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## The Relationship Between Social Cognition and Social Behavior of Young Adults with Autism Spectrum Disorder Using the UCLA PEERS® for Young Adults Social Skill Program

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**THE RELATIONSHIP BETWEEN SOCIAL COGNITION AND SOCIAL BEHAVIOR  
OF YOUNG ADULTS WITH AUTISM SPECTRUM DISORDER USING THE UCLA  
PEERS® FOR YOUNG ADULTS SOCIAL SKILL PROGRAM**

By

Meaghan Balsdon

B.A.Sc. McMaster University, 2020

M.A. University of Maine, 2023

A THESIS

Submitted in Partial Fulfillment of the

Requirements for the Degree of

Master of Arts

(in Communication Sciences and Disorders)

The Graduate School

The University of Maine

May 2023

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OF YOUNG ADULTS WITH AUTISM SPECTRUM DISORDER USING THE UCLA  
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By Meaghan Balsdon

Thesis Advisors: Dr. Jane Puhlman & Dr. Sarah Howorth

An Abstract of the Thesis Presented  
in Partial Fulfillment of the Requirements for the  
Degree of Master of Arts  
(In Communication Sciences and Disorders)  
May 2023

Research indicates that social communication impairments are a defining and persistent feature of Autism Spectrum Disorder (ASD; Centers for Disease Control and Prevention, 2022). Social communication consists of what an individual knows about social skills (i.e., social cognition) and how they observably respond in social situations (i.e., social behavior). It is difficult to gain a comprehensive assessment of social communication because social cognition assessments are prone to inaccuracies due to poor metacognitive skills in individuals with ASD (DeBrabander et al., 2021; Cederlund et al., 2010; Vickerstaff et al., 2006). Inaccurate reporting of social cognition leads to potential discrepancies in observable social behavior (Vickerstaff et al., 2006; White et al., 2015). Thus, the relationship between social cognition and observable social behavior is not well understood (White et al., 2015).

This within-subjects research design study aims to investigate the relationship between social cognition and social behavior in young adults with ASD and to test the effectiveness of the PEERS® for Young Adults social skill program in improving social cognition and social

behavior. Four participants with ASD – Level 1 (ages 18-25 years) completed the Test of Young Adult Social Skill Knowledge (TYASSK; Laugeson, 2017) and the Contextual Assessment of Social Skills (CASS; Ratto et al., 2011) before and after the completion of PEERS® for Young Adults. Results revealed that young adults demonstrated improvement in social skill knowledge but no significant improvement in social behavior after the completion of PEERS® for Young Adults. The improvement in social cognition from pre-intervention to post-intervention was approaching significance. Results also indicated that young adults' introspection of rapport and involvement in social scenarios was inaccurate. Results support the effectiveness of PEERS® for Young Adults in improving participants' social cognition but not in improving their observable social behavior. Thus, the skills learned in PEERS® for Young Adults did not generalize and improve participants' overall social communication. Limitations of this study include a small sample size, lack of maintenance measurements, and a discrepancy between specificity of research measures. Suggestions for future research include assessing the effectiveness of social communication interventions by utilizing general social cognition and behavior assessments that are not specific to the intervention. Clinical implications include ways to improve the generalizability of social communication interventions.

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## **LIST OF ABBREVIATIONS**

ASD	Autism Spectrum Disorder
DSM-IV	Diagnostic Statistical Manual - Fourth Edition
DSM-V	Diagnostic Statistical Manual - Fifth Edition
PEERS®	Program for Education and Enrichment of Relational Skills
TYASSK	Test of Young Adult Social Skill Knowledge
CASS	Contextual Assessment of Social Skills

# CHAPTER 1

## INTRODUCTION

### 1.1. ASD Diagnostic Criteria

Autism Spectrum Disorder (ASD) is a developmental disorder that is characterized by deficits in social communication along with restricted and repetitive behaviors and interests (Centers for Disease Control and Prevention, 2022). Deficits in social communication include difficulties with social-emotional reciprocity (i.e., limited back and forth information sharing), nonverbal communication behaviors (e.g., eye contact), and developing, maintaining, and understanding relationships (Centers for Disease Control and Prevention, 2022). Restricted and repetitive behaviors and interests can include stereotypical motor movements (e.g., repetitive lining up of toys), insistence of sameness (e.g., eating the same food every morning), fixated interests or preoccupation with specific objects (e.g., switching lights on and off), and hyper-reactivity or hypo-reactivity to sensory input (Centers for Disease Control and Prevention, 2022). Aside from social and behavioral differences, there are no other physical or observable characteristics that set individuals with ASD apart from others. It is a spectrum disorder meaning that each person that is diagnosed with ASD presents differently.

The Diagnostic and Statistical Manual of Mental Disorders - Fifth Edition (DSM-V) uses a severity rating to classify the impairment of ASD symptoms on social communication and behaviors (American Psychiatric Association, 2013; Hyman et al., 2020; Murphy et al., 2016). ASD - Level 1 is classified as requiring support in social communication and restricted and repetitive behaviors and interests (American Psychiatric Association, 2013; Hyman et al., 2020; Murphy et al., 2016). ASD - Level 1 is formerly known as high functioning autism. ASD - Level 2 is classified as requiring substantial support and ASD - Level 3 is classified as requiring very

substantial support (American Psychiatric Association, 2013; Hyman et al., 2020; Murphy et al., 2016).

## **1.2. Prevalence of ASD**

In the 1960's and 1970's, the United States and Europe reported ASD prevalence rates of two to four children per 10,000 children (Boat et al., 2015). During this time, people believed that ASD was a rare childhood disorder, not a lifelong disorder. Currently, the Centers for Disease Control and Prevention (CDC) estimates that one in 36 children are diagnosed with ASD each year in the United States (Centers for Disease Control and Prevention, 2023).

The diagnostic criteria for ASD has changed significantly from the DSM-IV published in 1994, to the current DSM-V published in 2013. In the DSM-IV, Autistic Disorder (i.e., currently referred to as ASD) was included under the umbrella of Pervasive Developmental Disorders along with Asperger's Syndrome, Pervasive Developmental Disorder-Not Otherwise Specified, Rett's Disorder, and Childhood Disintegrative Disorder (Murphy et al., 2016; Sharma et al., 2018). All of these disorders were characterized by deficits in social interaction, communication, and restricted and repetitive behaviors and interests (Murphy et al., 2016; Sharma et al., 2018). To receive a diagnosis of Autistic Disorder under the DSM-IV, an individual had to demonstrate at least six to 12 deficits in social interaction, communication, and restricted and repetitive behaviors and interests (Murphy et al., 2016; Sharma et al., 2018). With this classification system, there was a wide variety of symptom severity that made it difficult to differentially diagnose the disorders resulting in lower Autistic Disorder diagnoses (Sharma et al., 2018). The DSM-V further refined these disorders to exist as separate diagnoses under the category of Autism Spectrum Disorder (Sharma et al., 2018). As a result, the diagnostic criteria changed so that individuals had to demonstrate at least three deficits in social communication and at least

two deficits in restricted and repetitive behaviors and interests to receive a diagnosis of ASD (Sharma et al., 2018). The expansion of the diagnostic criteria for ASD in the DSM-V is thought to contribute to the dramatic increase in ASD diagnoses and prevalence (Boat et al., 2015; Murphy et al., 2016; Sharma et al., 2018; Watkins & Angus-Leppan, 2022).

Currently, the CDC reports that 2.2% of adults aged 18 and older in the United States have ASD (Centers for Disease Control and Prevention, 2020). While this percentage seems low, many of the children diagnosed with ASD under the DSM-V have either yet to enter adulthood or have just recently entered adulthood. The current prevalence of adults with ASD mostly reflects the diagnostic criteria in the DSM-IV, not the expanded diagnostic criteria in the DSM-V. Therefore, the recent wave of children diagnosed with ASD under the DSM-V will lead to an increased prevalence of adults with ASD in the near future (Murphy et al., 2016).

### **1.3. Social Communication**

To better understand the degree to which the characteristics of ASD affect adulthood, it is critical to understand social communication as it is one of the most salient characteristics in individuals with ASD. Recent research suggests that social impairments are the most stable ASD symptom in children and adults (Barendse et al., 2018; Shattuck et al., 2007). Social communication impairments tend to follow individuals throughout their lifespan. Thus, it is said that social impairments are the most fundamental and persistent symptom of ASD (Barendse et al., 2018; Church et al., 2000; Laugeson et al., 2015; Shattuck et al., 2007).

The American Speech Language and Hearing Association defines social communication as “how and why we use language to interact with other people” (Social Communication, n.d.). It involves using language for a variety of purposes (e.g., greeting, informing, requesting), tailoring language to the listener or situation (e.g., providing more information to someone who is not

familiar with the topic versus omitting basic details with someone who is already familiar with the topic), and following social rules in conversations (e.g., turn taking, staying on topic, use of appropriate facial expressions). As expected, social communication varies across people and contexts resulting in a wide range of norms. Despite the wide range of norms, people quickly make judgements about an individual's social competence based on whether their social communication falls within those acceptable norms (Crooke et al., 2016). Individuals with ASD are often considered socially incompetent due to their marked social communication deficits (Crooke et al., 2016; Howorth et al., 2023; Laugeson et al., 2015).

