Examining Social Skills Training and Computer Assisted Technology for Teens with Autism Spectrum Disorder: A Follow-up of the UCLA PEERS® Intervention

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Abstract

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Kamila Tomaszewski

The present study examines a follow-up to the Program for the Education and Enrichment of Relational Skills (PEERS®), with teens with Autism Spectrum Disorder (ASD) and a Computer Assisted Technology (CAT) component. Over the course of the intervention, teens and parents met weekly and participated in a follow-up version of the PEERS® program. Social skills improvements were measured at pre and post intervention using the *Social Skills Improvement System-Rating Scales* (SSIS-RS; Gresham & Elliot, 2008), the *Quality of Play Questionnaire* (QPQ; Frankel & Mintz, 2011) and the *Test of Adolescent Social Skills Knowledge-Revised* (TASSK-R; Laugeson & Frankel, 2010). Results indicated that based on mean scores teens increased their social skills and the majority decreased their problem behaviours. Further, the majority of teens increased their social skills knowledge and increased their attended and hosted get-togethers. Findings also suggest students were motivated and paid more attention to the intervention due to the use of visuals and videos throughout the intervention. Computer homework showed high completion rates across the program and positive parental feedback was observed in its ability to evoke discussions and consolidate learning. Implications of the PEERS® program in collaboration with a technological component for teaching social skills to teens with ASD are discussed.

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Introduction

Autism Spectrum Disorder Characteristics

Autism is defined by the *Diagnostic and Statistical Manual of Mental Disorders* (5th ed.; *DSM-5*; American Psychiatric Association, 2013) as a neurodevelopmental disorder with severity based on social communication impairment and restricted, repetitive patterns of behaviour. This manifests in individuals having persistent deficits in social communication and social interaction as well as restricted, repetitive patterns of behaviour, interests and activities, which have been present from early childhood and impair everyday functioning. Individuals who had a previous diagnosis under the DSM-IV of autistic disorder, Asperger's disorder or pervasive developmental disorder are all placed under the umbrella terms of Autism Spectrum Disorder (ASD) in the current definition (American Psychiatric Association, 2013). [1]

The Autism and Developmental Disabilities Monitoring (ADDM) Network funded by the Centers for Disease Control and Prevention (CDC), estimates that 1 in 68 children (8-year-olds) have been diagnosed with ASD across the United States (Centers for Disease Control and Prevention [CDC], 2014; Zablotsky, Black, Laenner, Schieve, & Blumberg, 2015). This is a 123% increase in prevalence rates since their first study in 2002, with boys being 4.5 times more likely to be diagnosed with ASD (CDC, 2002). The substantial increase in children diagnosed with ASD has led to questions and concerns regarding the treatment intervention in numerous contexts (Cotugno, 2009).

As the disorder is characterized by challenges in communication, social functioning and stereotypical behaviours and interests, treatment interventions focusing on social reciprocity and social communication are critical (Weiss & Harris, 2001). Social deficits have been observed

[1] Although no longer used, the term High Functioning Autism (HFA) and/or Asperger's Syndrome (AS) is kept here to maintain the terms used by studies prior to 2013 which utilize the Diagnostic and Statistical Manual of Mental Disorders, Edition 4, definition for Autism Spectrum Disorder.

across the spectrum and are a common impairment shared by all individuals with ASD (Mandelberg et al., 2014). Further, as individuals with ASD are included in mainstream classrooms in higher numbers and interact daily with others, the need for evidence-based social skills interventions is more pressing than ever before (Laugeson, Frankel, Gantman, Dillon, & Mogil, 2012; White, Keoing, & Scahill, 2007).

Social Skills in Youth with ASD

Social skills are defined as socially appropriate learned behaviours that promote successful interaction with others and the environment, while simultaneously avoiding negative social interactions with individuals (Elliot, 2007). Social skills can be clustered into seven major areas: communication, cooperation, assertion, responsibility, empathy, engagement and self-control (Elliot, 2007; Elliot, Malecki, & Demaray, 2001). By definition, ASD is associated with challenges in a number of these areas and as such indicates deficits in social skills. Social skill difficulties are the most salient feature of children with ASD and they set this population apart from other developmental disorders diagnoses (Klin et al., 2007; Reichow & Volkmar, 2010). Social deficits are varied and include impairments in linguistic conventions, interpersonal communication and speech (White et al., 2007). More specifically, issues with social pragmatics, poor speech prosody, topic repetition, difficulty with emotions and understanding nonliteral language are common (Tager-Flusberg, 2003). Social skills challenges are a core feature of ASD and key areas of deficit are difficulty with starting interactions, perspective taking, conversation exchange, and understanding others' interests (Bellini, Peters, Benner, & Hope, 2007).

As children approach the adolescence years, social impairment may become more noticeable as social situations increase in complexity and children have an increased self-awareness (White et al., 2007). Klin et al. (2007) investigated the relationship between

communication, social ability and social disability using the Vineland and Autism Diagnostic Observation Schedule (ADOS) with higher functioning school aged children in two separate samples. Results of the Vineland indicated that levels of social ability decreased significantly as the child gets older. Further, both samples of the study showed deficits in the communicative adaptive skills at one and two standard deviations below and the social adaptive skills at two and three standard deviations below their normative verbal IQ scores (Klin et al., 2007). This indicates there is a large discrepancy between participants IQ scores, which are in the normative range for their age group, and their real life communication and social skills, which fall years below their chronological age (Klin et al., 2007). The data presented emphasizes the challenges children with ASD face in the communication and social spheres that play a critical role in making friends. As a result, anxiety may be experienced due to misunderstanding social cues, lack of meaningful relationships, and dealing with social failure, which in turn may be related to feelings of loneliness and social isolation (Bellini, 2004; Bellini et al., 2007; White & Roberson-Nay, 2009). In fact, although the link is not well understood, children with ASD suffer from increased levels of anxiety, with approximately 40% having some anxiety disorder or clinically raised levels of anxiety (van Steensel, Bogels, & Perrin, 2011). One possible explanation points to the relationship between ASD, anxiety and social skills deficits, linking biological and psychosocial aspects together (Bellini, 2004; White & Roberson-Nay, 2009). It is estimated that between 11-84% of children and teens with ASD experience anxiety (White et al., 2010).

Social skills' training is critical to children with ASD, as research has linked social impairment to a lack of academic success, social isolation and peer rejection, anxiety and depression (Bellini, 2004; Tantam, 2000; White & Robertson-Nay, 2009). There has been a marked increase in the development and implementation of social skill intervention programs in

the last twenty years (Reichow & Volkmar, 2010; Weiss & Harris, 2001). Interventions are plentiful and have different theoretical and developmental underpinnings (Reichow & Volkmar, 2010). There is a gap in treatment intervention research in assessing social skills interventions geared towards adolescents and adults with ASD, especially adolescents with less cognitive impairment (Laugeson et al., 2012; Weiss & Harris, 2001).

Social skill deficits are not "outgrown" but instead continue to negatively impact social situations as teens mature into adults (Schohl et al., 2014). Research has indicated that adults with High-Functioning Autism (HFA) have less satisfying relationships than the general population (Rao, Beidel, & Murray, 2008). Howlin, Moss, Savage, and Rutter (2013) investigated social functioning in a sample of 60 adults who had average nonverbal IQ when first diagnosed with ASD in childhood. Most participants (63%) reported never having a friend, while 9% reported they have one or more friends of appropriately the same age. Furthermore, 77% reported never having a relationship, while 7% stated they are currently in or had a close reciprocal relationship (Howlin et al., 2013). This implies social skill deficits remain one of the most daunting areas of need for this population that continue well into adulthood (Weiss & Harris, 2001).

Making and maintaining friendships are major difficulties for children with ASD as they lack the skills to have reciprocal interactions with peers (Frankel et al., 2010). Conversational reciprocity, sharing interest with others, joining a group, and conflict resolution skills are some of the challenging areas for children with ASD (Attwood, 2000; Frankel et al., 2010). However, having friends, especially one or two best friends, acts as a buffer for stressful events, influences later adjustment, helps with self-esteem and decreases the likelihood of psychological symptoms (Schohl et al., 2014). Friendship skills and improved quality of friendships may increase

appropriate social skills and thus influence outcomes in current and long run factors (Laugeson et al., 2012).

Review of the Literature

Parental Involvement in Intervention

Parents are often involved, at varying degrees, in their child's treatment and/or interventions for ASD. This is especially true during the toddler and preschool years. Based on their review of early year interventions, Schertz, Baker, Hurwitz, and Benner (2010) specify that 52% of programs supported the child-parent relationship, while 59% had a parental component in the delivery of the interventions. There is large variety in what role parents' play during treatment, differing in purpose, method and focus based on the individual programs and parents (Granger, des Rivieres-Pigeon, Sabourin, & Forget, 2012; Karst & Van Hecke, 2012). Parent involvement with treatments often increases, as their children grow older due to the completion of formal therapy at a young age (Karst & Van Hecke, 2012).

Parents can effectively implement social, behavioural and communication programs for children with ASD. Through the lens of parent education, parents become implementers of their child's intervention program. This allows the child to receive increased support and coaching on a daily basis (Symon, 2001). Because parents spend the most time with their children, they can teach appropriate skills in a number of different settings and contexts, thereby increasing generalizability (Burrell & Borrego, 2012; Dekker, Nauta, Mulder, Timmerman, & Bildt, 2014). Treatments, which include parent-training components, have shown beneficial and successful outcomes (McConachie & Diggle, 2007). In their review of 12 parent implemented early interventions, McConachie and Diggle (2007) suggest that parent training improved the child's social communication skills, child-parent communication and parental skills and knowledge.

When children enter the teenage years, interventions are usually focused on addressing social skills impairments (Karst & Van Hecke, 2012). However, parental involvement in these programs seems to be as varied as the programs themselves (Matson, Mahan, & Matson, 2007; Rao et al., 2008; Schreiber, 2010; White et al., 2007). In a review of 38 social skills interventions, Schreiber (2010) highlighted the importance of practice in a naturalistic environment to ensure the taught social skills are generalized and maintained. Parental involvement in the form of scaffolding during social interactions of children with ASD is an essential component for successful outcomes (Schreiber, 2010).

Parental involvement is critical for a positive treatment outcome, yet more research is needed to establish how best parents should be involved in treatment (Burrell & Borrego, 2012). Dekker et al. (2014) investigated the effect of Social Skills Training (SST) with 120 children with ASD in three conditions; SST, enhanced SST with parent and teacher participation (SST-PTI), and care-as-usual (CAU). Preliminary results indicated that children in both conditions (SST and SST-PTI) improved significantly on the socialization and cooperation measures. The SST-PTI group showed significant improvement on cooperation, assertion, self-control and socialization according to the teacher report compared to the SST group. However, 6 months later results showed the SST and SST-PTI conditions did not maintain initial improvements. This brings into question the role of teachers and parents in the long-term acquisition of social skills.

Current Social Skills Training Programs

Social skills training (SST) encompass the teaching of specific social skills through behavioural and social learning techniques (Cooper, Griffith, & Filer, 1999). Group SST utilizes peers to teach social skills and is effective when working with children who experience social anxiety, bullying, or exhibit unusual social behaviour (DeRosier, Swick, Davis, McMillen, &

Matthews, 2011). Group-based interventions are thought to be beneficial when teaching appropriate social competency (White et al., 2007). They employ a variety of methods such as cognitive-behavioural strategies, pragmatic language, theory of mind concepts or a specific skill, to enhance social skills development (Cotugno, 2009).

Gates, Kang, and Lerner (2017) conducted a large meta-analysis to examine the effectiveness of group-based social skills interventions (GSSIs) for teens with ASD. Based on parents, teens themselves, observers and tasks, GSSIs resulted in moderate improvements in social competence, and specifically social knowledge. Both teachers and teens reported an increase in social knowledge; they reported no change in their social behaviour, indicating there may not have been ample opportunity to practice the newly acquired skills (Gates, Kang, & Lerner, 2017).

Beaumont and Sofronoff (2008) examined the effectiveness of the Junior Detective Training Program (JDTP) with 49 children with Asperger's Syndrome. JDTP utilizes group and parent training, teacher handouts and a computer game over the course of six weeks. Based on parent reports, results indicated participants made significant improvements in social functioning and these were maintained at five-month follow-up. JDTP utilizes modified Cognitive Behaviour Therapy (CBT) strategies such as increased structure, visual aids, and increased parental involvement, pointing towards an encouraging approach for teaching social skills to children with HFA (White et al., 2010).

