors. Peer Mediated Instruction and Intervention is an EBP that has proven to be beneficial in children diagnosed with ASD from age 3-22 in the area of social communication (National Autism Center [NAC], 2009; Griffin, Sam, &...
AFIRM Team, 2016) even in research without an explicit training program. Therefore, the purpose of this study was to examine if the results from the RaMP training program for peer mentors in reinforcement and modeling with prompting using the research based AFIRM modules (Sam, Griffin, & AFIRM Team, 2015) could further support the (PMII) EBP by building a solid foundation of skills that Peer Mentors (PMs) could maintain and generalize to various settings when working with people with disabilities. Findings from the study may also prove to be useful when instructing paraprofessionals, general education teachers, parents, and special education teachers. Professionals working in the field of special education may not have previously received training in the aforementioned EBPs. While EBPs are required to be provided (ESSA, 2015), there is currently not a method to demonstrate adherence to this mandate. Therefore, this study will have participants use the Mixed Reality Simulations (MRS) platform Mursion, to allow for purposeful practice of these skills. The study will address the following questions about peer mentors as they relate to working with children with ASD:

1. Does explicit training in conjunction with purposeful practice affect the fidelity of peer mentors’ implementation of RaMP?

2. Are the effects of the peer mentor training maintained after the support is withdrawn by the trainer, and then generalized when working with children with ASD?

In Chapter 2, the literature reviewing studies that incorporated the specific RaMP EBPs was reviewed. Additionally, the training or lack thereof that peer mentors receive within PMII was analyzed. Further, the inclusion of mixed reality simulation as a platform for purposeful practice was also studied and extrapolated.
**List of Terms**

**Autism Focused Intervention Resources & Modules (AFIRM)** – modules designed to help you learn the step-by-step process of planning for, using, and monitoring an EBP with learners with ASD from birth to 22 years of age developed by The National Professional Development Center to support teachers, therapists, and service providers with delivering the EBPs.

**Autism Spectrum Disorder (ASD)** - umbrella term that now encompasses autistic disorder, childhood disintegrative disorder, Asperger’s syndrome (AS), and pervasive developmental disorder - not otherwise specified (PDD-NOS).

**Evidence Based Practice (EBP)** - a reliable and replicable intervention and/or instructional procedure based on empirical studies and findings.

**Mixed Reality Simulations (MRS)** - when real people and physical environments interact with virtual people and virtual environments.

**Modeling (MD)** - Demonstration of a target behavior shown by the mentor to the mentee that results in imitation of the desired skill (Wong et. al.; 2014).

**Peer Mediated Instruction and Intervention (PMII)** - an evidence-based practice (EBP) where similar aged peers receive training to support children with disabilities.

**Reinforcement (R+)** - An item, activity, or verbal response that is given by the mentor to the mentee occurring after they display a desired skill (Wong et. al.; 2014).

**Social Skills Training (SST)** - as “any adult-directed instruction in which social skills are targeted for improvement . . . in either a group or individual format . . . may co-occur with peer mediated instruction and intervention (PMII) . . . to support practice of targeted skills”.

**Verbal Prompt (VP)** - Providing either a full or partial verbal response or visual example that is given by the mentor to the mentee that result in a display of the desired skill.
Chapter 2

REVIEW OF LITERATURE

Children with ASD struggle in the area of social communication and interactions (APA, 2013). Incorporating early interventions for children with ASD at a young age demonstrates progress when explicitly instructing them on demonstrating appropriate social skills (Dawson et al., 2010). However, the median age for diagnosis in 2014 was 52 months (Baio et al., 2018), which limits the amount of time to provide early intervention services before entering school. To combat address difficulties with social communication and interactions that children with ASD faced prior to beginning school, teachers are instructed to use EBPs (Dawson & Lignugaris-Kraft, 2017; Hudson et al., 2018; Pas et al., 2016) in the instructional setting. It is important that these interventions continue as the children age into adolescence, at a time when social communication is essential as they navigate through middle school, high school, and eventually join the workforce. Peer Mediated Instruction and Intervention (PMII) is an EBP that can be used in multiple settings by having a trained peer mentor work with another peer that has a deficit in a particular area, such as social reciprocity skills (NAC; 2009a). To meet the instruction piece of PMII, the peers could be trained using the RaMP training program which includes the aforementioned EBPs reviewed by the literature provided in this chapter. Since peer mentoring is already an EBP (Sam & AFIRM, 2015) and shows positive gains, explicitly training the mentors in the RaMP EBPs could show further positive results. Further, mixed reality simulations (MRS) also provide an opportunity for purposeful practice in the field of special education (Dieker et al., 2008). Ericsson (2016) relays that the four essential components of purposeful practice are well-defined specific goals, being focused, involving feedback, and leaving the comfort zone. Offering this training through the use of MRS for the peer mentors
could continue to build a solid foundation of skills. A review of MRS used in education is also included here.

**Theoretical Framework**

To understand the nature of peer mentoring on students with ASD, the theory of Social Cognitive Theory (Bandura, 1986) and the Social Development Theory (Vygotsky, 1978) are analyzed. Encouraging positive social reciprocity skills via peer mentoring could prove to be beneficial for the students with ASD that display a deficit in social communication. Behaviorists believed that the environment created the behaviors, and Bandura (1977) posited that learners acquire information from others as well. Burrhus Frederic (B.F.) Skinner theorized that behavior could be modified using positive and negative reinforcement (Hurtado-Parrado, 2015). The theory of behaviorism was based on the belief that behavior could be manipulated to control the outcome (Cooper et al., 2007). Additionally, Bandura states that people learn by observing and imitating a model. His Social Cognitive Theory (SCT) focused on behavior modeling, observing the desired skill, and practicing the skills (Bandura, 1986). The peer mentors provide such a model to observe and learn from. Further, Vygotsky’s Social Development Theory focused on social interaction at the core of development of cognitive processes. He believed that knowledge is co-constructed; therefore, a skilled peer could help a child that was less able to develop skills through instruction and guidance as long as they were in proximity to each other. He named this theory the Zone of Proximal Development (ZPD). The social learning theories provide a theoretical framework for the current study. They were utilized to assist in creating the peer mentor partnerships in the study. When applying these theories, they help us understand the roles and relationships of a mentor and mentee and how they create positive results. Peer mentors
(PMs) can be readily implemented in the school setting (Gardner et al., 2014; Pierce & Schreibman, 1997; NAC, 2009c) to support students with ASD.

**Social Skills Training**

Sam and AFIRM Team (2016) define Social Skills Training (SST) as “any adult-directed instruction in which social skills are targeted for improvement . . . in either a group or individual format . . . may co-occur with peer mediated instruction and intervention (PMII) . . . to support practice of targeted skills” (Social Skills Training (SST) EBP Brief Packet, p. 2). Here, SST is not a specific curriculum, but rather a collection of practices that utilize a behavioral approach to teaching preschool through twelfth grade children age-appropriate social skills and competencies, including communication, problem solving, decision making, self-management, and peer relations. Wong et al. (2014) state that SST is “group or individual instruction designed to teach learners with ASD ways to appropriately interact with peers, adults, and other individuals. Most social skill meetings include instruction on basic concepts, role-playing or practice, and feedback to help learners with ASD acquire and practice communication, play, or social skills to promote positive interactions with peers” (p. 21). This umbrella term includes a myriad of EBPs that can be used in the K-12 school setting to aid students with autism in the areas of social communication and interactions which can be delivered in a variety of instructional formats. Instruction on social skills can improve the level of social competence for students with ASD (Griffin & AFIRM, 2015).

To target the deficit area of social communication and interactions in children with ASD (APA, 2013), researchers conducted studies with interventions that included EBPs to support children and improve social reciprocity skills. Reinforcement, modeling, and prompting (RaMP) are recommended EBPs to be included in PMII training and implementation (Gonzalez-Lopez &
Kamps, 1997; Griffin & AFIRM, 2016; Kamps et al., 2002). Studies that focus on using the RaMP strategies with adolescent aged students with ASD (Argott et al., 2008; Cadette et al., 2016; Gutman et al., 2012; Gutman & Raphael-Greenfield, 2012; Hagopian & Kuhn, 2009; Taylor et al., 2005) to increase social reciprocity skills are included in Table 1 located in the appendix. The studies all yielded positive results when the included.

**Evidence-Based Practices in Social Skills Training**

Students with ASD show positive gains when the interventions used in the following studies included the RaMP EBPs to target social reciprocity skills (Griffin et al. 2016). Therefore, the below paragraphs analyze the studies mentioned above that include the EBPs of Reinforcement (R+), Modeling (MD), and Prompting (PP).

**Reinforcement**

Wong et al. (2014) define reinforcement as “an event, activity, or other circumstance occurring after a learner engages in a desired behavior that leads to the increased occurrence of the behavior in the future” (p. 21). Providing the learner with a direct consequence for exhibiting the preferred behavior to increases the likelihood that the behavior will reoccur as seen through the theory of behaviorism (Hurtado-Parrado, 2015). This reinforcement can consist of both positive or negative feedback. When a child demonstrates the desired behavior, they can be provided with positive reinforcement. Likewise, if the desired behavior is not displayed, they may receive a negative reinforcement, and something can be removed in order to increase the desired behavior. Positive reinforcement can be in the form of verbal praise, a token system, preferred activities, or a privilege. Negative reinforcement can be losing an activity, privilege, or a peer not wanting to interact with them as a result of a display of negative behavior. This
process reinforces behavior by providing immediate feedback. Three studies that used R+ as an intervention with adolescents with ASD are included below.

**Reinforcement (R+) Interventions.** Taylor et al. (2005) examined the frequency of initiations on three male children with ASD, ages 12, four, and 10. The researchers used a multiple baseline across participants design with an ABA reversal method. The 12-year-old child used a communication device for verbal output, the other two participants were verbal. The baseline and intervention data were collected in the student’s classroom with a similarly aged peer. The participant who was 12 did not initiate interactions for desired objects during baseline. The preferred snacks for each participant were determined by offering choices. A peer would sit next to or across from their partner and offer three snacks, at which time students would be expected to make a mand (request) for the desired snack. The snacks were then kept put up during the school day. The dependent variable was the number of times that the students would ask his peer for the desired snack using his communication device. The frequency was calculated during snack time, which lasted five minutes without a mand or when ten mands were made. Results showed that establishing a consistent replicable practice can prove to be successful and that students with ASD can be taught to make mands to their peers for preferred objects. A limitation of the study was the necessity for adult interference by the peer mentors to ensure that the participants understood the established procedures.

Hagopian and Kuhn (2009) completed a multiple baseline across behaviors designed study combined with a withdraw A-B-A-B design. The participant was a thirteen-year-old male with PDD-NOS, Attention Deficit Hyperactivity Disorder, and mild intellectual disability. His frequency of inappropriate comments and inappropriate touching as well as appropriate comments and social withdrawal were tallied. The intervention sessions ranged in time from 90
to 120 minutes at which time the therapist conducted “a differential-reinforcement -of-low- rate behavior (DRL) schedule with corrective feedback” (p. 908) during the intervention phase (B) and then withdrawn, and then reimplemented. The therapist responded when appropriate requests were made and ignored the student when aggressive behavior was displayed. Corrective feedback was given in the form of explicitly stating the type of inappropriate behavior followed by the number of times the behavior had occurred. In addition, tangible reinforcement in the form of a candy bar was offered if the student made seven or fewer inappropriate comments within a session. The study yielded positive results, with inappropriate behaviors reducing from a mean of nineteen per hour to two per hour. When the treatment was withdrawn, the inappropriate behaviors increased to a mean of thirty-three, then decreased to two when the treatment was repeated. The A-B-A-B method supports the research basis that facilitated practice with feedback and tangibles can show significant gains with someone with ASD, though here the participant is identified with the earlier diagnosis of PDD-NOS. However, the study has limitations as there was only one participant and neither maintenance or generalization data was collected.

Argott et al. (2008) completed an adult led social skills intervention with two girls and one boy, age 11, 11, and 14, that all had a diagnosis of ASD. In the multiple baseline across participants design They use scripted responses to learn how to express their emotions and to ask others about their emotions. They were engaged in 24 trials lasting 15 minutes a piece three times a week. The children were provided reinforcement in the form of tokens and verbal praise. Reinforcement was offered every time they correctly read the written prompt. If they did not read it, then they were given another opportunity and reinforced once they competed the task. Results were positive and the students responded to the reinforcement as indicated prior to the study.
beginning. The study used participants that were previously taught conversational skills. A limitation is that children without this skill set may not show the same level of progress.

**Modeling**

The second EBP in RaMP is modeling. Modeling is explicitly demonstrating a desired behavior or skill before the learner is expected to demonstrate the same behavior or skill. Wong et al. (2014) define modeling as the “demonstration of a desired target behavior that results in imitation of the behavior by the learner and that leads to the acquisition of the imitated behavior. This EBP is often combined with other strategies such as prompting and reinforcement” (p. 20). It is commonly used to assist in building social reciprocity skills with children with ASD (Charlop-Christy, Le, & Freeman, 2000; Matson et al., 1992). Modeling can either be a primer or a prompt; it is considered a primer when an individual is given a model and then expected to mimic the behavior and it is a prompt when they do not exhibit the desired behavior and require follow up assistance with what behavior to demonstrate.

**Modeling (MD) Interventions.** Gutman and Raphael-Greenfield (2012) conducted a multiple baseline across participants design A-B-A pilot study with two participants aged 15. The students were recommended by the high school administrator as having extreme social skill deficits. The Evaluation of Social Interaction (ESI) tool was used to assess the level of support needed. The two participants received the intervention concurrently, a four-week social skills program consisting of seven modules: “social skills in the classroom, lunchroom, and gym; developing and maintaining friendships; social skills supporting family relationships; social skills supporting sports team membership; social skills in the community; and exploring dating” (p. 7). The eighth module included a dog care component to identify if the canine increased the use of social skills. Each module included fifteen minutes of three motor-based warm up
activities and forty-five minutes of three role-playing activities where the adult modeled the appropriate behaviors. Following the facilitated practice, the participants were offered corrective feedback. Corrective feedback is important in the training process to support the participants in understanding how to improve. This process was also used in the RaMP training program. The frequency of the targeted social skills was recorded throughout the baseline, intervention, and probe stages in twenty-minute sessions, and showed an increase in social reciprocity skills.

Gutman and Raphael-Greenfield (2012) conducted a similar study using the same seven module handbook (Gutman, Raphael-Greenfield, & Rao, 2012). In the multiple baseline across participants design they were again able to see an increase in communication with participants with ASD. This study looked at participants aged 15-21 with high functioning ASD. The students participated in twenty-minute motor-based warm up activities and forty-minute role play activities over a 12-month period. The seven subjects were matched up with their same age peers in an effort to imitate and interact socially, and the study elicited positive results in both verbal and nonverbal communication. The study also showed that the highest increase occurred near the beginning of the study, suggesting that the interventions are most effective early on. Further, modeling was shown to be more effective when it is used in conjunction with prompting and reinforcement (McDowell et al., 2015).

**Prompting**

The third component of RaMP is prompting. Positive results (Cadette et al., 2016) are shown when studies included prompting in conjunction with reinforcement and modeling; thus, it is included as an EBP in this literature review. Prompting is when a learner is offered assistance while acquiring a new skill or behavior. Prompting is also known as an errorless teaching method (Griffin et al., 2016) to help those being prompted to make correct choices
when a learner doesn’t respond, is about to respond incorrectly, or does respond incorrectly when attempting to master a new skill. McClannahan and Krantz (1999) define prompts as “instructions, gestures, demonstrations, touches, or other things that we arrange or do to increase the likelihood that children will make correct responses” (p. 37). Wong et al. (2014) defines prompting as “verbal, gestural, or physical assistance given to learners to assist them in acquiring or engaging in a targeted behavior or skill. Prompts are generally given by an adult or peer before or as a learner attempts to use a skill” (p. 21). There are various prompts that can be used to encourage learners ranging from more intrusive to less intrusive: full physical, partial physical, modeling, gestural, verbal, and visual (McClannahan & Krantz). The three components that make up prompting are: (a) antecedent - a cue that tells the learners how to respond to the target skill, (b) behavior - how the learners respond to the prompt, and (c) consequence - feedback and/or reinforcement depending on the response (Griffin et al., 2016).

**Prompting (PP) Interventions.** Cadette et al. (2016) performed a multiple baseline single subject design across behaviors on three secondary students with ASD that were instructed in a self-contained classroom at a charter school for students with ASD. None had any previous experience with direct instruction (DI) and struggled with responding to questioning, scoring below a 50% on the baseline assessment. The assessment consisted of ten open-ended questions beginning with “who”, “what”, “why”, “when”, and “how”. The researchers only examined the “who”, “where” and “what” questions” on the effects of direct instruction on the students. The instructors used the Reading Mastery Signature Education language curriculum, with scripted lessons to teach the material. In addition, visual and verbal prompting and cues were implemented along with modeling. Data was then collected individually, with four questions per type, lasting from three to fifteen minutes. Maintenance data was collected at two and four
weeks. The participants mastered two of the three “wh” questions and made progress on the third. Limitations include modifications made to the intended curriculum, the low number of participants, and a lack of generalization sessions. Future research could include teaching the participants to answer spontaneous questions in a naturalistic environment.

**Social Skills Training Conclusion and Next Steps**

The general population may not understand how to socialize with people with ASD and as a result, children with disabilities are not integrated as much as they could be in the school setting (Schlieder et al., 2014). Siebers (2008) believes that the way that society views those with disabilities is an evolutionary process that continues to change with time. This could occur as more children become acquainted with those with disabilities. By training typically developing peers, students with ASD could build social network salience (Locke et al., 2017).

Peer Mediated Instruction and Intervention can easily and readily be implemented in the school setting (NAC, 2009c). If modeling, prompting, and reinforcement were explicitly taught to the mentors and then they were given an opportunity for purposeful practice applying the training before working with a student with ASD, could have a positive impact on the fidelity of the intervention.

**Peer Mediated Instruction and Intervention**

The Peer Training Package ([PTP], NAC, 2009) and Peer Mediated Instruction and Intervention ([PMII], Sam, & AFIRM, 2015) are different names for the same EBP involving utilizing trained peer mentors as an intervention. PMII is defined as when “typically developing peers interact with and/or help children and youth with ASD to acquire new behavior, communication, and social skills by increasing social and learning opportunities within natural environments. Teachers and service providers systematically teach peers strategies for engaging
children and youth with ASD in positive and extended social interactions in both teacher-directed and learner-initiated activities” (Wong et al., 2014, p. 20).

Enjoyment in engaging others in social interactions motivates typically developing children. This can be different for a child with ASD. Subsequently, a child with ASD can benefit from watching and learning social skills from their peers (Bohlander, Orlich, & Varley, 2012; Kasari, & Patterson, 2012; DiSalvo & Oswald, 2002). Vygotsky maintained the idea that education is only brought about when new knowledge is intrinsically linked to old knowledge (1978). Therefore, only when the pupil can adopt the new information based on their individual understanding of ideas, can the learning be authentic and valid. PMII, through the Zone of Proximal Development, offers such an opportunity to children with ASD as evidenced in the Grey et al. (2007) study where they placed typically developing children with children with ASD in cooperative learning groups. Without any instruction or training, the children with ASD improved their social interactions from 3% and 4% to 40% and 20%. Literature demonstrates that PMII is effective with children from ages 3-22 that have been diagnosed with ASD (Sam & AFIRM). This EBP builds communication, interpersonal, and play skills through social interactions with a PM (NAC, 2009a). Picci and Scherf (2015) state that the issue of social ineptitude only worsens as children enter adolescence. As a result, social isolation and ostracization are negative consequences stemming from the ineptitude to perform in a social environment. Friendships benefit children in multiple ways; having friends during the adolescent years can ease the stressors that children go through, thus raising a child’s self-esteem and limiting the opportunities for depression (Semel Institute, 2017). To combat this, typically developing peers could be trained to encourage the production of social communication skills through peer relationships. Pierce and Schreibman (2007) state that most PMs can be trained in
three or four half hour sessions for the four areas: explanation, role playing, additional role playing, and questions.

### Selection of PMII Studies

The AFIRM website (Sam, Griffin, & AFIRM., 2016) cites 15 studies used as an evidence-base for PMII; however, only one consists of middle and high school students (Carter, Cushing, Clark, & Kennedy, 2005). Due to the limited number of studies conducted with middle and high school students, all students in grades K-12 are included in this review. This excluded seven of the studies that included participants age three through five. The other eight studies are analyzed below.

A search using the EBSCO database, via the Kennesaw State University’s library system, was used to find additional articles. The following terms were used in the search: peer training package, PTP, peer mediated intervention and instruction, PMII, autism, ASD, PDD, Asperger, social skills. In addition, the following parameters were used: available in library collection, full text, scholarly (peer reviewed) journals, and academic journals. The DSM - IV was published in 1994 using different criteria than the previous 1980 version - the DSM III (American Psychiatric Association, 2018). Therefore, the date parameters where set from 1994-2018. Additionally, through an ancestral search a meta analyses was uncover studies that met the criteria. Studies that were selected met the following criteria: (a) the participant(s) had to have a diagnosis of Autism Spectrum Disorder, Asperger's, or Pervasive Developmental Disorder, (b) the minimum age of the participant(s) was 6 and educated in the K-12th grade setting, (c) the independent variables consisted of a type of peer mentoring intervention, (d) the explanation of the peer training, and (e) the results of the intervention were available. Based on the results, an additional seven studies were included, bringing the total reviewed to 15 studies, delineated below to support the tenets of
PMII into peer mediated, instruction, and intervention (see Table 2 in the appendix). Two points to highlight through the analysis of peer mentoring literature are: the lack of studies that occurred during adolescence and the absence of using a systematic training program for the peer mentors.

Of the 15 studies (See Table 2), 12 included participants 5-11 years of age and would be considered elementary aged children, 3 included participants 12-18 years of age and would be considered secondary education students. Sixty of the participants were male and 19 were female. This is in line with the statistic that males are also at greater risk and are 4.5 times more likely to be diagnosed with ASD than females (CDC, 2020). A multiple baseline single case design was used 13 of the 15 studies. One consisted of a comparison and one was a two-year (what design?) study. A majority of studies were centered around initiating and maintaining conversations. Additionally, although the number of mentors changed throughout the studies, the mentors were typically the same age as the mentee as recommended by the literature (Kasari & Patterson, 2012). The studies provided limited to in depth training in EBPs. Nine of the 15 studies included instruction in RaMP strategies for the peer mentors. Study duration ranged from four weeks to two years.

**PMII Studies without Explicit Instruction**

Peer mentoring is defined as a process that “involves one or more peers without disabilities providing academic and social support to a student with disabilities” (p. 16) and occurs when another similar aged child engages in a mentoring relationship with another student to encourage and facilitate increased academic or social skills (Carter et al., 2005). To mediate is to go between two others, in this instance, the peer mediates between the adult and the other peer. Clubs and social groups are created where PMs are implemented as an intervention throughout school systems, with names such as peer networks, circle of friends, buddy skills, and
special friends (NAC, 2009b). PMs can also be enlisted in the form of siblings or classmates to work with a child in their natural environment although similarly aged peers are preferred (NAC, 2009c). Studies that outlined a specific training program are detailed below.