#### **1.4. Social Communication Deficits in ASD**

Individuals with ASD typically have continuous difficulties with the use of verbal and non-verbal language for social uses (Crooke et al., 2016; Laugeson et al., 2015). Their atypical social communication is characterized by few conversational initiations, perseveration on specific themes, providing fewer reciprocal responses, providing less elaborate responses, providing irrelevant information during responses, and making unexpected leaps in topics during conversation (Church et al., 2000; Crooke et al., 2016; Hemphill & Siperstein, 1990; Koning & Magill-Evans, 2001; Orsmond et al., 2004). It is for these reasons that conversations with individuals with ASD are often described as one-sided (Orsmond et al., 2004). Social communication deficits are also evident in non-verbal communication. Individuals with ASD have difficulty interpreting cues such as sarcasm, tone of voice, eye gaze, gestures, and personal space (Koning & Magill-Evans, 2001).

#### **1.5. Social Cognition**

At the root of social communication is social cognition (Espelöer et al., 2021). Social cognition is the way people store and use information in social contexts to explain others social

behavior and to guide their own social behavior (Bulgarelli & Molina, 2016). It is believed to be the fundamental process for effective social functioning (Baron-Cohen, 2000; Baksh et al., 2021; Sasson et al., 2019; Velikonja et al., 2019). In daily social situations, neurotypical individuals simultaneously utilize various cognitive skills to recognize, understand, and predict other people's mental states and behavior (Baksh et al., 2021). Adequate cognitive skills are required to understand social norms (Baksh et al., 2021). In other words, our knowledge about social rules and norms guides our social communication skills. Based on this knowledge, individuals engage in either appropriate or inappropriate social communication. For example, if an individual has a poor understanding of social norms, then they are likely to engage in social communication that violates these norms. On the other hand, if an individual has a good understanding of social norms, then they are likely to engage in social communication that is consistent with those norms (Baksh et al., 2021).

Theory of mind is arguably one of the most important aspects of social cognition (Bishop-Fitzpatrick et al., 2017). Theory of mind is the ability to assign mental states such as thoughts, beliefs, and desires to ourselves and other people (Baksh et al., 2021; Bishop-Fitzpatrick et al., 2017). It is used to understand and predict others' behaviors. Research suggests that individuals with ASD have difficulty in social situations due to an underdeveloped theory of mind (Baron-Cohen, 2000; Baksh et al., 2021; Bishop-Fitzpatrick et al., 2017; Sasson et al., 2019; Senju, 2013; Velikonja et al., 2019). This leads to their having difficulties understanding that other people have different feelings, thoughts, and opinions than their own (Baron-Cohen, 2000; Baksh et al., 2021; Bishop-Fitzpatrick et al., 2017; Sasson et al., 2019; Velikonja et al., 2019). Individuals with ASD demonstrate difficulty determining others' intentions, understanding how their behavior affects others, and engaging in social reciprocity.

These difficulties perpetuate inappropriate social communication (Baksh et al., 2021; Bishop-Fitzpatrick et al., 2017; Sasson et al., 2019; Velikonja et al., 2019).

### **1.6. Factors Contributing to Social Communication Deficits**

The social communication deficits described above are further exacerbated by poor social awareness in individuals with ASD (Church et al., 2000). Individuals on the spectrum have difficulties accurately interpreting social cues and understanding the consequences of their inappropriate social communication (Church et al., 2000). Even after negative feedback, individuals with ASD typically do not understand where they went wrong during the social interaction and/or the consequences of their inappropriate social communication (Church et al., 2000). Their poor self-awareness makes it difficult for them to reflect on their social communication and accurately adapt it to suit the communication context and their communication partner (Church et al., 2000). Poor self-awareness is demonstrated in research that compares self-reported, parent-reported, and teacher-reported ratings of social competence. In these studies, individuals with ASD perceive their social competence as higher than it really is and higher than how others would report it to be (Cederlund et al., 2010; Vickerstaff et al., 2006; Koning & Magill-Evans, 2001). This suggests that individuals with ASD inaccurately interpret social cues leading to misperceptions of their social success. This enables inappropriate social communication. One can assume that poor social communication in individuals with ASD is unlikely to change until their social awareness and self-reflection skills improve.

Poor social motivation is another factor that perpetuates inappropriate social communication in individuals with ASD (Chevallier et al., 2012; Itskovich et al., 2021). Social motivation can be thought of as the desire to initiate, maintain, and enhance social relationships (Chevallier et al., 2012). To a degree, all neurotypical individuals orient themselves toward

social situations, seek out social situations, find social situations rewarding, and have a desire to maintain social relationships (Chevallier et al., 2012). Evidence indicates that individuals with ASD have limited social motivation in that the processes of social orienting, social seeking, social rewarding, and social maintaining are all disrupted (Chevallier et al., 2012). Individuals with ASD initiate few social interactions and have low engagement and involvement in social activities (Church et al., 2000; Orsmond et al., 2004). Poor social motivation creates limited opportunities to initiate and participate in social interactions, as well as practice learned social skills. As expected, the lack of motivation to seek out social interactions contributes to poor social communication in individuals on the spectrum.

### **1.7. Consequences of Social Communication Deficits**

As humans, we have a natural tendency to be social (Fiske, 2018). Our capacity for language allows us to express ourselves and form interpersonal relationships. Although individuals with ASD have poor social motivation, they still have a desire for social closeness (Church et al., 2000; Deckers et al., 2014; Orsmond et al., 2004). The challenge is that as we age, society places a greater emphasis on appropriate social communication (Barendse et al., 2018). For individuals with ASD, their social communication deficits become more noticeable and restrictive (Barendse et al., 2018). Young adults with ASD report that their social skill deficits become their primary area of difficulty and concern (Church et al., 2000).

Many individuals with ASD - Level 1 do not attend post-secondary school despite having the intellectual capability to succeed (Alverson et al., 2019; Howorth et al., 2023; White et al., 2016). Of those who attend post-secondary school, approximately 41% graduate (White et al., 2016). The low post-secondary attainment and graduation rates of individuals with ASD - Level 1 are attributed to their social communication deficits, not intellectual deficits (Alverson et al.,

2019; White et al., 2016). The lack of post-secondary education results in high underemployment and unemployment rates among adults on the spectrum (Elias & White, 2018; Shattuck et al., 2012; White et al., 2016; Whittenburg et al., 2019). When adults with ASD - Level 1 are employed, they often receive a reduced pay rate compared to adults not on the spectrum (Elias & White, 2018; White et al., 2016). Due to these challenges, they have limited opportunities to live independently and often remain dependent on their caregivers throughout adulthood (Shattuck et al., 2012).

Adults with ASD face various social consequences (Bauminger & Kasari, 2000). They tend to experience more peer rejection, have poorer friendship quality, have few close and meaningful friendships, and have few romantic relationships (Bauminger & Kasari, 2000; Church et al., 2000; Orsmond et al., 2004). Psychological comorbidities such as anxiety, loneliness, depression, and isolation may be present when educational, vocational, and social consequences unite (Bauminger & Kasari, 2000; Church et al., 2000; DiTommaso & Spinner, 1993; Orsmond et al., 2004). It is evident that poor social communication has grave ramifications in all aspects of life.

### **1.8. Challenges in Assessment of Social Cognition**

Overall, it is clear that social communication deficits pose significant challenges to an individual's quality of life. Thus, it is of great importance to study social cognition so clinicians can better understand social communication deficits and better tailor interventions to address those deficits. Overall, there is a significant lack of research regarding social cognition in adults with ASD - Level 1 (Velikonja et al., 2019). This is surprising given the common agreement among researchers that social skill impairments are driven by poor social cognition (Church et al., 2000; Velikonja et al., 2019; Sasson et al., 2019). Current research regarding social cognition

in individuals with ASD is mostly addressed in the domains of theory of mind and executive functioning (Velikonja et al., 2019). Current research often examines a sole domain of social cognition in a specific task such as false belief tasks (Velikonja et al., 2019; Sasson et al., 2019). This type of research does not provide information on how their social cognition deficits impact their observable social communication (Sasson et al., 2019).

Additionally, researchers typically examine social cognition via self-reported assessments. Yet, research has demonstrated that self-reported assessments may not provide an accurate representation of social cognition because they require strong metacognitive skills on the part of the responder (DeBrabander et al., 2021; Cederlund et al., 2010; Vickerstaff et al., 2006). Strong metacognitive skills allow individuals to accurately reflect and report on what they know and what they do not know (Garfinkel et al., 2016). It is assumed that strong metacognitive skills lead to a reliable and accurate measure of social cognitive skills. Prior research has demonstrated that individuals with ASD lack accurate introspection and self-awareness abilities (Vickerstaff et al., 2006; White et al., 2015). As discussed previously, individuals with ASD rate their social competence much higher than their parents and teachers do (Cederlund et al., 2010; Vickerstaff et al., 2006). It can be concluded that self-reported social cognition assessments do not accurately reflect an individual's social cognitive skills. This makes it difficult to predict overall social communication based on self-report measures.