Using another social skills intervention, the Children's Friendship Training (CFT), Frankel et al. (2010) investigated its effect on 68 elementary aged children with ASD. CFT is comprised of sections directly related to specific rules of behaviour common among peer groups, while parents receive concurrent sessions on the same subject. CFT focused on subjects such as

finding common interests, handling rejection and teasing, joining a peer group, and hosting a play date. These were taught through modeling, rehearsal, homework and coaching from both parents and facilitators (Frankel et al., 2010). Results indicated children in the CFT group made significant gains in five of 13 outcome measures and marginally significant improvement in four other measures when compared to the delayed treatment control (DTC) group. Parents reported the occurrence of more appropriate play dates, more self-control and assertiveness and less peer conflicts. However, these findings were not supported by the teacher reports. Moreover, at the three-month follow up, only the parent's reports continued to show significant improvement from baseline. CFT was one of the first to introduce a parent-assisted model for friendship training and this study demonstrated the effectiveness of such a model.

Cognitive Behavioural Therapy and ASD

Cognitive Behavioural Therapy (CBT) is rooted in both cognitive and behavioural models. Cognition is defined as all mental activities involved in acquiring and processing information such as attention, perception, learning, memory, thinking, problem solving, decision making and language (Colman, 2014). Cognitive therapy is then based on the assumptions that psychological problems stem from flawed thinking patterns and perceptions of reality (Colman, 2014). As such, CBT involves the development of mental models that result in desired behaviour while unlearning maladaptive or dysfunctional responses (Brewin, 2006). Three strategies to activate the above were proposed by Brewin (2006): 1) active participation in activities that encourage the creation of desired behaviours, 2) desired behaviours should be practiced in settings that in the past have yielded maladaptive responses, 3) desired behaviours should be associated with a memory that is positive and has reinforcing features. CBT interventions are typically 12-16 sessions long, focus on the here and now and are action-oriented (White et al.,

2010).

CBT has been established as a successful approach to treating a variety of childhood psychiatric disorders and is an effective intervention when dealing with core autism deficits (Wood, Fujii, Renno, & Van Dyke, 2014). In fact, teens with ASD have shown positive results when working with programs based on adapted CBT. CBT social skills treatments that encompass a structured program using visual supports, explicit verbal cues and feedback, skills rehearsal and include parents have shown promise (Koning et al., 2013; Laugeson, Frankel, Mogil, & Dillon, 2009, 2012; White et al., 2010).

Wood et al. (2014) investigated the use of CBT on social communication challenges for 13 elementary aged children with ASD in the context of schoolyard play. Families received 32 sessions of CBT covering topics such as friendship skills, appropriate ways to enter peer conversations, and conversation maintenance. Coaching was provided in context (i.e., during play-dates, at school) alongside short and long term reward systems and included parents and teachers. Results indicated participants doubled their rate of social interactions, exhibiting positive peer interactions and appropriate communication response while decreasing solitary behaviour by 50%. This study provides support for intensive CBT alongside extensive parent and teacher involvement in reducing the severity of ASD social challenges.

Cotugno (2009) employed a number of approaches from the cognitive-developmental model to teach social skills and social competence to students with ASD, 7 to 11 years old. Over the course of 30 weeks, the social skills training had a special focus on including stress and anxiety management techniques, joint attention and flexibility in the context of group therapy, peer support, and cognitive-behavioural instruction approaches. Results showed significant improvement on all four scales of the Walker-McConnell Scale (WMS); teacher and peer-

preferred social behaviour, school adjustment behaviour and total score for all participants (Cotugno, 2009). Furthermore, parents reported significant improvements on all three special focus measures with reduced anxiety, more positive peer interactions and increasing flexibility to change (Cotugno, 2009). The results provided support for interventions based in the cognitive developmental model targeting poor social skills in students with ASD.

One CBT program, Multimodal Anxiety and Social Skills Intervention (MASSI) focuses on the association between social skill deficits and anxiety in students with ASD. White et al. (2010) suggest a cyclical relationship of the two factors whereby the central social deficit of ASD creates experiences of anxiety in social situations and thus leads to greater social isolation and more anxiety. MASSI is focused on the here and now, utilizing the participant's thoughts, feelings and actions to stimulate change while simultaneously working on social skills development. It utilizes parental involvement, group social skills training and individual therapy to address skills deficit and anxiety. In a pilot randomized control trial, 30 teens were randomly assigned to receive the 14-week treatment condition or to the Wait-List control condition. Preliminary results showed significant improvements in social impairment, with a 16% increase in scores as measured by the Social Responsiveness Scale (White et al., 2013). Further, based on parental reports, teens displayed a decrease in anxiety symptoms, although not significant. Finally, teens and families reported a high satisfaction from the program (White et al., 2013). Maddox, Miyazaki, and White (2016) examined the maintenance of the skills acquired during MASSI at a 3-month and 1-year follow-up. They reported that social impairment improvements were maintained at 3-month and 1-year follow-up, compared to pretreatment. A similar trend was reported for decreased anxiety symptoms at the 1-year mark (White et al., 2015). Overall,

findings support the use of adapting CBT approaches to address anxiety and social deficits for teens with ASD.

One such program, the *Program for the Education and Enrichment of Relationship Skills (*PEERS®*)* is evidence based social skills program that uses strategies and teaching methods based on CBT. PEERS® uses a group setting to teach adolescents and their parents the skills involved in making friends and dealing with peer conflict and rejection (Laugeson & Park, 2014). The program uses a variety of strategies borrowed from CBT: didactic instruction, role-play, cognitive strategies, behavioural rehearsal, performance feedback, homework assignments, and parental involvement (Laugeson & Frankel, 2010; Laugeson & Park, 2014).

First, PEERS® utilizes small group format for treatment, which is considered to be equally effective as individual therapy when working with teens. The ideal group size is between eight to ten students however, when the program is taught in school there may be up to 16 students (Laugeson, 2014). Next, didactic instruction, where the therapist or educator takes an active teaching role, is used during each session in the form of providing concrete rules and steps to social behaviour and Socratic questioning. Teens are taught multifaceted concepts such as peer entry into conversations by providing broken down easy to understand concrete steps. The CBT strategy of Socratic questioning involves using a systematic line of questions to guide the lesson. This interactive style is preferred to lecturing as it may increase teen attention and provides a rationale for the rules and steps being taught (Laugeson & Park, 2014). PEERS® further uses role-play demonstrations (good and bad), whereby the therapist or educator models the appropriate and inappropriate new skill. Role-play allows the teens to see exactly what they have been talking about and increases comprehension.

Furthermore, numerous cognitive strategies are employed, such as taking the perspective of others, processing information accurately and defining if a behaviour is socially appropriate, to enhance cognitive skills (Bauminger, 2007; White et al., 2007). PEERS® specifically includes reading social cues, perspective taking questions, and social problem solving to address cognitive skills. Next, behavioural rehearsal and performance feedback allows teens to actively practice the new skill set with peers while receiving constructive feedback. The final component of CBT is homework assignments and review. Homework is critical in promoting generalization and maintenance of the new skill set through practice and it notifies the therapist or educator of the teen's level of understanding (Koning et al., 2013).

Overall, using adapted CBT strategies has been beneficial in teaching social skills to teens with ASD. A number of interventions have used different aspects of CBT with positive outcomes in social communication, peer interactions and general social skills. Thus far, the evidence based PEERS® program provides the most detailed description and rationale of specific CBT strategies for teaching teens social skills.

Computer Assisted Technologies and ASD

It is suggested that some individuals with autism may have greater skills in "systemizing," which is defined as wanting to build systems to gain understanding of the system's behaviours and rules (Golan, LaCava, & Baron-Cohen, 2007). Some individual with ASD tend to be more detail oriented and prefer consistent, structured environments that are fundamental to systems (Golan et al., 2007). Computers are unsurprising, predictable systems, offering a stable environment without social demands. They offer the flexibility of allowing the user to work at their own cognitive and communicative level, while being able to repeat and

review lessons as necessary. Additionally, individual computer incentives may play a part in increasing motivation in the initial lesson itself (Golan & Baron-Cohen, 2006).

Over the decades, computers assisted technology (CAT) has become widely accessible to students with ASD, as computer technology has made significant developments in the hardware and software realms. Although research in this area continues to be in its exploratory phase, CAT has been used to teach a variety of skills to students with ASD including vocabulary words (Coleman-Martin, Heller, Cihak, & Irvine, 2005), reading (Williams, Wright, Callaghan, & Coughlan, 2002), social skills (Beaumont & Sofronoff, 2008), and emotional regulation (Lacava et al., 2010).

Bernard-Opitz, Sriram, and Nakhoda-Sapuan (2001) examined the use of a computer program with eight children with ASD and eight typically developing children as a control comparison, to teach how to problem solve conflicts during social situations. Eight different social problems were given and children had to either choose one of the possible provided solutions or produce alternative solutions. Appropriate solutions were rewarded by visual and auditory reinforcements. Results showed that both groups increased their productions of appropriate solutions as they went through the program (Bernard-Opitz et al., 2001). This evidence demonstrates that both groups of children can learn social problem solving though the use of real life problem settings modeled on the computer.

Simpson, Langone, and Ayres (2002) used a teacher designed computer based program with inserted video clips to teach social skills to four students with ASD. Over the course of 24 consecutive school days, students participated in daily computer/video sessions consisting of 36 trials spread throughout the day, focusing on three target behaviours; sharing with others, following through on teacher directions and social greetings. Afterwards, students practiced the

target behaviours in a group setting with peers. Results indicated that all students improved in the target behaviour areas in their natural environment, implying that computer based models and instruction were effective (Simpson et al., 2002). In general, the use of real life problems and naturalistic settings within a CAT has positive effects when teaching behaviours related to social skills.

Furthermore, Bernard-Opitz et al. (2001) also indicated that children with ASD enjoyed using the programs and were more motivated by the sensory reinforcements as compared to controls in their study. In fact, students with ASD may pay more attention to prompts delivered by computer programs. This in turn may decrease negative behaviours associated with academic demands and increase task engagement (Williams et al., 2002). In their study, Williams et al. (2002) suggested children learning to read were able to focus for longer periods of time in the computer conditions and cooperated better than those using the traditional book method. CAT can work as a distraction from self-stimulatory and obsessive behaviours, thereby increasing the time spent engaging with the presented material.

In a large-scale randomized control study, Whalen et al. (2010) examined the efficacy of TeachTown Basics, a computerized educational software, versus a non-CAT approach. Forty-seven young students participated, half the students receiving the program for 20 minutes per day over a 3-month period, while the other half acted as controls. TeachTown Basics uses the basic principles of ABA to teach skills in four areas (receptive language, social understanding, life skills, and academic/cognitive skills). Compared to the controls, the preschool students displayed larger increases in their receptive vocabulary size, while the kindergarten-1st grade students had the same receptive vocabulary size in control and treatment groups. However, all participants in the treatment group showed improvements in social and cognitive abilities, measured by the

Brigance Inventory of Early Development in correlation with the number of TeachTown lessons completed (Whalen et al., 2010). The generally positive effects associated with this CAT approach highlight the possibilities of its use addressing some of the core challenges of ASD.

In recent years, reviews have surfaced examining dozens of studies in the academic, social, and communication area of need for students with ASD (for a review see Ploog, Scharf, Nelson, & Brooks, 2013; Ramdoss et al., 2011; Ramdoss et al., 2012; Wainer & Ingersoll, 2011). Similar to individual studies, conclusions suggest positive results across domains and deem CAT to be a promising practice for students with ASD. Ramdoss et al. (2011) reviewed 10 studies related to the use of CAT in teaching communication skills to children with ASD. Studies included a combination of researcher developed and mass-produced software. All studies reported improvements on communication related variables, signifying CAT could be considered a favorable practice for students with ASD (Ramdoss et al., 2011). However, the authors caution that specialized interventions created by researchers need to be well designed and effective at promoting generalization (Ramdoss et al., 2011).

In another review of how CAT can improve social and emotional skills, Ramdoss et al. (2012) found that although there was a variation of effect sizes, outcomes related to social skills were always positive. They further suggest studies involving researcher-developed measures had larger effect sizes compared to studies with standardized measures that showed smaller effect sizes. This indicates students might respond better to individualized age appropriate software than using one size fit all models. Indeed, motivation and generalization also increase when age appropriate relevant social situations are included in the CAT training (Ramdoss et al., 2012).