Banda, Hart, and Liu-Gitz (2010) conducted a study with two male participants with ASD. They wanted to observe the social initiation skills of asking and answering questions using a PM. A four to five-minute training lesson was conducted with the participants and the PM immediately prior to the intervention. The PI modeled how to ask a question and gave each person a turn. If they completed the task, they were reinforced. If they did not and needed assistance, then a prompt was provided. The same was done for answering questions. The PMs engaged in short training lessons lasting only a few minutes before the intervention. Yet, the study showed significant gains in initiations and responses by students with ASD and adds to the research with an added academic element. Alex’s average initiations rose from 1.0 (range 0–2) in baseline to 9.7 (range 4–17) during intervention. Bret’s average initiations went up from .5 (range 0–2) to 9.4 (range 7–15). Alex’s average responses increased from 1.0 (all values of 1) to 9.3 (range 5–13). Bret’s responses started at .63 in baseline (range 0–3) and became 8.2 (range 5–12). Within the multiple baseline single subject design across participants, the initiations and responses were measured during center time. The participants were observed two to three times a week for ten minutes at a time. The dyads were instructed to ask and answer questions in a reciprocal manner. The researcher modeled and prompted the student participants and PM to encourage them to initiate and respond to social interactions and reinforced them when they did. Future research could look at setting up a naturalistic environment with opportunities for cooperative learning. Reinforcement, modeling, and prompting was used by the researcher, but the mentors were not instructed in the RaMP skills.
Halle et al. (2016) conducted a multiple baseline single subject design across participants study where the peer mentors received whole group training in listening to the voice tone, reading the facial expressions, and prompting the students with ASD to provide a greeting. Four middle school students aged 12-14 with an ASD diagnosis were presented with social stories in a video format and then greeted by trained peers. The students were all educated in the general education classroom for the majority of the day and received the social story intervention at the beginning of the day prior to class. The study focused on encouraging an appropriate greeting as a response to being greeted by a peer, and event recording in addition to observations was used to record data during lunch and transitions with a yes or no. An appropriate greeting was defined as orienting the eyes to the speaker and using verbal or non-verbal communication to indicate a greeting. All four students showed increased greetings during the intervention phase and remained stable during the maintenance phase. While the researchers mentioned training in prompting, the specific method that was used was not detailed. The RaMP study details an explicit training program using the AFIRM modules (Griffin et al., 2015).

Four eight and nine-year-old typically developing peers were trained to work with two students with ASD in the Krebs et al. (2010) multiple probe across tasks, replicated across participants design. They were trained on social behaviors, peer initiation and engagement, and were provided successful and unsuccessful communication examples so that they could see what to do as well as what not to do. Baseline was collected over three sessions in the Krebs et al. (2010) study. Once the PMs were trained, they entered the intervention phase where they engaged in a variety of games for 20-40 minutes with peers with ASD. Data was collected after ten minutes had gone by; if the PM did not display the initiation skill, then the PI would prompt them until they did. The dependent variables were: “1) maintaining eye contact; 2) maintaining
close proximity to peers; 3) directing or initiating conversation; and 4) maintaining the topic of conversation” (p. 398). Increases were observed in all four categories. The social reciprocity skills are similar to those included in the RaMP Study.

Laushey & Heflin (2000) used a Buddy Skills Training Script to train their peer mentors to stay, play, and talk to a buddy. The children were taught to look for similarities and differences in each other. They were given a buddy chart where they would be paired with a different student every day to play with. The steps to Stay with your Buddy, Play with your Buddy, and Talk with your Buddy were explicitly described by the PI. Buddy pairs that stayed together were rewarded with a treat. The results show that when implementing the buddy system, students with ASD have a higher increased in social skills that those engaged in active passivity. Limitations of the study include the limited number of participants; however this is common in an ABAB reversal design. Another limitation was the verbal capability of the participants. When eliciting social reciprocity skills, it is important that the participants be able to communicate with their peer mentors though.

Lee et al. (2007) had 12 typically developing peers assist in social interactions with three students with ASD in this multiple baseline across participants and settings design. The participants, 3 males ages 7, 8, and 9, all demonstrated ASD stereotypic behavior, had severe communication deficits and low social engagement. The 12 peers consisted of six PM that were trained in peer initiation and six additional peers were included in the generalization setting. The training sessions included a discussion, a review of the concepts, and positive and negative modeling examples. They collected data in five-minute videotaped sessions using event recording software to code the videos for social interactions and stereotypical behavior from both the students with ASD and those without. Additionally, prompts by an adult were recorded.
During baseline, two peers accompanied the student with ASD during free play time. The peers were trained in five 20-minute sessions on four social skills concepts, sharing, suggesting play ideas, assisting, and being affectionate. The PM practiced the learned skills with each other while the teacher provided reinforcement in the form of verbal praise. The teacher also used verbal prompting during the sessions when a social initiation had not occurred within 30 seconds. During the generalization phase, two additional untrained peers joined the two trained peers and the students with ASD during free play time. Results showed a positive correlation between an increase of social interactions and a decrease of stereotypical behaviors in each of the three participants. Limitations of the study are the lack of a maintenance phase and the immediate nature of the generalization phase. More time should be allotted between the intervention and the generalization phases. In addition, the five-minute lessons were short and may not have captured the entirety of the intervention.

**PMII Studies with Explicit Instruction**

A limited number of entries were available to examine the differences and similarities between the peer mentor instruction as that piece is rarely analyzed. However, the studies below analyze the training that the PMs received with regards to the RaMP strategies. The following nine studies (Carter et al., 2005; Chung et al, 2007; Dart et al., 2017; Gonzalez-Lopez & Kamps, 1997; Kamps et al., 2000; Mundschenk & Sasso, 1995) provide information not only on the training procedures, and also include the EBPs that the PMs are taught to execute when the training is complete.

Carter et al. (2005) conducted a multiple baseline across participants' study with a 12 and a 13-year-old female with ASD and moderate intellectual disabilities. The participants were identified as those that could benefit from working with a PM and had social interaction IEP
goals. Six general education students were chosen as the PM students. The PMs were instructed to adapt the classwork while working on the participants’ selected goals, by providing feedback and prompting. The training took place over 2 to 4 days, and they also received ongoing feedback on their performance. In the Carter et al. (2005) study, one PM worked with the student with ASD during phase A. During phase B, two peers worked with the student with ASD. The student pairs, or teams, were observed in one-minute timed intervals. The results did indicate that the number of social interactions increased when the participants worked with two peers over one peer; however, the number of social interactions with other peers did not differ greatly. This indicates that multiple peer mentors may add a layer of support to children with ASD. This could prove to be a meaningful and beneficial intervention in person; however, COVID placed limitations on our ability to instruct multiple children at once.

Four mentors age six, seven, nine, and 10 underwent training to support four students age 6-7 with ASD (Chung et al., 2007). Within the training, the PMs were taught how to solicit responses and questioning from the participants. The skills were divided into appropriate talking and inappropriate talking. After baseline data was collected and immediately preceding each session, the mentors were instructed on the skill of the day, how to use prompting to encourage the participants to use the skill and ask questions, and how to reinforce them when the skill was displayed. Additional information regarding the training was not available; however, the author stated that it could be requested. In the Chung 2007 study, on any given week, three of the mentors were included in the intervention, thus creating a group of seven children. The entire intervention lasted 12 weeks and “followed the same structure: welcome, explanation of skill of the day, teaching/didactic time, practice time, snack time, video time, and wrap-up” (p. 427). The students participated in six group sessions lasting 90 minutes each week. Results were positive in
that three of the four children showed both an increase in appropriate talking and a decrease in inappropriate talking. The author notes that comparison design is not ideal but was necessary as the number of sessions that could be held was limited and that although the findings were positive, it was difficult to tell which component of the training program provided the most support as it was completed as a package. Following an identical structure creates a sense of stability for both the mentor and mentee. This process was included in the RaMP study as well.

Dart et al. (2017) trained four high school students to conduct discrete trial training (DTT) in a concurrent multiple baseline across participants' study. Four high school seniors were instructed as interventionists in the tenets of DTT using the NPDC’s AFIRM modules. The authors aimed to discover the training intensity required by the trained peer mentors (PM) to implement DTT with fidelity. The typically developing peers were nominated by their teachers for being high achieving, responsible, and respectful. The four students with ASD were taught in a self-contained class and had difficulty communication and a lack of knowledge regarding life skills. Their IEP goals directed which task they would complete, and included vacuuming, putting on a helmet, taking off shoes, sorting coins, and drinking from a milk carton, and ranged in number of steps from five to 16. After baseline, the PMs entered the intervention phase, where they were trained by a graduate research assistant using behavioral skills training (BST) on DTT, prompting, reinforcement, and modeling. They were also given corrective feedback during behavior rehearsal to ensure that the DTT skills were mastered at least 80%. They were also directed to earn a minimum of 80% on an author created quiz with multiple choice and true/false questions before continuing. Following training, the student interventionists provided instruction in the particular life skill utilizing DTT and received additional training by the GRA if their treatment integrity fell below the 80% threshold. In the Dart et al. (2017) study, the PMs were
asked to instruct the student with ASD on the specific life skill and record how well they performed on a scoring sheet. The dependent variable was the number of steps that were mastered and were scored correct, incorrect, or no opportunity by the GRA. During training, the PMs acquired two to four of the nine steps. Following BST, the integrity increased drastically, averaging 91.49%. However, three of the four PMs never achieved 100% mastery for DTT and also did not meet mastery (80%) for accurate data recording. These results support the need for not only a rigorous training program, but also adult supervision. Limitations of the study included a shortened time frame for DTT opportunities due the time constraints, lack of data regarding skill acquisition by the students with ASD, having only one student dyad at a time, PM that did not know the participants outside of the study, only one interventionist mastering the skills at 100%, an inconsistent prompt procedure that did not follow the hierarchy, an inability to collect IOA on all participants, and lack of maintenance data. Using a research based training program – AFIRM – ensured that the mentors were learning the EBPs with fidelity; the RaMP study also incorporates the AFIRM modules.

Twelve children (six kindergarten and six first grade) were trained in the Gonzalez-Lopez and Kamps (1997) study to work with four children with ASD. Each participant was matched with three similarly aged peer mentors. The training that the peers received covered five social skills, of which the participants were present for four of the lessons. The training included descriptors, examples of behaviors, and also opportunities for practice. The trainer provided verbal feedback and reinforcement through a sticker chart. Throughout the lessons, the PMs were instructed in how to model, provide prompts, and also reinforcement. The results show the greatest increase when the students engaged in social skill instruction, in addition to feedback and reinforcement in the Gonzalez-Lopez and Kamps (1997) study. During the intervention
phase, the teacher would lead social skills lessons for approximately ten minutes and then have open play time for ten to 15 minutes while the children were observed. In the first phase, the children were not given feedback or reinforcement. Then verbal feedback and reinforcers in the form of stickers were offered to all of the children in response to displaying social initiation skills. In a second baseline phase, the social skill training was not completed; the students were only directed to play. Feedback and reinforcement played a large part in the increase of social engagement. The RaMP study also includes these components to assist the children in acquiring the instructed skills.

Kamps et al. (2002) conducted two studies – a 12-week multiple baseline across participants ABAB study and a two-year longitudinal study. In the former study, 51 general education peers were divided into three groups – social skills, cooperative learning, and a control group. The cooperative learning group received training in tutoring peers in social studies vocabulary and curriculum, group roles, and the social skills necessary to work in a group with the goal of completing a final team activity. The social skills group was trained in specific social skills such as initiating and responding to peers. The 10-minute training included a skill introduction, modeling, a chance to practice, and review. The trained mentors were taught to model the skills, prompt the learners for a response, and then to reinforce them when they respond appropriately. The latter study focused on the maintenance and generalization phases. The 130 peers were divided into three groups as well – students familiar to the 34 participants with ASD that received social skills and cooperative learning training, students that were familiar and did not undergo training, and students that were strangers to the participants. The Kamps et al. (2002) study included a cooperative learning group, during which time two of the students with ASD participated in the training and sessions three to four times a week with two weeks of
baseline, four weeks of intervention, two weeks of baseline, and four more weeks of intervention. Likewise, the social skill group followed an identical schedule with 17 peers working with two more students with ASD. They received points while participating in 10-15 of free play by displaying appropriate social skills. All three groups showed an increase in engagement, the cooperative learning group by triple, the social skills group by double, and the control group by 50%. This adds to the literature that peer mentoring increases skills, but an explicit training program can support this even more so. In the latter study, the children with ASD in the social skill group increased in initiations and language. The ones that worked with familiar untrained peers, increased in initiations. The ones that worked with students that were neither familiar to them nor trained increased a slight amount.

Mundschenk and Sasso (1995) conducted a multiple baseline single subject across design with three children with ASD, a seven and nine-year-old male, and a ten-year-old female to foster reciprocal interactions. The children were all taught in a self-contained classroom, would play without reinforcement, were not physically aggressive, and had social interaction IEP goals. Fifteen typical developing peers were chosen as mentors using a peer nomination measure. There were five student participants that were selected from each of the following grade levels: 2nd, 3rd, and 4th grade. The PMs were trained in 30-minute sessions individually for five sessions. First, the PMs were shown a training video of the participants and the teachers which demonstrated appropriate and inappropriate behaviors. A discussion followed where the PMs were instructed on how to model, administer prompts, and offer reinforcement to their mentee. Participants then role played skills with the teacher and feedback was offered. If the PM did not meet the criterion, they would receive additional training. If they did meet criteria they were finished with training and the next PM began their training. In the study conducted by
Mundschenk and Sasso (1995), after training the PMs were asked to generalize the skills that they had acquired through training to the setting with the participants who had ASD. Treatment integrity was verified through observing the mentors demonstrating these behaviors as well as having them complete a self-monitoring checklist. Data was collected during 10-minute intervals, stopping every 10 seconds to record for five seconds, on peer initiation and response. The study found that physical proximity of nondisabled peers to peers with ASD alone did not affect the number of reciprocal interactions. Once the peers were trained however, positive results were displayed. Increasing the ratio of mentors that worked with a single mentee also directly correlated to an increase in the number of interactions by the mentee. The authors noted future research could use a reversal design in which trained peers were replaced with untrained peers and a study where the peers with ASD were trained as well. The researchers found that PMs required an explicit training program to demonstrate a higher level of skill. The RaMP it UP! program provides just that.

Sasso et al. (1998) conducted two studies to analyze the concept of peer mentors engaging with students with ASD. In the first study, four nine and ten-year-old children with ASD and moderate intellectual disabilities were targeted. They worked with six fourth grade students that were trained as peer mentors. Both sets of PMs received one hour of training. The first set of mentors received training in cooperative play; they were instructed on how to engage the learners with ASD and create interactions. The second set of mentors were trained as tutors. They received the same training as the first group, but in addition were taught how to encourage the learners with ASD to play correctly by prompting them, modeling appropriate skills, and offering reinforcement. The second study included three children with ASD, two from the previous study and an additional female. The multiple baseline across participants with
treatments design utilized only the cooperative one-hour training program. In the Sasso et al. 1998 study, the alternating treatment design had one student with ASD either working with one mentor creating a dyad or two trained mentors creating a triad. The second part of the treatment was that the PM was instructed to either simply play with the participant (cooperative) or to teach the participant how to play by incorporating RaMP (tutoring). This created four separate groups. Data was collected during 10-minute open play sessions where the children were provided with Uno and Go Fish. Both dyad groups resulted in higher initiations and responses than the triad groups. The triad groups resulted in an increase of interactions between the nondisabled peers. Additionally, the cooperative group displayed a higher increase then the tutoring group, indicating that children were more likely to initiate and respond when they were not being tutored to do so. This study supports the RaMP it UP! program as it entails a student dyad and encourages social reciprocity through spontaneous conversation. As a follow up, the researchers completed a second study where another six students were only trained in cooperative play. The children were separated into dyads based on their sociometric score that determined if they would be considered high or low socially – one student with ASD worked with two children considered high, another with two student mentors considered low, and the third with a high and a low student. Results displayed that there was a slight increase when working with the PMs that were considered high. This indicates that any peer could be trained to work with a student with disabilities.

**Peer Mediated Instruction and Intervention Conclusion and Next Steps**

The above review examined the literature that implemented PMII with students with ASD, the specific social skills that were targeted, the training of the mentee as well as the training and intervention programs were analyzed. While some studies included above detailed
an explicit training program (Carter & Cushing, 2005; Chung et al., 2007; Dart et al., 2017; Gonzalez-Lopez & Kamps, 1997; Kamps, 2002; Mundschenk & Sasso, 1995), many studies reviewed lacked a specific process, including the skills that the PMs were taught to exhibit (Banda et al., 2010; Halle et al., 2016; Krebs, 2010; Laushey & Heflin, 2000; Lee et al., 2007).

Two points to highlight through the analysis of peer mentoring literature are: the lack of studies that occurred during adolescence and the absence of using a systematic training program for the peer mentors. To the first point, the research conducted on peer mentoring interventions consists more of elementary aged children and college programs. Middle school and high school are times when acquiring and using social skills is necessary to be successful. The social deficits associated with ASD are complex and become even more pronounced when a child becomes an adolescent, particularly when undergoing hormonal changes (Picci & Scherf, 2015) thus creating a need for PMs to support these students during the middle and high school years. However, the number of studies using PMII in adolescence continues to be limited and leaves a large gap in society.

Regarding the second, the level of training can range vastly as the mere presence of a skilled peer can facilitate an increase in knowledge without a specific training program in place (Grey et al., 2007; Kamps et al., 2002; Koegel, 2012). This experience of passive proximity (Laushey & Heflin, 2000) can be RaMPed up by training the PMs with reinforcement with modeling and prompting. Strasberger and Ferreri (2014) note that future research should look at providing more comprehensive and explicit peer training. Chung et al. (2007) mirror this sentiment in their research, listing the lack of systematic peer-training program as a limitation. Peer mentoring studies tend to focus on the mentee and not the mentor training. Since peer mentoring is already an EBP and shows significant promise, providing explicit training in EBPs
could show further positive results. Dart et. al (2017) note that providing explicit training to typically developing peers could create potential interventionists in the schoolhouse.

A review of literature on PMII demonstrated the positive effects of Vygotsky’s Zone of Proximal Development Theory. All of the studies reviewed portrayed a positive effect, even those without an explicit training program or opportunities for purposeful practice by the PMs. Implementing PMII to a student population with ASD has been shown to encourage increased social interactions (Gardner et al., 2014; Pierce & Schreibman, 1997). So if PMII alone can increase social reciprocity skills in children with ASD, then training the PMs should only increase the skill set. The majority of studies included in the above section incorporate EBPs into their interventions. By instructing peers without disabilities to engage and respond to learners through social interactions, these relationships that support children with ASD can be fostered, thus kids can be exposed to different things and different people.

Further, to increase the fidelity of peer mentor training, technology could be embedded as well. The studies above all yielded increases, even without the benefit of technology applications. However, students today have been exposed to a world embedded with technology while Mekie, Mehta and Sajja (2014) reported in their research that learning can be simplified, motivation increased, and academic needs met with the aid of technology. This could be incorporated in peer training to increase the success rates of the PMII. Current practitioners implement advances in technology in their research along with modeling and prompting (Odom et al., 2003). Mixed reality simulations (MRS) are such an advance that have been incorporated into pre-service and in-service educational training for teachers to practice their skill set of EBP implementation (Dawson & Lignugaris-Kraft, 2017; Driver et al., 2018; Hudson et al., 2018; Pas et al., 2016). This study aims to incorporate MRS in conjunction with explicit instruction so the
peer mentors can practice the skills they have been trained in, similar to the pre-service teachers described above, thus creating an opportunity for the purposeful practice that research has shown to be beneficial.

**Simulation Literature in Education**

In the last section, training PMs in the EBPs of modeling, prompting, and reinforcement was discussed and analyzed, in addition to incorporating technology in the form of MRS. In education, technology is readily incorporated into instruction. Wise (2012) posits that every kind of technology created thus far was done so in order to address a deficit that previously existed in the world. Wise also noted that there are always going to be problems that arise in society; consequently, various types of technology are created to answer those needs and are used to effectively address such problems. Consequently, the role of technology is examined in this literature review and how simulations could aid instruction in this study in conjunction with RaMP.

There are different types of virtual simulations: virtual reality, augmented reality, and mixed reality. The experiences can be created using a two-dimensional screen, a device mounted to the head, or a cave automatic virtual environment (CAVE) which is an immersive environment (Ren et al., 2016). Studies include using simulations in a variety of ways, including training for medical procedures (Cook et al., 2013), preparing troops for military operations, learning to guide autonomous vehicles (Selecky et al., 2018), undergoing flight training (Covelli et al., 2010), and instructing teachers (Dieker et al., 2014; Calandra & Puvirajah, 2014; Kauffman & Ireland, 2016). Simulation compounded with purposeful practice has been shown to produce positive results (Birt et al., 2018; Cook et al. 2013; Driver et al., 2018; Vince Garland et al., 2016; Vlachopoulos & Makri, 2017) (as seen in Table 3 in the appendix).
Virtual Reality

Virtual Reality (VR) is a virtual 3-Dimensional computer-generated world that allows a person to interact with simulated objects and environments (Birt et al., 2018). Teachers implemented virtual reality games into their daily instructional practices to encourage, attract interest, and motivation (Vlachopoulos & Makri, 2017). Students are able to learn and acquire skills at a higher rate when technology is incorporated into their education (Fotaris, Pellas, Kazanidis, & Smith, 2017).

Augmented Reality

Augmented Reality (AR) is when virtual information is layered on top of the real physical environment (Fotaris, Pellas, Kazanidis, & Smith, 2017). Fotaris et al. note that even though AR devices have been present for years, it is the ease of access to technological devices (i.e. smartphones, tablets, laptops) that has created an opportunity in the educational setting. Technology is becoming more and more prevalent in the classroom setting. Computer programs and tablet applications are consistently used in the classroom. Computer based interventions are also used to assist with skill deficits.

Mixed Reality Simulations

Mixed Reality is when real people and physical environments interact with virtual people and virtual environments (Birt et al., 2017). Nagendran et al. (2014) presented a system entitled AMITIES (Avatar-Mediated Interactive Training and Individualized Experience System) that connects the inhabitants (people that control the avatars) with the participants that use the avatars. This occurs using human surrogates to represent a real-life person in a mixed reality environment. The gestures that are created by the inhibitors create a lifelike experience that is easy to control. This remains true for the natural conversation personalized to the users. The
creators attempt to model an authentic learning experience to offer what they refer to as place illusion and situational plausibility. AMITIES are used in mixed reality platforms (e.g., TeachLivE™) sessions for college and universities to train education majors. Mixed reality platforms also utilized the Activity Storage and Retrieval (ASR) component of AMITIES to record the sessions to analyze at a later time.

Mixed Reality Simulations in Education

TeachLivE™, was the first lab in the United States that used mixed reality simulations (MRS) to train pre-service and in-service teachers. This mixed reality platform was created by University of Central Florida professors, Drs. Lisa Dieker, Michael Hynes, and Charles Hughes (Dieker, 2008). The program offers educators an opportunity to be instructed and hone their skills in a safe environment. TeachLivE™ is unique in that it does not put students at risk and allows educators space to experiment, make mistakes, gather feedback, and try again. Since 2009, 75 universities have created partnerships with UCF to use TeachLivE™ in their programs. Studies that incorporated TeachLivE™ were located on the TeachLivE™ website and an ancestral search was conducted to locate additional articles. The TeachLivE™ classroom appears like any other classroom, with desks, chairs, a whiteboard, and students. Here the students are avatars and controlled by a person on the other side of the screen. The virtual, synthetic avatars are puppeteered by an interactor who has been trained in psychology, philosophy, and acting in order to create a lifelike experience as they guide one or more avatars through interactions with the trainee. The interactor looks to ensure that the educator is responding appropriately to the “students”. If not, then they may demonstrate inappropriate behavior as a result. TeachLivE™ addresses the problem of lacking true authentic opportunities to practice skills by creating a true to life simulated experience. The challenges of MRS are cost and realism. The equipment can
cost hundreds of thousands of dollars. To create a fully realistic environment is difficult and expensive. In order to meet these challenges, the TeachLivETM team has worked to create a system run by human interactors so that they can respond to the trainee and allow for consistency from day to day.

Mursion, a branch of TeachLivETM, is a form of Mixed Reality Simulation (MRS) used in the instruction of pre-service teachers to support students with disabilities (Calandra & Puvirajah, 2014; Dieker et al., 2014; Kauffman & Ireland, 2016). This process creates an authentic experiential learning opportunity (Heinrich, Habron, Johnson & Goralnik, 2015), thus helping to build a solid foundation before the teacher enters the classroom. Birt et al. (2017) state simulation training supports student success through the use of hands on application.

TeachLivETM uses a simulated environment to encourage the application of desired performance in the classroom (Dieker et al.). Simulations have shown positive effects of increasing skill knowledge and implementation when employed with pre-service teachers (Kauffman & Ireland, 2016).