### **1.9. Role of Behavioral Observation in Assessing Social Communication**

Arguably, behavioral observation assessments provide more reliable and realistic information about individuals' social behavior than self-reported assessments because they are not as prone to respondent bias (Ratto et al., 2011; White et al., 2015). Behavioral observation assessments are also useful for determining if skills taught in intervention programs generalize to

natural social interactions (White et al., 2015). Combining social cognition assessments with behavioral observation assessments has the potential to produce a comprehensive understanding of the relationship between social cognition and social behavior.

### **1.10. Current Study**

This study was completed within the context of the Program for the Education and Enrichment of Relational Skills (PEERS®) for Young Adults. PEERS® for Young Adults was developed by Dr. Elizabeth Laugeson, Psy.D. It is the only evidence-based social skill intervention for young adults with ASD - Level 1 (Laugeson, 2017). The efficacy and effectiveness of PEERS® for Young Adults has been verified through the completion of numerous studies done within and outside of the United States (Laugeson, 2017). PEERS® for Young Adults has led to a significant reduction in anxiety and loneliness along with a significant improvement in social skill knowledge, overall social skills, frequency of social interactions, social responsiveness, and empathy in adults with ASD - Level 1 (Gantman et al., 2012; Laugeson et al., 2015; McVey et al., 2016). These findings have been corroborated by studies completed in countries outside of the United States such as Taiwan and Korea (Chien et al., 2021; Oh et al., 2021). The positive outcomes of PEERS® for Young Adults have been validated by young adults' caregivers and maintained 16 weeks post intervention (Gantman et al., 2012; Laugeson et al., 2015).

This study seeks to investigate the relationship between social cognition and social behavior in young adults with ASD – Level 1 and to test the effectiveness of the PEERS® for Young Adults social skill program in improving participants' social cognition and social behavior. Results of this study may enhance researchers, clinicians, and educators' understanding of social communication deficits in young adults with ASD - Level 1. Results may also provide

guidance on how clinicians can create more focused social skill intervention programs that better address deficits in social communication.

### **1.11. Research Questions**

1. What is the effectiveness of PEERS® for Young Adults in improving social cognition and social behavior in young adults with ASD - Level 1?
2. What is the effectiveness of self-reported social cognition assessments in predicting social behavior?
3. What is the relationship between social cognition and social behavior in young adults with ASD - Level 1?

## **CHAPTER 2**

### **METHODS**

#### **2.1. Inclusion and Exclusion Criteria**

Inclusion criteria for the current study were that participants were between the ages of 18 and 25 years of age and were participating in the PEERS® for Young Adults social skill program at the University of Maine in Orono. To participate in PEERS® for Young Adults, participants must have reported social problems (i.e., difficulty making friends, being teased), been diagnosed with a developmental disability, were fluent in English, were willing to be video/audio recorded, and willing to participate in 13 out of 16 sessions. Exclusion criteria for the current study was an inability to complete PEERS® for Young Adults or a removal from the program by the certified providers due to behavioral issues. Participants were deemed ineligible to participate in PEERS® for Young Adults if they disclosed a major mental illness (i.e., schizophrenia, bipolar disorder), had a medical condition that prevented participation in the program (i.e., severe depression, severe anxiety), a receptive language IQ below 70, an expressive language IQ below 50, and current severe behavioral issues.

#### **2.2. Participants**

Four young adults participated in the current study. All participants were recruited from the Program for Education and Enrichment of Relational Skills (PEERS®) lab at the University of Maine, Orono campus. All participants were between the ages of 18 and 25 years and identified as male. Two participants were 18 years of age, one participant was 21 years of age, and one participant was 24 years of age (mean age = 20 years). Three participants identified as White and one participant was of Puerto Rican descent and identified as Latino. One participant attended a post-secondary institution, two participants were employed, and one was neither a

student nor employed. The attrition rate for this study was 43% resulting in three participants that discontinued the program. Reasons for discontinuation included a mental health crisis, family emergency, and poor behavior management and motivation.

## **2.3. Measures**

### **2.3.1. Test of Young Adult Social Skills Knowledge (TYASSK)**

The Test of Young Adult Social Skills Knowledge (TYASSK, Laugeson, 2017) is a 30-item criterion-based measure based on the Test of Adolescent Social Skill Knowledge. Its purpose is to assess young adults' knowledge of social skills. Items tested in the TYASSK are derived from the social skill lessons taught in PEERS® for Young Adults and can be grouped into the following social skill categories: conversational skills (four test items), sources of friends (two test items), electronic communication (two test items), humor (two test items), peer entry (two test items), peer exiting (two test items), get-togethers (two test items), dating etiquette (eight test items), conflict resolution (two test items), peer rejection (four test items). A score is obtained by selecting the correct response to a question. Scores range from 0 to 30, with higher scores indicating greater knowledge of adult social skills.

Reliability and validity assessments were conducted on the Test of Adolescent Social Skill Knowledge. The coefficient alpha of the Test of Adolescent Social Skill Knowledge was determined to be 0.56 indicating a moderate level of internal consistency, which is acceptable given the large variety of questions on the assessment (Laugeson, 2017). Since the TYASSK is a modified version of the Test of Adolescent Social Skill Knowledge, the reliability and validity measures remain the same for the TYASSK (Laugeson, 2017). Therefore, the TYASSK was chosen as a research measure because its

strong psychometric properties indicate its potential to assess social skill knowledge in young adults with ASD - Level 1.

Pre-intervention and post-intervention TYASSK raw scores were compared to assess treatment gains. A Wilcoxon signed rank test was conducted to determine the statistical significance of results. This test was chosen because of the small sample size.

### **2.3.2. Contextual Assessment of Social Skills (CASS)**

The Contextual Assessment of Social Skills (CASS; Ratto et al., 2011) is an observational measure designed to assess social skills in young adults with ASD. Young adults engage in two 3-minute role play conversations with confederates. In one role play, a confederate acts as if they are interested in the conversation. In the second role play, a different confederate acts as if they are bored in the conversation. Before beginning each role play, the primary investigator reads the following script to the participant and the confederate:

“Thank you both so much for coming in. Right now we’d like for each of you to act as if you had recently joined a new club or social group, and now you’re sitting next to each other, waiting for the first meeting of this new club or group to start. You will have 3 minutes to talk to each, and then I will come back in the room.” (Ratto et al., 2011, p. 1279)

The primary investigator exits the room after reading the script to the participant and confederate. After three minutes elapses, the primary investigator re-enters the room and instructs the confederate to exit the room. Then, the primary investigator instructs the participant to rate the confederate’s perceived level of involvement in the conversation

and the overall quality of rapport. This procedure is repeated for both role play conditions.

The young adult's conversational skills are assessed across various domains: Asking Questions, Topic Changes, Vocal Expressiveness, Gestures, Positive Affect, Kinesic Arousal, Social Anxiety, Overall Involvement, and Overall Quality of Rapport. Role plays are recorded via zoom and recordings are used to code the participants observable behaviors across the domains. Asking Questions and Topic Changes are scored by behavioral counts, while the remainder of the domains are scored according to a 7-item Likert scale. A score of 1 indicates a low/impaired performance. A score of 7 indicates a high/skilled performance.

Ratto and colleagues (2011) assessed the inter-rater reliability of the CASS by calculating the intraclass correlation coefficient (ICC) for each of the nine domains separately. The mean value of the ICC was 0.68 indicating moderate reliability (Ratto et al., 2011). ICC was also calculated on the CASS primary domains (Asking Questions, Topic Changes, Overall Involvement, Overall Quality of Rapport). The ICC for the CASS primary domains was 0.81 indicating good reliability (Ratto et al., 2011). To assess for validity, Ratto and colleagues (2011) calculated a CASS total change score. The CASS total change score was calculated by subtracting the total score of the primary domains in condition A (i.e., interested role play) from the total score of the primary domains in condition B (i.e., bored role play). A higher change in CASS total scores represented typical social adaptation (Ratto et al., 2011). CASS total change scores were significantly associated with verbal IQ and theory of mind (Ratto et al., 2011). It was not significantly correlated with performance IQ (Ratto et al., 2011). The CASS total change

scores demonstrated predictive validity as they significantly predicted the presence of ASD (Ratto et al., 2011). The psychometric assessments indicate that the CASS is reliable and valid as a social impairment assessment (Ratto et al., 2011). Therefore, the CASS was chosen as a research measure because its strong psychometric properties indicate its potential to assess social impairment in individuals with ASD - Level 1.