Another way to target the generalization of new skills is through the use of virtual reality. Virtual reality allows the user to practice and trouble-shoot the newly acquired skills in a safe

and controlled environment that closely resembles real life (Bolte, Golan, Goodwin, & Zwaigenbaum, 2010). Wainer and Ingersoll (2011) examined the use of an innovative computer technology to teach social and communication skills to students with ASD. They identified 14 studies that used original technology such as interactive computer programs and virtual reality to teach language, emotional recognition or social skills. All 14 studies reported positive findings; many participants found the use of the computer motivating and rewarding, and one third of the studies provided evidence of participants using the new skills in natural or novel environments (Wainer & Ingersoll, 2011). Although further research is required to encompass the effect of participant characteristics, larger and more diverse sample sizes, and to identify the impact of individual factors independently, CAT is a promising strategy for students with ASD (Wainer & Ingersoll, 2011).

Overall, the evolving field of CAT has thus far demonstrated positive results in the areas of language, social skills, and cognitive abilities for students with ASD. Although available in plentiful formats, CAT provides a number of advantages that are critical for this population. First, interventions can be individualized while at the same time be consistent and predictable (Whalen et al., 2010). Then, computers are motivating and rewarding and thus decrease challenging behaviours while increasing attention to the lesson at hand (Whalen et al., 2010). Finally, computers offer rich data, allowing the teacher or parent to ascertain which parts of the intervention where effective and ineffective (Whalen et al., 2010). Over time, CAT may play a critical role in the classrooms and homes of students with ASD.

A critical question arises about the effectiveness of CAT as compared to traditional teaching methods. Thus far, research is pointing to a model where the presence of an adult not only results in increasing the target skill but also focuses on the area of skill generalization. For

example, Sansosti and Powell-Smith (2008) used individualized computerized Social Stories presented on Microsoft PowerPoint with a video model for three students with High Functioning Autism (HFA). Two students required treatment modification in the form of teacher prompting and child partners when they experienced skill regression after some improvement. Results showed that computer-presented Social Stories, video models, teacher prompting and child partners were successful in increasing participant specific social communication skills (Sansosti & Powell-Smith, 2008).

Further, Lacava, Rankin, Mahlios, Cook, and Simpson (2010) examined the use of emotional recognition software, *Mind Reading: The Interactive Guide to Emotions*, with the aid of an adult tutor to teach social interaction skills and emotional recognition to students with ASD. Students used the software for 7 to 10 weeks and the adult tutor assisted them in using all parts of the program, provided support as needed, and performed a variety of activities associated with emotions. Results showed that all participants increased their emotional recognition scores on basic and complex tasks and their positive social interactions (Lacava et al., 2010). They propose that the increase in scores and positive social interactions can be credited, in part, to the presence of a tutor working with the students.

Many studies have shown that while students with ASD acquire the target skill in clinical settings, these skills are rarely generalized over other contexts (Golan et al., 2007). The involvement of an adult (teacher, parent) may be critical in carrying the new skill set to real life scenarios. CAT is effective when used in combination with adult tutoring or as part of a group activity, both that encourages generalization to daily life and motivation to participate (Golan et al., 2007; Ramdoss et al., 2012). Wainer and Ingersoll (2011) concluded that the presence of a parent, teacher or tutor might be necessary to teach refined social skills when using CAT.

Meanwhile, Coleman-Martin et al. (2005) found that teacher instruction with the addition of CAT resulted in higher scores than using CAT only, when teaching reading skills. Finally, in the Beaumont and Sofronoff's (2008) study, students played the Junior Detective Computer game with their parents and then immediately after received group therapy in small groups for seven consecutive weeks. Sessions consisted of practicing emotional recognition and social skills with peers and learning the steps for dealing with bullying and making mistakes, as well as playing and talking with peers. Participants made significant treatment gains in social functioning. Although the multi-component factor makes it difficult to ascertain which exact features led to positive treatment gains, children using CAT with a parent present played a contributing role (Beaumont & Sofronoff, 2008).

Although most studies report significant positive finding when it comes to computerized social and communication interventions, the field is still in its exploratory phase. As such, many studies in this area of "budding new science" (Ploog et al., 2013, p. 302) are highly descriptive in nature and have methodological limitations that make it challenging to conduct a rigorous assessment of the efficacy of the programs (Wainer & Ingersoll, 2011). Nonetheless, the promise of CAT as an effective practice for students with ASD warrants further investigation, especially in the area of social skills.

PEERS® Program

The PEERS® program is a parent-assisted program that works with middle and high school teens that find making and keeping friends challenging. It is an extension of the Children's Friendship Training program (Frankel & Myatt, 2003). PEERS® involves 14 weeks of separate sessions for parents and teens, running on a weekly basis for 90 minutes (Laugeson & Frankel, 2010).

In Laugeson et al.'s (2009) first study examining the PEERS® program, 33 teens with ASD where randomly assigned to treatment or the delayed treatment group (DT). Results showed that teens in the treatment group showed significant improvement in rules of social etiquette, increased hosted peer get-togethers and overall improvement in their social skills as reported by parents (Laugeson et al., 2009). In a replication study (Laugeson et al., 2012), 28 teens were assigned to treatment or DT with three assessment points. Baseline was assessed at week 1 (T1), after the 14-week intervention at week 14 (T2) and 14 weeks after the intervention at week 28 (T3). Results indicated improved social skills, increased social skills knowledge, increase of hosted get-togethers as well as a decrease in ASD symptoms related to social responsiveness. A 14-week follow up assessment revealed that teens maintained most of their new skills with the exception of social cognition. Findings from these studies indicate the PEERS® program leads to progress in developing friendship skills for teens with ASD (Laugeson & Frankel, 2010). Further, these studies also highlight the role of parents as social coaches who may have promoted and reinforced the skills learned even after the treatment (Laugeson et al., 2012).

To address the failure in maintaining social cognition during follow-up and investigate the long-term treatment gains, Mandelberg et al. (2014) evaluated the long-term outcomes of teens 1-5 years (mean= 29.3 months) after the completion of the PEERS® program. Results indicate most new skills learned in the program were maintained at long-term follow up; increase in social skills knowledge, increase in the frequency of get-togethers and a decrease in problem behaviours. One of the long terms goals of PEERS® is to have teens use social skills independently and appropriately with the goal of developing meaningful relationships. Positive long-term results may indicate parents are continuing to support teens by providing opportunities

to practice social skills through organized get-togethers or enrollment in extracurricular activities well beyond the completion of the program (Mandelberg et al., 2014).

On the opposite end, Chang et al. (2014) investigated the predicator of positive social outcome for the PEERS® and determined that teens with higher baseline social skills as reported by parents and lower self-perceived social functioning exhibited greater improvement in social skills post intervention. This indicates that teens need to have a minimal social skill set in order to complete the weekly socialization homework and practice the new social skills taught. Further, teens that are aware of their social skill deficits may be more motivated to learn these skills that will enable better social interactions with their peers (Chang et al., 2014).

Laugeson, Gantman, Kapp, Orenski, and Ellingsen (2015) provided the PEERS® for Young Adults program to twenty-two young adults, ages 18-24, randomly assisted to treatment or delayed treatment. Findings indicate there was significant improvement in multiple areas including social skills knowledge; increased social engagement through get-togethers and a decrease in problem behaviours, with gains maintained for most skills at the 16 weeks follow up. Again, findings underline the effectiveness of a program where caregiver involvement has supported the improvement of social skills (Laugeson et al., 2015). This study replicated Gantman, Kapp, Orenski, and Laugeson's (2012) study where similar study parameters resulted in increase in cooperative social behaviour, social assertiveness and self-control as measured by the *Social Skills Rating System (SSRS).* Increased social responsiveness and decreased problematic behaviours as measured by the *Social Responsiveness Scale (SRS)* were further observed. Finally, caregivers noted increased get-togethers; both hosted and invited.

Research has been conducted examining a number of different factors related to PEERS®, such as social, emotional and behavioural functioning (Lordo et al., 2017), parental and family

outcomes (Karst et al., 2015), independent replications (Schohl et al., 2014) and cross-cultural efficiency (Yoo et al., 2014). Lordo et al. (2017) examined the effects of PEERS® on the social, emotional and behavioural functioning of teens with ASD and concluded that participating teens showed lower levels of aggression, anxiety and withdrawal while at the same time exhibiting better adaptability, leadership skills and participation in day-to-day life after completing the intervention. Parent reports also showed a significant improvement in emotional responsiveness and symptoms of anxiety. Karst et al. (2015) found that the PEERS® intervention may have a positive effect on the family environment through decreasing family chaos and increasing parenting self-efficacy. In a critical study of intervention replication, Schohl et al. (2014) tested the effectiveness of the PEERS® program targeting numerous study limitations from the first PEERS® trial (Laugeson et al., 2009). This study used a stronger diagnostic measure, included more teacher reports and examined how PEERS® influenced social anxiety. Fifty-eight teens were assigned to treatment of waitlist and results pointed in improvement in 7 of 14 outcome measures (Schohl et al., 2014). There was an increase in hosted and invited get-togethers, an increase but not significance in general social skills as reported by the parents and teachers, and finally a decrease in social anxiety symptoms and problem behaviours. In general, these independent findings support previous research (e.g., Laugeson et al., 2009; Laugeson et al., 2012) highlighting the positive outcomes associated with the PEERS® program.

Finally, Yoo et al. (2014) examined the effectiveness of PEERS® on 47 Korean teens, divided among treatment and waitlist and assessed at three different time frames; baseline, post intervention and three months after treatment. Findings parallel those from previous PEERS® studies (Laugeson et al., 2009; Laugeson et al., 2012; Mandelburg et al., 2014) and include significant improvements in language, communication and social interaction on the Autism

Diagnostic Observation Schedule (ADOS) as well as anxiety and depression, mostly maintained at follow-up.

Taking a new approach to evaluating PEERS®, Dolan et al. (2016) examined its effects by looking at 10 minute social interaction between teens with ASD and typically developing adolescents pre- and post-treatment. Results demonstrated significant improvements in vocal expressiveness, knowledge of PEERS® concepts and an upward trend towards overall quality of rapport. Vocal expressiveness is related to the ability to vary one's own vocal tone to express ideas or emotions, pointing to the possibility that post-treatment teens felt more at ease during their peer interactions (Dolan et al., 2016). Improvements in quality of rapport indicate teens improved in their ability to have a reciprocal conversation, including topic changes and conversation maintenance (Dolan et al., 2016). This study suggests PEERS® increased social knowledge and is moving towards generalizability as teens implemented their newly learned skills.

Through numerous studies, PEERS® has been established as an evidence-based intervention for teens with ASD, with overall positive short and long-term outcomes in relation to social skill deficits. As a whole, PEERS® studies employed a higher quality with results indicating improvements in social interaction, social skills knowledge and friendship quality potentially leading to improvements in mental health and friendships in general (Hotton & Coles, 2016). Studies of the PEERS® program have been mostly favorable, with some indication that at long-term follow up not all new skills were maintained and that there is a lack of recorded generalizability and much needed teacher feedback.

Present study

Problem statement

The provided review emphasizes that further work remains to be done to better meet the needs of teens with ASD in the social skills realm. As adolescence is an unpredictable period of development, finding appropriate social skills interventions during this stage is critical to decrease later hardships. Furthermore, parental involvement seems to be a key component of achieving successful treatment outcomes. Thus, making it beneficial for both parties to have parents actively involved when dealing with ASD and social skill deficits. Finally, although research in the field of how computer assisted technology (CAT) can impact the acquisition of social skills often lacks scientific-methodological rigor, a well-designed CAT can be beneficial in helping teens learn skills independently and with accuracy (Ploog et al., 2013).

The present study is part of a larger investigation on the UCLA Program for the Education and Enrichment of Relational Skills (PEERS®), a parent-assisted program for teens with roots in cognitive behavioural therapy, and only procedures relevant to the current study are discussed. The efficacy of an 8 week condensed review session based on the original intervention was examined through a pre- and post-test study design. A computer-based element in conjunction with a group activity was added to promote motivation and generalization. Since the ASD profile is well matched with "systems-oriented visual technologies" (Golan et al., 2007, p. 126), using a computer to target social skill deficits may be an advantageous strategy.

In the current study, the participants meet once a week over an 8-week period to cover and review topics that were chosen in combination based on separate parent and teen surveys in a previous PEERS® session (winter/spring 2016) and on areas that proved difficult for the teens during those sessions. The topics covered under this study were: two-way conversation,

electronic communication, appropriate friends, appropriate use of humour, entering a conversation, exiting a conversation, teasing and embarrassing feedback, and rumours and gossip.