**Teachers Practicing with Mixed Reality Simulations**

Dawson and Lignugaris/Kraft (2017) observed four novice teachers, three female and one male, in their field placements to investigate the development of behavioral and academic skills, including specific praise, praise around, and error correction as a result of practicing using TeachLivETM (TLE), and also the extent that the skills were generalized. The study showed positive effects for repeated practice using an authentic learning environment. The study was limited in that the skills were interrelated (e.g. specific praise and around praise), the recommended number of data points for each phase (three) was not evident across the study, and interobserver agreement was low in areas. In this study, the participants also received ongoing
coaching and feedback from their supervisors. An important limitation to consider is the inability to know how other programs and interactions may affect educational knowledge. Another limitation is whether you gain an accurate depiction of the teacher’s true teaching ability during recorded sessions.

A pilot study was completed by Vasquez et al. (2017) that replicated the Kunnavatana et al. (2013) study where three teachers were trained to work with students that were displaying attention and escape behaviors. The role-playing component from the Kunnavatana et al. study was replaced with MRS. The three teachers that participated in the study reached competence after only three sessions of working with the avatar. A multiple baseline across participants design indicated an increased score in all three participants during intervention and also when the skills were generalized to the classroom environment. The study is important as it demonstrates how MRS can replace the standard method of role playing in an intervention and the effect that MRS can have on cementing a solid skill base. Other studies can be easily replicated with the addition of MRS as a component. Multiple PMII studies have included RaMP skills; however, none of incorporated MRS to date. The Vasquez study is an example of a seamless transition towards incorporating MRS to give participants an opportunity for meaningful purposeful practice.

Mateu et al. (2014) discuss the experience of using Virtual Touch, a mixed reality education application used to provide pre-service teachers and students with tangible interfaces to provide students with disabilities new learning experiences. They discuss the implications of virtual worlds, which allow teacher educators with more autonomy as facilitators during the learning process in inclusive settings. By using Virtual Touch, students have also had the opportunity to apply new skills and build proficiency. Drawbacks of Virtual Touch include the
need to develop more activities, and it was observed that the more introverted students were not comfortable performing activities based on gestures. Researchers suggest potential benefits of virtual worlds, or mixed reality simulations (e.g., TeachLivE™, Mursion…) as a means for pre-service educators to practice social interactions by interacting with virtual humans (avatars) in a practical situation that allows for immediate feedback. Teachers are educated in the use of EBPs in pre-service training; however, additional practice using MRS could prove to be beneficial in building proficiency in their skill set.

**Students Practicing with Mixed Reality Simulations**

There are examples of children using MRS for a variety of reasons. Vasquez et al. (2015) identified 19 empirical studies from 2009-2013 that used virtual environments as an intervention for children with ASD to develop social skills. While all studies included children in grades K-12, the designs varied from multiple baseline to randomized group design to case studies. Various types of virtual environment technology types were reviewed, as well as TeachLivE™. The authors recommend adding to the field of research with children using virtual environments as the current research is limited. Below are a couple examples.

Lan, Hsiao, and Shih (2018) conducted a design-based qualitative design study to examine how special education students acquire vocabulary and sentence structure in their native language of Mandarin using a 3D virtual environment. The four participants were special education students between 8 and 9 years old, with disabilities including ASD, attention hyperactivity disorder, and intellectual disabilities, all of which had a language delay. Over two cycles, and seven months, the researchers collected observations, videos, and interviews from both the children and their parents. The study yielded positive results for language acquisition and resulted in the form of proposed Human-computer interface (HCI) components for using
virtual worlds to support education. An authentic learning experience was created to foster the language acquisition skills. Simulated environments were created to mimic eight places they would visit in their everyday life that included objects that would be found there and events that would naturally occur in that space. Additionally, the platform was game based, with challenges, activities, adventures, and rewards.

Dieker et al. (2008) discuss the changes in technology as it affects the children they refer to as Generation M - those that access technology on a daily basis. These forms of technology have the ability to support students with disabilities and the teachers that support them. As with any new form of technology, misunderstandings may follow. Parents and educators will have to continue to advocate for the usage of technological equipment for their children for they could assist in building a foundation of academic, social, and life skills. Additionally, technology has the potential to aid in pre-service teacher education through simulated virtual teaching environments. Teaching in a Mixed Reality Environment (TeachME) refers to a virtual simulation experience that portrays realistic middle school students in a virtual classroom. Using the American Academy of Child and Adolescent Psychiatry descriptions, the interactors learned about children in early adolescence (12-14) and how they are affected by their move toward independence, career interests, sexuality, and ethics and self-direction. To prepare for this virtual experience, interactors that were trained in acting and human psychology and were given scripts created for individual virtual students. The interactor becomes the child that the trainer is interacting with and improvises their verbal and nonverbal communication. Familiar settings were created in the virtual environment including a kitchen, restaurant, and supply depot. These environments have shown success when working with a myriad of student and adult participants with special needs, including those with cognitive deficits, amnesia, and stuttering. This is
beneficial in that it is cost efficient to not have to pay for a therapist. This type of technology offers the opportunity for students with and without disabilities to practice skills that before would not have been possible. MRS offer time to practice and build confidence by applying skills before working with real live people. The type of practice is neither widely used or known about.

**Mixed Reality Simulation Conclusion and Next Steps**

Academic and professional journals contain very few articles that deal specifically with training peer mentors. Most studies analyze the result of the relationship on the mentees. Personnel trained in EBPs are necessary and required by law (ESSA, 2015), to aid children with ASD in the classroom. Therefore, teacher preparation is an area that is studied when working with students with disabilities. Establishing effective communication practices and strategies are key components to enjoying a successful educational experience. Technology is rampant in the present school systems. Kress and Selander (2011) noted that presenting information in multiple modes through the use of technology may offer an additional way to support the needs of students with disabilities and should be carefully considered as a teaching method. It is imperative that educators and caregivers are able to evaluate the types of technology to determine the efficacy (Boyd et al., 2015; Vasquez (2015)) to aid students with ASD and communication disorders.

Peer mentoring studies tend to focus on the mentee and not the mentor training. Since peer mentoring is already an EBP that shows progress, providing explicit training to the mentors in the RaMP EBPs could show further positive results. Ward-Horner and Sturmey (2012) defined Behavioral Skills Training as “an effective training package that consists of instructions, modeling, rehearsal, and feedback” (p. 75). Peer mentors could receive BST, including role
playing, modeling, prompting, and reinforcement as part of the training they receive to support children with ASD. In addition, MRS can be utilized to promote maintenance of acquired skills.

Moreover, MRS can offer the opportunity to partake in such an experience. Vasquez et al. (2015) surmise that while virtual simulations are used often in the fields of business, medicine, engineering, and medicine a gap exists for using this type of technology with children. The conducted study incorporated Mursion simulations to offer an opportunity to apply acquired information through application of the program. The purpose of incorporating this second training component of MRS is to further increase the fidelity of implementation of EBPs by the peer mentors. The Musion program has student avatars that can be equipped with a number of personality choices, including students with ASD. The peer mentors included in the study benefitted from the simulations when given the opportunity to practice the acquired RaMP skills.

In Chapter 3, the study methodology is described regarding the RaMP training program. A multiple baseline across participants design was utilized to demonstrate the effect of instructing three PMs on the RaMP strategies.

**Problem Statement and Research Questions**

Children with ASD are often ostracized by their peers due to their nonconforming social interaction skills and their limited interactions with others (Mancil, Conroy, & Haydon, 2009; Koegel, 2011). Despite concerted efforts to expand the definition and nature of ‘inclusion’ in public school systems across the nation, this issue persists and negatively impacts such children even into adulthood (Bottema-Beutel, 2017). A possible contributing factor to this problem is that their typically developing peers have limited knowledge or awareness of how to support them in attaining and demonstrating appropriate social skills. There are a variety of methods to
train mentors. Many studies included the use of RaMP EBPs in their training (Carter & Cushing, 2005; Chung et al., 2007; Dart et al., 2017; Gonzalez-Lopez & Kamps, 1997; Kamps, 2002; Mundschenk & Sasso, 1995), but a training method was not evident in others (Banda et al., 2010; Halle et al., 2016; Krebs, 2010; Laushey & Heflin, 2000; Lee et al., 2007). Additionally, many studies do not incorporate the application of the skills before the intervention, and none include MRS. Therefore, this study will have participants use the MRS platform, Mursion, to allow for purposeful practice of these skills. The study will address the following questions about peer mentors as they relate to working with children with ASD:

1. Does explicit training in conjunction with purposeful practice affect the fidelity of peer mentors’ implementation of RaMP?

2. Are the effects of the peer mentor training maintained after the support is withdrawn by the trainer, and then generalized when working with children with ASD?
CHAPTER 3  
METHODS  

This study centered on providing explicit instruction on implementing the evidence-based practices (EBPs) of reinforcement and modeling with prompting (RaMP) utilizing the Autism Focused Intervention Resources & Modules (AFIRM) (Sam & AFIRM, 2015) by the same name in conjunction with purposeful practice via Mursion avatars. The goal was to create a universal training program that could be imbedded and serve as the ‘instruction’ component for the EBP of Peer Mediated Instruction and Intervention (PMII). PMII as an EBP has shown effectual in children 3-22 to support social skills in children with ASD (Sam & AFIRM, 2015). Furthermore, the EBPs of modeling, prompting, and reinforcement (Sam & AFIRM, 2015) have shown to be effective with children with ASD, thus creating an increase of social reciprocity skills by the mentee. This chapter described the methodology of the creation of the RaMP it UP Program. Using a multiple baseline design, the PMs were trained on the following EBPs: reinforcement and modeling with prompting (RaMP) and practiced with a Mursion avatar, Nate, to encourage social reciprocity skills in adolescents with ASD.  

Study Design  

Single case research design (SCRD) is an experimental design method frequently used when working with a small number of participants (Horner et al., 2005). By having the participants act as their own control, SCRD negates the need for a control group (Kazdin, 2010). A majority of the studies included in the literature review utilized SCRD (12 of 15). This included multiple baseline across participants, (Argott et al., 2008; Banda, Hart, & Liu-Gitz, 2010; Gutman et al., 2012; Gutman & Raphael-Greenfield, 2012; Lee et al., 2007; Halle et al., 2016; Taylor et al., 2005), settings, (Bock, 2007), and behaviors (Cadette et al., 2016; Hagopian
What Works Clearinghouse assembled a panel who wrote a technical document to create the standards of what works in SCRD (Kratochwill et al., 2010). They explain that SCRD addresses concerns to external validity through the need for replication and when possible, randomization.

Multiple baseline provides the highest opportunity for replication of the single case methodologies. Since a component of SCRD is that the study can be replicated by another researcher at a later time, the operational descriptions must be defined in order to achieve this (Wolery & Ezell, 1993). By doing this, external validity is addressed. Procedural fidelity refers to the need to carry out the experimental study in the way in which it is designed (Gast & Ledford, 2018).

In a multiple baseline design, a minimum of three participants, behaviors, or settings are required, and each participant acts as their own control (Gast & Ledford, 2018). However, more participants add to the validity of the study. To determine whether a causal relationship existed, a minimum of at least three data points are collected in each phase for each participant (Barlow & Hersen, 1973; Kazdin & Kopel, 1975; Wolf & Risley, 1971) with four or more increasing the design strength. Many researchers believe that randomized control trials produce the best results; however, there are many advantages to conducting an SCRD, such as not requiring as many resources and the ability to be implemented in a real world scenario (Byiers et al., 2012). This is beneficial in determining whether an intervention shows evidence of success before implementing it on a larger scale. A disadvantage to SCRD withdrawal methods is the ethical concern when withdrawing an intervention. Additionally, multiple baseline approaches, while there is no withdrawal period, there can be a period of time where the participant cannot receive the intervention while waiting for a clear baseline to occur (Byiers et al.). In the four types of
triangulation that Denzin (2006) notes, investigator triangulation is the most appropriate to use during SCD. This involves the use of multiple researchers in an investigation. Additionally, methodological triangulation will be ensured by having more than one data collection method. Data will be collected during the baseline, intervention, maintenance, and generalization phases with the following dependent measures.

RaMP is a multiple baseline across participants design. Here the purpose is typically to elicit desired behaviors in a free-operant setting - where they are free to display the desired behavior without interference - as opposed to continuous trials - where the behavior or skill is repeatedly elicited (Ledford et. al. 2009). During the baseline phase, the researcher will collect data over a minimum of three sessions to ensure a stable baseline (Horner et al., 2005) on the current RaMP tenets. Once a stable baseline is achieved for the first participant, they will begin instruction on the RaMP it UP! program. Once they receive instruction on all three EBPs and how to implement them, they will enter the intervention phase. Once a visual increased is observed, the next participant will receive the intervention. This continues until all participants have received the intervention, creating a multiple baseline (Gast & Ledford, Horner et al.). After the intervention phase, the mentors will enter the maintenance phase. During this time, they will not receive any assistance as to observe whether they can maintain the RaMP skills that were taught. Once that data is collected, one by one the participants will work with an adolescent with ASD in the generalization phase. It is here that the Peer Mentors (PMs) will finally have the opportunity to interact with a peer as opposed to Nate and find out if the RaMP skills they have acquired will be generalized outside of the virtual environment.
The methods and procedures are detailed in this chapter using the following organizational method: (a) the criteria for participation and selection of participants, (b) setting, (c) data collection measures, (d) experimental procedures, and (e) data collection and analysis.

**Criteria for Participation and Selection of Participants**

The researcher obtained approval from Kennesaw State University’s Institutional Review Board (IRB) to conduct the study and seek the participants, both mentors and mentees. The Primary Investigator identified six participants (three typically developing adolescents and three adolescents with ASD) that fit the qualifications detailed below. This would be considered a convenience sample as the first six participants that volunteered were told about the study by a mutual friend or through a Facebook post. Once it was verified that they met inclusion criteria three student mentors and three student mentees were selected. The participants included in the study consisted of six adolescents (middle and high school students ages 14-18), grouped into three dyads. A dyad is a set of two people working together in this study it is a peer mentor and a peer mentee. In addition, the peer mentors and mentees also were similarly aged. The participants could be any race, ethnicity, or gender. Further, specific criteria for the mentors and mentees is detailed below. The mentors and participants were placed in order of when they contacted the PI with interest and as such were lettered A, B, and C. Their videos were de-identified and renamed PMA, PMB, and PMC. Pseudonyms are used for the purpose of this study.

**Mentor and Mentee Selection**

Following IRB, a google form was emailed to be completed by the legal guardian for the mentors (Appendix A) and mentees (Appendix B) upon learning of their child’s interest in the study. The form also included demographic and background information questions to ascertain
whether the participants met the inclusion criteria. Questions regarding whether the child has access to the internet and zoom, their age, grade, and sex, if there were any days/times they would not be available, and contact information for both the parent and the child. An informal conversation followed, initiated by the PI with the legal guardian to explain the study’s purpose and answer any questions. A follow up email that detailed the purpose of the study, the time commitment, and an example of a simulation video was sent afterwards with a Parental Consent Form with Child Assent Statement to the parents or legally authorized representatives (LAR) of the first three mentors and three mentees that met the criteria to be signed by both the legal guardian and the child. The exception was one mentor and one mentee who were both 18 years old and signed the consent without a legal guardian. The following information was garnered through the google form and the informal discussion regarding the study.

**Mentor Criteria**

Peer Mentors can be used in a variety of capacities ranging from introducing social skills to reinforcing skills. When selecting peers to assist with the interventions, there are specific criteria that should be used as it is important to choose someone that will facilitate a successful working relationship with the students in question. The National Autism Center ([NAC], 2009a) and Morales and Ledford (2016) suggest the following attributes to assist in forming a positive relationship with their mentee: exhibits good social skills, language, and age appropriate skills; has positive social interactions with others; is generally compliant with adult directions; can attend to an interesting task or activity; expresses a willingness to participate; ability to follow a model, is willing and motivated; being of similar age, and have regular attendance. In addition, due to age, they must also have parent permission to participate obtained through the consent forms as well as the child assent forms. These attributes mirror in the Peer Selection Checklist.
located in the AFIRM PMII module (Sam et. al, 2015). The mentors’ legal guardians completed a modified version (Appendix A) to determine if the peer mentors displayed these characteristics and met the inclusionary criteria to be a peer mentor. Exclusionary characteristics would be juxtaposed to these, in that the participants do not encompass these skills, in which they cannot follow a model, are noncompliant, unwilling, unmotivated, unable to demonstrate appropriate social interactions, of a different age, and do not have regular attendance, or permission.

**Mentor Descriptions**

**Peer Mentor A - “Scarlett”**

Peer Mentor A is a fourteen-year-old female that just completed her eighth-grade year. In answering whether she had any prior experience interacting with people with autism or other disabilities, her mom reported that “she has interacted with several children on the autism spectrum on a limited basis (peer at school, another at camp, brother of one of her sibling’s friend)”. Her mother affirmed that Scarlett met the inclusion criteria: good social skills, language, and age appropriate skills, has positive social interactions with others, is generally compliant with adult directions, can attend to an interesting task or activity, and expresses a willingness to participate and has parent permission to participate. In addition, she added that Scarlett “enjoys working with children (has some babysitting experience)”. When asked why her child wants to be a peer mentor, she responded that Scarlett “enjoys working with children and would be interested in gaining some experience working with children who have special needs”.

**Peer Mentor B - “Aurora”**

Peer Mentor B is a fourteen-year-old female that just completed her eighth grade year. In answering whether she had any prior experience interacting with people with autism or other disabilities, Aurora stated “I have known people that are on the spectrum and have interacted
with them but other than that nope!” Her mother affirmed that she met the inclusion criteria: good social skills, language, and age appropriate skills, has positive social interactions with others, is generally compliant with adult directions, can attend to an interesting task or activity, and expresses a willingness to participate and has parent permission to participate. When asked why she wants to be a peer mentor, Aurora responded “I am very interested in learning how to be a peer mentor because I think this might be a career path that I might want to take and I think that I will be able to apply it to my everyday life and it would be a great skill to have!”

Peer Mentor C - “Clay”

Peer Mentor C is an eighteen-year-old male that has almost completed his senior year. In answering whether he had any prior experience interacting with people with autism or other disabilities, his mom reported that “he has a brother with autism and attended an inclusion school for middle school”. His mother affirmed that he met the inclusion criteria: good social skills, language, and age appropriate skills, has positive social interactions with others, is generally compliant with adult directions, can attend to an interesting task or activity, and expresses a willingness to participate and has parent permission to participate. When asked why Clay wants to be a peer mentor, he stated “because it will help me learn how to better communicate with my brother.”

Mentee Criteria

The mentee participants were middle and high school students that had received an independent diagnosis by an outside agency within the umbrella of Autism Spectrum Disorder (autism, Pervasive Developmental Disorder, Asperger Syndrome) by a clinical professional. In addition to the diagnosis, they demonstrated social skill deficits as reported by their legal guardian. For this study, mentees were selected that are both verbal and required mild to
moderate support to acquire and demonstrate social reciprocity skills (as seen in Table 4). In the DSM-5 (APA, 2013), those diagnosed with ASD are given levels differentiating the level of support they require based on their disability. Some students are a Level 1: Requiring Support, where impairments can be noticed without support, Level 2: Requiring Substantial Support, when even with supports in place impairments are noticeable and affect the person, and a Level 3: Requiring Very Substantial Support, where severe impairment limits the ability of the person to interact appropriately with others (APA, 2013). The level of support was garnered through informal conversations with the parents and children, as well as inclusionary questions as seen in RaMP Survey for Mentees such as whether they could maintain attention for ten minutes at a time, if they could speak in complete sentences, and that they could log into zoom to meet their mentor (Appendix B). All three mentors operated at a Level 1 or 2 based on the informal conversations.

Table 4

*Definition of Social Reciprocity Skills to be Implemented by the Mentees*

<table>
<thead>
<tr>
<th>Skills</th>
<th>Operational Definition</th>
<th>Examples/Non-Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Makes comments on topic</td>
<td>Verbal statement that reflects the same topic that is being discussed</td>
<td>I like cards. My favorite game is Minecraft. I would like to go there. Non-Example: I love space when discussing favorite games.</td>
</tr>
<tr>
<td>Asks questions on topic</td>
<td>Making a statement that begins in “what, why, where, when, or how” in order to receive a response.</td>
<td>How are you? during a greeting. Who is your favorite character? when talking about a show. Non-Example: Do you have any candy? when talking about a show.</td>
</tr>
<tr>
<td>Answers questions on topic</td>
<td>Verbal (e.g. yes/no or elaboration) response within 3-5 seconds following a question.</td>
<td>The answer is ____. Yes, I would like to ____. Non-Example: Making noises or grumbles in response or responding off topic.</td>
</tr>
</tbody>
</table>
Mentee Descriptions

Mentee A - “Javier”

Javier is a thirteen-year-old male that had just completed his sixth-grade year. He was diagnosed with Autism Spectrum Disorder (ASD) and a Speech Language Impairment (SLI). When asked which autistic behaviors her child exhibits (APA, 2013), mom selected:

- Deficits in social-emotional reciprocity, ranging, for example, from abnormal social approach and failure of normal back-and-forth conversation; to reduced sharing of interests, emotions, or affect; to failure to initiate or respond to social interactions.
- Deficits in nonverbal communicative behaviors used for social interaction, ranging, for example, from poorly integrated verbal and nonverbal communication; to abnormalities in eye contact and body language or deficits in understanding and use of gestures; to a total lack of facial expressions and nonverbal communication.
- Deficits in developing, maintaining, and understanding relationships, ranging, for example, from difficulties adjusting behavior to suit various social contexts; to difficulties in sharing imaginative play or in making friends; to absence of interest in peers.
- Hyper- or hypo reactivity to sensory input or unusual interests in sensory aspects of the environment (e.g., apparent indifference to pain/temperature, adverse response to specific sounds or textures, excessive smelling or touching of objects, visual fascination with lights or movement).

Mom also affirmed that Javier was able to maintain attention for 10 minutes at a time and communicate verbally in complete sentences. She stated that he had never worked with a peer.
mentor and that his reinforcers were listening and playing music as well as playing video games such as Roblox.

**Mentee B - “Oliver”**

Oliver is a fourteen-year-old male that had just completed his eighth grade year. He was diagnosed with Autism Spectrum Disorder (ASD)/ HFA - Level 1 Asperger's Syndrome (AS) and Attention-Deficit/ Hyperactivity Disorder (ADHD). When asked which autistic behaviors her child exhibits (APA, 2013), mom checked off:

- Deficits in social-emotional reciprocity, ranging, for example, from abnormal social approach and failure of normal back-and-forth conversation; to reduced sharing of interests, emotions, or affect; to failure to initiate or respond to social interactions.
- Insistence on sameness, inflexible adherence to routines, or ritualized patterns or verbal nonverbal behavior (e.g., extreme distress at small changes, difficulties with transitions, rigid thinking patterns, greeting rituals, need to take the same route or eat food every day).
- Highly restricted, fixated interests that are abnormal in intensity or focus (e.g., strong attachment to or preoccupation with unusual objects, excessively circumscribed or perseverative interest).
- Hyper- or hypo reactivity to sensory input or unusual interests in sensory aspects of the environment (e.g., apparent indifference to pain/temperature, adverse response to specific sounds or textures, excessive smelling or touching of objects, visual fascination with lights or movement).

His mom also listed concerns with high levels of generalized anxiety, social anxiety, and induced depression as well. Oliver’s mom also affirmed that he was able to maintain attention for 10
minutes at a time and communicate verbally in whole complete sentences. She stated that he had never worked with a peer mentor before and that his reinforcers were the PlayStation 4, Minecraft/Roblox on the computer, and Let’s Play on YouTube. He also enjoys watching The Office and Supernatural on Netflix.

*Mentee C - “Keegan”*

Keegan is an eighteen-year-old male that has completed his junior year. He was diagnosed with Autism Spectrum Disorder (ASD), Asperger's Syndrome (AS) and Attention-Deficit/ Hyperactivity Disorder (ADHD). When asked which autistic behaviors he exhibits (APA, 2013), mom checked off:

- Deficits in social-emotional reciprocity, ranging, for example, from abnormal social approach and failure of normal back-and-forth conversation; to reduced sharing of interests, emotions, or affect; to failure to initiate or respond to social interactions.
- Insistence on sameness, inflexible adherence to routines, or ritualized patterns or verbal nonverbal behavior (e.g., extreme distress at small changes, difficulties with transitions, rigid thinking patterns, greeting rituals, need to take the same route or eat food every day).
- Highly restricted, fixated interests that are abnormal in intensity or focus (e.g., strong attachment to or preoccupation with unusual objects, excessively circumscribed or perseverative interest).
- Hyper- or hypo reactivity to sensory input or unusual interests in sensory aspects of the environment (e.g., apparent indifference to pain/temperature, adverse response to specific sounds or textures, excessive smelling or touching of objects, visual fascination with lights or movement).
Mom also reported that Keegan struggled with social cues and the tone of his voice. Initially, he can communicate well with adults, but as a conversation continues, he is unable to maintain interactions. Additionally, he does not communicate as well with his peers. He also affirmed that he was able to maintain attention for 10 minutes at a time and communicate verbally in whole complete sentences. He reported that he had never worked with a peer mentor and that his reinforcers were drawing and playing video games.