Pre-intervention and post-intervention CASS raw scores were compared to assess treatment gains. As described by Ratto and colleagues (2011), each item within a domain was converted to a z-score so the results across domains could be compared. An increase in the primary domains (Asking Questions, Topic Changes, Overall Involvement, Overall Quality of Rapport) indicates normative social adaptation. The primary domain scores were summed to create a CASS total score for each condition. An increase in the CASS total score was also indicative of normative social adaptation. Quality of Rapport was reverse scored in the bored condition because reporting a lower quality of rapport is normative and indicates greater social skill. A CASS total change score was calculated by subtracting the CASS total score on the interested condition from the CASS total score on the bored condition. Again, an increase in CASS total change scores were indicative of greater normative social adaptation. CASS total scores and CASS total change scores were compared at pre-intervention and post-intervention. A Wilcoxon signed rank test was conducted to determine the statistical significance of results. This test was chosen because of the small sample size.

#### **2.4. PEERS® for Young Adults Intervention**

PEERS® for Young Adults is an evidence-based social skill intervention for adults 18 to 30 years of age (Laugeson, 2017). PEERS® discusses ecologically valid social skills meaning

that the social skills taught are skills that are used by socially successful individuals. Young adults participating in PEERS® for Young Adults learn about developing and maintaining friendships, conversational skills, entering and exiting conversations, appropriate use of humor, electronic communication, dating skills, organizing get-togethers, handling direct and indirect bullying, handling disagreements, and handling dating pressure. Inclusion of young adult social coaches supports the generalization of learned social skills. Social coaches can be young adults' parents, siblings, friends, partners, or mentors. Social coaches learn how to assist their young adult in social situations outside of PEERS® for Young Adults. The young adults and social coaches learn skills in separate but co-occurring groups that meet weekly for 90 minutes. The young adult group begins with a 30 minute review of the homework assigned the previous week. Homework assignments include opportunities to practice the learned skills (e.g., practice starting and ending phone calls, practice joining conversations, etc.). Next, young adults are taught social skills for 45 minutes through didactic lessons, role-play demonstrations, and behavioral rehearsals. Young adults and social coaches are reunited in the last 15 minutes to discuss homework tasks for the upcoming week.

## **2.5. Procedures**

### **2.5.1 Data Collection**

Permission for the current study, IRB# 2022-03-17, was given by the University of Maine Institutional Review Board for the Protection of Human Subjects (IRB). The study was completed in the context of the PEERS® for Young Adults program and in a within-subjects research design.

After inclusion criteria were met and written consent to participate was obtained, participants were scheduled for an individual in-person baseline assessment before the

PEERS® for Young Adults intervention began. At this intake meeting, participants completed a paper copy of the Test of Young Adult Social Skills Knowledge (TYASSK; Laugeson, 2017) and the Contextual Assessment of Social Skills (CASS; Ratto et al., 2011). The pre-intervention assessments were administered by the primary investigator to obtain baseline data on the participants social cognition and social behavior.

After completion of the pre-intervention assessments, participants participated in the PEERS® for Young Adults intervention once a week for 11 weeks. The young adult group was facilitated by the primary investigator and a co-investigator at the University of Maine. The social coach group was facilitated by Sarah Howorth, Ph.D, BCBA-D. After completion of the PEERS® for Young Adults intervention, participants completed the TYASSK and CASS research measures a second time. This occurred immediately after the last PEERS® session. The research measures were administered post-intervention to compare their results to their pre-intervention results and to obtain information about the effectiveness of PEERS® for Young Adults in improving social cognition and social behavior.

### **2.5.2. Quality of Measurements**

In pre-intervention and post-intervention administrations, the TYASSK was administered by the primary investigator. Participants were told that it was a questionnaire to see what they know about social skills. The TYASSK was scored by a co-researcher and verified by the primary investigator.

The CASS was administered by the primary investigator at pre-intervention and post-intervention. During the CASS administrations, the participants were told that they were participating in a role play conversation. Participants were not informed of the

different role play conditions to prevent participant bias. To avoid researcher bias, the CASS was coded by two independent coders unfamiliar with the task. Two unfamiliar coders were used to ensure reliability of scoring. Unfamiliar coders were undergraduate students in the Communication Sciences and Disorders undergraduate program. To train the unfamiliar coders, the primary investigator created a simplified version of the CASS training manual. The coders were instructed to review the training manual independently prior to attending a live zoom training session hosted by the primary investigator. During the live training session, the primary investigator explained the general scoring procedures of the CASS (i.e., what domains to score first), defined the domains and its parameters (i.e., what counts as gestures), and explained how to score domains according to behavioral counts and the 7-item Likert scales specific to each domain. The unfamiliar coders were instructed not to discuss the role plays and their assigned scores with each other. Agreement between raters occurred when they assigned the same score to a CASS domain or were within 1 point from each other. If the coders reported different scores, the primary investigator watched the role play and assigned the final score. Interrater agreement was 67%, indicating substantial agreement. Scoring was conducted in this manner to avoid researcher bias since the primary investigator implemented the intervention and formed professional relationships with the participants.

## CHAPTER 3

### RESULTS

The data reported in this study reflects the individuals who completed the PEERS® for Young Adults intervention. Data collected from individuals who discontinued the program was destroyed immediately and is not reported in this study. In addition, maintenance measures were not conducted due to low participant participation eight weeks after the intervention.

#### 3.1. TYASSK Results

To measure the effectiveness of PEERS® for Young Adults in improving social cognition, the difference in pre-intervention and post-intervention TYASSK scores were examined. Results were analyzed using SPSS. Table 1 presents the pre-intervention (i.e., T1) and post-intervention (i.e., T2) data including mean raw scores, range, and standard deviation. The average pre-intervention raw score was 14.25 (range = 12-18, SD = 2.63). The average post-intervention raw score was 22.25 (range 20-24, SD = 1.71). This indicates an increase in social cognition of 8 points.

**Table 1**

*TYASSK Descriptive Statistics*

Timepoint	Number of Participants	Minimum	Maximum	Mean	Standard Deviation
T1	4	12	18	14.25	2.63
T2	4	20	24	22.25	1.71

Table 2 and Figure 1 presents the participants' individual raw scores at pre-intervention (i.e., T1) and post-intervention (i.e., T2). Participant 1 obtained a raw score of 12 at T1 and 24 at T2, indicating a difference score of 12. Participant 2 obtained a raw score of 14 at T1 and 20 at T2, indicating a difference score of 6. Participant 3 obtained a raw score of 13 at T1 and 22 at

T2, indicating a difference score of 9. Participant 4 obtained a raw score of 18 at T1 and 23 at T2, indicating a difference score of 5.

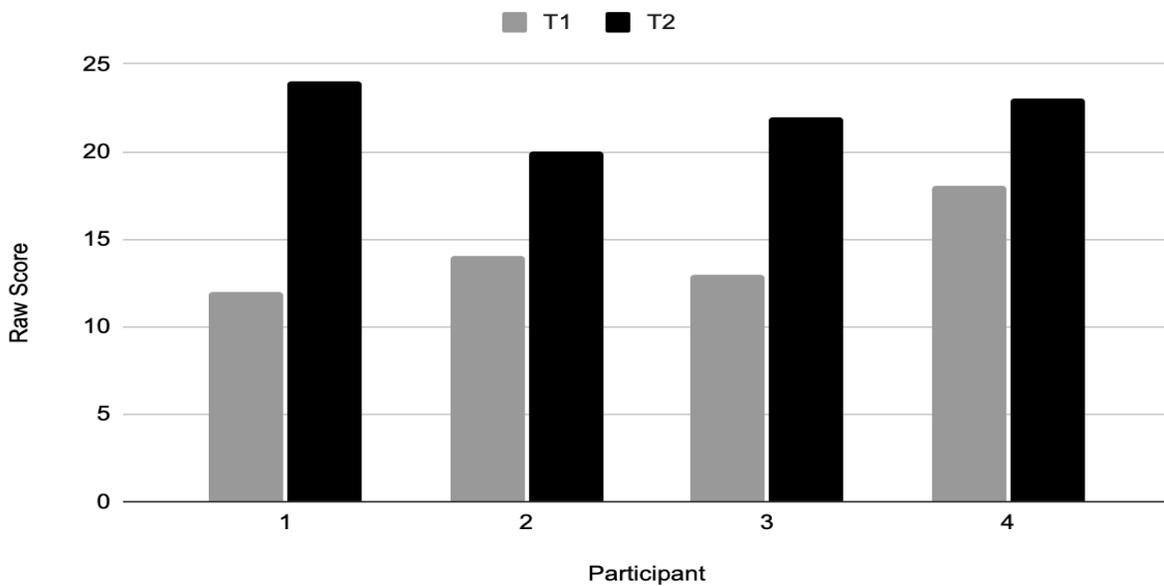
**Table 2**

*TYASSK Raw Scores*

Participant	T1	T2
1	12	24
2	14	20
3	13	22
4	18	23

**Figure 1**

*TYASSK Raw Scores*



Results of a Wilcoxon signed-rank test showed nonsignificant gains in social cognition from pre-intervention to post-intervention ( $Z = -1.83, p = 0.07$ ). However, it is important to note that these results are approaching significance.