Based on the PEERS® program, the focused 8-week follow up intervention with a computer element was provided to students who had already received the full 14-week program. Teacher reports were collected at both pre and post test periods to increase validity of the results and examine generalizability. Teacher reports also allowed us to corroborate the parental feedback on the efficacy of the intervention. Providing a focused follow up allowed for a better understanding of how students are affected with repeated information and additionally review and evaluate the role of technology in the PEERS® intervention.

The research question for this study were as follows:

1. What effects does participating in a focused follow up PEERS® program have on the social skills, social skills knowledge and get-togethers of teens with ASD, as reported by their parents and teens themselves?
2. What impact does the use of weekly at home computer review sessions have on the social skills of teens with ASD?
3. Does repeating critical PEERS® topics affect the results compared to previous findings in those areas?
4. Does the use of visual aids (i.e.. PowerPoint slides) and videos during the sessions impact student motivation to participate and attention?
5. What is the relationship between teacher and parent reports?

The previous research on the PEERS® program (Gantman et al., 2012; Laugeson et al., 2015; Laugeson et al., 2012; Mandelberg et al., 2014; Schohl et al., 2014; Van Hecke et al., 2013; Yoo et al., 2014) permitted the following expected outcomes for this study.

In line with previous research, it was expected that results would suggest improvements in social skills, social skill knowledge and get-togethers. Further, it was anticipated that the length of the program (8 weeks) might result in lower rates of attrition than previous studies with no negative effects on results. Additionally, it was expected that the online component would increase participant motivation, due to the well-documented relationship between individual with ASD and computers. Lastly, the increased use of multimedia sources during the session was expected to further increase student attention and motivation to participate in discussions.

Methods

Participants

Inclusion criteria for teen participants included: (a) between 12 and 17 years of age, (b) past participant of the original 14-week PEERS® program, (c) experiencing social difficulties, (d) ASD diagnosis by a reliable mental health professional, (e) verbally fluent, (f) motivated to participate, (g) no prior history of major mental illness.

The participants were four ($N = 4$), 13-15-year-old teens ($M = 14.35$-years-old) diagnosed with ASD who had experienced social skills deficits as reported by the parents and who had participated in the previous Winter 2016, 14-week PEERS® session. The follow-up session started with five participants but one teen and parent duo stopped attending after the 3rd session for personal reasons and as such are not included in the analysis of this study. The mean Autism Spectrum score on the parent form of the SSIS-RS at pre-test for participants was 20 (refer to Figure 1 for individual scores). The Autism Spectrum subscale includes behaviours such as being

preoccupied with objects, repeating things over and over and not making eye contact when talking. Scores on the SSIS-RS above 14 on the Autism Spectrum subscale are considered above average and as such individuals with these scores are expected to exhibit above average behaviours related to autism (i.e., participant 1, 2 and 4). Scores below 14 are in the average range with individuals exhibiting an average level of behaviour related to autism (i.e., participant 3). All participants were male and came from two-parent households (100%). All participants attended either regular school programs or adapted programs in a number of schools in the Greater Montreal Area. As the parent group session is a mandatory component of PEERS®, there was always a minimum of four parents present during each session. No incentives to participate were given, however a "graduation party" at the end of the program at SkyTag with a pizza lunch included.

Participant	Age	Gender	Diagnosis (as reported by parents)	SSIS-RS Autism Score	Family Make-Up	Which parent attended sessions
1 (Ali)	14	Male	ASD	26	Bio Parents	Mom
2 (Arthur)	15	Male	PDD-NOS	20	Bio Parents	Mom
3 (Sam)	13	Male	ASD	12	Bio Parents	Mom
4 (Kevin)	14	Male	PDD-NOS	22	Bio Parents	Dad

Figure 1. Participant Demographic Information

Setting

The program took place in two classrooms assigned to the Centre for the Arts in Human Development (CAHD) in the Hingston Building on the Loyola Campus of Concordia University. The teen classroom was a large carpeted room with ample space to practice the requirements from the behavioural rehearsal activities and games. Two tables with chairs were set up in one half of the room. One small table held the projector and laptop for the PowerPoint presentation, which was projected onto a blank wall. Directly behind it, the large table had a chair for each of the teens and the research assistant. A table in the back with snacks and drinks was available for

teens after each session was completed. Parents met in a room beside the teen group room. The parent room had chairs placed around two attached tables to facilitate discussion and idea sharing during each session. Parents were also provided with refreshments during each session.

Research team

The research team included two graduate students and the main author. A research assistant who facilitated the winter 2016 PEERS® session led each parent group sessions according to the PEERS® manual and handouts created by the main author. A research assistant volunteer helped the main author facilitate the teen sessions by taking notes, participating in the behaviour rehearsal and overseeing small groups during the teen activity. The PEERS® manual was followed for all aspects of the program with the exception of homework, where teens were responsible for the online component as well as the PEERS® specific homework.

Measures

Families who had participated in the winter 2016 PEERS® study were contacted to ascertain their interest and availability. Families filled out an application form to take part in the intervention (See Appendix A for the Application form for PEERS® program). Parents provided written informed consent; teens also provided written consent to all procedures.

Teens and parents were given separate consent forms prior to beginning the program (See Appendix B for Parent Consent Form). During the Welcome Back session, teens were taken into another room and the teen consent form describing the purpose, the program and asking if they wanted to participate was read out to each individual teen. Teens were asked to provide oral consent if they agreed to participate in the program and assured that their participation was on a voluntary basis and they could stop at any point of the program without penalties. Separately,

parents were provided all the necessary details of the program and asked to give written consent on behalf of their teen since they were minors.

Primary outcome measures included self-report, parent and teacher rated questionnaires assessing social skills, problem behaviours and social knowledge. Parents also completed one post-participation questionnaire with a focus on the computer component to gain insight about their views in the PEERS® follow-up with a computer component (See Appendix C).

Social Skills Improvement System-Rating Scales (SSIS-RS). Changes in social skills were measured using the *Social Skills Improvement System-Rating Scales* (SSIS-RS; Gresham & Elliot, 2008). The SSIS-RS is formally known as the Social Skills Rating Scale (SSRS; Gresham & Elliot, 1990) and intended to assist in classifying and screening students who exhibit significant social skill deficits. The SSIS-RS highlights specific social skills deficits for individual teens in the program, as well as, demonstrates any improvements of the skills learned after the treatment.

Parents and teens provided assessment information at two intervals: (1) first program session, and (2) during the last program session, while teachers were mailed assessments and asked to complete them prior to the first program session and immediately after the last program session. The 75-item rating scale takes about 15 minutes and is typically used for teens between the ages of 13 and 18 (Crosby, 2011; McVey et al., 2016). Teachers and parents provided frequency-based rating from “never” to “almost always”, written at fifth-grade level readability. Items on the teen questionnaire use a 4-point scale from “not true” to “very true” and are written at below the second-grade level readability (Crosby, 2011). In addition, a 3-point importance rating is used to assess which areas require urgent intervention (Gresham, Elliot, Vance, & Cook, 2011).

Raters provided scores in two areas of the SSIS-RS, Social Skills scale and the Problem Behaviours scale. Social Skills scale includes subscales of communication, cooperation, assertion, responsibility, empathy, engagement and self-control. For example the parent form included questions such as, "takes turns in conversations" and "expresses feelings when wronged." The student form includes questions such as, "I feel bad when others are sad" and "I stay calm when I am teased." The Problem Behaviour scale includes subscales of externalizing, internalizing, hyperactivity/inattention, autism spectrum, and bullying. For example, questions on the parent form include, "forces others to act against their will" and "has difficulty waiting for turn." The student form includes question such as, "I'm afraid of a lot of things" and "I often do things without thinking." The teacher scale also included an Academic Competence scale where general academic functioning is measured (Gresham et al., 2011). For example, teachers are asked, "This student's overall motivation to succeed academically is…" and "more specifically "In mathematics, how does this student compare with other students?" Higher scores on the Social Skills scale show better social skills, while lower scores on the Problem Behaviour show better behavioural performance.

Median alpha values are in the mid- to upper- .90s for all three scales (Social Skills, Problem Behaviour, and Academic Competence). Median reliabilities are in the .80s for both the parent and teacher form and near .80 for the student section (Gresham et al., 2011). Test-retest reliability median values are in the .80s for the Social Skills and Problem Behaviour subscales across teacher, parent and students forms, while the Academic Competence scale is .92 for the teacher form (Gresham et al., 2011). Content validity was established by using content guidelines and key terms/items for the development of the Social Skills scale. The *DSM-IV-TR* and individual expertise were used to develop the Problem Behaviours Scale. Statistical analyses was

used to retain only items with moderate to strong relationship with their respective subscale (Crosby, 2011).

The Quality of Play Questionnaire. The frequency of peer get-togethers and the level of conflict involved in these get-togethers were assessed by *The Quality of Play Questionnaire* (QPQ; Frankel & Mintz, 2008) (See Appendix D and E). The 12-item QPQ was given to teens and parents during the first and last program session and took about two to three minutes to complete. Two items ask about the estimated number of hosted and invited get-togethers in the last months while ten items make up the Conflict Scale and ask about peer conflict during those get-togethers. Raters rate items as either "not at all," "just a little true," "pretty much true," or "very much true," with higher scores showing more conflict and vice versa (Laugeson et al., 2012, p. 1028). The scale was developed through factor analysis on 175 boys and girls and has a coefficient alpha of .87 for the Conflict Scale. Spearman correlations were .55 for the Conflict Scale and .99 for frequency of hosted and invited get-togethers between parents and teens at baseline in the Laugeson et al. (2009) study.

Test of Adolescent Social Skills Knowledge-Revised. Teen knowledge of social skills taught during the program was assessed using the *Test of Adolescent Social Skills Knowledge-Revised* (TASSK-R; Laugeson & Frankel; 2010) (See Appendix F). The TASSK-R includes sentence stems from the didactic lessons whereby teens have to choose the best option from two choices. Teens completed this measure during the last program session. With the authors' permission, the original 26-item measure was modified to fit the program content taught during this 8-week intervention to include 16 items. Two items are derived from each of the 8 didactic lessons, with scores ranging from 0 to 16 and higher scores indicating greater knowledge of the taught material. Coefficient alpha for the original TASSK was moderate at .56 (Laugeson et al., 2009).

According to the authors, the moderate level of internal consistency is a reflection of the large domain of questions asked and thus acceptable (Laugeson et al., 2009).

Procedure

Pre-test and post-test: The pre-test was given to both the parents and teens at a Welcome Back meeting. A research assistant volunteer and the main author worked with teens to ensure verbal consent to the study, answered any initial questions and read instructions to the given questionnaires. Main teachers were contacted prior to the meeting and their participation was requested in the study. Pre-test measures and an introductory letter were given to parents in sealed envelopes to forward to participating teachers. The post-test were completed at the end of the intervention. Parents and teens again completed post-test questionnaires in separate quiet rooms. The teen group leader and research assistant volunteer were available to teens to answer questions and read instructions.

Youth sessions: Teens attended the program session every week for 10 weeks, including one Welcome Back meeting, 8 weeks of intervention and one graduation party. The PEERS® manual was followed for each session with the addition of visual support through the use of PowerPoint presentations and videos as well as an icebreaker activity at the beginning of class to generate participation and increase teens' comfort level. For each session, the manual outlined the concepts, activities, and homework that should be covered. Homework was added to each session via the computer component. Each session followed a consistent format: introduction, icebreaker, homework review, didactic lesson, behaviour rehearsal and teen activity, homework (PEERS® and computer component), snack and gathering with parents (See Appendix G for overview of the lesson plan).

Computer Component: A PEERS® website (www.peerscraft.com) was created by the main author and a web developer for the purpose of this study, which students accessed on a weekly basis. During the Welcome Back session teens chose their personal usernames and passwords and were shown how to access the website and login section. Each week there were two computer tasks for teens to complete in collaboration with their parents. First, they reviewed the weekly PowerPoint from class and answered a 10-question multiple-choice quiz based on the information covered that week. Teens were directed to review the learned rules with their parents by reviewing the PowerPoint that was uploaded to the website, having a discussion as needed, and then complete the quiz independently. The quizzes were directly submitted to the author for assessment and teens were encouraged to attempt the quiz as many times as needed to get a better score. The second aspect involved more direct participation of the parent. Ramdoss et al. (2012) suggest that computer based interventions be used in combination with adult tutors. Teens were asked to complete and hand in a variety of mini assignments such as writing their experiences, problem-solving relevant scenarios and identifying character mistakes based on the lesson. Work submitted by the teens was reviewed to ascertain which concepts/rules require reinforcement at the beginning of the next class. Parents were strongly encouraged to be present alongside their teen in order to offer relevant examples and troubleshoot potential areas of misunderstanding and provide guidance as needed.