**Principal Investigator**

The principal investigator (PI) of this study served as both the primary observer and trainer. The PI is a highly qualified special education teacher who specializes in ASD. She has received extensive prior training in social skills instruction and behavior modification through the Boys Town Student Achievement Model, TeachTown, the Crisis Prevention Institute (CPI), Mindset, as well as ongoing professional development by practitioners in the field. Further, she holds a Master’s and a Specialist degree in Special Education and has completed all coursework to earn a doctoral degree in Special Education in addition to being certified in the following fields: Early Childhood P-5, Middle Grades Math 4-8, English/L.A. 6-12, Reading P-12, ESOL P-12, Special Education: Math, Science, Social Studies, Reading, English P-12, Special Education: General Curriculum P-12, Special Education: Adapted Curriculum P-12. She also has ten years of teaching experience working with students with ASD that demonstrated social reciprocity skill deficits in the classroom. This study is being conducted after extensive research in the area of ASD and social skills as part of her doctoral dissertation.

**Setting**

The study took place using the zoom.us virtual platform. The PI and the mentors connected from their own homes due to the COVID-19 global pandemic. The mentors and
mentees also connected through zoom from their own homes. The mixed reality simulation was an avatar sitting at a desk in a virtual classroom environment. The only piece of equipment needed to facilitate the application was a device that had both video and microphone capabilities. They used computers, phones, and iPad to connect online. Once the children logged on to zoom, they were greeted by an avatar, to practice their skills for as long and as often as needed. It was in this environment that the mentors engaged Nate, who was situated alone in a classroom setting.

**Materials**

The adult directed peer mentor training instructing the mentors in the RaMP EBPs was the independent variable in this study. In addition, Mursion - a simulated virtual experience - was implemented to provide participants the opportunity for purposeful practice implementing RaMP with fidelity before working with a live student with ASD.

**PPT Presentations Based on AFIRM Modules**

Peer Mentors were trained over zoom using PowerPoint (PPT) presentations linking to the Autism Focused Intervention Resources & Modules (AFIRM) website created by the primary investigator (Appendix C, D, E, F, G). The National Professional Development Center (Griffin et al. 2015) created modules to support teachers, therapists, and service providers with delivering the EBPs. Each training session includes videos, discussion questions, and interactive activities incorporating the AFIRM website (Sam, & AFIRM, 2015, 2016; Sam et. al., 2019). These are available upon request by the researcher. In addition, modified Post-Tests from the AFIRM Modules (Appendix M) consisting of 5 questions as opposed to 10 questions were given immediately following each training session. All documents were provided through email. A score of 80% or greater was required to be considered mastered, which was four of five
questions. If a skill had fallen below 80%, it would have been re-taught to the peer mentors during the intervention phase.

**Mursion**

Purposeful practice of the RaMP skills was completed using Kennesaw State University’s AVATAR Lab, which uses the MRS platform, Mursion. An adolescent aged avatar named Nate was selected for this study. The Sim Specialist who controlled Nate was instructed by the PI on the characteristics of a person with ASD for the mentors to communicate with and practice encouraging social reciprocity skills. He was informed that Nate should display the typical characteristics of a person with ASD. This included communication and language deficits, seen by Nate grumbling answers, not answering, answering with one word replies, or answering off topic. He would also look off or lay his head down if he became disinterested. Nate’s profile also indicated that he had an affinity for space and the Sim Specialist was instructed to focus on space so that the PMs would be able to observe his restrictive interests. Nate will also display repetitive behaviors, such as rocking and flapping- self stimulating behaviors that are often observed in people with ASD. The AVATAR RaMP Lab Scenarios were used as a training guide for the Sim Specialist during collaborative sessions prior to beginning the study (Appendix H, I, J, K, L) to ascertain how Nate should act or react in response to the PMs. The Lab Scenarios detailed what the objective was for each of the 5 sessions – Introduction to Autism Spectrum Disorder, Peer Mediated Instruction and Intervention, Reinforcement, Modeling, and Prompting. It also included hits (if the PM did provide RaMP, then Nate would display the social reciprocity skills) and misses (if the PM did not provide RaMP, then Nate would not display the social reciprocity skills). Nate’s behavior could be on a scale of 1-5 with 1 being the most cooperative and 5 being the least cooperative.
Measurement Procedures

How data was collected on the RaMP training methods during the baseline phase is described below. These behaviors (Greeting, Opening Reinforcement, Opportunities for Social Reciprocity, Consistent Reinforcement, Prompt Hierarchy, Verbal Prompting, Modeling, Appropriate Wait Time, Consistent Interactions, and Positive Tone) continued to be observed during the maintenance and generalizations phases as well using the following measure. Through observations, data was collected to determine if the mentor is able to implement, maintain, and generalize with fidelity the skills they acquired during training.

Independent Variable

The EBP components of the RaMP it UP! Training program that the mentors are instructed in – modeling, prompting, and reinforcement - are based on the definitions from the Wong et. al. (2014) literature. The peer mentors were trained through three sessions on Reinforcement, Modeling, and Prompting using the AFIRM to elicit social reciprocity skills from adolescents with ASD. They were instructed to deliver positive reinforcement when the mentee exhibits the targeted social reciprocity skills of asking questions, answering questions, and making comments on topic (Table 4). Reinforcement (R+) can include general reinforcement, by saying good job or thank you, offering explicit oral praise when the mentee displays the desired skill, and offering social reinforcement by smiling, nodding, and positively gesturing. For the modeling (MD) EBP, the PMs were instructed to model how to ask questions, answer questions, and make comments when the mentee did not perform the task independently or with a verbal prompt. The goal was for the mentor to demonstrate or explain the target skill they want displayed that would in turn lead to the mentee demonstrating the desired skill. The PMs were also instructed in implementing the prompt hierarchy by allowing the mentee to first
question, comment, or respond independently, then use a verbal prompt if needed, and then uses a controlling (modeling) prompt to receive the correct response. Prompting can range from least intrusive to most intrusive: visual, verbal, gestural, modeling, partial physical, or full physical. In this study, physical promoting was not used, and modeling was separated into its own skill as the controlling prompt. A verbal prompt was instructed to be the intermediary prompt, when the mentor either provides the full answer or response or a partial one.

Table 5

*Definition of RaMP skills to be Implemented by Peer Mentors*

<table>
<thead>
<tr>
<th>RaMP EBP</th>
<th>Definition</th>
<th>Example/Non-Example</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Reinforcement (R+)</strong></td>
<td>An item, activity, or verbal response that is given by the mentor to the mentee occurring after they display a desired skill (Wong et. al.; 2014).</td>
<td>Great; good job; awesome; way to go; thanks; You are correct, it is the 2 of hearts. Thank you for asking how I am. Non-Examples: Okay; I guess so; maybe.</td>
</tr>
<tr>
<td><strong>Verbal Prompt (VP)</strong></td>
<td>Providing either a full or partial verbal response given by the mentor to the mentee that results in a display of the desired skill.</td>
<td>Is your favorite game Apex or Minecraft? Look at the card. What number is it? Ask me how I am. Non-Examples: What is it? What did you say? What do you think it is?</td>
</tr>
<tr>
<td><strong>Modeling (MD)</strong></td>
<td>Demonstration of a target behavior shown by the mentor to the mentee that results in imitation of the desired skill (Wong et. al.; 2014).</td>
<td>Nate, say I would like to go to the park. Ask me what my favorite game is. Non-Examples: Can you do it? You say it too.</td>
</tr>
</tbody>
</table>

**Dependent Variables**

In order to quantify the data collected, the RaMP Observation Protocol was introduced. The researcher used the observational measure when the mentor practiced with the avatar as well as during the mentorship sessions to determine if the EBPs taught to the mentor were present. During the social interactions, the sessions will be recorded. The RaMP Observation Protocol was used to capture data on the fidelity that the EBPs (modeling, prompting, and reinforcement)
were used during the sessions. The EBPs of modeling, prompting, and reinforcement were taught to the mentor and then observed and recorded during the MRS sessions to ascertain fidelity. The RaMP Observation Protocol is listed as Appendix N and the Operational Definitions Related to the RaMP Observation Protocol are listed in Appendix O. Using this protocol, the mentors were instructed on how to provide positive reinforcement, model, and provide prompts to encourage social interactions from their mentee. They were scored 0-2 on the following items: Greeting, Opening Reinforcement, Opportunities for Social Reciprocity, Consistent Reinforcement, Prompt Hierarchy, Verbal Prompting, Modeling, Appropriate Wait Time, Consistent Interactions, and Positive Tone. If they did not display the targeted skill, they received a 0. If they displayed the skills halfway or half of the time, they received a 1. If they displayed the instructed skill throughout the session, they received a 2. Once coded, the score was calculated out of a total of 20 points. The score was divided into 100 to determine a final percentage, which was placed into a graph to display the data.

Appendix O

*Operational Definitions Related to the RaMP Observation Protocol*

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Definition and Coding Procedures</th>
</tr>
</thead>
</table>
| Greeting | **Definition:** Mentor starts with a greeting by looking at the mentee, using a pleasant voice, saying “hi, how are you”, and waiting for a response.  
**Code:**  
- Mentors who follow the prescribed steps will be coded with a 2 for greeting.  
- Mentors who follow some of the prescribed steps will be coded with a 1 for greeting.  
- Mentors who follow none of the prescribed steps will be coded with a 0 for greeting. |
| Opening Reinforcement | **Definition:** Mentor provides an option/choice of two reinforcers to choose from for when they complete the session.  
**Code:**  
- Mentors who provide an option/choice of two reinforcers to choose from for when they complete the session will be coded with a 2 for opening reinforcement.  
- Mentors who provide an option/choice of one reinforcer for when they complete the session will be coded with a 1 for opening reinforcement.  
- Mentors who do not provide an option/choice of two reinforcers to choose from for when they complete the session will be coded with a 0 for opening reinforcement. |
|---|---|
| Opportunities for Social Reciprocity | **Definition:** Mentor provides opportunities for the mentee to ask questions, answer questions, and make comments.  
**Code:**  
- Mentors who provide opportunities for the mentee to ask questions, answer questions, and make comments throughout the session will be coded with a 2 for social reciprocity.  
- Mentors who provide opportunities for the mentee to ask questions, answer questions, and make comments half of the session will be coded with a 1 for social reciprocity.  
- Mentors who provide opportunities for the mentee to ask questions, answer questions, and make comments rarely or not at all during the session will be coded with a 0 for social reciprocity. |
| Reinforcement (R+) | **Definition:** Mentors offer an item, activity, verbal, or nonverbal response that is given by the mentor to the mentee occurring after they display a desired skill (Wong et. al.; 2014).  
**Code:**  
- Mentors who offer an item, activity, verbal, or nonverbal response occurring after the mentee displays a desired skill will be coded with a 2 for reinforcement.  
- Mentors who offer an item, activity, verbal, or nonverbal response sometimes occurring after the mentee displays a desired skill will be coded with a 1 for reinforcement.  
- Mentors who rarely or do not offer an item, activity, verbal, or nonverbal response occurring after the mentee displays a desired skill will be coded with a 0 for reinforcement. |
| Prompt Hierarchy | **Definition:** Mentor implements the prompt hierarchy by allowing the mentee to first question, comment, or respond independently, then use a verbal prompt if needed, and then uses a controlling (modeling) prompt to receive the correct response.  
**Code:**  
- Mentors who use the prompt hierarchy throughout the session will be coded with a 2 for prompt hierarchy.  
- Mentors who use the prompt hierarchy half of the session will be coded with a 1 for prompt hierarchy.  
- Mentors who use the prompt hierarchy rarely or not at all during the session will be coded with a 0 for prompt hierarchy. |
| **Verbal Prompt (VP)** | **Definition:** Mentor provides a verbal response during the session to encourage the mentee to ask questions, answer questions, and make comments when the mentee does not perform the task independently.  
**Code:**  
- Mentors who provide a verbal response if needed throughout the session will be coded with a 2 for verbal prompting.  
- Mentors who provide a verbal response if needed half of the session will be coded with a 1 for verbal prompting  
- Mentors who provide a verbal response if needed rarely or not at all during the session will be coded with a 0 for verbal/visual prompting |
| **Modeling (MD)** | **Definition:** Mentor models how to ask questions, answer questions, and make comments when the mentee does not perform the task independently or with a verbal prompt (Wong et. al.; 2014).  
**Code:**  
- Mentors who model if needed when the mentee does not perform the task independently or with a verbal prompt throughout the session will be coded with a 2 for modeling  
- Mentors who model if needed when the mentee does not perform the task independently or with a verbal prompt half of the session will be coded with a 2 for modeling  
- Mentors who model if needed when the mentee does not perform the task independently or with a verbal prompt rarely or not at all during the session will be coded with a 2 for modeling |
| **Wait Time** | **Definition:** The mentor should give the mentee 3-5 seconds of wait time before offering a prompt.  
**Code:**  
- Mentors who give the mentee 3-5 seconds of wait time throughout the session before offering a prompt will be coded with a 2 for wait time.  
- Mentors who give the mentee 3-5 seconds of wait time half of the session before offering a prompt will be coded with a 1 for wait time.  
- Mentors who rarely or do not give the mentee 3-5 seconds of wait time before offering a prompt will be coded with a 0 for wait time. |
| **Interaction** | **Definition:** Mentors should continuously interact with the mentee for the entire time allotted.  
**Code:**  
- Mentors who continuously interact with the mentee for the entire time allotted will be coded with a 2 for interaction.  
- Mentors who interact with the mentee for half of the time allotted will be coded with a 1 for interaction.  
- Mentors who do not continuously interact with the mentee for the time allotted and have several time periods where nothing is said will be coded with a 0 for interaction. |
**Tone**

<table>
<thead>
<tr>
<th>Definition:</th>
<th>Mentor will use an upbeat, positive tone throughout the session.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code:</td>
<td>Mentors who use an upbeat, positive tone throughout the session will be coded with a 2 for tone.</td>
</tr>
<tr>
<td></td>
<td>Mentors who use an upbeat, positive tone half of the session will be coded with a 1 for tone.</td>
</tr>
<tr>
<td></td>
<td>Mentors who do not use an upbeat, positive tone throughout the session will be coded with a 1 for tone.</td>
</tr>
</tbody>
</table>

**Experimental Procedures**

The RaMP it UP! training was conducted over three sessions with a five-minute Mursion simulated experience at the end of each training day in addition to two pre-training lessons. This lesson plan structure offers the learner an opportunity to receive information and then practice the skills under the guidance of the instructor. The instruction was divided into five lessons based on AFIRM’s modules (Sam & AFIRM Team, 2014) by the same name: the first module was the Introduction to Autism Spectrum Disorder (Steinbrenner et al., 2019); the second module explained the Peer Mediated Instruction and Intervention (Sam & AFIRM Team, 2015); the third module the mentors received instruction in Reinforcement (Sam & AFIRM Team, 2015); the fourth module focused on Modeling (Sam and AFIRM Team, 2015); and the fifth module was on Prompting (Sam & AFIRM Team, 2015).

**Mixed Reality Simulation Application**

The training incorporated a five-minute simulation after each session through Kennesaw State University’s AVATAR Lab to offer an opportunity to apply the acquired information through the MRS platform, Mursion (Calandra & Puvirajah, 2014; Dieker et. al., 2014; Kauffman & Ireland, 2016). The students were given access to Nate, an avatar that displayed the characteristics of a teenage student with moderate ASD, through a zoom link. The avatar responded to the PMs positively or negatively depending on whether they demonstrated the
acquired RaMP it UP! skills based on the AVATAR RaMP Lab Scenarios (Appendix H, I, J, K, L). Here it was explained to the PMs that if they did provide RaMP, then Nate would display the targeted social reciprocity skills and if the PM did not provide RaMP, then Nate would not display the targeted social reciprocity skills. During this phase, Nate’s behavior was a Level 3 – moderately cooperative. Additionally, the simulation could be paused if the PM had a question, comment, or concern and required assistance from the PI by saying “pause simulation”. It could then be restarted by saying “start simulation”.

Once the training was completed and mastery criteria was met through a score of 80% or better on the modified post-tests, the participants engaged with Nate in five-minute planned scenarios. During these sessions, the PMs practiced the learned skills with the avatar, Nate, while the PI provided reinforcement and modeling with prompting as well to ensure mastery of the skills. The PMs were also provided with the specific script based on the training components (Appendix P).

Study Overview

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<th>Baseline</th>
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<th>Maintenance</th>
<th>Generalization</th>
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<tr>
<td>AFIRM ASD Module: Social Skills, Communication &amp; Language, and Restrictive or Repetitive Behaviors</td>
<td>AFIRM PMII Module: positive peer mentor</td>
<td>AFIRM R+ Module: Types, When, Opening</td>
<td>Received no instruction or assistance</td>
<td>Met with live adolescents diagnosed with autism spectrum disorder</td>
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<tr>
<td>Study Overview</td>
<td>Sample scenarios - 6 Social reciprocity 3-6 sessions</td>
<td>AFIRM MD: controlling prompt AFIRM PP: prompt hierarchy, wait time Script, RaMP Post-Tests 4-6 sessions</td>
<td>4 sessions</td>
<td>3 sessions 10-minute</td>
</tr>
<tr>
<td>Meet Nate</td>
<td>1 session</td>
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Pre-Baseline

During the informational pre-baseline session, the mentors were given an overview of ASD using the Introduction to Autism Spectrum Disorder PPT (Appendix C) created based on AFIRM’s module. This PPT included a description of ASD, as well as information on the specific characteristics, including Social Skills, Communication & Language, and Restrictive or Repetitive Behaviors with opportunities to discuss certain aspects of ASD and their thoughts or experiences with people with ASD. Then the mentors were given detailed step by step instruction on the study and their expectations. Finally, they were given the opportunity to meet Nate, the avatar with ASD, that they would be working with during the study. Participants should be introduced to unfamiliar people and locations where the study will take place prior to starting the study to limit adaptation threats (Gast & Ledford, 2018). This was met by introducing the mentors to Nate through a “Meet Nate” five-minute session. During this time, the interactor for Nate was given the direction to respond easily to the mentors and engage in conversation while still displaying the characteristics of a person with ASD (i.e. communication and language deficits (slow, short answers), restrictive interests (space), and repetitive behaviors (rocking and flapping)). This information was provided to the Sim Specialist via the AVATAR RaMP Lab Scenario - Introduction to Autism Spectrum Disorder (Appendix H).

Baseline

During baseline, the mentors received an overview of PMII using the Peer Mediated Instruction and Intervention PPT (Appendix D) to better understand the purpose of the intervention and how it is used. The characteristics of a positive peer mentor were reviewed as well. The PMs watched videos, completed interactive activities, and listened as the PI read how a PM could support children with ASD. Once complete, the PMs were given sample scenarios and
directed to choose six scenarios that they would like to use to practice with Nate. Some examples were:

- Teach Nate how to play a game (i.e., Chess, Go Fish, Checkers, Bridge etc.)
- Explain the rules for a sport (i.e., Volleyball, Baseball, Soccer, Football etc.)
- Discuss your favorite type of movie/book (i.e., comedies, Lord of the Rings books, Marvel movies, Stranger Things etc.)
- Talk about a hobby (i.e., fishing, making jewelry, collecting something etc.)
- Recall a favorite holiday or vacation (Christmas, Halloween, the lake etc.)
- Current events (i.e., school, vacations, COVID-19, protests etc.)

The mentors were then explained how their goal was to get Nate – and eventually their mentee - to display the aforementioned social reciprocity skills by engaging in conversation and asking questions, answering questions, and making comments on topic (Table 4). At least three baselines are recommended to ensure a stable baseline (Barlow & Hersen, 1973; Kazdin & Kopel, 1975; Gast & Ledford, 2018; Wolf & Risley, 1971), therefore baseline data was collected a minimum of four sessions per peer mentor until a stable trend was observed. Data was collected on the level of mastery that the mentors displayed based on the RaMP Observation Protocol. The AVATAR RaMP Lab Scenario - Peer Mediated Instruction and Intervention (Appendix I) was reviewed with the Sim Specialist to ensure that Nate was receptive to the opportunities for social reciprocity. During this time, the Sim Specialist was given the direction to operate Nate on a Level 3 (out of 5) so that the mentors would be familiar with working with an adolescent who was a Level 2: Requiring Substantial Support, per DSM-5 ASD criteria (APA, 2013). This level of cooperativeness was maintained throughout the course of the study to ensure the results were consistent. Once baseline data was collected, the PMA then began training to
understand the skills necessary to encourage social reciprocity skills for an adolescent with ASD (NAC, 2009a).

**Intervention**

The training was staggered between participants, in letter order (i.e. PMA, PMB, PMC), and conducted after baseline data had been collected and a stable baseline occurred (Gast & Ledford, 2018). Once a stable baseline data was observed, the first peer mentor (PMA) entered the training stage, in which they received explicit instruction using the RaMP it UP! program. The primary investigator conducted the training over three 45-minute sessions with an opportunity for purposeful practice using the Mursion avatar at the conclusion of each session. The training was delineated to focus on a different part of RaMP each day: (Day 1) reinforcement, (Day 2) modeling, and (Day 3) prompting. A PowerPoint Presentation was created for each of the aforementioned modules. The presentation linked to information, videos, and interactive activities on the AFIRM website (Griffin et al., 2015) to support the instruction of the RaMP it UP! Not only were the EBPs taught to the PMs to be used with the mentees, but the RaMP tenets were also employed by the PI during the training process. Mursion could also be paused by either party to offer feedback and instruction. Further detail is described below.

**Reinforcement**

The Reinforcement PPT (Appendix E) began with a Question and Answer session to activate the PMs’ prior knowledge: How do you feel when you receive positive praise?, What do you work for in your life?, and What do you think reinforcement means? Reinforcement was selected to be taught first by the PI as the modeling and prompting modules both incorporate reinforcements following the model or prompt. The PI then used the AFIRM R+ module to detail the basic principles of reinforcement and the three reinforcement procedures (positive
reinforcement, negative reinforcement, token economy). The procedures for implementing positive reinforcement was then explained in greater detail along with potential reinforcers using the Positive Reinforcer Menu. Videos were incorporated to demonstrate how to give choices, prevent satiation, and deliver positive reinforcements. Interactive activities gave the mentors an opportunity to show their competency on the reinforcement module through the Reinforcer Checklist by discussing examples of positive reinforcers (i.e. preferred activity, verbal praise, preferred objects and games, food related activity) and the Using Activity to implement positive reinforcement with fidelity. Then the PM was given the opportunity to apply their newly acquired skills by implementing one of their chosen scenarios with the avatar Nate using the AVATAR RaMP Lab Scenario – Reinforcement (Appendix J) as a guide to ensure that Nate was receptive when the mentors used positive reinforcement when working with him. The PM was then sent the modified AFIRM R+ Post-Test (Appendix M). They had to score a minimum of 80% before moving on to the next RaMP skill, Modeling.