### 3.2. CASS Results

To measure the effectiveness of PEERS® for Young Adults in improving social behavior, the difference in pre-intervention and post-intervention CASS scores were examined. Table 3, Figure 2, and Figure 3 presents the pre-intervention and post-intervention CASS raw scores for each domain reported as means. Scores for Asking Questions and Topic Changes are reported as behavioral counts. Scores for Vocal Expressiveness, Gestures, Positive Affect, Kinesic Arousal, Social Anxiety, Overall Involvement, and Overall Quality of Rapport are reported on a 7-item Likert scale. Mean raw scores on Asking Questions, Vocal Expressiveness, Gestures, and Kinesic Arousal increased in the interested condition between T1 and T2. Mean raw scores on Topic Changes, Positive Affect, Social Anxiety, and Overall Involvement, and Overall Quality of Rapport decreased in the interested condition between T1 and T2. Mean raw scores on Gestures, Positive Affect, Kinesic Arousal, and Overall Quality of Rapport increased in the bored condition between T1 and T2. Mean raw scores on Asking Questions, Topic Changes, Vocal Expressiveness, and Overall Involvement decreased in the bored condition between T1 and T2. Mean raw scores on Social Anxiety remained the same in the bored condition between T1 and T2.

**Table 3**

*Mean CASS Raw Scores*

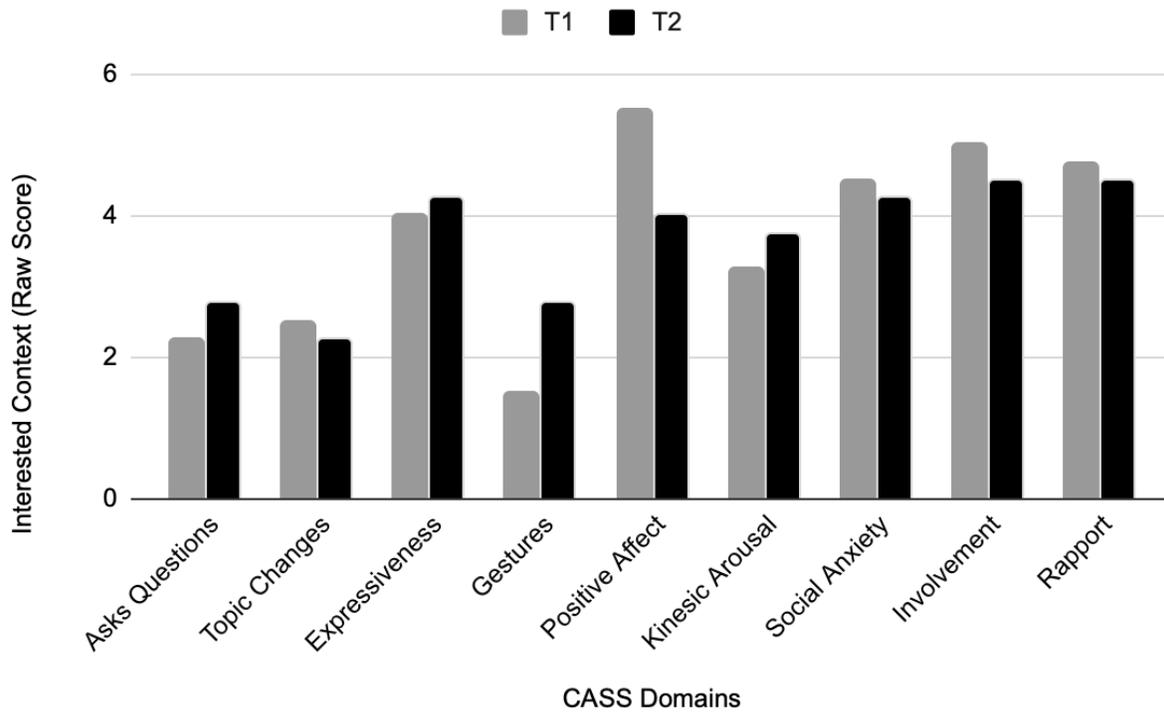
Domain	T1		T2	
	Interested	Bored	Interested	Bored
Asking Questions	2.25	5.5	2.75	5
Topic Changes	2.5	4.75	2.25	2.5
Vocal Expressiveness	4	4	4.25	3.25
Gestures	1.5	2.75	2.75	3.75

Table 3 Continued.

Positive Affect	5.5	2.75	4	3.5
Kinesic Arousal	3.25	3	3.75	3.75
Social Anxiety	4.5	3.5	4.25	3.5
Overall Involvement	5	4.5	4.5	4
Overall Quality of Rapport	4.75	3.25	4.5	3.5

**Figure 2**

*Mean CASS Raw Scores (Interested Condition)*



**Figure 3**

*Mean CASS Raw Score (Bored Condition)*

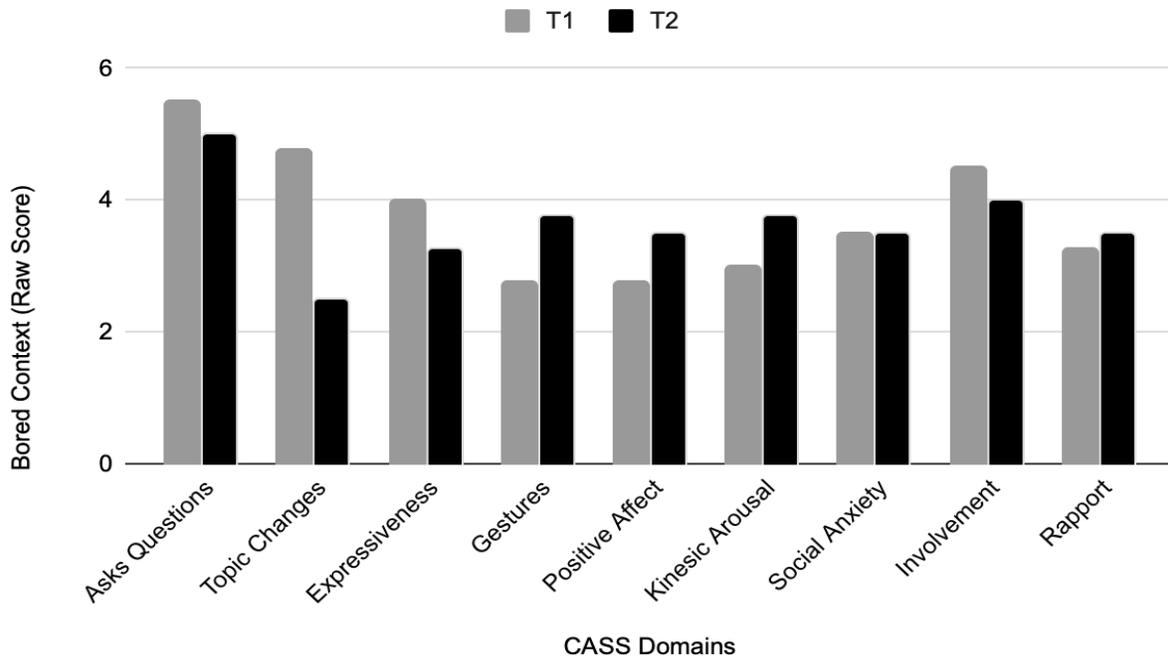


Table 4 presents the participants' CASS total scores pre-intervention and post-intervention reported as *z*-scores along with the mean CASS total score for each condition. A positive increase in the CASS total score indicates an improvement in normative social adaptation (Ratto et al., 2011). Participants 1, 2, and 4 demonstrated an improvement in normative social adaptation in the interested condition between T1 and T2. Participant 3 demonstrated a decrease in normative social adaptation in the interested condition between T1 and T2. Participants 1 and 2 demonstrated an improvement in normative social adaptation in the bored condition between T1 and T2. Participants 3 and 4 demonstrated a decrease in normative social adaptation in the bored condition between T1 and T2. The mean CASS total score was calculated by averaging participants' CASS total scores. The overall mean CASS total score demonstrates that participants had a slight decrease in normative social adaptation in interested

conditions and an improvement in normative social adaptation in bored conditions post-intervention. Results of a Wilcoxon signed-rank test indicate that the mean CASS total scores for the interested condition and bored condition were insignificant from pre-intervention to post-intervention ( $Z = -0.37, p = 0.72, Z = 0, p = 1$ ).

**Table 4**

*CASS Total Scores*

Participant	T1		T2	
	Interested	Bored	Interested	Bored
1	-3.19303	-1.45513	-1.27089	3.14936
2	-2.52636	-0.84945	-1.86664	-0.2394
3	3.06729	0.62886	-1.80433	-1.16422
4	2.65208	1.67571	4.94183	-1.74574
Mean	-0.000005	-0.0000025	-0.0000075	0

Table 5 presents participants' CASS total change scores and the mean CASS total change score across timepoints. Participants 1 and 3 demonstrated an improvement in normative social adaptation between T1 and T2. Participant 3 demonstrated a slight decrease in normative social adaptation, while participant 4 demonstrated a more significant decrease in normative social adaptation between T1 and T2. Results of a Wilcoxon sign rank test indicate that the mean CASS total change scores were insignificant from pre-intervention to post- intervention ( $Z = 0, p = 1$ ).