Website Development: The www.peerscraft.com website was created using Flask, a micro web framework written in Python. Armin Ronacher developed Flask with the main objective of keeping the web application's core simple yet scalable. The users database is a simple SQlite database that consists of one table, "users", to store the users' credentials. This database ensured that only the students that participated in the PEERS® follow-up program were

allowed to login to the website. The web pages were implemented using html5 and the various bootstrap CSS (cascading style sheets) templates. Bootstrap is an open-source front-end web framework that contains design templates for various interface components. The website also employs an additional open-source library, JQuery, to manipulate the Document Object Model (DOM) elements. The weekly assignments and quizzes are designed using two respective layout templates, and the presentations stored on OneDrive. The presentations, assignments and quizzes were available throughout the program on a weekly basis. Once uploaded, they were accessible at all times, with no hard deadline imposed. Finally, the website is hosted on pythonanywhere.com, a web hosting service that provides in-browser access to server-based Python application.

Welcome Back Session: Teens and parents gathered in the parent room with snacks and refreshments. The main author presented all the necessary details about the intervention, the weekly activities as well as the website and answered any questions. Parents and teens then split into their respective groups (teens moving to the teen classroom with the main author and research assistant volunteer) and completed all pretest measures as mentioned above.

Session 1: Two-way conversations. In the first lesson, teens learned the rules for having a two-way conversation. They learned the importance of trading information to find common interests, answering their own questions and asking open-ended questions, sharing the conversation, not being repetitive or acting like an interviewer and not getting too personal at first. Body awareness was also discussed through the use of eye contact, volume control and body boundaries. Students received homework assignments after engaging in role-play and a teen activity.

Homework from the PEERS® manual included a 5-10 minute in-group (teens participating in the PEERS follow-up) call. For the computer component, teens reviewed the rules for having a two-way conversation with their parents, completed a 10 question quiz on the website independently and then discussed two age appropriate social scenarios with their parents (Appendix H). For each scenario, they identified three mistakes the characters made according to the two-conversation rules.

Session 2: Electronic Communication. This session helped teens learn the appropriate uses of electronic communication such as phone calls, sending email, text messages and social media. They learned strategies such as having a "cover story" when you are calling, avoiding "cold calling" (i.e. when you were not given someone's contact information but you still call/contact them), and the "two-message rule" (do not leave more than two messages in row for someone you are trying to reach). Finally teens were advised not to get too personal, as information shared over electronic communication is not entirely private. Cyber bullying and making friends over the Internet were also discussed in brief.

PEERS® homework included making an in-group call. Computer homework included a review of learned rules and a 10 question quiz on the website. Furthermore, teens read two Snapchat messages and identified the mistakes each character made (Appendix I).

Session 3: Choosing Appropriate Friends. In this session teens learned how to understand the function and social meaning of crowds, and how to identify appropriate sources of friends. Teens identified how they know whether they have been accepted or not accepted by a group and how to identify which social group they fit into best.

For homework teens were instructed to place an in-group and out-group (someone outside of the PEERS group) call, try to find a new group that they do not normally hang out

with to trade information, and bring a personal item they could share with their peers. For the computer portion, teens reviewed concepts taught in class, did a 10-question quiz independently, and wrote the beginning of a good phone conversation, either one they've had or would like to have using the rules from Session 2 on how to start a conversation (Appendix J).

Session 4: Appropriate Use of Humour. Teens learned the rules for the appropriate use of humor when trying to make and keep friends. They learned not to repeat jokes, use age appropriate humor, avoid insult, inside and dirty jokes and to be serious when they first meet someone. They were encouraged to pay attention to their humor feedback (i.e. how people react to their jokes) and distinguish between peers laughing at them and peers laughing with them. For the teen activity, teens traded information in pairs about their personal items.

For homework, teens were instructed to pay attention to their humor feedback, make an in-group and out-group call, trade information with someone from a new group and bring a personal item. The computer component encompassed reviewing concepts taught in class and doing a 10-question quiz. Teens searched and found two jokes they were comfortable telling in class and which followed the given joke guidelines from the lesson (Appendix K).

Session 5: Entering and Exiting a Conversation. Teens focused on learning the steps involved for slipping into a group conversation and identifying good places and times to make new friends. The complex social behaviour was broken down into three main steps; watch/listen, wait, and join. Teens discussed concrete strategies for dealing with peer rejection during conversation entry. For slipping out of conversations, teens identified reasons for being turned down and how to tell if the group is interested in talking to them. Then they were guided through the four steps (keep your cool, look away, turn away, walk away) for exiting a

conversation. During the teen activity, three teens traded information about their personal items while the other teen attempted to slip into their conversation using the rules learned from class.

For homework, teens placed an in-group and out-group call as well as practiced slipping into a conversation with two peers they felt comfortable with. The computer components asked teens to review rules for slipping in and out of conversations and do a 10-question quiz as well as write up their specific experience with slipping into or out of a conversation (Appendix L).

Session 6: Teasing and Embarrassing Feedback. Teens learned strategies to deal with teasing, specifically verbal aggression from peers. For clarity, teasing referred to verbal attacks and bullying referred to physical attacks from peers. Teens learned "tease-the-tease" comebacks that show the teaser they do not care about what is being said. Tease-the-tease involves having an attitude, acting like you do not care and giving a brief comeback.

For homework, teens organized a get-together by placing an out-of group call and practiced using the tease-the-tease technique if they are being teased. Using the website, teens reviewed the weekly lesson and did a 10 question quiz. With their parents they discussed two relevant scenarios and provided advice and specific steps as to what the characters should do and say when experiencing teasing (Appendix M).

Session 7: Rumour and Gossip. The goal of this session was to give teens strategies for dealing with situations where they are the target of rumours and gossip. Teens learned that confronting those who spread the rumours is often ineffective and it is better to "act amazed" at such a silly idea. They were taught how to discredit the rumour and its source by spreading a rumour about themselves. This consists of acknowledging the current rumour and then spreading a new one about how silly the current rumour is, thereby discrediting the person who spread it in the first place.

For homework, teens organized a final get-together, which included a phone call to plan the get-together. They reviewed the weekly lesson and did a 10-question quiz online. Finally, with their parents, they gave advice to a character that was experiencing rumours in school (Appendix N).

Session 8: Review and Post Test Measures. In the last session, teens reviewed all concepts and rules taught over the course of the program through PowerPoint, asked questions related to the material or sought advice about a specific situation they were facing. Teens then filled out all post-test measures as mentioned above and discussed details regarding their graduation party.

Session 9: Graduation Party: Teens and their parents met the main author, research assistant, research assistant volunteer and study supervisor at SkyTag. Teens participated in an hour and a half on jumping on the trampolines, a game of laser tag and a pizza lunch.

Parent sessions. The parents attended the program session every week for 10 weeks, including one Welcome Back meeting and one graduation party. Parent sessions followed the same topics as youth sessions with a larger focus on homework completion and were led by an experienced group leader. The parent sessions followed the same consistent format throughout: introduction, homework review and troubleshooting areas of concern, review of the week's PowerPoint and parent handout, PEERS® and computer homework explanation and visuals on a laptop computer.

Session 1: Two-way conversations. The purpose of the first session was to familiarize parents with the structure of the group, outline the expectations for treatment and highlight the importance of homework completion. As such, the didactic lesson itself was brief. Parents were first introduced to the purpose of the group, the structure of the parent sessions and the structure of the youth sessions. Then they were informed of the core concepts the teens would be covering.

Parents were provided with the information on the goals and rules of a two-way conversation and possible sources where youths may find friends through a parent handout on this topic. The homework assignment for the following week was reviewed with special focus on the computer component. The group leader guided the parents through the PEERS® website, including signing in, reviewing the weekly posted PowerPoint notes, and accessing the quiz and homework assignments.

Session 2: Electronic Communication. The focus of this session was how to effectively navigate different forms of electronic communication. First the group leader reviewed the previous session's homework. Then parents learned about choosing appropriate friends for the teens as well as rules for phone calls, text messages, emails and Internet usage. The homework assignment for the following week was reviewed. Parents were also required to identify and investigate at least one new extracurricular activity and identify which group their teen attempted to fit in with and which group they believe the teen would best fit in with.

Session 3: Choosing Appropriate Friends. In this session parents continued the conversation about choosing appropriate friends. First the group leader reviewed the homework from last week. Then the week's lesson covered the importance of having a crowd or cliqué and how to help teens develop friendships within peer groups. There was a strong focus on the importance of extracurricular activities at school or in the community to help foster these friendships. Finally, homework for the next week was discussed. Parents were required to help teens choose an appropriate group to try and make friends and discuss possible extracurricular activities the teen would like to join.

Session 4: Appropriate Use of Humour. This session was focused on humour. Teens with ASD often have a difficult time understanding humour and jokes (Emerich, Creaghead, Grether,

Murry, & Grasha, 2003), although many enjoy joke telling. This session highlighted the advantages of a parent-assisted approach. Once parents are informed about a topic they are more likely to intervene with a "teachable moment" that is meaningful and specific enough for the teen to understand. Parents were asked to assist their teen in paying attention to their humour feedback. The homework review focused on the out-of-group calls to ensure both the teen and the parents have established the friendship potential of the teen that was called. The group leader discussed the homework assignment for the next session and dealt with any possible problems.

Session 5: Entering and Exiting a Conversation. First the group leader reviewed the homework from the previous week. Then this session focused on helping the teen slip in and out of conversation with an appropriate social group. The goal was to help parents and teens find the crowd they intend to join, as this increases chances of successful friendships and entry into conversations. Parents also discussed how teens should exit an unsuccessful conversation with minimal negative social impact. The group leader went over the homework assignment for the next session and reviewed any possible problems.

Session 6: Teasing and Embarrassing Feedback. Homework review focused on the teen's experiences with slipping into conversations. The purpose of this session was to differentiate between teasing and embarrassing feedback, while establishing effective strategies to dealing with both. The terms teasing and bullying were defined to parents and teens to avoid confusion. The tease-the-tease technique was taught to teens as an effective way to handle being verbally teased. Homework assignment for the next session involved the teen having a friend over for a get-together. The group leader provided important details about the get-together such as the importance of parents monitoring from a distance, the get-together should be activity based and limited to about two hours.

Session 7: Rumour and Gossip. The homework review concentrated on get-togethers. This session was focused on how to appropriately manage rumours and gossip. Gossip gives information about the mishaps of others and is a very common form of communication among teens. Rumours are negative information about someone and usually begin as gossip. Research has suggested that denial is the best way to dispel the negative effects of rumours and as such teens are taught not to confront their originator of the gossip but to "spread a rumour about themselves." For example, in the presence of other people teens can say, "Have you heard about this rumour going around about me? It's crazy what some people will believe!" For the homework aspect, there was another get-together and details of the PEERS® graduation party were discussed.

Session 8: Review and Post-test Measures. During the final session parents discussed the get-togethers and reviewed the parent handout that outlined all previous taught concepts of the PEERS® follow-up program. Enough time was set aside to administer post-program outcome measures.

Results

Efficacy of Intervention

The teens and parents completed the SSIS-RS, QPQ and the TASSK (teens only) forms at pre- and post-test to determine the effectiveness of the PEERS® follow-up program on social skills, get-togethers, and social skill knowledge. Given the number of participants (N=4), the raw scores from the questionnaires were used as qualitative descriptive information and each research questions will be addressed in case study format to illustrate individual change and discuss group dynamics.

Social Skills

Question number one asks what effects does participating in a focused follow up PEERS® program have on the social skills, social skills knowledge and get-togethers of teens with ASD, as reported by their parents and teens themselves. This question is answered by examining the social skills and problem behaviour ratings on the SSIS-RS parent and student forms, the QPQ parent and student form and the TASSK.

Descriptive statistics were used to analyze the results of the SSIS-RS according to the respondents, student form and parent form. Means and raw scores were used to highlight the changes from pre- to post-test in both the Social Skills and Problem Behaviours Subscales. Below, the results of each participating teen will be described. All names are pseudonyms.