**Modeling**

Likewise, the Modeling PPT (Appendix F) followed the same format and began with a Q & A to activate the PMs’ prior knowledge: What does controlling mean? What are we trying to control? and What does modeling mean to you? The PI then used the AFIRM module to show a video that displayed how modeling is used and then reviewed the two types of modeling – modeling used as a primer and modeling used as a prompt. With modeling as a primer, the instructor (PM) would model the behavior and then give the learner (mentee) an opportunity to display the target skill and reinforce when it’s completed. When used as a prompt, as in this study, the learner is directed to display the behavior and when they do not, then the instructor models the target behavior, and reinforces the learner when it is displayed. The interactive Basic
Activity allowed the PM to think about the foundation of modeling in a true/false activity. Videos were incorporated to demonstrate how to role play and train peers to model. The Modeling Decision Tree was also discussed along with How to Provide Feedback to Learners. Another interactive activity gave the mentors an opportunity to show their competency on the modeling module by having them think about how to assist an adolescent with ASD in the cafeteria. Then they reviewed the MD Target Skill Written Cues Script together. The PI and the PM went over possible scenarios for modeling and how the PM could model for the learner. Finally, the PM was given the opportunity to apply their newly acquired skills by implementing one of their chosen scenarios with the avatar Nate using the AVATAR RaMP Lab Scenario – Modeling (Appendix K), which ensured through the hits and misses that when the PM modeled a skill for Nate, he would display the same skill. Before moving on to the next RaMP skill, the PM would have to score a minimum of 80% on the modified AFIRM MD Post-Test (Appendix M).

**Prompting**

The third part of the RaMP it UP! instruction was provided using the Prompting PPT (Appendix G), and also began with a Q & A to activate the PMs’ prior knowledge: Did our mentee respond to modeling? What does least to most mean to you? What would be the least amount of support you could offer and the most amount of support? The PI then used the PP AFIRM module to display a video to demonstrate when prompting would be beneficial. They then discussed what prompting is and the three components of prompting – antecedent (target stimulus), target skill (learner response), and the consequence (feedback or reinforcement). There are three types of prompting procedures – the least to most prompting procedure or system of least prompts is the one targeted in this study and therefore was the only one reviewed at that time. Next, the five types of prompts were discussed: gestural prompts, verbal prompts, visual
prompts, model prompts, and physical prompts. A minimum of three prompt levels are required to practice least to most prompting (Godby et al., 1987) – an independent level, an intermediate level(s), and a controlling prompt level. For this study, the intermediate level was verbal prompting, and the controlling prompt level was modeling. Interactive activities gave the mentors an opportunity to show their competency on the prompting module by completing a chart on Sequence Prompts from Least-to-Most Assistance. How to establish the learner’s attention, using an appropriate wait time of 3-5 seconds, and providing immediate reinforcement was also covered. Then the PM was given the opportunity to apply their newly acquired skills by implementing one of their chosen scenarios with the avatar, Nate using the AVATAR RaMP Lab Scenario – Prompting (Appendix L) which ensured that Nate would be receptive to the PMs use of the prompting hierarchy.

**Maintenance**

While in the intervention stage, the PMs received reinforcement and modeling with prompting (RaMP) by the PI and learned to successfully complete a session without any support. Once each mentor had completed the RaMP it UP! training sessions and intervention data collected using the RaMP Observation Protocol displayed a visual increase (Horner et al.), they entered the maintenance phase. When PMA entered the maintenance phase, PMB began training and once PMB entered the maintenance phase, PMC began training. Maintenance data was collected for four sessions on all three PMs. During this time, they completed four additional five-minute sessions to determine if the skills were maintained without any support given by the PI. The PI observed the sessions but kept the video and microphone off so as not to interfere with the sessions in any way. The data collected was used to determine if the RaMP it UP! training program was successful in cementing the use of the RaMP EBPs for the PMs.
Generalization

Following the four maintenance sessions, the mentors moved to generalization one at a time. It was then that they were fully trained and when they were provided the opportunity to work with an adolescent diagnosed with ASD to observe whether they would generalize the RaMP it UP! Skills from the avatar, Nate, to the adolescents. The PMs were paired with children that were similarly aged to them and met during three consecutive days. These generalization probes were collected over three 10-minute zoom sessions during which time the PMs were given the choice to discuss any one of the scenarios that they had practiced with or another topic of interest. This method of generalization is supported by the NSP Findings and Conclusions research (NAC, 2015).

Data Collection and Analysis

The investigator collected data throughout the baseline, intervention, maintenance, and generalization phases using the RaMP Observation Protocol (Appendix N) during the peer mentoring sessions. Data on the following skills was collected: Greeting; Opening Reinforcement; Opportunities for Social Reciprocity; Consistent Reinforcement; Prompt Hierarchy; Verbal Prompts; Modeling; Wait Time; Interaction; and Voice Tone.

Inter-Observer Agreement

The PI and an independent secondary observer collected IOA data during each phase of the study. The secondary observer was solicited to observe the recorded videos and code them accordingly to show an inter-observation agreement of 80% or better, with 90% or better being ideal (Cooper, Heron, & Heward, 2007; Gast, 2010; Gast & Ledford, 2018). The independent observer is a recently graduated doctoral student. He is a special education teacher that has taught for eight years in middle school and holds a bachelors in English Education and
Masters and Specialist in Special Education. He is in no way affiliated with the study. IOA was calculated for all sessions - baseline, intervention, maintenance, and generalization. The point by point method of looking at each skill individually and comparing the two sets of scores to each other was implemented (Ayres & Ledford, 2014) using the RaMP Observation Protocol.

Table 6

*Training IOA by Behavior*

<table>
<thead>
<tr>
<th>Behavior</th>
<th>Training #1</th>
<th>Training #2</th>
<th>Training #3</th>
<th>Training #4</th>
<th>Training #5</th>
<th>Training #6</th>
<th>% IOA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Greeting</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td>+</td>
<td>83%</td>
</tr>
<tr>
<td>Opening Reinforcer</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>100%</td>
</tr>
<tr>
<td>Social Reciprocity</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>83%</td>
</tr>
<tr>
<td>Reinforcement</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td>83%</td>
</tr>
<tr>
<td>Prompt Hierarchy</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>100%</td>
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<tr>
<td>Verbal Prompt</td>
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<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
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<td>+</td>
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<td>100%</td>
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<tr>
<td>Total % IOA</td>
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<td>100%</td>
<td>95%</td>
<td>95%</td>
<td>96%</td>
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The secondary observer was trained using the Operational Definitions Related to the RaMP Observation Protocol (Appendix O) created by the PI. Six training videos were observed and completed until the two reached 80% or higher, at which time they began to code the videos separately. They scored an average of 96% on the six training videos (Table 6).

The primary investigator recorded, reviewed, and coded all 50 baseline, intervention, maintenance, and generalization videos. Of those 50 videos, six were used for training (Table 3). The secondary observer coded 37% of the videos for IOA - 17 of the remaining 44. These recordings consisted of 33% (3/9) of the baseline sessions, 43% (6/14) of the intervention sessions, 33% (4/12) of the maintenance sessions, and 44% (4/9) of the generalization sessions across all participants.

**Treatment Fidelity**

A treatment fidelity checklist (Appendix Q) was implemented to ensure that each mentor received consistent training throughout the sessions. The RaMP Treatment Fidelity Checklist outlines the components that must be taught during the training sessions to ensure treatment fidelity between peer mentors. The PI used the checklist as a guide during training to ensure that each participant received the same treatment. The checklist detailed what major elements were required to make the foundation of the training program for it to be successful. All components were covered for each participant.

**Social Validity**

The PMII Self-Monitoring Checklist located on the AFIRM website under PMII (Sam & AFIRM, 2015) consists of an eight question Likert self-report measure with the choices of yes, a little, or no that aims to better understand how the mentor feels that the intervention has altered their social exchanges with their mentee. As the study concluded, the PI administered a
questionnaire to both the mentors and the mentees (Appendix R and Appendix S). The questionnaire for the PMs consisted of six Likert style questions that revolved around the training and an open-ended comment option. The questionnaire for the mentees consisted of four Likert style questions that asked about the peer mentoring process.
CHAPTER 4

RESULTS

The purpose of the study was to examine the effectiveness of providing explicit training and purposeful practice for peer mentors in reinforcement and modeling with prompting (RaMP) to support adolescents with ASD. These EBPs have been shown to support social communication skills in adolescents with ASD and other developmental disabilities.

The research questions were:

1. Does explicit training in conjunction with purposeful practice affect the fidelity of peer mentors’ implementation of RaMP?

2. Are the effects of the peer mentor training maintained after the support is withdrawn by the trainer, and then generalized when working with live children with ASD?

Overall, the PMs all increased in the RaMP it UP! Program skills and were able to maintain the skills even without the support of the Primary Investigator (PI). During baseline, the average RaMP score was 46% (range 30-60%) for all PMs. In the maintenance phase, the average RaMP score was 97% (range 85-100%) for all PMs. Results clearly show an increase in the RaMP skills with no percentage of non-overlapping data points (Tarlow & Penland, 2016).

Individual Participant Results

During baseline, PMA’s average RaMP score was 48% (range 45-50%). During maintenance, PMA’s average RaMP score was 94% (range 90-100%). During baseline, PMB’s average RaMP score was 53% (range 50-60%). During maintenance, PMB’s average RaMP score was 100% (all values of 100%). During baseline, PMC’s average RaMP score was 38% (30-45%). During maintenance, PMC’s average RaMP score was 88% (range 85-95%).
During this time, the mentors were instructed on the three social reciprocity skills that they wanted to elicit from the mentee (Table 4). The PMs were instructed on how to provide positive reinforcement, model, and provide prompts to encourage social interactions from their mentee. Using the RaMP Observation Protocol, they were scored 0-2 on the following items: Greeting, Opening Reinforcement, Opportunities for Social Reciprocity, Consistent Reinforcement, Prompt Hierarchy, Verbal Prompting, Modeling, Appropriate Wait Time, Consistent Interactions, and Positive Tone (Appendix E). If they did not display the targeted skill, they received a 0. If they displayed the skills halfway or half of the time, they received a 1. If they displayed the instructed skill throughout the session, they received a 2. Once coded, the score was calculated out of a total of 20 points. The score was then divided into 100 to determine a final percentage, which was then placed into a graph to display the data. During training, the PMs were also assessed using a modified version of the AFIRM Post-Tests (Appendix M).

Shown in Figure 1, the phases of the study are displayed below.

**Peer Mentor A “Scarlett” (PMA)**

**Baseline Phase for PMA**

Scarlett scored 45-50% over three baseline sessions (n=3, mean = 48%, Range= 45-50%). She used the following scenarios and received the subsequent scores when practicing with Nate: she taught the card game ‘Go Fish’ (50%), discussed volleyball and school (45%), and her favorite show Grey’s Anatomy (50%). She was emailed the modified AFIRM PMII Post-Test following the session to complete and she scored 100%. Scarlett was asked the following two questions after meeting and working with Nate. Her response to Question 1. How is talking to Nate like talking to a real kid? “Nate is like talking to a kid because he interacts the same way
that kids with ASD do.” For Question 2. How is talking to Nate unlike talking to a real kid? She answered, “Nate is a simulation so you can pause and start him talking.”

**Intervention Phase for PMA**

Scarlett was the first PM to receive instruction in the RaMP it UP! procedures. She was given a modified AFIRM Post-Test based on the Reinforcement, Modeling, and Prompting modules to ascertain her competency with each EBP (Appendix M) after learning about each EBP. Scarlett scored 100% on all three tests (Table 7). Her first intervention session following the training, she scored 95%, only falling short in the modeling section, earning a 1 for modeling, which meant that she modeled the skills half of the time. During the intervention sessions, the PI offered reinforcement and modeling with prompting (RaMP) to ensure that Scarlett was able to display the EBPs as she had been instructed. In the subsequent four sessions, she scored 100% with the RaMP errorless teaching method (n=5, mean = 99%, Range= 95-100%).

**Maintenance Phase for PMA**

Scarlett entered the maintenance phase after showing that she was able to successfully exhibit the RaMP EBPs without assistance from the PI. She scored 90-100% on all four sessions and after the first session. She did not earn a 2 for using the prompt hierarchy throughout the sessions and offering verbal prompts when Nate answered in grunts during two of the sessions; at this point she should have verbally prompted him to respond in a whole, complete sentence. She also lost a point for not offering consistent reinforcement in the last session when Nate displayed the appropriate social reciprocity skills (n=4, mean = 94%, Range= 90-100%).

**Generalization Phase for PMA**

Once Scarlett had completed the four scheduled maintenance sessions, she entered the generalization phase where she practiced her recently learned skills with a peer with ASD. Her
peer mentee was Javier. When they began talking, Scarlett was excited and readily used the prompt hierarchy to encourage Javier to answer questions, ask her questions, and make comments. She consistently used reinforcement as well and offered opportunities for social reciprocity throughout the session (n=3, mean = 98%, Range= 95-100%). On the second session, she missed her opportunity to model how to answer the questions she was asking and instead moved on to the next topic. They covered a wide array of topics in the three sessions. By the third session, Javier greeted Scarlett and asked her how she was at the beginning without any prompting.

**Peer Mentor B “Aurora” (PMB)**

**Baseline Phase for PMB**

Aurora was also given the AFIRM PMII Post-Test and scored 100% as well. When asked the following questions following the “Meet Nate” session, her responses to the two questions were: 1. How is talking to Nate like talking to a real kid? “Nate does hand gestures like a normal kid and he talks back to me and he is very sweet. He also has an interest in space which many kids have and he is interested in learning games!!” 2. How is talking to Nate unlike talking to a real kid? “Nate doesn't keep a conversation going that well and he can't get up or anything and he's always in one classroom and he can't see me through the screen.” PMB scored 50-60% over six baseline sessions (n=6, mean = 53%, Range= 50-60%). She used the following scenarios and received the following scores when practicing with Nate: she taught the card game ‘War’ (50%), discussed pets (55%), sports (50%), vacations (60%), birthday parties (55%), and school (50%). She consistently offered a greeting and maintained opportunities for social reciprocity and engaged Nate with a warm tone.
**Intervention Phase for PMB**

Aurora started her training while Scarlett completed her intervention sessions and entered the intervention phase when Scarlett moved into the maintenance phase. Aurora scored 100% on all three modified AFIRM Post-Tests based on the Reinforcement, Modeling, and Prompting modules after each session (Table 7). Before beginning the first intervention session, Aurora asked to review her expectations. Using the errorless RaMP teaching method, she scored 100% on all four sessions (n=4, mean = 100%, Range= all scores were 100%).

**Maintenance Phase for PMB**

Aurora began her maintenance sessions at 100%. After the first session, she beamed with pride saying, “that went so well I think . . .it’s so crazy how much I've improved because he’s actually carrying on a conversation with me”. She asked about changing reinforcement so that they don’t get sick of hearing the same thing. The PI explained that in the training they discussed that the reinforcement is heavy in the beginning and can be tapered off over time. Aurora scored 100% on her three additional sessions as well (n=4, mean = 100%, Range= all scores were 100%), and after completing the final session asked if she could work with children for more than just a week.

**Generalization Phase for PMB**

Following the four maintenance sessions, Aurora entered the generalization phase with Oliver, another 14-year-old, who would be starting high school in the Fall. She scored 100% as she offered reinforcement and opportunities for social reciprocity throughout (n=3, mean = 100%, Range= all scores were 100%). There were times she verbally prompted him to ask her a question or make a comment. However, there was no time that she needed to model a skill for him. While talking to the PI she stated that “I am struggling with the feedback part. I feel like I
would get annoyed by someone saying, ‘great job’ over and over”. She was given the feedback that if Oliver is displaying the skills independently and unprompted then she doesn’t need to continually reinforce. In the second session, both Aurora and Oliver carried on the conversation. She did prompt him as needed and used social reinforcers (smiling, nodding etc.) but did not explicitly reinforce the social reciprocity skills as Oliver was engaged and participated independently. For the third session, Aurora asked Oliver about a show he watched; subsequently, Oliver detailed all six seasons which left little opportunity for her to interact. She used her RaMP skills when needed in all three generalization sessions, earning 100% across the board.

**Peer Mentor C “Clive” (PMC)**

**Baseline Phase for PMC**

Clive was also instructed in PMII following the pre-baseline and completed 2 baseline sessions immediately afterwards. He was emailed the AFIRM PMII Post-Test. However, Clive scored 40% on this first test. The material and the correct answers were reviewed during his one on one session during the following week. When answering the following questions, his responses were to #1. How is talking to Nate like talking to a real kid? “You can have continued conversations with him about subjects you both like.” To the second question, #2. How is talking to Nate unlike talking to a real kid? He responded, “He's a simulation and at times it feels a bit stiff.” PMC completed six total baseline sessions, scoring in the range of 30-45% (n=6, mean = 38%, Range= 30-45%). He struggled with talking to Nate for the full five minutes and ended early; however, by the sixth baseline video, he completed the entire practice session without stopping early.
**Intervention Phase for PMC**

Clive completed five intervention sessions. In the first session, he required prompting from the PI to offer a greeting at the beginning. The PI also modeled how to use the RaMP skills consistently throughout the session. The comment he made was that “it wasn’t terrible”. For his second and third sessions, Clive chose to repeat the topics of ‘going on a boat trip’ and ‘blacksmithing’. He scored 60%, 60%, and 80% on the three modified AFIRM Post-Tests based on the Reinforcement, Modeling, and Prompting modules (Table 7). Before each new session, the concepts were re-reviewed and explained until he understood and could explain them himself. Using the errorless teaching method to implement the RaMP skills, Clive scored 100% on all five sessions (n=5, mean = 100%, Range= all scores were 100%). He did require consistent prompting by the PI to prompt Nate in return. By the fifth session, he was able to display the RaMP skill without assistance.

**Maintenance Phase for PMC**

Clive chose to repeat the topics of ‘going on a boat trip’ and ‘blacksmithing’. He scored an 85% on the first session and 95% on the second (n=4, mean = 88%, Range= 85-95%). He did not offer consistent reinforcement on both sessions and skipped over the intermediate prompt level (verbal) before moving to the controlling prompt (modeling) on the former. He had again scored 85%, only lacking in the same areas as the first session. This was also true for the fourth and final maintenance session.

**Generalization Phase for PMC**

Due to scheduling conflicts and a sickness, Clive was unable to complete his generalization sessions.
Table 7

AFIRM Modified Post-Test Scores

<table>
<thead>
<tr>
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<th>Reinforcement</th>
<th>Modeling</th>
<th>Prompting</th>
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The RaMP it UP! data points were analyzed and placed into a graph to view the trend (Gast & Ledford, 2018). Once graphed, the data would either show a support of intervention efficacy or unclear or unstable results (Gast, 2010; Gast & Ledford, 2018). In Figure 1 below, the results clearly show an upward trend for all three PMs. The blue data points represent the baseline data – before the PMs received instruction in the RaMP skills. All three PMs scored an average of 46% (range 30-60%). The orange data points are the intervention scores. When the PMs were trained in the RaMP it UP! Program, they were also receiving assistance in the form of reinforcement and modeling with prompting. During this time, it is expected that they would receive scores of 100% because they had maximum support. Once that support was withdrawn is when the results of the training program were able to be highlighted. The grey data is from the maintenance sessions. During this time, the PMs were working with Nate without any assistance or support and were expected to implement the training that they had receive. The results were phenomenal. In the maintenance phase, the average RaMP score was 97% (range 85-100%) for all PMs. Moreover, when the PMs began to work with children with ASD and generalize the skills they were taught (yellow data), they continued to implement RaMP with fidelity, scoring an average of 99% (range 95-100%).
Figure 1

Percentage of RaMP Skills displayed by peer mentor during baseline, intervention, maintenance, and generalization phases

* No session due to being on vacation
Inter-Observable Agreement

In order to quantify the data that was collected, the RaMP Observation Protocol (Appendix N) was used. For the observation protocol, it was coded when the skills were observed, along with the level of mastery that was displayed. The level of mastery ranged from 0 (not displayed) to 1 (displayed half of the time) to 2 (displayed throughout the session). The scores were collected and compared between the first and second observer. Inter-observer Agreement (IOA) was collected for Peer Mentor A on 33% of the baseline sessions, 40% of intervention sessions, 50% of maintenance sessions, and 33% of generalization sessions with an average score of 95%. Overall IOA for Peer Mentor B was 98% based on 16% of their baseline sessions, 50% of intervention sessions, 25% of maintenance sessions, and 66% of generalization sessions. For Peer Mentor C, IOA data was calculated for 16% of the baseline sessions, 40% of intervention sessions, and 25% of the maintenance sessions as there were no generalization sessions completed for an overall total IOA of 91%.

The PI and an independent secondary observer collected IOA data during each phase of the study. The secondary observer was solicited to observe the recorded videos and code them accordingly to show an inter-observation agreement of 80% or better, with 90% or better being ideal (Cooper, Heron, & Heward, 2007; Gast, 2010; Gast & Ledford, 2018). The independent observer is a recently graduated doctoral student. He is a special education teacher that has taught for eight years in middle school and holds a bachelors in English Education and Masters and Specialist in Special Education. He is in no way affiliated with the study.
Social Validity

Upon the completion of the data collection period, the researcher sent a google form to both the mentors and the mentees to ascertain the social validity of the study. Both social validity questionnaires utilized five-point Likert questions, detailed below.

Mentors

The mentors were given a questionnaire consisting of six Likert style questions and one open response question to understand how they feel about the RaMP it UP! program (Appendix R). The questions were numbered 1-5 and correlated to the following choices: strongly disagree, disagree, neither agree nor disagree, agree, or strongly agree. All three PMs strongly agreed that it was beneficial to work with Nate before working with a live child. Two PMs strongly agreed and one agreed that the RaMP training prepared them to work with a peer with ASD, that they feel comfortable working with someone with ASD after receiving the training, that they will use the RaMP strategies in their future, and they believe that other peers would benefit from being trained in the RaMP it UP! program. When asked whether the RaMP training they received lasted the right amount of time, the mentors chose three different answers - strongly agree, agree, and neither agree or disagree.

In the second baseline session, Scarlett paused the simulation to ask assistance, “he didn’t want to talk about sports. Should I have kept trying to talk about them? . . . I don’t know what to keep talking about”. She was given limited feedback by the PI only in regard to providing opportunities for social reciprocity without further assistance to maintain procedural fidelity (Gast & Ledford, 2018). During the intervention phase, PMA made the comment “I think I could work [with a kid]” once she had completed the last intervention session. When in the
maintenance phase, she shared “I’m good, it’s kind of natural, it’s not too hard anymore. I’m getting the hang of it pretty easy”.

During baseline, PMB (Aurora) responded “he didn’t really seem interested”. After the fourth session, she remarked “I feel like I’m doing it a lot better since I’ve done it a few times now and I know what to do kind of and having my topics laid out is easy, but I still don’t know when I asked him how he was doing, he didn’t respond . . . there was one other time when I wasn’t sure . . . it’s really hard to have a one sided conversation”. During intervention, the PM script was reviewed with her. She struggled in recalling how to prompt Nate and afterwards explained “I was used to asking him questions and him answering and sometimes not answering. But now that I have to make him answer and ask me some and it’s a lot to remember so I get kind of nervous”. The PI offered the feedback to focus on one topic from the training and work off of that. During the second session, she required no assistance on the second session gleaming afterwards, “That time went so much better . . . and sticking to one subject helped a lot”. Moreover, in the third session she again did not require any assistance smiling “I did really good and am proud of myself”. She required only one instance of limited assistance on prompting in the fourth session. She exclaimed “that went so fast . . . I am [a lot more comfortable with it]”. When asked at the end of the social validity questionnaire if they had any additional comments, PMB stated “Thank you so much for giving me the opportunity to do this wonderful program! I really enjoyed it and it really helped me out!”

Some comments PMC (Clive) made during the baseline sessions were “I was at a loss of what to say” following the first session when he stopped before the five-minute session was completed. Likewise, he stated “I wasn’t sure what else to say” and then continued “the hard part of it is that I know that it’s a simulation” after the third session when he ended it early at three
minutes and 44 seconds. Similarly, he ended the fourth session at three minutes and thirty
seconds citing “I wasn’t sure how to continue . . .”. When asked how he thought the third
maintenance session went, Clive responded “I think it could have gone better, but I’m still a little
tired”. The PI replied that “it went great. You had lots to tell him. You got him to ask you some
questions. You reinforced him for answering your questions. You had a good conversation.
There were a couple times you were thinking about questions, but that’s alright. Even when
you’re talking with your friends, sometimes you're thinking about what you want to say, right?”