**Table 5**

*CASS Total Change Scores*

Participant	T1	T2
1	1.7379	4.42025
2	1.67691	1.62724

Table 5 Continued.

3	-2.43843	0.64011
4	-0.97637	-6.68757
Mean	0.0000025	0.0000075

Table 6 presents the mean raw scores of participants' self rating of Overall Involvement and Overall Quality of Rapport. For comparison, Table 7 presents the mean raw scores of the coders rating of Overall Involvement and Overall Quality of Rapport. In the interested condition at T1, the participants rated Overall Involvement and Overall Quality of Rapport higher than the coders rating. In the bored condition at T1, participants rated Overall Involvement lower than the coders rating and Overall Quality of Rapport higher than the coders rating. In the interested condition at T2, the participants rated Overall Involvement and Overall Quality of Rapport higher than the coders rating. In the bored condition at T2, participants' self rating of Overall Involvement and Overall Quality of Rapport was lower than the coders rating. These results highlight the inaccuracy of the self-introspection skills in individuals with ASD - Level 1.

**Table 6**

*Participant Self-Rating of Overall Involvement and Quality of Rapport*

Domain	T1		T2	
	Interested	Bored	Interested	Bored
Overall Involvement	5.5	4	5.75	2.5
Overall Quality of Rapport	5.5	3.75	5.5	2.75

**Table 7***Coder Rating of Overall Involvement and Quality of Rapport*

Domain	T1		T2	
	Interested	Bored	Interested	Bored
Overall Involvement	5	4.5	4.5	4
Overall Quality of Rapport	4.75	3.25	4.5	3.5

**3.3. TYASSK and CASS Results**

To assess the relationship between social cognition and social behavior, pre-intervention and post-intervention CASS and TYASSK results were examined. Table 8 presents the correlations between the TYASSK raw scores and the CASS total scores in the interested condition at T1 and T2. Correlation was calculated using only the CASS total scores in the interested condition because the interested condition is more representative of typical social interactions. Results indicate there is a moderate positive correlation between participants' pre-intervention TYASSK scores and pre-intervention CASS total score (PCC = 0.532). Results indicate there is a weak positive correlation between participants' post-intervention TYASSK scores and post-intervention CASS total score (PCC = 0.362). Results indicate there is a very strong positive correlation between participants' pre-intervention TYASSK scores and post-intervention CASS total score (PCC = 0.925). Results indicate there is no positive correlation between participants' post-intervention TYASSK scores and pre-intervention CASS total score (PCC = 0.078). Thus, analysis indicates that there is insignificant correlation between TYASSK raw scores and CASS total scores at pre-intervention and post-intervention. Data suggests that social cognition scores do not accurately predict social behavior on the CASS.

**Table 8***TYASSK and CASS Correlations*

Variable	Pre-Intervention TYASSK	Post-Intervention TYASSK
Pre-Intervention CASS Total Score	0.532	0.078
Post-Intervention CASS Total Score	0.925	0.362

## CHAPTER 4

### DISCUSSION

#### 4.1. Discussion of TYASSK Results

The first research question aimed to investigate the effectiveness of the PEERS® for Young Adults intervention in improving social cognition. Results of this study indicate that young adults with ASD - Level 1 demonstrated an improvement, that was approaching significance, in their social cognition after the PEERS® for Young Adults intervention. Although the current study is not consistent with the level of significance reported in previous studies, the finding remains the same (Gantman et al., 2012; Laugeson et al., 2015; McVey et al., 2016).

The gains in social cognition can be attributed to the topics addressed in the PEERS® for Young Adults curriculum. The program includes social skills that are ecologically valid and meaningful to participants which allows them to engage and connect with the material. Furthermore, PEERS® for Young Adults uses systematic and explicit instruction to teach each social skill. During instruction, the program focuses on a detailed explanation of the skill itself, its rationale, and the outcomes of appropriate and inappropriate usage. Instead of simply stating the correct social skill, PEERS® for Young Adults provides an in-depth discussion of each skill. This discussion facilitates greater understanding of social skills and improves social cognition.

Moreover, the gains in social cognition are likely due to the specificity of the TYASSK. The TYASSK was developed by the UCLA PEERS® research team to assess the effectiveness of PEERS® for Young Adults in improving social cognition. The test items on the TYASSK are derived from the topics discussed in PEERS® for Young Adults. Therefore, the TYASSK assesses social cognition learned in PEERS® for Young Adults, not participants' general social

cognition. Given the findings of the current study, it is suggested that PEERS® for Young Adults is effective in improving targeted social cognition topics discussed in the program.

#### **4.2. Discussion of CASS Results**

The first research question was aimed at investigating the effectiveness of the PEERS® for Young Adults intervention in improving social behavior. The results of this study indicate that, overall, no significant improvements in social behavior were observed after the completion of the PEERS® for Young Adults intervention. This finding is consistent with the results obtained by White and colleagues (2015). Although some improvements across domains were observed after program completion, they were insignificant. The lack of consistent improvements across CASS domains is also consistent with findings from White and colleagues (2015). The lack of significant results can be attributed to the limited possible movement on the 7-item Likert scale (i.e., scores can only improve so much) along with the lack of consistent improvements across all CASS domains (i.e., improvement was only observed on some domains).

A major factor contributing to the limited improvement in social behavior after the completion of the PEERS® for Young Adults intervention is the lack of specificity of the CASS in assessing social skills learned in the program. Of the nine CASS domains, PEERS® for Young Adults directly targets Topic Changes and Asking Questions through lessons on trading information and maintaining conversations. PEERS® for Young Adults indirectly targets Overall Involvement and Overall Quality of Rapport throughout the entirety of the program. Thus, PEERS® for Young Adults only targets four out of the nine CASS domains.

Following the intervention, the mean raw score for Topic Changes decreased indicating an improved ability to engage in reciprocal conversation (i.e., trading information) and maintain

a conversation around a single topic. The mean raw score for Asking Questions increased following the intervention indicating an improved ability to trade information with communication partners. The improvement in social behavior on Topic Changes and Asking Questions can also be attributed to the method of scoring. Topic Changes and Asking Questions are the only CASS domains that are scored by an objective behavioral count leading to less variability between coders.

However, the mean raw scores for Overall Involvement and Overall Quality of Rapport decreased after the completion of the PEERS® for Young Adults intervention. This is likely due to the various paralinguistic factors (e.g., facial expressions, gestures, tone of voice) that are not discussed in the PEERS® for Young Adults curriculum, yet continue to impact social behavior. In addition, the subjective method of scoring of these domains leads to greater variability between coders. Therefore, it is suggested that an improvement across all CASS domains is unlikely because PEERS® for Young Adults does not address the majority of the CASS domains.

The limited improvement in social behavior following the PEERS® for Young Adults intervention can also be attributed to the lack of generalization of the program. The program presents social skills in a structured and predictable social environment, yet the CASS assesses social behavior in a fairly unstructured social environment. Although practicing learned skills outside of sessions is assigned as homework, there is no way to guarantee completion. It is assumed that the majority of the behavioral rehearsals practicing learned social skills occur during the in-person sessions with guidance and feedback from the certified provider. Participants are then expected to generalize the skills they learned in the highly structured class environment with support from the certified provider, to novel and unstructured environments

without support from the certified provider. PEERS® for Young Adults does not provide opportunities to practice learned social skills in unstructured environments with guidance and feedback from the certified provider. Thus, there is a discrepancy between the level of structure in the social environment during PEERS® for Young Adults and the CASS. The lack of improvement in social behavior after the intervention, as measured by the CASS, is not surprising given that the CASS simulates an unstructured social situation.

In addition, psychological factors and ASD symptomatology in participants restricted the level of improvement in social behavior following the intervention. Individuals on the spectrum have an increased likelihood of psychological comorbid disorders such as social anxiety and depression. Comorbid disorders such as anxiety can greatly influence their social functioning and contribute to maladaptive social behaviors. In the current study, one participant had severe anxiety that often restricted his level of involvement in social situations and enhanced his inappropriate social behaviors. Another participant in the current study had a high frequency of self-stimulating behaviors that also restricted his level of involvement in social situations and enhanced his inappropriate social behaviors.

#### **4.3. Discussion of TYASSK and CASS Results**

The second research question investigated the effectiveness of self-reported social cognition assessments in predicting social behavior. Results of participants' post-intervention TYASSK and CASS scores indicate that self-reported social cognition does not accurately predict social behavior. This is demonstrated by an improvement in social cognition post-intervention but no improvement in social behavior post-intervention.