Ali: Table 1 highlights the mean scores of social skills and problem behaviours on SSIS-RS for both Ali (student) and Candice (mom). The mean score decreased from pre- to post-test on the student form and increased on the parent form for the Social Skills subscale. More specifically Ali rated himself as below average on communication, assertion, empathy and engagement and average on cooperation, responsibility and self-control during the pre-test. At post-test there was a significant increase in communication and engagement from below average to average indicating an increase in positive behaviours associated with making eye contact, inviting others to join activities, making friends and introducing himself to others. Although there was a decrease in responsibility from average to below average, the raw score changed by 1 from 11 to 10 indicating minimal change.

On the Social Skills subscale at pre-test, Candice scored Ali as below average on communication, assertion, empathy, and engagement and average on cooperation, responsibility, and self-control. At post-test, Candice scored Ali as below average only on communication and

engagement and increased or stayed the same at average on cooperation, assertion, responsibility, empathy, and self-control, representing positive change in social skills behaviour. A significant positive change was seen in assertion and empathy, indicating Candice may have observed Ali asking for help when needed, informing the mom when there's a problem, trying to comfort others and/or feeling bad when others are sad. All raw scores increased from pre-test to post-test on the parent form for the social skills subscale.

Table 1
Mean Scores of Social Skills and Problem Behaviours on SSIS-RS Student and Parent Forms – Ali

	Social Skills		Problem Behaviours	
	Pre-test	Post-test	Pre-test	Post-test
Student	9.86	9.29	9.75	7.50
Parent	9.86	11.86	7.25	4.25

On the Problem Behaviours subscale the mean score decreased on both the student and parent forms. Ali rated himself as average on externalizing, bullying, hyperactivity/inattention and above average on internalizing at pre-test. On the post-test, all subscales were average with lower raw scores. The raw score on the internalizing subscale decreased from 14 at pre-test to 9 at post-test demonstrating a significant decrease in behaviours associated with withdrawing from others, acting sad, and having low energy.

On the Problem Behaviours subscale at pre-test, Candice scored Ali as average on externalizing and bullying and above average on hyperactivity/inattention and internalizing. At post-test hyperactivity/inattention and internalizing decreased significantly in raw scores (9 to 4 and 12 to 6 respectively) and were in the average behaviour level, indicating Candice may have observed less behaviour associated with acting without thinking, temper tantrums, withdrawing from others, acting sad or having low energy. Externalizing and bullying remained in the average behaviour level at post-test.

Arthur: Table 2 highlights the mean scores of social skills and problem behaviours on the SSIS-RS for both Arthur (student) and Nancy (parent). The mean score increased from pre- to post-test on both the student and parent form on the Social Skills subscale. More specifically, Arthur rated himself as average on all subscales of the Social Skills scale with the exception of engagement, which was below average. At post-test, all raw scores increased, although engagement remained at below average. The raw scores for engagement increased from 5 to 7 indicating some positive change.

At pretest Nancy scored Arthur as average on communication, cooperation, assertion, responsibility, but below average on empathy, engagement, and self-control. At post-test, all raw scores increased or remained the same with the exception of communication. Although there was a decrease in the communication subscale from average to below average, the raw score changed by 1 from 13 to 12, indicating minimal behavioural change. Empathy and self-control increased significantly from below average to average indicating a positive observed change in behaviours related to trying to comfort others, feeling bad when others are sad, staying calm when teased and using appropriate behaviour when upset.

Table 2
Mean Scores of Social Skills and Problem Behaviours on SSIS-RS Student and Parent Forms – Arthur

	Social Skills		Problem Behaviours	
	Pre-test	Post-test	Pre-test	Post-test
Student	11.43	12.14	4.00	3.25
Parent	10.43	11.29	5.00	5.00

On the Problem Behaviour subscale the mean score decreased on the student form and stayed the same on the parent form. Arthur rated himself as average on all four Problem Behaviour subscales at pretest. At post-test, three out of four subscales decreased in raw scores

(externalizing, bulling and internalizing) and all stayed in the average behaviour level. Hyperactivity/inattention increased by one point at post-test.

On the Problem Behaviour subscale at pretest, Nancy scored Arthur as average on externalizing, bullying, hyperactivity/inattention and above average on internalizing. At post-test, externalizing and bullying stayed the same, hyperactivity/inattention increased by one point and internalizing decreased by one point, indicating very little change.

Sam: Table 3 displays the mean scores of social skills and problem behaviours on SSIS-RS for both Sam (student) and Charlotte (parent). The mean score increased from pre- to post-test on both the student and parent form on the Social Skills subscale. Sam rated himself as average on all subscales of the Social Skills scale at pretest. At post-test self-control increased from 14 to 17 in raw score, from average to above average indicating positive behavioural change in the ability to stay calm when teased and using appropriate behaviour when upset. All other subscales remained at average with raw scores staying the same (e.g. cooperation, 17 at pre- and post-test) or increasing (e.g., communication, 13 to 15, assertion 13 to 16) representing maintenance of skills or positive change.

Charlotte rated Sam as below average on assertion and engagement, average on communication, cooperation, empathy, and self-control and above average on responsibility at pretest. At post-test six out of the seven subscales increased in raw scores. There was significant increase on the assertion (from 8 to 12) and engagement (from 9 to 13) subscale indicating Charlotte may have noticed an increased in positive behaviours associated with asking for help when needed, saying when there is a problem, inviting others to join in activities and introducing himself to others.

Table 3
Mean Scores of Social Skills and Problem Behaviours on SSIS-RS Student and Parent Forms – Sam

	Social Skills		Problem Behaviours	
	Pre-test	Post-test	Pre-test	Post-test
Student	15.14	15.43	5.75	3.75
Parent	13.14	14.00	9.50	5.75

On the Problem Behaviour subscale the mean score decreased on both the student and parent form. Sam rated himself average on all four subscales at pretest. All raw scores decreased at post-test, representing less behaviour associated with externalizing, hyperactivity/inattention, bullying, and internalizing.

Charlotte rated Sam as average on externalizing, bullying, and hyperactivity/inattention, but above average on internalizing at pretest. Raw scores decreased or remained the same at post-test, staying in the same behaviour levels throughout. Although internalizing remained at above average at post-test, there was a large decrease in raw score from 15 to 10, indicating Charlotte may have observed less behaviours associated with withdrawing from others, acting sad and having low energy.

Kevin: Table 4 displays the mean scores of social skills and problem behaviours on SSIS-RS for both Kevin (student) and Paul (parent). The mean score increased from pre- to post-test on both the student and parent form on the Social Skills subscale. At pretest, Kevin scored himself below average in communication, assertion, responsibility, and empathy, average on cooperation and engagement, and above average on self-control. With the exception of engagement, all raw scores increased or stayed the same from pre- to post-test. Responsibility (from 8 to 11) and empathy (from 8 to 11) significantly increased at post-test indicating more positive behaviours in areas such as respecting the property of others, being well behaved when unsupervised, trying to comfort others when sad and feeling bad when others are sad.

Communication and assertion remained at below average and self-control remained at above average.

At pretest on the Social Skills subscale Paul rated Kevin as below average in the following subscales: communication, cooperation, responsibility, empathy, engagement, and self-control and average in the assertion subscale. All raw scores increased at post-test with communication and engagement staying at below average, while cooperation, assertion, responsibility, empathy, and self-control increased to average. This significant increase on four subscales was connected with an increase in positive behaviours associated with those subscales.

Table 4
Mean Scores of Social Skills and Problem Behaviours on SSIS-RS Student and Parent Forms –Kevin

	Social Skills		Problem Behaviours	
	Pre-test	Post-test	Pre-test	Post-test
Student	10.29	11.43	14.50	18.50
Parent	8.14	11.71	6.00	9.75

On the Problem Behaviour subscale the mean score increased on both the student and parent form. At pretest, Kevin rated himself as above average on externalizing, bullying, hyperactivity/inattention and average on internalizing. All raw scores increased or stayed the same at post-test. More specifically, internalizing increased significantly from average to above average with the raw score jumping from 13 to 25, indicating an increase in behaviour related to being withdrawn from others, acting sad or having low energy. Externalizing, bullying, and hyperactivity/inattention remained at above average.

On the Problem Behaviours at pretest, Paul scored Kevin as average on externalizing, bullying and hyperactivity/inattention and above average on internalizing. At post-test, all raw scores increased except for hyperactivity/inattention, which stayed the same. There was a

significant increase on externalizing (from 6 to 12) and bullying (from 1 to 5), from average to above average, representing an increase in behaviours associated with disobeying rules, fighting with others, temper tantrum and doing things to make people scared and keeping others out of social circles. An increase of those behaviours was not observed in class or in Kevin's interactions with peers in the session.

Get-Togethers

Table 5 illustrates the Quality of Play Questionnaire as completed by teens and parents before and after the PEERS® follow-up session. According to the self-reports, 50% of teens (Arthur and Sam) increased the number of hosted get-togethers after the intervention. One teen decreased his hosted get-together from 8 to 3, however there was some discussion at pretest about how many of the 8 hosted get-togethers included his brother's friends and not the teen's friends. According to parent reports, 75% of teens (Arthur, Sam, and Kevin) increased the number of hosted get-togethers post intervention.

Table 5
Quality of Play Questionnaire Adolescent and Parent Form (pretest and post-test)

	HOSTED				ATTENDED			
	Teen		Parent		Teen		Parents	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Ali	4	3	3	1	0	2	0	1
Arthur	0	1	0	1	0	0	0	0
Sam	0	1	0	1	0	1	0	0
Kevin	8	3	2	3	0	0	1	2

According to self-reports, 50% of teens (Ali and Sam) increased their attended get-togethers after the intervention, while 50% (Arthur and Kevin) maintained their get-togethers at zero, meaning there was no change. According to parent reports, 50% of teens (Ali and Kevin) increased their attended get-togethers while 50% of teens (Sam and Arthur) did not attend any get-togethers. There were discrepancies between the teen and parent reports.

Generally, findings from the QPQ demonstrated that teens increased or maintained the number of hosted and attended get-togethers, although inconsistencies are evident between the teen and parent reports.

Social Skills Knowledge

Table 6 illustrates pre- and post-test scores on the Test of Adolescent Social Skills Knowledge (TASSK) across participants, noting which numbers were answered correctly and incorrectly. Fifty percent of teens answered question 12 incorrectly at pretest and 75% of teens answered it incorrectly at post-test. This question was related to the average times one is likely to be rejected when attempting to join 10 conversations.

Table 6
Test of Adolescent Social Skills Knowledge Scores (Pretest and Post-test)

	Pretest	Answered Correctly	Answered Incorrectly	Post-test	Answered Correctly	Answered Incorrectly
Ali	56%	1-3, 5-7, 9-11	4, 8, 12, 13, 14, 15, 16	69%	1-4, 6-11, 16	5, 12, 13, 14, 15
Arthur	69%	1-4, 6-8, 10, 13-14, 16	5, 9, 11, 12, 15	94%	1-8, 10-16	9
Sam	81%	1-3, 5-9, 11-12, 14-16	4, 10, 13	94%	1-11, 13-16	12
Kevin	88%	1-5, 7-14, 16	6, 15	88%	1-7, 9-11, 13-16	8, 12

Ali: At pretest Ali's correct answers were related to having a conversation (questions 1-3), phone conversation (questions 5 & 6), joking (question 7), and joining a conversation (questions 9-11). His incorrect answers were surrounding humour and joke telling (question 4 & 8), and teasing, rumours, and gossip (questions 13-16).

Ali increased his score on the post-test by two questions. At post-test his correct answers were related to having a conversation (questions 1-4), phone conversation (question 6), joking (question 7 & 8), joining a conversation (questions 9-11) and gossip (question 16). At post-test

his errors were surrounding phone conversations (question 5), and teasing, rumours, and gossip (questions 13-15). Ali had similar incorrect questions on both tests with the majority of the questions being at the end of the test. Although no clear pattern was identified, content area surrounding teasing, rumours and gossip was a challenge at both pre- and post-test while conversation rules and phone conversations were consistently answered correctly.

Arthur: His correct answers were related to having a conversation (questions 1-4), phone conversations (question 6), humour and joking (questions 7 & 8), joining a conversation (question 10), and teasing and gossip (questions 13, 14, & 16). His incorrect answers at pretest involved phone conversation (question 5), joining a conversation (questions 9, 11, 12) and rumours (question 15).

Arthur increased his score on the post-test by four questions. At post-test Arthur answered all questions correctly with the exception of questions 9 (Joining a Conversation). While no specific pattern was identified, Arthur improved his score significantly, while getting question 9 wrong on both pre- and post-test.