Mentees

The mentees were given a questionnaire consisting of four Likert style questions to
understand how they feel about the RaMP it UP! program (Appendix S). The choices?
Responses? were numbered 1-5 and correlated to the following choices: strongly disagree,
disagree, neither agree nor disagree, agree, or strongly agree. Due to not being able to complete
the generalization phase for PMC, only the first two mentees completed the survey. The mentees
strongly agreed that they would be interested in having a peer mentor at school. They either
strongly agreed or agreed that they enjoyed talking to their mentor and would like to talk to their
mentor again. On the question, do you think that your mentor helped you, one mentee said agree
and the other chose strongly agree. After the first session, Javier shared that he liked Scarlett
because she was pretty and nice and that they had things in common.

Summary

Through training the mentors, the goal was to provide instruction on the selected EBPs
with fidelity to support those with disabilities. The purpose of this study was to discover if there
was an increase of targeted RaMP skills observed when peer mentors received systematic
training regarding EBPs, combined with purposeful practice through MRS. The purpose of
incorporating this second training component of Mursion simulations is to further increase the implementation of RaMP by the peer mentors. Visual analysis of the graphs shows that not only were the PMs able to increase in their skill level from the RaMP it UP! Training Program, but they were also able to maintain those skills when support was withdrawn, from an average of 46% at baseline to 97% at maintenance and 99% during generalization.

Training peer mentors using simulations for purposeful practice could be beneficial toward cementing the acquired skills. Through observations, data was collected to determine if the mentors were able to implement, maintain, and generalize with fidelity the skills they acquired during training and if the mentee was able to display the selected social communication skills as a result. The data collected not only supports the RaMP it UP! intervention, but the feedback received further adds to the validity of the importance of providing explicit instruction to typically developing peers to support their knowledge base in working with adolescents with ASD.
CHAPTER 5
DISCUSSION

Peer mentoring is an EBP that has shown positive results in supporting social communication and interactions in children with ASD aged 3-22 (National Autism Center [NAC], 2009; Griffin, Sam, & AFIRM Team, 2016). Additionally, research shows that students with ASD who participate in social skills training using the EBPs of reinforcement, modeling, and prompting (RaMP) show an increase in communication skills (Katz & Girolametto, 2013; NAC, 2009; Griffin et al., 2016; Wong et al., 2014). The purpose of the study was to examine if training PMs using the AFIRM modules and practicing with an avatar would increase fidelity of the RaMP skills. The goal of training PMs was to support social reciprocity in adolescents with ASD by encouraging them to ask questions, answer questions, and make comments during informal conversations.

The literature supports the importance and impact that PMII on individuals with ASD (Dawson et. al, 2010), particularly in the area of social communication. However, the research is limited for adolescents (Griffin & AFIRM, 2016), which it is a time when children are bullied and ostracized for social awkwardness (Humphrey & Symes, 2010; De Boer et al., 2012; De Boer & Pijl, 2014). Further, a gap exists of explicit training programs for peer mentors, with an opportunity for purposeful practice. Most studies analyze the result of the relationship on the mentees. A limited number of studies were available to examine the differences and similarities between the peer mentor training procedures (Strasberger & Ferreri, 2014) on providing comprehensive and explicit peer training.

One such study is Mundschenk and Sasso’s (1995) study in which peer mentors were trained in RaMP practices using RaMP. Peer Mentors were trained individually for five sessions
and were instructed on how to model, administer prompts, and offer reinforcement to their mentee, thus showing an increase in skill level in the aforementioned EBPs. In this current study, the PMs were also trained in five sessions, showing promise that when PMs are explicitly taught RaMP practices they are able to better translate that into practice. The RaMP it UP! Training program adds to the previous research because when PMs are explicitly taught and trained in the RaMP EBPs, they are well equipped to provide support for children with disabilities.

The purpose of this chapter is to discuss the findings in relation to the research questions that guided the RaMP it UP! study. Then the limitation of the study will be discussed, as well as implications for practice and future research.

**Research Question #1**

The first research question for this study was: Does explicit training in conjunction with purposeful practice affect the fidelity of peer mentors’ implementation of RaMP? To answer this question, three typically developing adolescents were recruited to become peer mentors to three similarly aged adolescents diagnosed with ASD. The three PMs underwent an explicit RaMP it UP! Training program based on the Autism Focused Intervention Resources & Modules (AFIRM) (Sam & AFIRM Team, 2014) by the same name: the first was the Introduction to Autism Spectrum Disorder (Steinbrenner et al., 2019), the second covered the Peer Mediated Instruction and Intervention (Sam & AFIRM Team, 2015), and then the mentors received instruction in Reinforcement (Sam & AFIRM Team, 2015), Modeling (Sam & AFIRM Team, 2015), and Prompting (Sam & AFIRM Team, 2015). After each session, the PMs were given an opportunity to practice their newly acquired skills with an adolescent aged avatar coded with ASD, using Kennesaw State University’s mixed reality simulation AVATAR Lab.
As suggested by previous research, the study incorporated a specific training program to show positive results (Mundschenk and Sasso, 1995). During training, the mentors were instructed on how to reinforce, model, and prompt the avatar to answer questions, ask questions, and make comments on topic as the peers use scripted verbiage (Cadette et al, 2016). Through PowerPoint presentations, the study also delivered a structured, replicable training program as recommended by Dart et al. (2017). Moreover, the PMs were given the opportunity for facilitated practice with feedback (Hagopian & Kuhn, 2009) through the use of MRS. The four essential components of purposeful practice that Ericsson (2016) cited are (1) well-defined, specific goals, (2) being focused, (3) involving feedback, and (4) leaving the comfort zone, which were all achieved through the Mursion mixed reality platform which could be paused at any time to ask questions or receive feedback from the PI. The instructional goals were well defined with clear objectives at the beginning of all five training sessions. At the end of each instructional session, the PI reiterated objectives and had the PM to focus on the current objective for when they would work on with Nate. Moreover, they also received ongoing feedback during the MRS sessions. Finally, through consistent communication, the PI supported the PI by leaving their comfort zone to learn how to support adolescents with ASD.

A multiple baseline across participants design was implemented to answer the research questions. Many researchers believe that randomized control trials produce the best results; however, there are many advantages to conducting an SCRD, such as not requiring as many resources and the ability to be implemented in a real world scenario (Byiers, Reichle, & Symons, 2012). This is beneficial in determining whether an intervention shows evidence of success before implementing it on a larger scale. Multiple baseline across behaviors studies offer a method for “evaluating programs designed to improve social behaviors that are difficult to
establish and would be inappropriate to reverse (e.g. greeting responses, asking questions)” (Gast & Ledford, 2018, p. 253). With this study, the learned RaMP skills cannot be unlearned and therefore a multiple baseline approach is warranted. In accordance with the research methodology, the participants each received the training in a staggered form until a visual analysis of the data indicated the previous participant had displayed an increase in the desired behaviors (Gast & Ledford, 2018). In each of the three mentor participants, the data collected demonstrated mastery of the RaMP practices in the intervention sessions, as observed using the RaMP Observation Protocol (Appendix N) and the Operational Definitions Related to the RaMP Observation Protocol (Appendix O) which included the following skills: Greeting, Opening Reinforcement, Opportunities for Social Reciprocity, Consistent Reinforcement, Prompt Hierarchy, Verbal Prompting, Modeling, Appropriate Wait Time, Consistent Interactions, and Positive Tone.

Additionally, the recordings of the training sessions were able to include conversational information as well between the mentors and the primary investigator. The comments made by the PMs were all positive in nature as they all voiced confidence as a result of the training. Further, the PMs were all asked “Do you feel that the training prepared you to work with someone with autism?” Scarlett (PMA) responded “Yes, I’m really comfortable and I feel like I have a better understanding of how to take to them and communicate with them.” Once her training was completed, Aurora (PMB) answered the question with “Yes! I feel like I am so prepared and I wouldn't be anywhere without the training. It is so helpful and now I know how to successfully carry on a full conversation!” Clive (PMC) has a younger brother with ASD. For him, the training supported him on a personal level. He answered, “Yes, I struggled with my brother and now I know how to talk with him because it gave me a place to start from.”
providing this training, the PMs reflected that they felt better prepared to support social communication and interactions in adolescents with ASD as a result.

Based on the data collected, explicit training in conjunction with purposeful practice did affect the fidelity of peer mentors’ implementation of RaMP.

**Research Question #2**

The second research question was: Are the effects of the peer mentor training maintained after the support is withdrawn by the trainer, and then generalized when working with live children with ASD?

A minimum of at least three data points are required for analysis to determine if the study has a positive effect (Gast & Ledford, 2018). More than the required three data points were collected at each stage for each participant here. All three participants completed four maintenance sessions and the first two PMs completed the three generalization sessions to measure this question once intervention was completed. PMB displayed the highest percentages, scoring 100% on all maintenance and generalization sessions. PMA scored an average of 94% in the maintenance phase and an average of 98% during generalization. During maintenance, PMC’s average RaMP score was 88%. All three PMs rose in their skill set and were able to maintain the knowledge they acquired through the RaMP it UP! Training Program.

Data collected demonstrated that all three participants maintained the RaMP skills during the maintenance phase. Additionally, while four ten-minute sessions of practice with the avatar is recommended by the literature (Dieker et al., 2014), the peer mentors participated in 60-70 minutes of practice, including the intervention sessions, before entering the maintenance stage. The experiential learning opportunity “whereby knowledge is created through the transformation of experience” (Kolb, 1984, p. 38) built a strong foundation for the mentors (Vernon et al.,
As a result, they were able to implement RaMP to support the students with ASD in displaying the targeted social reciprocity skills for communication. Consequently, the PMs were also able to generalize the effects when working with live students diagnosed with ASD.

**Limitations**

As in all studies, there are limitations to their validity which must be reviewed. Here, there were limitations related to setting, the avatar, Nate, the participant pool, the length of time, and the behaviors that were observed or those not observed.

**Setting**

As the study was commencing in the summer of 2020, the world was enduring the COVID-19 global pandemic. Due to the high rate of infection, all schools including Kennesaw State University’s campus were closed to staff, students, and visitors. As such, the setting for the study had to be altered. Originally, the peer mentors were to be trained onsite with physical materials. The PI intended on providing visual posters, examples, and a participant guide to the PMs to view while practicing with the avatar online. As a result of stay at home and shelter in place orders, the training materials were merged into a PowerPoint presentation and all instruction took place over zoom. These materials were not able to be viewed as intended while working with the avatar since the screen was required to run the Mursion mixed reality platform.

**Nate**

The physical virtual avatar (PVA) is a digital being that instills a sense of presence (Nagendran, Pillar, Hughes, & Welch, 2012). The PVAs that were created are controlled by a Sim Specialist and can converse, gesture, and move. While there are many movements that the avatar, Nate, could complete, there are some that he cannot. The PMs were trained to encourage social reciprocity verbal skills due to the limitations of Nate and the inability to address the
nonverbal skills. Nonverbal skills, including orienting to the speaker, holding eye contact while communicating, maintaining appropriate proximity to the conversational partner, and looking/coming when called are social skill areas that the PMs were trained in and came across during the generalization sessions.

Additionally, while the interactor that controlled Nate was trained in traits common in autism by the PI, he did not have any personal experience with someone with ASD and went by provided information and information given through Mursion training. For this reason, working with a Sim Specialist over a real person can be a limitation. The training that is required to ensure that the chosen avatar acts, reacts, and responds in the manner that you intend can be time consuming. In this study, only one Sim Specialist was consistently used from start to finish; however, that is not always the case when you work with MRS.

**Participant Pool**

Selection bias can occur when then the participants are chosen without specific inclusion and exclusion criteria (Gast & Ledford, 2018). This was extinguished by listing explicit inclusion and exclusion factors for both the mentor and the mentee and using AFIRM’s Peer Selection Checklist (Sam & AFIRM, 2015) as a template. However, the adolescents chosen were from a convenience sample. There were three typically developing peers and three peers with ASD. The three typically developing middle and high school students that met the criteria underwent the peer mentor training intervention on implementing RaMP. However, as the caregivers were the ones that completed the Mentor Selection, thus confirming that their children met the inclusion criteria. Caregivers can be subjective. Ideally, a teacher or other educational professional would complete the selection checklist. Additionally, the participants were all located in the same geographical area. Further, the mentees were also recommended by their caregivers based on
their behaviors. While they did meet the inclusion criteria and demonstrated social communication deficits, they could be considered higher functioning students than Nate, the avatar included in the training, and required less support. In the DSM-5 (APA, 2013), those diagnosed with ASD are given levels differentiating the level of support they require based on their disability. Some students are a Level 1: Requiring Support, where impairments can be noticed without support, Level 2: Requiring Substantial Support, when even with supports in place impairments are noticeable and affect the person, and a Level 3: Requiring Very Substantial Support, where severe impairment limits the ability of the person to interact appropriately with others (APA, 2013). The level of support needed can dictate the ability of a student with ASD to be taught with their typically developing peers and can hinder being educated in the general education classroom resulting in a social dysfunction. All three participants.

**Length of time**

Data instability is maintained by observing the behavior until a stable baseline is achieved before introducing an additional variable. This is also true to limit variability due to regression of the mean (Gast & Ledford, 2018). In order to limit the threat of cyclical variability, condition lengths are varied as opposed to having a set schedule for the length of time that they will be implemented (Gast & Ledford). Due to the time constraints of the summer window to complete the study, the number of maintenance sessions were identical for each participant. Additionally, PMC was unable to complete the generalization sessions due to scheduling conflicts and a sickness.
Observed Behaviors

The purpose of the RaMP training program was to promote social reciprocity skills in adolescents with ASD. This study demonstrated effectiveness of the training program on the peer mentors; however, the social reciprocity skills were not measured. In this study, data was not collected on the social reciprocity behaviors (i.e. asking questions, answering questions, making comments) that were encouraged by the peer mentors. The data that was collected was all centered on the skills that the PMs displayed. To analyze the effectiveness of the RaMP training, baseline data could have been collected between the peer mentor and mentee prior to starting the intervention phase and then compared against the data collected during the generalization phase. Further, one mentee did not offer social validity feedback as they did not complete the generalization sessions as scheduled.

Implications

Implications for Practice

The preferred setting for parents and professionals continues to remain inclusion of children with ASD with their non-disabled peers, in a hope that it will benefit both the affected and non-affected students (Kasari et al. 1999; Katz & Girolametto, 2013). In recent legislation, a movement occurred towards encompassing special education students in the Least Restrictive Environment (LRE), which typically is a co-taught general education inclusive classroom, as mandated through IDEA 2004 (IDEA, USDOE, 2004). However, the social interaction deficits can hinder a child’s ability to collaborate in the inclusion classroom. Students with disabilities could be incorporated more often in the inclusion classroom if the challenges of social interactions, communications, and inappropriate behaviors were not an issue (Locke, Williams, Shih, & Kasari, 2017). If typically developing students received training in the RaMP it UP!
Program then they could support their peers with disabilities in the general curriculum classroom.

Mendelson, Gates, and Lerner (2016) cite that both parents and students report that children with ASD have a lower quality of friendship opportunities and experiences than those of typically developing students. Moreover, adolescents with ASD have fewer friendships and become isolated in their educational experience (Kasari et al. 1999; Katz & Girolametto, 2013; Mendelson, Gates, & Lerner, 2016; Whitman & DeWitt, 2011). Training typically developing peers in RaMP, particularly in the middle and high school setting, could create a support system for students with disabilities at school. Students with ASD have characteristic strengths that can be used to assist the process, such as an inclination towards predictability, an affinity for visual instruction, and well documented success with motivational reinforcers (Pierce & Schreibman, 2007). These tenets of their personalities have led to successful peer mentoring interventions (Battaglia & Radley, 2014). Through providing an explicit training program to the mentors, support could be provided to those with disabilities (Mundschenk and Sasso, 1995). The peer mentoring instruction and intervention (PMII) EBP in conjunction with purposeful practice using MRS showed increased positive effects on the fidelity of implementation and could support students with ASD and developmental disabilities at school, thus encouraging inclusion and minimizing isolation and ostracization.

**Implications for Future Research**

While this study focused on the gap in literature surrounding adolescent peer mentors, the RaMP training program can be provided to students in K-12 as well as at the university level. Peer mentors are used in multiple settings when an adept peer can work with another peer that has a deficit in a particular area. Vygotsky’s Zone of Proximal Development (ZPD) refers to
what a learner can do when proper assistance is given (1968). The National Institute on Disability and Rehabilitation Research (NIDRR) of the US Department of Education began funding a program at Gallaudet University in 2005. The training process includes a “combination of academic and experiential learning” (p.128) in which they learn about those with hearing loss and participate in activities and learn how to work with students with this disability (Bally & Bakke, 2007). Colleges and universities hire students to be peer mentors to support students with intellectual and developmental disabilities. There peer mentors have several responsibilities, including “encouraging social engagement on campus” (Kennesaw State University, 2018). The RaMP training program could be used to support the instruction of those PMs.

Further, the RaMP training program could be used to support teacher and paraprofessional preparation before entering the classroom. Teacher preparation is an area that is targeted in disability research. Teachers are educated in the use of evidence-based practices in pre-service training. The RaMP it UP! program could provide a systematic training platform during this time. Paraprofessionals are not required to receive instruction in education or disabilities. Instructing paraprofessionals could offer an opportunity to provide students with disabilities educators with informed practitioners to work with at school.

While this study did not address and analyze the social reciprocity skills in the peer mentees, further research could collect this data. While engaged in the peer mentor training, data could be collected on both the verbal skills of asking questions, answering questions, and making comments in addition to the nonverbal social skills, including orienting to the speaker, holding eye contact while communicating, maintaining appropriate proximity to the conversational partner, and looking when called.
Conclusion

The current number of students with ASD being educated in the inclusive general education setting for at least 80% of the day is 36.6%, ranging from a low 8% in Washington DC to a high of 62% in the state of Iowa. The number of students that are educated from 40-60% of the time in the same environment is 20.4%, ranging from 8% (D.C.) to 39% (Hawaii). The number of students kept in the self-contained classroom for more than 80% of the day is 34.8%, ranging from 8% from Iowa to 58% in South Carolina (Kurth, 2014). While it is noted that early intervention is beneficial to begin supporting children with ASD (Dawson et. al, 2010), it is imperative that this continues into adolescence. These young adults must acquire and maintain appropriate social communication skills before graduating and entering the workforce. Adults are confronted with a variety of opportunities that require communication on a daily basis. The education for learning social communication skills should start early in the school setting and continue through 12th grade so as to set up these students for success later in life.

Siebers (2008) believes that the way that society views those with disabilities is an evolutionary process that continues to change with time. As people learn and understand more about others, they grow. The way that society views disability affects how the students are treated in education. People can automatically assume that they are limited instead of believing that they are different. Regardless of the strengths that those with ASD possess, people tend to see the problems that they encounter concerning their social communication and interactions with others. Locke, Williams, Shih, and Kasari (2017) studied the characteristics of socially successful elementary school aged children. They found that the largest predictor of success was the level of social network salience. By surveying and observing the students, they were able to determine the number of perceived and received peer connections that each of the students has
through social connection web mapping. The higher the number of connections the child had predicted a higher social outcome during the observations. The RaMP it UP! program supports more than just the students with disabilities, it trains the peer mentors to be both understanding and accepting of their peers as well.
APPENDIX A

RaMP Survey for Mentors

Instructing Peer Mentors in Reinforcement and Modeling with Prompting (RaMP) to Support Social Interactions in Peers with Autism (Study #20-534)
Dissertation Study by Jasmine V. Sadler

Do you have access to the internet and a computer to log into zoom?
- Yes
- No

Student Age / Grade

Sex
- Male
- Female

Does your child have any prior experience interacting with people with autism or other disabilities? Please elaborate if so.

Select all that apply. Does your child exhibit the following behaviors:
- Good social skills, language, and age appropriate skills.
- Has positive social interactions with others.
- Is generally compliant with adult directions.
- Can attend to an interesting task or activity.
- Expresses a willingness to participate and has parent permission to participate,
- Other

Are there any dates/times that your child would not be available this summer to log into zoom? Please specify.

Why does your child want to be a peer mentor?

Parent/Guardian Name

Parent/Guardian Email

Parent/Guardian Phone

Student Name

Student Email

Student Phone
APPENDIX B

RaMP Survey for Mentees

Instructing Peer Mentors in Reinforcement and Modeling with Prompting (RaMP) to Support Social Interactions in Peers with Autism (Study #20-534)
Dissertation Study by Jasmine V. Sadler

Do you have access to the internet and a computer to log into zoom?

- Yes
- No

Student Age / Grade

_____________________________________

Sex

- Male
- Female

Has your child been diagnosed with any of the following:

- Autism Spectrum Disorder
- Asperger's Syndrome
- Childhood Disintegrative Disorder
- Pervasive Developmental Disorder-Not Otherwise Specified (PDD-NOS)
- Attention-Deficit/Hyperactivity Disorder (ADHD)
- Speech-Language Impairment (SLI)
- Intellectual Disability (ID)
- Other

Select all that apply. Does your child exhibit the following behaviors:

- Deficits in social-emotional reciprocity, ranging, for example, from abnormal social approach and failure of normal back-and-forth conversation; to reduced sharing of interests, emotions, or affect; to failure to initiate or respond to social interactions.
- Deficits in nonverbal communicative behaviors used for social interaction, ranging, for example, from poorly integrated verbal and nonverbal communication; to abnormalities in eye contact and body language or deficits in understanding and use of gestures; to a total lack of facial expressions and nonverbal communication.
- Deficits in developing, maintaining, and understanding relationships, ranging, for example, from difficulties adjusting behavior to suit various social contexts; to difficulties in sharing imaginative play or in making friends; to absence of interest in peers.
- Stereotyped or repetitive motor movements, use of objects, or speech (e.g., simple motor stereotypies, lining up toys or flipping objects, echolalia, idiosyncratic phrases).
- Insistence on sameness, inflexible adherence to routines, or ritualized patterns or verbal nonverbal behavior (e.g., extreme distress at small changes, difficulties with transitions, rigid thinking patterns, greeting rituals, need to take same route or eat food every day).
- Highly restricted, fixated interests that are abnormal in intensity or focus (e.g., strong attachment to or preoccupation with unusual objects, excessively circumscribed or perseverative interest).
- Hyper- or hypo-reactivity to sensory input or unusual interests in sensory aspects of the environment (e.g., apparent indifference to pain/temperature, adverse response to specific sounds or textures, excessive smelling or touching of objects, visual fascination with lights or movement).
  - Other

Is your child able to maintain attention for 10 minutes at a time?
  - Yes
  - No

Is your child able to communicate verbally in whole complete sentences?
  - Yes
  - No

Has your child ever worked with a peer mentor before?

What kind of reinforcers does your child work for (i.e. video games, puzzles, drawing, Legos, movies, bike rides etc.)?

________________________________________

Parent/Guardian Name

________________________________________

Parent/Guardian Email

________________________________________

Parent/Guardian Phone

________________________________________

Student Name

________________________________________

Student Email

________________________________________

Student Phone
Have you interacted with someone with disabilities? Either at school, work or in the community?

**Autism Spectrum Disorder**

*Autism Description*. Autism spectrum disorder (ASD) is a lifelong developmental disability that primarily affects social communication. This introduction to ASD describes characteristics of autism, including social communication, repetitive behaviors, thinking and learning, and how to support learners with ASD.

**Social Skills**

**Communication & Language**

**Restrictive or Repetitive Behaviors**
**Autism Spectrum Disorder**

Thank you for volunteering to help support your peers. You may grow up to one day be a police officer, teacher, nurse, lawyer, manager, doctor. Every job deals with customers and it’s important to know how to work with somebody with disabilities. I am going to ask you to write down any comments, questions, and concerns you may have during the training and also during the sessions.

---

**RaMP Program**

You are going to be trained in the RaMP program (reinforcement with modeling and prompting). Then you will be given the opportunity for purposeful practice using mixed reality simulations with an avatar with autism, Nate. Let me show you a video of what this looks like: [Meet Nate](#)

---

**RaMP - Step 1 (Pre-Test)**

Before we begin the training program, you will have a few sessions of 5 minutes each. This is to give you a chance to interact with Nate before being trained.

---

**RaMP - Step 2 (Instruction)**

Once we begin the training (3 days), you will have an opportunity to practice the new skills we review in a 5 minute session, or more if you want. During this time, you will be able to ask any questions and receive feedback.
RaMP - Step 3 (Post-Test)

Then you will work with Nate to see how you apply the training program over a minimum of 4 days (8 5-minute sessions). This may be more if you need extra time.