This finding can be attributed to the lack of insight individuals on the spectrum have in regards to social communication. Findings from the CASS on Overall Involvement and Overall

Quality of Rapport differed between participant self ratings and coder ratings revealing that individuals on the spectrum have poor insight and introspection skills. Thus, adults with ASD have a reduced ability to recognize and interpret various social cues. Although individuals' self-reported social cognition may be within normal limits, their lack of insight into social cues restricts their ability to recognize negative feedback and modify their inappropriate social behaviors. This leads to the continuation of inappropriate social behavior. A study conducted by Barendse and colleagues (2018) supports this explanation. It is suggested that inaccurate insight in social cues hinders the reliability of self-reported social cognition assessments in predicting social behavior.

The third research question explored the relationship between social cognition and social behavior. Since PEERS® for Young Adults was effective in improving social cognition but not social behavior, results of the current study indicate that an improvement in social cognition does not translate to an improvement in social behavior. The discrepancy between social cognition and behavior found in the current study is consistent with previous research (Barendse et al., 2018).

A major reason why improvements in social cognition do not lead to improvements in social behavior is the lack of structure in the social world. Social communication interventions are highly structured and explicit which fosters an environment that facilitates the acquisition and application of social skills. However, the real social world is highly unstructured and implicit. The expectations in real social situations are not explicitly defined, making the application of social knowledge and appropriate social behavior much more difficult. This explains why improvements in social behavior are not observed post-intervention despite the improvement in social cognition post-intervention.

#### **4.4. Limitations of Current Study**

The current study has a number of limitations. The small sample size is a major limitation that restricted the generalization and significance of the data. Future research would benefit from larger sample sizes to strengthen the external validity of findings. Although assessing the maintenance of treatment gains was intended in this study, it was not possible due to attrition eight weeks after the intervention. Future studies should investigate the maintenance of results to assess the durability of PEERS® for Young Adults and the durability of social cognition and behavioral observation assessments. Another limitation of this study was the lack of standardized assessments to confirm self-reported ASD diagnoses and mental health status. In the current study, participants only reported the status of their mental health before starting the intervention. Some participants' mental health status fluctuated throughout the intervention which may have impacted data. Future studies should regularly assess participants' mental health throughout the intervention to ensure the reliability of data collected.

An additional limitation of the current study was the discrepancy between the specificity of research measures. As previously discussed, the TYASSK has a high degree of specificity since it was developed to assess social cognition topics learned in PEERS® for Young Adults. Whereas, the CASS lacked specificity because it did not explicitly assess skills learned in PEERS® for Young Adults. As a result, the findings of the CASS did not reflect the potential carryover from the intervention. Future research should investigate the effectiveness of PEERS® for Young Adults in improving social behavior by using a behavioral observation assessment that specifically assesses the skills learned in the program. However, if researchers aim to investigate the effectiveness of PEERS® for Young Adults in improving general social communication, they should consider using general social cognition and behavioral observation assessments that lack

specificity to the program. In this case, researchers could make a more valid claim regarding the generalization of the PEERS® for Young Adults intervention.

Another limitation of this study was the lack of available research assistants to act as confederates in the CASS. Since the same confederates were used for each condition at pre-intervention and post-intervention, they became familiar conversation partners for the participants. Future research using the CASS should use different confederates for each condition across administration timepoints to reduce the effect of familiarity during conversation. In addition, participants and confederates had the freedom to choose what social club they were role playing around which to base conversation on. In this study, the majority of participants selected the same club to discuss at pre-intervention and post-intervention. This resulted in very similar content in conversations across timepoints, making it difficult to assess change in conversational skills. In future research, the primary investigator should determine the social club for each role play to ensure conversation content is different at pre-intervention and post-intervention.

Last, the range of disability of participants was a limitation in the current study. Despite all participants having a diagnosis of ASD - Level 1, the social functioning of participants varied. Social functioning ranged from severe impairment due to the high frequency of self-stimulation and scripting, to mild social functioning impairment. This discrepancy impacted the level of participation in lessons and the reciprocity of conversation in behavioral role plays. Therefore, the range of social functioning of the participants likely impacted the external validity of the results.

#### **4.5. Clinical Implications**

Given that social communication is within the scope of practice for Speech-Language Pathologists, the current study has numerous implications for clinical practice. Since the results

of the current study suggest that PEERS® for Young Adults is effective in improving targeted social cognition in adults with ASD - Level 1, it would be worthwhile for clinicians to pursue certification in the intervention. With this certification, clinicians will be able to provide evidence-based social skill intervention to clients with social communication goals in individual and group sessions. In addition, results of the current study highlight that the systematic and explicit instruction style used in PEERS® for Young Adults is effective in improving social cognition in adults with ASD. Therefore, to produce maximally beneficial outcomes for clients with ASD, clinicians should consider using systematic and explicit instruction.

The lack of significant gains in behavioral outcomes indicate that the skills learned in PEERS® for Young Adults may not generalize to novel and unfamiliar situations. The inclusion of functional therapy tasks, such as role plays, are crucial when targeting social communication to aid in carry-over and generalization of skills. Clinicians should consider creating client-centered role plays that address their client's needs in social communication. Furthermore, role plays should be realistic in their content and settings (i.e., typical conversation topics, use of unfamiliar conversation partners, practice in unstructured settings). Role plays should be conducted in structured and unstructured social environments with guidance from the clinician. When including role plays in therapy, it is important to remember that individuals with ASD often have increased levels of anxiety, and behavioral role plays can induce greater anxiety. If the anxiety and/or difficulty of the task is too great, it can inhibit the client's progress. Therefore, clinicians should create a hierarchy of role play tasks with their client that range from least to most difficult/anxiety-provoking. By implementing behavioral role plays in this manner, clinicians maintain a positive and encouraging therapeutic relationship with their client.

The current study also highlighted the inaccuracy of self-reported social skill awareness in individuals with ASD. To make significant and maintainable gains in social communication, clinicians should target the client's self-awareness and metacognitive skills. This can be targeted by asking the client to predict their performance before a role play and having them reflect upon their performance after the role play. When addressing metacognitive skills, it is important for the clinician to be honest and objective when reporting their observations and thoughts as to the success of the role play.

When addressing social communication goals in therapy, clinicians should also ensure to include the client's family, caregivers, and/or friends in therapy to aid in carryover. Family and/or friends play an important role when addressing social communication goals because they can provide supportive feedback for the client outside of therapy sessions.

Due to the psychological comorbidities (i.e., anxiety, depression) associated with ASD, negative thoughts and feelings can arise and/or surface throughout the social communication intervention. This is common when discussing situations such as peer rejection and bullying. Thus, it is crucial to use counseling skills when implementing social communication intervention. Clinicians should label feelings, provide encouraging and specific praise, reframe negative thoughts and feelings, and promote self-acceptance.

#### **4.6. Conclusion**

It is evident that social communication in adults with ASD - Level 1 is an important area of research given the many social, academic, vocational, and psychological consequences associated with social communication impairments. Moreover, there is a need for social communication interventions that are effective in improving both social cognition and social behavior. The current study investigated the effectiveness of an evidence-based social skill

intervention, PEERS® for Young Adults, in improving social communication. The findings in the current study revealed that PEERS® for Young Adults is effective in improving social cognition but not social behavior. Results indicate the need for social communication interventions with high generalizability that improve overall social communication. Findings also revealed that self-reported social cognition assessments do not accurately predict social behavior and measure overall social communication in adults with ASD - Level 1. Therefore, the relationship between social cognition and social behavior is not as straightforward as previously believed and should be investigated more.

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## APPENDIX A: TEST OF YOUNG ADULT SOCIAL SKILL KNOWLEDGE

### Instructions:

The following items are about making and keeping friends and romantic relationships. After you read each item, there will be a couple of choices to choose from. Decide which choice is the best by bubbling in the best answer. Only choose one answer per item.

1. The most important part of having a conversation is to:
  - Trade information
  - Make sure the other person is laughing and smiling
  
2. When starting a conversation:
  - Wait for person to notice you
  - Find a common interest
  
3. If your friend mispronounces a word, you should:
  - Not police them
  - Politely point out their mistake to be helpful
  
4. If you discover that you and a friend like the same thing:
  - Be repetitive
  - Don't be repetitive
  
5. It's ALWAYS a good idea to try to make friends with someone who:
  - Has lots of friends and is popular
  - Likes the same things as you
  
6. Friendship is a:
  - Choice
  - Gift
  
7. When you want to exchange contact information with someone:
  - Go up and nicely ask them for their number
  - Use a cover story
  
8. How many messages can you leave in row without hearing back from a person?
  - 1-2
  - 3-4
  
9. After you make a joke, it's a good idea to pay attention to:
  - Whether the other person is laughing

- Your humor feedback
10. It is ALWAYS a good sign if someone laughs at your jokes:
    - True
    - False
  11. When you're trying to meet a new group of people, it's a good idea to go up and say hello and introduce yourself:
    - True
    - False
  12. When you're trying to enter a group conversation, the FIRST thing you should do is:
    - Watch and listen to the conversation
    - Make a comment about what they're saying
  13. If you try to enter a group conversation and the people exclude you:
    - Start to look away
    - Make sure they can hear you
  14. If you try to join ten different conversations, on average how many times out of ten are you likely to be rejected:
    - 7 out of 10
    - 5 out of 10
  15. When having a friend over for a get-together at your home:
    - Tell your friend what you're going to do
    - Have your friend choose the activity
  16. If you're having a friend over for a get-together and someone else unexpectedly texts that you really like:
    - Ask your friend if you can invite them over
    - Text them later
  17. When you're interested in someone romantically, it's a good idea to:
    - Talk to mutual friends
    - Not tell people until you're sure they like you
  18. When you're flirting with someone, you should make eye contact, smile, and keep looking at them:
    - True
    - False