Sam: At pretest Sam's correct answers were related to having a conversation (questions 1-3), phone conversations (questions 5 & 6), joke telling (questions 7 & 8), joining a conversation (question 9, 11, & 12), and teasing, rumours and gossip (questions 14-16). His incorrect questions at pretest follow no specific pattern and were related to first getting to know someone (question 4), joining a conversation (question 10), and teasing (question 13).

Sam increased his score on the post-test by two questions. At post-test, Sam answered all questions correctly with the exception of question 12 which was related to how many times one will be rejected when joining a conversation. No specific pattern was identified.

Kevin: At pretest, Kevin's correct answers were related to having a conversation (questions 1-4), phone conversations (questions 5), joke telling (questions 7 & 8), joining a conversation (question 9-12), and teasing, rumours and gossip (questions 13, 14, & 16). He answered question 6 (phone conversations) and question 15 (rumours) incorrectly.

Kevin maintained his pretest score at post-test, although answered different questions correctly and incorrectly. His correct answers were related to having a conversation (questions 1-4), phone conversations (questions 5 & 6), joke telling (question 7), joining a conversation (question 9-11), and teasing, rumours and gossip (questions 13-16). At post-test he answered question 8 (humour and jokes) and question 12 (how many times one will be rejected when joining a conversation) incorrectly. No specific pattern was identified, as incorrect answers were found in different categories between pre- and post-test.

As evidenced above, findings from the TASSK showed an increase or maintenance in social skills knowledge after the PEERS® follow-up intervention.

Computer Component Effectiveness

Question two asks what impact does the use of weekly at home computer review sessions have on the social skills of teens with ASD. This question is answered by examining computer homework completion and parental perceptions of homework.

Homework Completion

Teens completed computer homework on top of their regular PEERS® homework on a weekly basis. Computer homework consisted of two sections; teens first reviewed the PowerPoint presentation from the week's didactic lesson and completed a 10-question multiple choice quiz. Teens then completed a short assignment applying the learned rules to real life scenarios. In total there were seven computer quizzes and seven computer assignments assigned.

Figure 2 showcases the number of homework completed by each participant, divided into quiz and assignment. On average teens completed more quizzes than assignments, with 89% of quizzes completed and 64% of assignments completed. Quiz completion averaged 100% for quizzes 1-5 and then became variable for quizzes 6-7. Assignment completion was variable with no clear pattern identified and the only assignment not completed was assignment five (Write your specific experience for slipping in or out of a conversation).

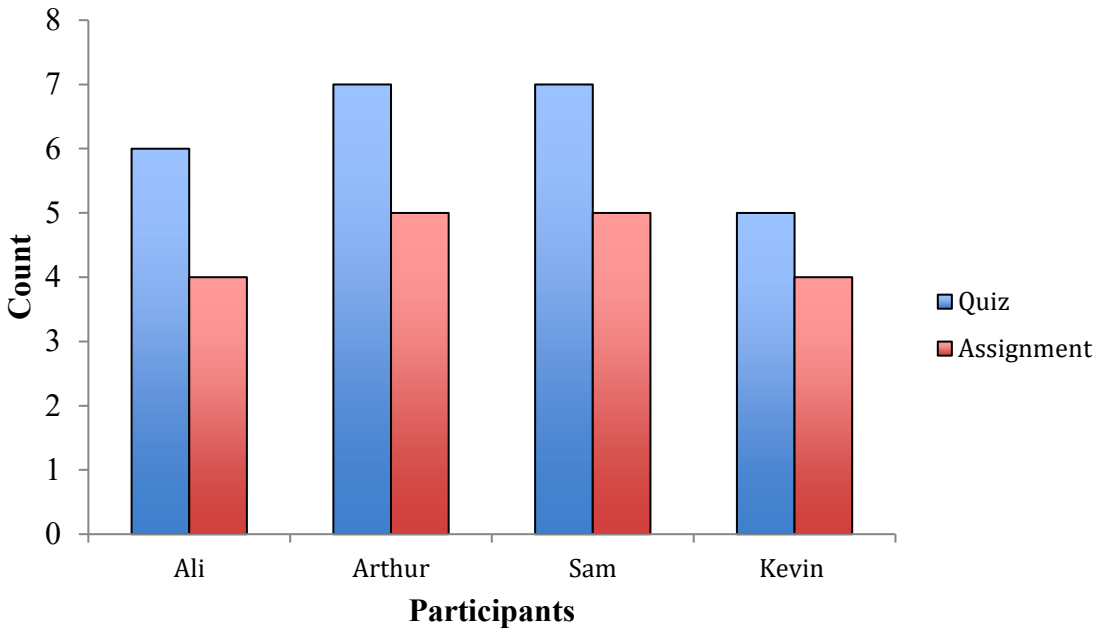

Figure 2. Computer homework completed per participant.

Ali: Ali handed in 86% of his quizzes and 57% of his assignments.

Quizzes: Ali completed 86% of his quizzes. He did quizzes 1-5 and 7. The average score was 85% on the first attempt for all quizzes. The highest mark was 100% on quiz 1 (Two Way Conversation) and quiz 7 (Rumours and Gossip); the lowest quiz mark was 60% on quiz 5 (Entering and Exiting a Conversation).

Assignments: Ali completed 57% of his assignments. Table 7 summarizes the completed and not completed assignments.

Table 7
Complete and Incomplete Assignments - Ali

Assignment	Completed	Not Completed
Week 1 - Identify character mistakes in two way conversations	✓	
Week 2 - Identify mistakes in two Snapchat messages		✓
Week 3 - Write the beginning of a phone conversation	✓	
Week 4 - Write two jokes that follow the guidelines	✓	
Week 5 - Write about your experience of slipping into/out of a conversation		✓
Week 6 - Provide advice to two characters being teased		✓
Week 7 - Provide advice to a character that experiences rumours	✓	

Arthur: Arthur completed 100% of his quizzes and 71% of his assignments.

Quizzes: Arthur did 100% of his quizzes. The average score was 94% and all the quizzes had marks of 90% or 100%. Arthur scored 100% on quiz 2 (Electronic Communication), quiz 3 (Choosing Appropriate Friends), and quiz 7 (Rumours and Gossip) and 90% on quiz 1 (Two-Way Conversations), quiz 4 (Appropriate Use of Humour), quiz 5 (Entering and Exiting a Conversation), and quiz 6 (Teasing and Embarrassing Feedback).

Assignments: Arthur completed 71% of his assignments. Table 8 summarizes the completed and not completed assignments.

Table 8
Complete and Incomplete Assignments – Arthur

Assignment	Completed	Not Completed
Week 1 - Identify character mistakes in two way conversations	✓	
Week 2 - Identify mistakes in two Snapchat messages	✓	
Week 3 - Write the beginning of a phone conversation		✓
Week 4 - Write two jokes that follow the guidelines	✓	
Week 5 - Write about your experience of slipping into/out of a conversation		✓
Week 6 - Provide advice to two characters being teased	✓	

Week 7 - Provide advice to a character that experiences rumours	✓

Sam: Sam handed in 100% of his quizzes and 71% of his assignments.

Quizzes: Sam handed in 100% of his quizzes. The average score was 93% across all quizzes with quiz 3 (Choosing Appropriate Friends), 4 (Appropriate Use of Humour) and 5 (Entering and Exiting a Conversation) being the highest mark of 100% and quiz 7 (Rumours and Gossip) being the lowest mark of 80%.

Assignments: Sam handed in 71% of his assignments. Table 9 summarizes the completed and not completed assignments

Table 9
Complete and Incomplete Assignments- Sam

Assignment	Completed	Not Completed
Week 1 - Identify character mistakes in two way conversations	✓	
Week 2 - Identify mistakes in two Snapchat messages	✓	
Week 3 - Write the beginning of a phone conversation		✓
Week 4 - Write two jokes that follow the guidelines	✓	
Week 5 - Write about your experience of slipping into/out of a conversation		✓
Week 6 - Provide advice to two characters being teased	✓	
Week 7 - Provide advice to a character that experiences rumours	✓	

Kevin: Kevin completed 71% of the quizzes and 57% of the assignments.

Quizzes: Kevin completed 71% of the quizzes. He did quiz 1-5 and the average scores were 90%. Kevin scored highest on quiz 4 (Appropriate Use of Humour) at 100% and the lowest on quiz 3 (Choosing Appropriate Friends) at 80%.

Assignments: Kevin completed 57% of the assignments and Table 10 summaries the completed and not completed assignments.

Table 10
Complete and Incomplete Assignments- Kevin

Assignment	Completed	Not Completed
Week 1 - Identify character mistakes in two way conversations	✓	
Week 2 - Identify mistakes in two Snapchat messages	✓	
Week 3 - Write the beginning of a phone conversation	✓	
Week 4 - Write two jokes that follow the guidelines	✓	
Week 5 - Write about your experience of slipping into/out of a conversation		✓
Week 6 - Provide advice to two characters being teased		✓
Week 7 - Provide advice to a character that experiences rumours		✓

In general, teens completed a larger proportion of quizzes than assignments, with more participation during the first five weeks of the intervention. While no clear pattern was evident for the assignments, both Sam and Arthur completed and missed the same assignments.

Parent Perceptions of Computer Homework

Candice: Candice felt the computer homework was motivating and she appreciated the ability to review what her teen had learned in class. Further, since Ali was a visual learner, seeing the PowerPoint and information again "consolidated learning". Candice further mentioned that using the computer to do homework was very age appropriate and "cool" and she could use it as a springboard to target the gaps in her son's knowledge and discuss any misunderstanding.

Karen and Paul: Although Paul attended the parent sessions with Kevin, Karen (the mom) worked with Kevin to complete the homework assignments and as such both parents completed the parent questionnaire together. Karen found the length and level of difficulty of the computer homework to be appropriate and that Kevin could complete it independently due to his ease on the computer. She found that some of the questions on the quiz were vague and in the "grey areas" but it gave her a chance to have a parent-teen discussion and talk about the sessions

in depth. Karen mentioned numerous times how the PowerPoint slides made it easier for her and Kevin to review the material if they needed to understand a concept better and structured things visually. Finally, she felt the quiz appealed to Kevin because of his competitive nature.

Nancy: Nancy felt the computer homework allowed her to see "how well my child understood the information" and review the areas that needed clarification. She further explained that the "simplicity" of the homework was user friendly for Arthur and that it was based exactly on the topics covered in class. Finally, she mentioned that the computer homework "helped open up a dialogue" and this facilitated a meaningful conversation with her son.

Charlotte: Charlotte felt the computer homework really gave her a chance to "go over the material" and check Sam's understanding of the concepts covered. The opportunity to review was highlighted and this led to her saying she "loved" the computer homework. It had an appropriate level of difficulty and "fully supported the topic in question", making it simple yet comprehensive. She concluded that while there was some ambiguity in the quiz questions, it opened up the discussion and led to a parent teen discussion, which she considered "always a good thing."

Overall, parents seemed to appreciate the computer homework as it gave them a chance to review pertinent information and have discussions around areas that were ambiguous or difficult.

Comparison with 2016 PEERS® results

Question three asks if repeating critical PEERS® topics affect the results completed to previous findings in those areas. This question is answered by examining the SSIS-RS student and parent forms from the winter 2016 PEERS® study alongside the current study. For the Social Skills subscale, positive change indicates an increase in social skills, while negative change

indicates a decrease in social skills. For the Problem Behaviour subscale, positive change indicated an increase in problem behaviours, while negative change indicates a decrease in problem behaviours. Of interest in any intervention for teens with ASD are the maintenance of acquired social skills and the decrease in problem behaviours. All four teens were involved in the original 14-week PEERS® program from January to May 2016. Teens and parents completed the pre- and post-test SSIS-RS student and parent form. Table 11 illustrates the mean scores and percentage changes for PEERS® completed in 2016 and PEERS® follow-up completed in 2017. For each participant the parent and self-reports are presented.

For Ali, the Social Skills subscale demonstrated almost parallel percentage change from 2016 to 2017, although 2016 started with higher mean values indicating a higher social skills level. Both years the parent reported an increase in social skills while the students reported a decrease. The Problem Behaviours subscale was similar based on the parent report for both 2016 and 2017 with problem behaviours decreasing. However, in 2016 there was an increase in problem behaviours while 2017 saw a decrease.