RaMP - Step 4 (Real World Application)

Then you will work with a peer with Autism to see how you use the new skills you are taught with a real live kid.

Meet Nate

Thoughts?
So how was meeting Nate?
A Case for PMII

https://afirm.fpg.unc.edu/node/3

Learners with ASD have limited opportunities to engage in meaningful social interactions with other children and youth because they might have less time to spend or work with these students, have fewer experiences with typically developing peers, and receive greater involvement from teachers and other adults. As a result, learners with ASD have fewer opportunities to practice and acquire social skills.

PMII trains peer mentors to engage learners with ASD. Then the learner can receive support from their peers at times as opposed to adults.

What is Peer-mediated Instruction and Intervention?

Several terms used to describe PMII include: Peer Modeling, Peer Initiation Training, Direct Training for Target Student and Peer, Peer Networks, and Peer Supports, Special Friends or Buddies.

Peer-mediated instruction and intervention (PMII) can address social concerns by training peers how to initiate and respond to social interactions of learners with ASD.

Types of PMII

These are the Five Types of Peer-Mediated Instruction and Intervention. Let’s review them together.


In middle and high school, peer mentors can be used to support both academic and social outcomes.
How is PMII Being Used?

Now let’s watch the AFIRM Video: How Is PMII Being Used? With High School Paraprofessional: Ms. Oaks and Elementary Special Education Teacher: Mr. Blackwell

https://afirm.fpg.unc.edu/peer-mediated-instruction-and-intervention/how-pmii-being-used

Select & Recruit Peers

Let’s complete: Select and Recruit Peers: Checking In. This same form was used to determine peers like yourself that would be good peer mentors.


By looking at the Peer Selection Checklist completed for James during math class, which four students would be best to select for a Peer Support intervention?

Peer Networks

Let’s go ahead and watch the AFIRM Video:

Video Story: High School Peer Network Session

https://afirm.fpg.unc.edu/peer-mediated-instruction-and-intervention/lesson-3-use-pmii/conduct-sessions

Peer Mentors will be provided support and feedback consistently.

Scenarios

Try to think of 6 scenarios that you would like to use during the study. This will be something you can talk about for 5 minutes. Some examples are:

❖ Teaching Nate how to play a game (i.e. Chess, Go Fish, Checkers, Bridge etc.)
❖ Explaining the rules for a sport (i.e. Volleyball, Basball, Soccer, Football etc.)
❖ Discussing your favorite type of movie/book (i.e. comedies, Lord of the Rings books, Marvel movies, Stranger Things etc.)
❖ Teaching an academic skill (i.e. writing a paper, long division etc.)
❖ Current events (i.e. COVID-19, protests, politics etc.)
Goal - Social Reciprocity

~ Ask questions
~ Answer questions
~ Make comments

Practice with Nate

Now you will have an opportunity to practice 2 of your scenarios with Nate. Remember, say “start simulation” to start and “stop simulation” to stop. The timer will go off after 5 minutes. We will rotate through so that everyone has 2 turns. If you want to ask a question, you can say “pause simulation”. If you are not certain if Nate can complete a task, you can ask “does your mom let you . . .”.

PMII Post-Test

I am going to send you the post-test. Please send back the answers in the email thread I created. It is fine to just enter the answers (i.e. 1. A, 2. B. 3. C).
Reinforcement

Jasmine V. Sadler

Q & A

How do you feel when you receive positive praise?

What do you work for in your life?

What do you think reinforcement means?

What is Reinforcement?

Let me read this information from the AFIRM Reinforcement Module: What Is R+?

https://afirm.fpg.unc.edu/reinforcement/lesson-1-basics-reinforcement/what-r

Reinforcement Procedures

Three reinforcement procedures can be used for learners with ASD: positive reinforcement, token economy programs, and negative reinforcement.

https://afirm.fpg.unc.edu/reinforcement/lesson-1-basics-reinforcement/what-r

We are only going to concentrate on providing positive reinforcement for this study.
A Case for Reinforcement

Let’s go ahead and watch the AFIRM Video: A Case for R+
https://afirm.fpg.unc.edu/resources/case-r

Notice the boy at the table in white shirt and shorts. He is the learner with ASD. Notice how the learner with ASD follows directions from the adult. Consider if you think reinforcement could be a possible intervention for this learner.

Potential Reinforcers

Let’s also review and identify Potential Reinforcers

Positive Reinforcer Menu
https://afirm.fpg.unc.edu/reinforcement/lesson-2-plan-r/prepare-supporting-materials/positive-reinforcer

Giving Choices & Preventing Satiation

Give a choice of reinforcement.
Would you rather ______ or ______?
Such as “Would you rather play legos or go on a bike ride when we are done?”
Let them make a decision. Then offer positive reinforcement for making the decision.
https://afirm.fpg.unc.edu/reinforcement/lesson-3-use-r/use-r/positive-reinforcement/prevent-satiation-varying-reinforcers

Delivering Positive Reinforcements

Let’s go ahead and watch the AFIRM Video: Use R+: Deliver R+
https://afirm.fpg.unc.edu/resources/use-r-deliver-r

When first beginning to use positive reinforcement, it is important to use continuous reinforcement by providing the learner with ASD the reinforcement each time the learner uses the target skill or behavior. What reinforcer is used? Does the child seem to enjoy the reinforcer?
Selecting Reinforcers

To increase the likelihood that the learner with ASD will use the target skill again in the future, select reinforcers that are appropriate for the individual learner with ASD and target skills. Reinforcers should be as natural as possible and related to the activity that is going on if possible.

Examples of positive reinforcement: Preferred activity, Verbal praise, Preferred objects and games, Food related activity

Reinforcer Checklist

Using Reinforcement

Using Activity: Reinforcement
https://afirm.fpg.unc.edu/reinforcement/lesson-3-use-r/using-activity

Practice with Nate

Now you will have an opportunity to apply the skills you have been learning so far using the MURSION avatar – Nate.

Post-Assessment

Now you will complete Reinforcement Post-assessment.
Modeling

Jasmine V. Sadler

Objective

Mentors will:
• Learn how to provide a model as a controlling prompt to ensure the learner responds correctly

Q and A

What does controlling mean?
What are we trying to control?
  Asking questions
  Answering questions
  Making Comments
What does modeling mean to you?

A Case for Modeling

Let’s go ahead and watch the AFIRM Video from the Modeling Module: A Case for MD

https://afirm.fpg.unc.edu/resources/case-md
What is Modeling?
Let me read this information from the AFIRM Modeling Module: What is MD
https://afirm.fpg.unc.edu/modeling/lesson-1-basics-md/what-md
Let’s also look at the 2 types of modeling and complete the checking in.

How is Modeling Being Used
Let’s complete the modeling activity.
https://afirm.fpg.unc.edu/modeling/lesson-1-basics-md/basic-activity

Role-Playing
Identify Model for the Learner
https://afirm.fpg.unc.edu/modeling/lesson-2-plan-md/identify-model-learner
Let’s go ahead and watch the AFIRM Video from PMII Module: Role-Play Peer Training
https://afirm.fpg.unc.edu/resources/plan-pmii-role-play-peer-training

Providing Feedback
Let me read this information from the AFIRM Modeling Module: Provide Feedback to Learner & Modeling Decision Tree
https://afirm.fpg.unc.edu/modeling/lesson-3-use-md/provide-feedback-learner
https://afirm.fpg.unc.edu/sites/afirm.fpg.unc.edu/files/imce/resources/MD%20Decision%20Worksheet.pdf
**Peer Training**

Let’s go ahead and watch the AFIRM Video from the Modeling Module: Video Story: Peer Training

https://afirm.fpg.unc.edu/modeling/lesson-2-plan-md/provide-training-model

---

**Modeling Activity**

Let’s complete the Modeling Using Activity: Modeling

https://afirm.fpg.unc.edu/modeling/lesson-3-use-md/using-activity

---

**Modeling Scripts**

Let’s complete the MD Target Skill Written Cues Script together.


---

**Practice with Nate**

Now you will have an opportunity to apply the skills you have been learning so far using the MURSIO avatar - Nate.
Post-Assessment

Now you will complete Reinforcement Post-assessment.
**Prompting**

**Jasmine Sadler**

**Objective**

Mentors will:
- Review the types of prompting from least restrictive to most restrictive
- Understand how to use the system of least prompts to encourage social communication skills

**Q and A**

Did our mentee respond to modeling?
What does least to most mean to you?
What would be the least amount of support you could offer and the most amount of support?

**A Case for Prompting**

Let’s go ahead and watch the AFIRM Video from the Prompting Module: A Case for PP
https://afirm.fpg.unc.edu/resources/case-pp

Watch the learner with ASD at the desk. Prompting is an effective practice to increase success and generalizability of target skills or behaviors for learners with ASD. This is a scenario where prompting could be used. What kind of prompting could be used here?
What is Prompting?
AFIRM Prompting Module: What is PP?
https://afirm.fpg.unc.edu/prompting/lesson-1-basics-pp/what-pp

Three PP Components

Three Types of Prompting Procedures
There are Three Types of Prompting Procedures.
We are going to review the Least-to-Most Prompting Procedures or the System of Least Prompts.
https://afirm.fpg.unc.edu/prompting/lesson-1-basics-pp/what-pp

Five Types of Prompting
https://afirm.fpg.unc.edu/prompting/lesson-1-basics-pp/what-pp
- Gestural prompts
- Verbal Prompts
- Visual prompts
- Model prompts
- Physical prompts

Prompting Activity
Let’s complete: Basic Activity: Prompting
https://afirm.fpg.unc.edu/prompting/lesson-1-basics-pp/basic-activity
Select the Number of Levels
Least-to-Most Prompt Levels

Sequence Prompts from Least-to-Most Assistance

<table>
<thead>
<tr>
<th>Level</th>
<th>Type of Prompt</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Independent</td>
<td>None</td>
<td>What is your favorite movie?</td>
</tr>
<tr>
<td>Intermediate</td>
<td>Verbal/Visual</td>
<td>Have you seen a movie lately? Is Cars your favorite movie?</td>
</tr>
<tr>
<td>Controlling prompt</td>
<td>Model</td>
<td>Do you like Cars or Avengers more? Say “Cars is my favorite movie.”</td>
</tr>
</tbody>
</table>

Determine the Length of the Response Interval

Response intervals are usually only a few seconds (3-5 seconds).

Following the Steps
https://afirm.fpg.unc.edu/promoting/lesson-2-pp/follow-unique-steps-using-least-most-prompting

- Establish learner attention, deliver stimulus, and provide the cue
  - Greeting
- Wait for the learner to respond
  - 3-5 seconds
- Respond to learner’s attempts
  - Reinforcement
### Respond to Learner’s Attempts


### Observation Sheet

Now let’s review the observation tool together. You do not need to know how to do all of these things right now. That’s what this training program is for. We will be going over the system of least prompts and how to model skills and reinforce them for the next couple days. This includes

Practice with Nate

Now you will have an opportunity to apply the skills you have been learning so far using the MURSION avatar – Nate.

Post-Assessment

You will be sent the Prompting Post-assessment to complete.
INTRODUCTION TO AUTISM SPECTRUM DISORDER

Synopsis
You are a peer mentor that is meeting your peer mentee for the first time at a school event, social outing, sports game etc. You decide.

Learner Challenge
You will offer a greeting and introduce yourself. You will get to know Nate by talking to him.

Objectives
Learner will...
To hit this objective:
• Practice greeting Nate
• Introduce yourself to Nate
• Get to know Nate

Materials
PPT on Autism Spectrum Disorder

<table>
<thead>
<tr>
<th>When learners…</th>
<th>Avatars will…</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIT</td>
<td>HIT</td>
</tr>
<tr>
<td>▪ Greet Nate</td>
<td>▪ Be engaged in activity</td>
</tr>
<tr>
<td>▪ Introduce themselves</td>
<td>▪ Respond to the learner</td>
</tr>
<tr>
<td>▪ Asks and answers questions</td>
<td>▪ Asks and answer questions</td>
</tr>
<tr>
<td>Miss</td>
<td>Miss</td>
</tr>
<tr>
<td>▪ Is nervous, fast or rude in tone</td>
<td>▪ Not listen and stare off or stim</td>
</tr>
<tr>
<td>▪ Does not greet Nate</td>
<td>▪ Not respond to the learner</td>
</tr>
<tr>
<td>▪ Does not introduce himself</td>
<td>▪ Not ask and answer questions</td>
</tr>
<tr>
<td>▪ Does not ask and answer questions</td>
<td></td>
</tr>
</tbody>
</table>

Objective
Peer Mentors meet and interact with a student with autism and get to know him.

Avatar
Middle/High School AVATAR – Nate with ASD

Learner Audience
- Peer Mentor(s)
- Primary Investigator
- Additional Researcher
## AVATAR LAB
### SCENARIO GUIDE

### Objective
Peer Mentors meet and interact with a student with autism and offer continuous Opportunities for Social Reciprocity

### Avatar
Middle/High School AVATAR – Nate with ASD

### Learner Audience
- Peer Mentor(s)
- Primary Investigator
- Additional Researcher

### Synopsis
You are a peer mentor that is working with a peer with ASD.

### Learner Challenge
You will practice offering Opportunities for Social Reciprocity (i.e. asking questions, answering questions, and making comments) while conversing with Nate.

### Objectives
Learner will...

To hit this objective:
- You will offer continuous Opportunities for Social Reciprocity (i.e. asking questions, answering questions, and making comments)

### Materials
PPT on Peer Mediated Instruction and Intervention

### When learners...

<table>
<thead>
<tr>
<th>HIT</th>
<th>HIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Greet Nate</td>
<td>Be engaged in activity</td>
</tr>
<tr>
<td>Offer continuous</td>
<td>Display the target</td>
</tr>
<tr>
<td>Opportunities for</td>
<td>behaviors (i.e. asking</td>
</tr>
<tr>
<td>Social Reciprocity</td>
<td>questions, answering</td>
</tr>
<tr>
<td>(i.e. asking</td>
<td>questions, and making</td>
</tr>
<tr>
<td>questions, and</td>
<td>comments)</td>
</tr>
<tr>
<td>making comments)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Miss</th>
<th>Miss</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is nervous, fast or</td>
<td>Not listen and stare off</td>
</tr>
<tr>
<td>rude in tone</td>
<td>or stim</td>
</tr>
<tr>
<td>Do not offer</td>
<td>Not respond to the learner</td>
</tr>
<tr>
<td>continuous</td>
<td>Not display the target</td>
</tr>
<tr>
<td>Opportunities for</td>
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<tr>
<td>questions, and</td>
<td>comments)</td>
</tr>
<tr>
<td>making comments)</td>
<td>Stop displaying the target</td>
</tr>
<tr>
<td></td>
<td>behaviors</td>
</tr>
</tbody>
</table>
**REINFORCEMENT**

**Synopsis**
You are a peer mentor that is working with a peer with ASD.

**Learner Challenge**
You will practice positive reinforcement while conversing with Nate.

**Objectives**
Learner will...

To hit this objective:
- You will offer continuous reinforcement when the peer mentee demonstrates Social Reciprocity Skills (i.e. asking questions, answering questions, and making comments)

**Materials**
PPT on Reinforcement

<table>
<thead>
<tr>
<th>When learners...</th>
<th>Avatars will...</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>HIT</strong></td>
<td><strong>HIT</strong></td>
</tr>
<tr>
<td>▪ Greet Nate and offer continuous Opportunities for Social Reciprocity (i.e. asking questions, answering questions, and making comments)</td>
<td>▪ Be engaged in activity</td>
</tr>
<tr>
<td>▪ Use positive reinforcement</td>
<td>▪ Display the target behaviors (i.e. asking questions, answering questions, and making comments)</td>
</tr>
<tr>
<td><strong>Miss</strong></td>
<td><strong>Miss</strong></td>
</tr>
<tr>
<td>▪ Is nervous, fast or rude in tone</td>
<td>▪ Not listen and stare off or stim</td>
</tr>
<tr>
<td>▪ Do not offer continuous Opportunities for Social Reciprocity</td>
<td>▪ Not respond to the learner</td>
</tr>
<tr>
<td>▪ Do not use positive reinforcement when the avatar displays the target behaviors</td>
<td>▪ Not display the target behaviors</td>
</tr>
<tr>
<td></td>
<td>▪ Stop displaying the target behaviors</td>
</tr>
</tbody>
</table>

**AVATAR LAB**

**SCENARIO GUIDE**

**Objective**
Peer Mentors meet and interact with a student with autism and offer continuous positive reinforcement.

**Avatar**
Middle/High School AVATAR – Nate with ASD

**Learner Audience**
- Peer Mentor(s)
- Primary Investigator
- Additional Researcher

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MODELING

AVATAR LAB

SCENARIO GUIDE

Objective
Peer Mentors meet and interact with a student with autism and offer continuous positive reinforcement while modeling.

Avatar
Middle/High School AVATAR – Nate with ASD

Learner Audience
- Peer Mentor(s)
- Primary Investigator
- Additional Researcher

Synopsis
You are a peer mentor that is working with a peer with ASD.

Learner Challenge
You will practice positive reinforcement while modeling social reciprocity skills when conversing with Nate.

Objectives
Learner will...

To hit this objective:
- You will offer continuous reinforcement when the peer mentee demonstrates Social Reciprocity Skills (i.e. asking questions, answering questions, and making comments)
- Model the skills when they are not demonstrated

Materials
PPT on Modeling

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</tr>
<tr>
<td>▪ Use positive reinforcement</td>
<td></td>
</tr>
<tr>
<td>▪ Demonstrate modeling for target behaviors</td>
<td></td>
</tr>
<tr>
<td>▪ Be engaged in activity</td>
<td></td>
</tr>
<tr>
<td>▪ Display the target behaviors (i.e. asking questions, answering questions, and making comments</td>
<td></td>
</tr>
</tbody>
</table>

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<td></td>
</tr>
<tr>
<td>▪ Do not use positive reinforcement</td>
<td></td>
</tr>
<tr>
<td>▪ Does not demonstrate modeling to encourage Social Reciprocity Skills</td>
<td></td>
</tr>
<tr>
<td>▪ Not listen and stare off or stim</td>
<td></td>
</tr>
<tr>
<td>▪ Not respond to the learner</td>
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</tr>
<tr>
<td>▪ Not display the target behaviors</td>
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<td>▪ Stop displaying the target behaviors</td>
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PROMPTING

AVATAR LAB

SCENARIO GUIDE

Objective
Peer Mentors meet and interact with a student with autism and offer continuous positive reinforcement while offering verbal and modeling prompting.

Avatar
Middle/High School AVATAR – Nate with ASD

Learner Audience
- Peer Mentor(s)
- Primary Investigator
- Additional Researcher

Synopsis
You are a peer mentor that is working with a peer with ASD.

Learner Challenge
You will practice positive reinforcement while offering verbal and modeling prompts to encourage social reciprocity skills when conversing with Nate.

Objectives
Learner will…

To hit this objective:
- You will offer continuous reinforcement when the peer mentee demonstrates Social Reciprocity Skills (i.e. asking questions, answering questions, and making comments)
- Verbally prompt and model the skills while using the system of least prompts when they are not demonstrated

Materials
PPT on Prompting

<table>
<thead>
<tr>
<th>When learners…</th>
<th>Avatars will…</th>
</tr>
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<tbody>
<tr>
<td>HIT</td>
<td>HIT</td>
</tr>
<tr>
<td>Greet Nate and offer continuous Opportunities for Social Reciprocity</td>
<td>Be engaged in activity</td>
</tr>
<tr>
<td>Use positive reinforcement</td>
<td>Display the target behaviors (i.e. asking questions, answering questions, and making comments)</td>
</tr>
<tr>
<td>Demonstrate verbal and modeling prompts for target behaviors</td>
<td></td>
</tr>
<tr>
<td>Miss</td>
<td>Miss</td>
</tr>
<tr>
<td>Is nervous, fast or rude in tone</td>
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</tr>
<tr>
<td>Do not offer continuous Opportunities for Social Reciprocity</td>
<td>Not respond to the learner</td>
</tr>
<tr>
<td>Do not use positive reinforcement</td>
<td>Not display the target behaviors</td>
</tr>
<tr>
<td>Does not demonstrate verbal and modeling prompts to encourage Social Reciprocity Skills</td>
<td>Stop displaying the target behaviors</td>
</tr>
</tbody>
</table>
Appendix M

AFIRM Modified Post-Tests

PMII Post-Test

1. PMII includes…
   A. Teaching learners with ASD how to interact with each other
   B. Teaching peers without disabilities ways of engaging learners with ASD in positive and meaningful interactions
   C. No adult support
   D. Only activities within the school day

2. Which is NOT a goal of PMII?
   A. Extend peers’ social initiations with learners with ASD across classroom activities
   B. Maximize teacher and adult support
   C. Teach peers without disabilities ways to talk and interact with learners with ASD
   D. Promote interactions between peers without disabilities and learners with ASD that are positive and natural in quality

3. Based on the evidence-base, what outcome would be appropriate to address using PMII with a high school student with ASD?
   A. Academics and Social Outcomes
   B. Joint Attention
   C. Play
   D. Behavior

4. What traits or behaviors should peers without disabilities exhibit to be recruited to participate in PMII? Select all that apply.
   A. Exhibit good social skills
   B. Frequent absences
   C. Have similar schedule as learner with ASD
   D. Teacher and parent permission to participate
   E. Struggles with adult directives
   F. Unable to attend to an interesting task for an age-appropriate amount of time

5. After peers are trained, the trainer should . . .
   A. Provide support and feedback through consistent meetings.
   B. No additional training is needed
   C. Provide support to peers only during their interactions with learners with ASD
   D. Meet monthly with them to address any concerns or questions they might have.

Nate:
1. How is talking to Nate like talking to a real kid?
2. How is talking to Nate unlike talking to a real kid?

R+ Post-Test

1. Reinforcement...
   A. Increases target behaviors
   A. Decreases target behaviors
   B. Increases and decreases target behaviors
2. A teacher saying, “Good job” is an example of what type of reinforcer?
A. Material reinforcer  
B. Sensory reinforcer  
C. Social reinforcer  
D. Natural reinforcer

3. Select the considerations for identifying reinforcers for individual learners:
A. Age of learner  
B. Information from a reinforcer sampling  
C. Information from parents or team members about potential reinforcers  
D. All of the above

4. When beginning to use positive reinforcement, provide reinforcement…
A. Each time the learner uses the target skill or behavior.  
B. After using the target skill or behavior correctly two times.  
C. Every two minutes.  
D. Every five minutes.

5. What happened if the learner was making progress with a target skill, but recently became uninterested with the reinforcer?
A. Deprivation  
B. Negative reinforcement  
C. Satiation  
D. None of the above

MD Post-Test

1. Which statement below does not apply to modeling? Choose one
A. Modeling supports generalization of new skills.  
B. Modeling requires many resources to implement.  
C. Modeling is a cost-efficient tool.  
D. Modeling helps learners acquire new skills.

2. Select the skills that could be addressed using modeling.
A. Asking a peer for a toy.  
B. Single digit subtraction.  
C. Preparing a meal.  
D. Asking a peer a question.

3. Select the two evidence-based practices most frequently used with modeling.
A. Prompting  
B. Visual Supports  
C. Time Delay  
D. Reinforcement

4. Select the best person to serve as a model.
A. Teacher.  
B. Parent.  
C. Peer who is physically similar to the learner and respected by the learner.
5. When beginning to use modeling, how often should the learner receive reinforcement?
A. Every time the learner performs the target skill or behavior.
B. Every other time the learner performs the target skill or behavior.
C. Every two times the learner performs the target skill or behavior.
D. After a predetermined length of time the learner performs the target skill or behavior.