19. When you're asking someone on a date, you should:
  - Tell them you like them and ask if they'll go out with you
  - Ask what they're doing on a certain day and time
  
20. If you ask someone on a date and they turn you down, it's okay to politely ask them for a reason:
  - True
  - False
  
21. At the end of a date, if you want to kiss goodnight, you should:
  - Ask your date if you can kiss him or her
  - Wait for a sign they want to be kissed
  
22. When you're on a first date it's a good idea to give general compliments:
  - True
  - False
  
23. When you FIRST start dating someone, you should:
  - Tell them about your dating history
  - Avoid talking about your dating history
  
24. If a date you like is pressuring you to get physical and you're not ready, you should:
  - Date someone else
  - Change the subject
  
25. The FIRST thing you should do when you get into an argument is:
  - Listen and keep your cool
  - Explain your side
  
26. When a friend accuses you of doing something you didn't do:
  - Say you're sorry that this happened
  - Explain your side until they believe you
  
27. If someone is teasing you and calling you names:
  - Ignore them or walk away
  - Give a teasing comeback
  
28. A good strategy for handling chronic bullying is:
  - Try to make friends with the person so they won't bully you

- Don't try to make friends with the person
29. If someone spreads a rumor about you that isn't true, you should:
- Spread the rumor about yourself
  - Confront the person that started the rumor
30. If someone is gossiping behind your back, you should:
- Let them know that the gossip hurts your feelings
  - Act amazed that anyone would believe the gossip

**APPENDIX B: CONTEXTUAL ASSESSMENT OF SOCIAL SKILLS DOMAINS AND  
RATING SCALES**

**Table 9**

*CASS Domains and Rating Scales*

Domain	Domain Description	Domain Rating Scale
Asks Questions	The number of times the participant asked the confederate a question. The participant must pause to allow the confederate to respond.	N/A, behavioral count.
Topic Changes	The number of times the participant initiates a topic change during the conversation.	N/A, behavioral count.
Vocal Expressiveness	Rate the degree to which the participant varied their vocal quality (i.e., tempo, pitch, volume).	<p>Rating of 1: Flat or monotone voice throughout the role play</p> <p>Rating of 2: Mostly flat or monotone voice, with minimal or rare variation</p> <p>Rating of 3: Some vocal expressiveness, but seems odd, stereotyped, or exaggerated</p> <p>Rating of 4: Several instances of appropriate vocal expressiveness, but not consistent, or seems more flat than expressive</p> <p>Rating of 5: Somewhat appropriate vocal expressiveness, but mostly a polite tone, not warm and engaging</p> <p>Rating of 6: Good use of vocal expressiveness, but not overly engaging or enthusiastic</p> <p>Rating of 7: Very warm, friendly, and enthusiastic use of vocal expressiveness, that clearly attempts to engage the confederate in conversation</p>
Gestures	Rate the overall frequency and appropriateness with which the participant uses gestures.	<p>Rating 1: Does not gesture during interaction</p> <p>Rating of 2: Only gestures once or twice during interaction (may be appropriate or inappropriate)</p> <p>Rating of 3: Uses some gestures, but these seem odd, stereotyped, or exaggerated or are poorly integrated with speech</p> <p>Rating of 4: Uses only descriptive/conventional gestures without use of any emphatic/emotional gestures</p> <p>Rating of 5: Uses several appropriate gestures, but not frequently or consistently</p> <p>Rating of 6: Uses appropriate gestures frequently throughout the conversation</p>
Positive Affect	Rate the degree to which the participant demonstrates a	Rating of 1: No smiling, seems openly angry, negative, or bored; clearly turns face or body away from confederate at

Table 9 Continued

	<p>positive affect using non-verbal behaviors (i.e., smiling, open eyes).</p>	<p>more than one point in conversation            Rating of 2: A mostly flat or bored facial expression; may turn face or body away            Rating of 3: Occasional appropriate or positive affect but seems uncomfortable, forced or false; may only turn face or body away infrequently, without clear intent to show lack of interest or disengagement            Rating of 4: Appropriate and polite affect, but not clearly positive; may not turn away            Rating of 5: Positive, though not enthusiastic, affect and consistently facing confederate            Rating of 6: Clearly positive, warm affect, but not overly animated or enthusiastic            Rating of 7: Smiling and positive affect throughout interaction to the point that the participant seems animated and enthusiastic about the conversation</p>
Kinesic Arousal	<p>Rate the degree to which the participant demonstrates physical movement (i.e., fidgeting, tapping fingers) throughout the conversation.</p>	<p>Rating of 1: High arousal throughout the interaction that has at least some impact on the smoothness of the conversation (shifting in chair, fidgeting, tapping, swinging or bouncing foot, leg, arm, or hand, etc.)            Rating of 2: High arousal as described for a “1,” but limited impact on conversation            Rating of 3: Some clear kinesic arousal for most of the conversation, but not high arousal and has limited impact on conversation            Rating of 4: Some clear kinesic arousal (e.g. consistent fidgeting or body movements), but without impact on the conversation            Rating of 5: Very little kinesic arousal that has no impact on conversation            Rating of 6: Brief moments of kinesic arousal at only one point in the conversation            Rating of 7: No observed kinesic arousal</p>
Social Anxiety	<p>Rate the degree to how anxious the participant appears to be throughout the conversation (i.e., vocal tremors, avoidance of eye contact).</p>	<p>Rating of 1: Clear signs of extreme anxiety throughout interaction that have a definite impact on the smoothness of conversation            Rating of 2: High social anxiety throughout most of conversation, with clear, but not overwhelming, impact            Rating of 3: Clear, but not high, anxiety with only limited impact on conversation (e.g. occasional silences or strained conversation due to anxiety)            Rating of 4: Some anxiety evident, but not always clear and not overly distracting            Rating of 5: Minimal or brief anxiety evident, but with minimal or no impact on conversation            Rating of 6: No clear behavioral indicators of anxiety, but does not seem completely relaxed            Rating of 7: Seems completely relaxed throughout the</p>

Table 9 Continued.

Overall Involvement	Rate the extent to which the participant indicates through verbal and/or nonverbal means that he/she is interested and involved in the conversation and in what the confederate is saying	<p>Rating of 1: Withdrawn or unengaged, speaks infrequently, turns face and/or body away from confederate, leans back in chair, shows poor eye contact</p> <p>Rating of 2: Shows low engagement in the conversation but does not actively avoid conversation; may show occasional nods and respond verbally or nonverbally to confederate's questions and/or statements</p> <p>Rating of 3: Demonstrates some engagement, but seems uninterested overall, may look away often</p> <p>Rating of 4: Seems mostly engaged in conversation but interaction is odd, stilted, awkward, and/or uncomfortable; may ask some questions or elaborate on answers for confederate's benefit</p> <p>Rating of 5: Appropriately engaged throughout and generally works to keep the conversation going; does not look or turn away often</p> <p>Rating of 6: Demonstrates consistent engagement in the conversation, and takes the lead in the conversation more than once, by asking questions and/or building on what the confederate has said</p> <p>Rating of 7: Highly engaged in the conversation and leads most of the conversation; clearly seems to enjoy the interaction</p>
Overall Quality of Rapport	Rating the quality of rapport and give-and-take in the role play – especially consider the degree to which one person had to initiate and maintain conversation	<p>Rating of 1: Highly uncomfortable for entire interaction, partners show little regard or interest in one another</p> <p>Rating of 2: Largely uncomfortable interaction with brief comfortable moments</p> <p>Rating of 3: One sided or unusual interaction that is sustained by one person and that would have failed had that person not given clear additional effort</p> <p>Rating of 4: Slightly awkward or uncomfortable interaction at times, but largely appropriate and somewhat comfortable</p> <p>Rating of 5: Conversation is polite and appropriate, but not clearly comfortable</p> <p>Rating of 6: Comfortable, appropriate interaction, with no clearly long or awkward silences</p> <p>Rating of 7: Consistently comfortable, warm interaction that is enjoyable for both</p>

## **BIOGRAPHY OF THE AUTHOR**

Meaghan Balsdon was raised in Hamilton, Ontario, Canada and graduated from McMaster University in 2020 with a Bachelor of Applied Science in Human Behavior. She worked in applied behavioral analysis before starting her Master's degree at the University of Maine in the fall of 2021. After receiving her Master's degree, Meaghan plans on working as a Speech-Language Pathologist in Ontario, Canada. Meaghan is a candidate for the Masters of Arts Degree in Communication Sciences and Disorders from the University of Maine in May 2023.