Prompting Post-Test

1. What are the three prompting components:
   A. Antecedent
   B. Reinforcement
   C. Target skill
   D. Task stimulus
   E. Consequence

2. A student’s target behavior is raising his hand when he needs help. When the teacher notices the student needs help, the teacher raises her own hand halfway up as a prompt. What type of prompt is the teacher using?
   A. Verbal
   B. Visual
   C. Model
   D. Physical

3. How many prompt levels are required when using least-to-most prompting?
   A. Two
   B. Three
   C. Four
   D. Five

4. What prompt ensures the learner responds correctly and uses the target skill?
   A. Visual prompt
   B. Model prompt
   C. Physical prompt
   D. Controlling prompt

5. When using least-to-most prompting, how should a teacher respond if a learner responds correctly to an intermediate prompt level?
   A. Offer reinforcement
   B. Interrupt the correct response
   C. Use the prompt in the next level of the prompt hierarchy
   D. Begin the next activity

Also, do you feel that the training prepared you to work with someone with autism?
Appendix N

RaMP Observation Protocol

<table>
<thead>
<tr>
<th>Mentor:</th>
<th>Date:</th>
<th>Start:</th>
<th>Stop:</th>
<th>Time:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>_______</td>
<td>_______</td>
<td>_______</td>
<td>_______</td>
</tr>
</tbody>
</table>

Phase: Baseline / Intervention / Maintenance / Generalization

<table>
<thead>
<tr>
<th>Topic:</th>
<th>Criteria</th>
<th>Score</th>
<th>Criteria</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Greeting</td>
<td></td>
<td>Greeting</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Opening</td>
<td></td>
<td>Opening</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Reciprocity</td>
<td></td>
<td>Reciprocity</td>
<td></td>
</tr>
<tr>
<td></td>
<td>R+</td>
<td></td>
<td>R+</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PP</td>
<td></td>
<td>PP</td>
<td></td>
</tr>
<tr>
<td></td>
<td>VP</td>
<td></td>
<td>VP</td>
<td></td>
</tr>
<tr>
<td></td>
<td>MD</td>
<td></td>
<td>MD</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Wait Time</td>
<td></td>
<td>Wait Time</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Interaction</td>
<td></td>
<td>Interaction</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Tone</td>
<td></td>
<td>Tone</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Percent</td>
<td>/20=</td>
<td>Percent</td>
<td>/20=</td>
</tr>
</tbody>
</table>
APPENDIX O

Operational Definitions Related to the RaMP Observation Protocol

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Definition: Mentor starts with a greeting by looking at the mentee, using a pleasant voice, saying “hi, how are you”, and waiting for a response.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Code:</td>
</tr>
<tr>
<td></td>
<td>□ Mentors who follow the prescribed steps will be coded with a 2 for greeting.</td>
</tr>
<tr>
<td>Greeting</td>
<td>□ Mentors who follow some of the prescribed steps will be coded with a 1 for greeting.</td>
</tr>
<tr>
<td></td>
<td>□ Mentors who follow none of the prescribed steps will be coded with a 0 for greeting.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Definition: Mentor provides an option/choice of two reinforcers to choose from for when they complete the session.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Code:</td>
</tr>
<tr>
<td></td>
<td>□ Mentors who provide an option/choice of two reinforcers to choose from for when they complete the session will be coded with a 2 for opening reinforcement.</td>
</tr>
<tr>
<td>Opening Reinforcement</td>
<td>□ Mentors who provide an option/choice of one reinforcer for when they complete the session will be coded with a 1 for opening reinforcement.</td>
</tr>
<tr>
<td></td>
<td>□ Mentors who do not provide an option/choice of two reinforcers to choose from for when they complete the session will be coded with a 0 for opening reinforcement.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Definition: Mentor provides opportunities for the mentee to ask questions, answer questions, and make comments.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Code:</td>
</tr>
<tr>
<td></td>
<td>□ Mentors who provide opportunities for the mentee to ask questions, answer questions, and make comments throughout the session will be coded with a 2 for social reciprocity.</td>
</tr>
<tr>
<td>Opportunities for Social Reciprocity</td>
<td>□ Mentors who provide opportunities for the mentee to ask questions, answer questions, and make comments half of the session will be coded with a 1 for social reciprocity.</td>
</tr>
<tr>
<td></td>
<td>□ Mentors who provide opportunities for the mentee to ask questions, answer questions, and make comments rarely or not at all during the session will be coded with a 0 for social reciprocity.</td>
</tr>
</tbody>
</table>
### Reinforcement (R+)

**Definition:** Mentors offer an item, activity, verbal, or nonverbal response that is given by the mentor to the mentee occurring after they display a desired skill (Wong et. al.; 2014).

**Code:**
- Mentors who offer an item, activity, verbal, or nonverbal response occurring after the mentee displays a desired skill will be coded with a 2 for reinforcement.
- Mentors who offer an item, activity, verbal, or nonverbal response sometimes occurring after the mentee displays a desired skill will be coded with a 1 for reinforcement.
- Mentors who rarely or do not offer an item, activity, verbal, or nonverbal response occurring after the mentee displays a desired skill will be coded with a 0 for reinforcement.

### Prompt Hierarchy

**Definition:** Mentor implements the prompt hierarchy by allowing the mentee to first question, comment, or respond independently, then use a verbal prompt if needed, and then uses a controlling (modeling) prompt to receive the correct response.

**Code:**
- Mentors who use the prompt hierarchy throughout the session will be coded with a 2 for prompt hierarchy.
- Mentors who use the prompt hierarchy half of the session will be coded with a 1 for prompt hierarchy.
- Mentors who use the prompt hierarchy rarely or not at all during the session will be coded with a 0 for prompt hierarchy.

### Verbal Prompt (VP)

**Definition:** Mentor provides a verbal response during the session to ask questions, answer questions, and make comments when the mentee does not perform the task independently.

**Code:**
- Mentors who provide a verbal response if needed throughout the session will be coded with a 2 for verbal prompting.
- Mentors who provide a verbal response if needed half of the session will be coded with a 1 for verbal prompting.
- Mentors who provide a verbal response if needed rarely or not at all during the session will be coded with a 0 for verbal/visual prompting.

### Modeling (MD)

**Definition:** Mentor models how to ask questions, answer questions, and make comments when the mentee does not perform the task independently or with a verbal prompt (Wong et. al.; 2014).

**Code:**
- Mentors who model if needed when the mentee does not perform the task independently or with a verbal prompt throughout the session will be coded with a 2 for modeling.
- Mentors who model if needed when the mentee does not perform the task independently or with a verbal prompt half of the session will be coded with a 2 for modeling.
- Mentors who model if needed when the mentee does not perform the task independently or with a verbal prompt rarely or not at all during the session will be coded with a 2 for modeling.
<table>
<thead>
<tr>
<th></th>
<th><strong>Definition:</strong></th>
<th><strong>Code:</strong></th>
</tr>
</thead>
</table>
| **Wait Time** | The mentor should give the mentee 3-5 seconds of wait time before offering a prompt. | - Mentors who give the mentee 3-5 seconds of wait time throughout the session before offering a prompt will be coded with a 2 for wait time.  
- Mentors who give the mentee 3-5 seconds of wait time half of the session before offering a prompt will be coded with a 1 for wait time.  
- Mentors who rarely or do not give the mentee 3-5 seconds of wait time before offering a prompt will be coded with a 0 for wait time. |
| **Interaction** | Mentors should continuously interact with the mentee for the entire time allotted. | - Mentors who continuously interact with the mentee for the entire time allotted will be coded with a 2 for interaction.  
- Mentors who interact with the mentee for half of the time allotted will be coded with a 1 for interaction.  
- Mentors who do not continuously interact with the mentee for the time allotted and have several time periods where nothing is said will be coded with a 0 for interaction. |
| **Tone** | Mentor will use an upbeat, positive tone throughout the session. | - Mentors who use an upbeat, positive tone throughout the session will be coded with a 2 for tone.  
- Mentors who use an upbeat, positive tone half of the session will be coded with a 1 for tone.  
- Mentors who do not use an upbeat, positive tone throughout the session will be coded with a 0 for tone. |
Appendix P

Mentor Script

Greeting

Hi Nate, how are you?
  • Answers - reinforcement
  • Doesn’t answer - verbal prompt
  • Answers - reinforcement
  • Doesn’t answer - model
  • Answers - reinforcement

Have Nate to ask you how you are.
  • Ask - reinforcement
  • Doesn’t Ask - verbal prompt
  • Asks - reinforcement
  • Doesn’t Ask - Model
  • Asks - reinforcement

Objective and Reinforcer

When we are done would you rather ____ or ______?
Today we are going to talk about ____.
  • Reinforcement

Conversation

Encourage Nate to:
  • Answer questions
  • Ask questions
  • Make Comments

Use least to most prompts
  • Independent
  • Verbal
  • Model

Offer reinforcement
Appendix Q

RaMP Treatment Fidelity Checklist

<table>
<thead>
<tr>
<th>Lesson</th>
<th>Explicit Instruction &amp; Purposeful Practice</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Introduction to Autism Spectrum Disorder</td>
<td>a. Reviewed the definition</td>
</tr>
<tr>
<td></td>
<td>b. Reviewed the characteristics, including Social Skills Communication &amp; Language, and Restrictive or Repetitive Behaviors</td>
</tr>
<tr>
<td>Date Met: _______</td>
<td>c. Detailed step by step instructions on the study and their expectations</td>
</tr>
<tr>
<td></td>
<td>d. Practice with Nate</td>
</tr>
<tr>
<td>2. Peer Mediated Instruction and Intervention</td>
<td>a. Reviewed the purpose</td>
</tr>
<tr>
<td>Date Met: _______</td>
<td>b. Discussed how it is used</td>
</tr>
<tr>
<td></td>
<td>c. Explained social reciprocity and the targeted skills of asking questions, answering questions, and making comments</td>
</tr>
<tr>
<td></td>
<td>d. Developed individual scenarios to use</td>
</tr>
<tr>
<td></td>
<td>e. Practice with Nate</td>
</tr>
<tr>
<td>3. Reinforcement</td>
<td>a. Q &amp; A to activate prior knowledge</td>
</tr>
<tr>
<td>Date Met: _______</td>
<td>b. Defined reinforcement</td>
</tr>
<tr>
<td></td>
<td>c. Explained positive reinforcement and potential reinforcers</td>
</tr>
<tr>
<td></td>
<td>d. Demonstrated how to prevent satiation and select reinforcers</td>
</tr>
<tr>
<td></td>
<td>e. Completed the Reinforcer Checklist and Using Activity</td>
</tr>
<tr>
<td></td>
<td>f. Practice with Nate</td>
</tr>
<tr>
<td>4. Modeling</td>
<td>a. Q &amp; A to activate prior knowledge</td>
</tr>
<tr>
<td>Date Met: _______</td>
<td>b. Defined modeling</td>
</tr>
<tr>
<td></td>
<td>c. Explained the two types of modeling</td>
</tr>
<tr>
<td></td>
<td>d. Demonstrated how to role play and train peers</td>
</tr>
<tr>
<td></td>
<td>e. Completed the Basic and Using Activities as well as the MD Target Skill Written Cues Script</td>
</tr>
<tr>
<td></td>
<td>f. Practice with Nate</td>
</tr>
<tr>
<td>5. Prompting</td>
<td>a. Q &amp; A to activate prior knowledge</td>
</tr>
<tr>
<td>Date Met: _______</td>
<td>b. Defined prompting</td>
</tr>
<tr>
<td></td>
<td>c. Explained the three components of prompting, least to most prompting procedure, and 5 prompt types</td>
</tr>
<tr>
<td></td>
<td>d. Demonstrated opportunities for practicing prompting</td>
</tr>
<tr>
<td></td>
<td>e. Completed the Basic Activity and the Sequencing the Steps Activity</td>
</tr>
<tr>
<td></td>
<td>f. Practice with Nate</td>
</tr>
</tbody>
</table>
Appendix R

RaMP Social Validity Survey for Mentors

<table>
<thead>
<tr>
<th>Question</th>
<th>PMA</th>
<th>PMB</th>
<th>PMC</th>
</tr>
</thead>
<tbody>
<tr>
<td>On a scale of 1 - 5, do you feel the RaMP training prepared you to work with a peer with ASD?</td>
<td>5</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>On a scale of 1 - 5, do you feel the RaMP training you received lasted the right amount of time?</td>
<td>5</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>On a scale of 1 - 5, do you think it was beneficial to work with Nate before working with a live child?</td>
<td>5</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>On a scale of 1 - 5, do you feel comfortable working with someone with ASD after receiving the training?</td>
<td>5</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>On a scale of 1 - 5, do you think you will use the RaMP strategies in your future?</td>
<td>4</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>On a scale of 1 - 5, do you believe that other peers would benefit from being trained in the RaMP it up! program?</td>
<td>4</td>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>

Appendix S

RaMP Social Validity Survey for Mentees

<table>
<thead>
<tr>
<th>Question</th>
<th>MA</th>
<th>MB</th>
<th>MC</th>
</tr>
</thead>
<tbody>
<tr>
<td>On a scale of 1-5, did you enjoy talking to your mentor?</td>
<td>4</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>On a scale of 1-5, do you think that your mentor helped you?</td>
<td>3</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>On a scale of 1-5, would you want to talk with your mentor again?</td>
<td>4</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>On a scale of 1-5, would you be interested in having a peer mentor at school?</td>
<td>5</td>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>
### Table 1

**Social Skills Interventions Studies**

<table>
<thead>
<tr>
<th>Author &amp; Year</th>
<th>Age Gender</th>
<th>Disability</th>
<th>Dependent Targeted Skills</th>
<th>Social Skills Intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Argott, Townsend, Sturme, &amp; Poulson (2008)</td>
<td>Age 11 Female Autism</td>
<td>Autism</td>
<td>student orient his or her eyes toward the instructor and directing a verbal statement of empathy</td>
<td>Adult led Model facial expression Gesture Scripted Responses Reinforcement</td>
</tr>
<tr>
<td></td>
<td>Age 11 Male Autism</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Age 14 Male Autism</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bock (2007)</td>
<td>Age 12 Male Asperger</td>
<td></td>
<td>Participate in cooperative learning activities during English Play a board game with one or more peers Visit one or more peers during lunch</td>
<td>Adult led SODA Strategy Stop Observe Deliberate Act Visual Model Prompt</td>
</tr>
<tr>
<td>Cadette, Wilson, Brady, Dukes, &amp; Bennett (2016)</td>
<td>10th grade Male ASD</td>
<td>ASD</td>
<td>correct oral responses to questions The target “wh-” question types for this study were: “who,” “where,” and “what.”</td>
<td>Adult led Direct Instruction to respond to the cues and hand signals Modeling Prompting Assessing</td>
</tr>
<tr>
<td></td>
<td>11th grade Male ASD</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>10th grade Male ASD</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gutman, Raphael-Greenfield, &amp; Rao (2012)</td>
<td>7 participants</td>
<td>High Functioning Autism or PDD-NOS</td>
<td>Greeting Appropriate conversations Respond End a conversation Eye Contact Appropriate Distance Orient to Speaker Reciprocate Touch Reciprocate Expression Tolerate Others Presence</td>
<td>Peer Mentoring Role Play Modeling</td>
</tr>
<tr>
<td></td>
<td>Age 15-21 Males</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gutman &amp; Raphael-Greenfield, 2012</td>
<td>Age 15 Female ASD</td>
<td></td>
<td>Verbal behaviors Nonverbal behaviors</td>
<td>Adult led Direct Instruction Video Modeling Canine Support</td>
</tr>
<tr>
<td></td>
<td>Age 15 Male ASD</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hagopian &amp; Kuhn (2009)</td>
<td>Age 13 Male PDD</td>
<td></td>
<td>Inappropriate comments Inappropriate touching Appropriate touching</td>
<td>Adult led Reinforcement Feedback</td>
</tr>
<tr>
<td></td>
<td>Age 16 Male Autism</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tan (2015)</td>
<td>n=3 * two fit the criteria</td>
<td></td>
<td>Social and emotional regulation Emotion recognition Emotion management</td>
<td>Adult led Secret Agent Society Social Skills Program Model Discussion with Parents Weekly Tip Sheets</td>
</tr>
<tr>
<td></td>
<td>Age 11 Male Autism</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Age 11 Male Autism</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Taylor et. al. (2005)</td>
<td>12 Male: ASD</td>
<td></td>
<td>Initiate interactions</td>
<td>Reinforcement</td>
</tr>
<tr>
<td></td>
<td>4 Male ASD</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>10 Male ASD</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>
Table 2

**Peer Mediated Instruction and Intervention Studies**

<table>
<thead>
<tr>
<th>Author &amp; Year</th>
<th>Age/Sex</th>
<th>Study Design</th>
<th>Dependent Skills</th>
<th>Mentors</th>
<th>Peer Training including RaMP</th>
<th>Intervention Length of time</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Banda et al. (2010)</td>
<td>6 M PDD/SLI 6 M PDD/SLI</td>
<td>Multiple baseline across participants</td>
<td>Initiation Responses</td>
<td>2-3 mentors per child</td>
<td>Trained together</td>
<td>Two to three times a week for ten minutes at a time during centers</td>
<td>Significant gains in social initiations and responses.</td>
</tr>
<tr>
<td>Carter &amp; Cushing (2005)</td>
<td>12 F ASD/ MOID 13 F ASD/ MOID</td>
<td>Multiple baseline across participants</td>
<td>Social Interactions - both verbal and nonverbal</td>
<td>6 ment 1-2 per child Ages 11–17</td>
<td>Overview Training 2-4 days Ongoing monitoring and feedback 1 week of training Prompting</td>
<td>30 minute Science class periods 4 weeks</td>
<td>Number of social interactions increased when the participants worked with two peers over one peer</td>
</tr>
<tr>
<td>Chung et al. (2007)</td>
<td>6 M ASD 7 M ASD 6 M ASD 7 M PDD</td>
<td>Comparison</td>
<td>Appropriate social skills</td>
<td>4 ment 2 per child of the same age 8</td>
<td>Target skill of the day, demonstrate how to prompt and praise Prompting &amp; Reinforcement</td>
<td>12 weeks</td>
<td>Three out of the four children demonstrated improvement initiating comments.</td>
</tr>
<tr>
<td>Dart et al. (2017)</td>
<td>Four M HS students with autism</td>
<td>Multiple baseline across participants</td>
<td>Number of steps that were mastered 4 HS students</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gonzalez-Lopez &amp; Kamps (1997)</td>
<td>7 F ASD 7 M ASD 5 F ASD 5 M ASD</td>
<td>Greetings Using names Conversation Imitation Following instructions Sharing, Asking for help Requesting</td>
<td>6 kindergarten children, ages 5 and 6 and 6 first-grade children (ages 7 and 8)</td>
<td></td>
<td>Direct instruction of five social skills using scripts Modeling, Prompting, and Reinforcement</td>
<td>3-4 times a week 20 to 25 minutes social skills training and 10 to 15 minutes of play time</td>
<td>Social skills training in addition to reinforcement resulted in increased scores.</td>
</tr>
<tr>
<td>Halle et al. (2016)</td>
<td>13 M ASD 13 M 12 F ASD 14 M ASD</td>
<td>Multiple baseline across participants</td>
<td>Encouraging appropriate greetings as a response to being greeted by a peer Similarly matched nondisabled peer helpers</td>
<td></td>
<td>Large group training sessions on proper verbal intonation and gestural topography and how to prompt</td>
<td>Classroom, lunchroom, and passing period observations Two times in each of two general education classes</td>
<td>All four students showed substantial improvements</td>
</tr>
<tr>
<td>Kamps et al. (2002)</td>
<td>10 F ASD 10 M ASD 9 F ASD 9 M ASD</td>
<td>Multiple baseline across reversal participants ABAB</td>
<td>Initiating and responding Orienting Cooperating, Engaging in positive interaction</td>
<td>51 mentors</td>
<td>Tutor partners in vocabulary Responsibilities Social skills Prompting and reinforcement</td>
<td>2 weeks baseline 4 weeks cooperative groups 2 weeks baseline 4 weeks cooperative groups</td>
<td>Cooperative group - increased triple Social skills group - increased double Control group - increased 50%</td>
</tr>
<tr>
<td>Study 2</td>
<td>34 students 24 M 10 F 7–14 years ASD</td>
<td>Longitudinal Quantitative Social interaction Reciprocal Interactions Try Play On Topic Verbalization</td>
<td>130 mentors</td>
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<tr>
<td>Kerbs et al. (2010)</td>
<td>9 M ASD 10 M ASD</td>
<td>Multiple probe across tasks across participants</td>
<td>Maintaining eye contact Maintaining close proximity Initiating conversation with the peer Maintaining the topic conversation</td>
<td>4 mentors</td>
<td>Trained together using Communication styles Role playing Examples Discussion Activities Modeling</td>
<td>Baseline data one week period 3 sessions 20 to 40 minutes. Intervention 20-40 minute sessions</td>
<td>Increases were observed in all 4 behaviors</td>
</tr>
<tr>
<td>Study</td>
<td>Participants</td>
<td>Design</td>
<td>Initial Behavior</td>
<td>Intervention</td>
<td>Data Collection</td>
<td>Findings</td>
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<tr>
<td>Lauhey &amp; Heflin (2000)</td>
<td>5 M ASD 5 M ASD</td>
<td>Multiple baseline reversal across Participants AABAB</td>
<td>Asking for an object Appropriately getting the attention Waiting for a turn Looking at the speaker</td>
<td>Entire class Buddy Skills Training Script All students trained to stay, play, and talk to a buddy by prompting them to initiate</td>
<td>4 weeks of baseline 10 minutes every 10 days 4 weeks buddy system 4 weeks of baseline 4 weeks buddy system</td>
<td>Buddy program elicited more appropriate social skills than passive proximity</td>
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<tr>
<td>Lee et al. (2007)</td>
<td>8 M ASD MO/SID 7 M ASD SID 9 M ASD MO/SID</td>
<td>Multiple baseline across participants and settings</td>
<td>Increased engagement in peer interaction Decrease in stereotypic behavior</td>
<td>12 peers 6 PMs were trained 6 were included generalization</td>
<td>Five 20-min sessions Four social skills concepts (i.e., sharing, suggesting play ideas, assisting, and being affectionate).</td>
<td>Five-minute samples of the behavior of the participants Structured play and free-play/ Increase of social interactions and a decrease of stereotypic behaviors in all three participants</td>
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<tr>
<td>Mundschenk &amp; Sasso (1995)</td>
<td>7 M ASD 10 F ASD</td>
<td>Multiple baseline across participants</td>
<td>Peer initiations and responses</td>
<td>15 2nd, 3rd, and 4th grade peers</td>
<td>30 min training sessions examples of appropriate interactive behavior instructed on how to model, administer prompts, and offer reinforcement</td>
<td>Reciprocal interactions occur with greater frequency when multiple peer initiators are present</td>
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<tr>
<td>Owen-DeSchryver et al. (2008)</td>
<td>7 M ASD 10 M AS 7 M ASD</td>
<td>Multiple baseline across participants</td>
<td>Increased social interactions</td>
<td>2-4 per student</td>
<td>Three sessions 30 to 45 min - 1. developing friendships w/SWD 2. Strengths and weaknesses 3. Initiating and maintaining conversation</td>
<td>6 months Baseline 3-6 weeks Training 2 weeks Data Collection 14 weeks Increased initiations by trained peers and increased initiations and responses by students with ASD.</td>
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<tr>
<td>Sasso et al. (1998) Study 1</td>
<td>10 M ASD/ MOID 9 M ASD/ MOID 10 M ASD/ MOID</td>
<td>Multiple baseline across participants Sequential alternating treatments design</td>
<td>Initiating and responding while playing a game</td>
<td>3 F and 3 M 4th graders</td>
<td>1 hour First group - cooperative play Second group - Tutoring using modeling, reinforcement, and prompting</td>
<td>5 days a week over 10 weeks during free play time 20 sessions Dyads increased more than the triad groups Cooperative increased more than the tutoring groups</td>
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<tr>
<td>Sasso et al. (1998) Study 2</td>
<td>10 M ASD/ MOID 10 M ASD/ MOID 10 F MOID</td>
<td>Multiple baseline across participants Alternating treatments</td>
<td>Initiating and responding while playing a game</td>
<td>6-4th grade students 3 high socially and 3 low socially</td>
<td>1 hour Cooperative play</td>
<td>5 days a week over 12 weeks during free play time 20 minute play sessions There was a slight increase when working with the higher students.</td>
<td></td>
</tr>
</tbody>
</table>

**Table 3**

*Mixed Reality Simulation Studies*
References


All 4 students showed an increase in skill level.


& Other Developmental Disabilities, 17(4), 198.


Humphrey, N., & Symes, W. (2010). Responses to bullying and the use of social support among


McClannahan, L. E., & Krantz, P. J. (1999). Activity schedules for children with autism:


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