Table 11

Mean Scores and Percentage Change on SSIS-RS Student and Parent Forms 2016 – Ali

2016	Social Skills		% change	Problem Behaviours		% change
	Pre-test	Post-test		Pre-test	Post-test	
Student	11.86	11.14	**-6%**	3.25	4.00	**23%**
Parent	11.14	13.00	**17%**	7.25	5.oo	**-31%**

Mean Scores and Percentage Change on SSIS-RS Student and Parent Forms 2017 – Ali

2017	Social Skills		% change	Problem Behaviours		% change
	Pre-test	Post-test		Pre-test	Post-test	
Student	9.86	9.29	**-6%**	9.75	7.50	**-23%**
Parent	9.86	11.86	**20%**	7.25	4.25	**-41%**

For Arthur, Table 12 illustrates the mean scores and percentage changes for PEERS® completed in 2016 and PEERS® follow-up completed in 2017 based on parent and self-reports.

The Social Skills subscale indicated an increase in social skills in both 2016 and 2017, although the percentage change is substantially greater in 2016 for both parent and self-reports. The Problem Behaviour subscale showed a large decrease in behaviours on the self-report in both 2016 and 2017, while a much smaller decrease based on the parent report for both years. The general trend in the direction of percentage changes was followed in both years, yet 2017 displayed a smaller change.

Table 12

Mean Scores and Percentage Change on SSIS-RS Student and Parent Forms 2016– Arthur

2016	Social Skills		% change	Problem Behaviours		% change
	Pre-test	Post-test		Pre-test	Post-test	
Student	10.57	13.29	**26%**	4.25	2.25	**-47%**
Parent	8.43	11.29	**34%**	5.75	5.25	**-9%**

Mean Scores and Percentage Change on SSIS-RS Student and Parent Forms 2017– Arthur

2017	Social Skills		% change	Problem Behaviours		% change
	Pre-test	Post-test		Pre-test	Post-test	
Student	11.43	12.14	**6%**	4.00	3.25	**-19%**
Parent	10.43	11.29	**8%**	5.00	5.00	**0%**

For Sam, Table 13 illustrates the mean scores and percentage changes for PEERS® completed in 2016 and PEERS® Follow-up completed in 2017 based on parent and self-reports. The Social Skills subscale displayed an increase in social skills across both self- and parent reports in 2016 and 2017, although the percentage change is noticeably larger in 2016. The means for the Social skills subscale in 2017 started at higher values indicating a higher social skill level prior to completing the PEERS® follow-up. The Problem Behaviours subscale moved in the same direction for the parent report for both 2016 and 2017, with a large decrease in problem behaviours both years. However, the self-report suggested an increase in problem behaviours in 2016, with a large decrease in 2017.

Table 13

Mean Scores and Percentage Change on SSIS-RS Student and Parent Forms 2016– Sam

2016	Social Skills		% change	Problem Behaviours		% change
	Pre-test	Post-test		Pre-test	Post-test	
Student	9.43	13.29	**41%**	7.00	8.50	**21%**
Parent	7.43	11.29	**52%**	12.50	10.00	**-20%**

Mean Scores and Percentage Change on SSIS-RS Student and Parent Forms 2017– Sam

2017	Social Skills		% change	Problem Behaviours		% change
	Pre-test	Post-test		Pre-test	Post-test	
Student	15.14	15.43	**2%**	5.75	3.75	**-35%**
Parent	13.14	14.00	**7%**	9.50	5.75	**-40%**

For Kevin, Table 14 illustrates the mean scores and percentage changes for PEERS® completed in 2016 and PEERS® follow-up completed in 2017 based on parent and self-reports. The Social Skills subscale demonstrated a positive change in both years on the parent report, although 2017 indicated a double percentage change. However, the self-report moved in the opposite directions, with 2016 seeing a decrease in positive behaviour and 2017 seeing an increase. On the Problem Behaviours subscale there was an increase reported for both years on both reports, although the parent reported a much larger increase in 2017 than 2106.

Table 14

Mean Scores and Percentage Change on SSIS-RS Student and Parent Forms 2016 –Kevin

2016	Social Skills		% change	Problem Behaviours		% change
	Pre-test	Post-test		Pre-test	Post-test	
Student	13.14	11.57	**-12%**	9.00	11.00	**22%**
Parent	10.29	12.57	**22%**	8.50	8.75	**3%**

Mean Scores and Percentage Change on SSIS-RS Student and Parent Forms 2017 – Kevin

2017	Social Skills		% change	Problem Behaviours		% change
	Pre-test	Post-test		Pre-test	Post-test	

Student	10.29	11.43	**11%**	14.50	18.50	**28%**
Parent	8.14	11.71	**44%**	6.00	9.75	**63%**

Student Motivation and Attention

Question four asks does the use of visual aids (i.e. PowerPoint slides) and videos during the sessions impact student motivation to participate and attention. This question is answered by looking at two SSIS-RS subscales, cooperation in Social Skills and hyperactivity/inattention in Problem Behaviours as well as notes from individual sessions. Cooperation includes behaviours such as following rules, completing tasks without bothering other and was used to highlight student motivation to participate in the intervention and complete the homework. Hyperactivity/inattention includes behaviours such as acting without thinking, having temper tantrum and being inattentive and was used to highlight student attention in class during the session. PowerPoint presentations were used with every session to highlight the main points of the didactic lesson as well as review and assign homework, and during the meeting with parents. All presentations included images from Google related to the subject at hand and funny memes to increase student attention and motivation to participate. Session 3 (Choosing Appropriate Friends), Session 4 (Appropriate Use of Humour) and the final review session included a variety of teaching videos from YouTube.

Ali: At pretest Ali's raw score for cooperation was 13 and decreased to 11 at post-test. On the parent form, the pretest score was 12 but increased to 14 at post-test. For hyperactivity/inattention, Ali's raw score was 7 and it decreased to 6 at post-test. On the parent form, the pretest score for hyperactivity/inattention was 9 and it decreased to 4 on the post-test. These findings indicate an increase in motivation according to the parent and a substantial increase in student attention.

Arthur: At pretest Arthur's raw score for cooperation was 14 and it stayed the same at post-test. On the parent form, the pretest score was 14 and increased to 15 at post-test. For hyperactivity/inattention, Arthur's raw score was 5 at pretest but 6 at post-test. On the parent form, the pretest score was 4 and increased to 5 at post-test. These findings demonstrate a slight increase in motivation and a slight decrease in student attention.

Sam: At pretest for cooperation, Sam's score was 17 and this stayed the same at post-test. On the parent form, the pretest score was 14 and it increased slightly to 15 at post-test. For hyperactivity/inattention, Sam' raw score was 5 and it decreased to 3 at post-test. On the parent form, the pretest score was 8 and it decreased to 7 at post-test. These findings show an increase in motivation according to parental reports and an increase in attention based on both self and parental report.

Kevin: At pretest for cooperation, Kevin's score was 11 and this stayed the same at post-test. On the parent form, the pretest score was 7 and increased to 11 on post-test. For hyperactivity/inattention, Kevin's raw score was 16 at pretest and stayed the same at post-test. On the parent form, the pretest score was 7 and stayed the same at post-test. These findings show an increase in motivation based on the parental perspective and no change related to student attention.

In general, the SSIS-RS parent and student forms revealed mixed results in terms of student motivation and attention. All four parents noticed an increase in motivation, but 3 (Arthur, Kevin, Sam) out of 4 teens in their own scores indicated there was no change on this subscale. For the attention subscale, parent and teen reports showed collaboration, as two out of four parent-teen pairs stated an increase in attention (Ali, Sam); one pair reported no change (Kevin) and one pair reported a decrease in attention (Arthur).

Observational notes from individual sessions highlighted the positive nature of using PowerPoint and videos during the didactic lesson. Students seemed comfortable and engaged when presented with the PowerPoint presentation and in Session 1 it was noted, "all students were asked to read from the PowerPoint slides, which they did so willingly." The visual cues provided students with a reference point when they were unsure of their answers, with some students using it more frequently than others. In Session 1 it was underlined numerous times that, "Sam referenced the PowerPoint frequently," and "Sam would check the PowerPoint for the answers." Finally, at times the use of additional images merging the topic at hand and personal interests seemed to increase participation from those teens that were not active participants. For example, during Session 1 it was noted Arthur was "interested in and had an opinion related to the popularity of cat memes" when minutes before it was noted, "Arthur was consistently talking over people and interrupting." In Session 7, Arthur again "analyzed a Toy Story meme and it seems like he kinda likes it" and finally in the final review session, it was noted Arthur, "smiled at a meme in the PowerPoint." These findings demonstrated the ability of PowerPoint and interest specific images to capture a teen's interest in a classroom setting.

Videos were also used to motivate student participation, increase their interest level in the topic at hand, and provide concrete real life scenarios. During session 3 teens watched a number of videos related to appropriate humour and it was noted, "videos were very well received, everyone participated and was engaged!" During Session 7 teens watched a video clip from the movie Mean Girls to introduce the concept of rumours and gossip and Kevin reacted with, "Wow," while Sam said, "Rachel McAdams is spreading rumours." This indicated both teens not only were engaged in the video but also further understood the underlying concept of gossip. Finally, numerous video were shown during the last review session and it was noted all teens

made appropriate comments and answered questions using quotes from the video. As such, findings from session notes indicated students seemed motivated to participate and showed increased attention when presented with PowerPoint presentations and videos.

Parent-Teacher Report Relationship

Question five asks what is the relationship between the parent and teacher report. This question is answered by examining the mean scores from the SSIS-RS teacher and parent forms. Teachers filled out the SSIS-RS Teacher Form before and after the PEERS® follow-up intervention. Three out of four teachers filled out both pre- and post-test forms accordingly and one teacher did not, "mark every item" and thus no means were available for analysis.

Ali: Table 15 demonstrates the relationship between the parent and teacher forms for Ali on the SSIS-RS. Both the parent and teacher reported an increase in positive behaviours associated with social skills and a decrease in negative behaviours associated with Problem Behaviours. The teacher reported the most significant increase on the assertion, from a raw score of 5 on pretest to 11 on post-test, and empathy, from a raw score of 5 on pretest to 10 on post-test. While the parent reported an increase in assertion and empathy at post-test, the greatest change was for the self-control subscale, increasing from 10 to 14 at post-test. On the Problem Behaviours subscales, the teacher reported a decrease in all subscales, while the parent reported a decrease on all subscales with the exception of bullying, which increased by one point. These findings demonstrate a parallel relationship for the Social Skills and Problem Behaviour subscale for both the parent and teacher reports.

Table 15
Mean Scores of Social Skills and Problem Behaviours on SSIS-RS Teacher and Parent Forms –Ali

	Social Skills		Problem Behaviours	
	Pre-test	Post-test	Pre-test	Post-test
Teacher	9.57	11.00	4.75	2.75

Parent	9.86	11.86	7.25	4.25

Arthur: For the SSIS-RS teacher report at pretest, Arthur's teacher answered 36 out of 46 questions on the Social Skills subscale and all 30 questions on the Problem Behaviours subscale. Unfortunately, the scoring instructions clearly indicated, "If the number of missing responses exceeded the maximum allowed, do not continue scoring the scale or its subscales." The maximum number of missing responses allowed for Social Skills subscale was four and three for Problem Behaviours subscale. As such, the SSIS-RS could not be adequately scored at pretest, mean scores were not generated and a table comparing mean scores to parent scores was not possible. While raw scores were computed for each Social Skills subscale, they can be viewed as misleading and incomplete due to the missing items. Raw scores for the Problem Behaviour subscale were completed precisely as no items were missing.

For the SSIS-RS teacher report post-test, Arthur's teacher answered 25 out of 46 questions for the Social Skills subscale and 28 out of 30 questions on the Problem Behaviour subscale. Once again, the SSIS-RS could not be scored at pretest and mean scores could not be calculated. While raw scores are available for the Social Skills subscales they must be taken with extreme caution, as they do not provide an accurate picture of the student's abilities and challenges. For example, one out of seven questions was answered for the self-control subscale and three out of seven questions were answered for the assertion subscale, indicating an incomplete assessment. Raw scores for the Problem Behaviour subscale were calculated as only two items were missing.

For the Social Skills subscale, all questions in the engagement and assertion subscale and the majority in the empathy subscale were scored lower at post-test than at pretest indicating a potential decrease in behaviours associated with social skills. Both cooperation and self-control

were scored higher at post-test according to the teacher report. On the parent report, engagement, empathy, co-operation and self-control increased at post-test, while assertion stayed the same. There is no key relationship between the parent and teacher report based on the above subscales due to an incomplete assessment.

Table 16 demonstrates the relationship between the parent and teacher forms for Arthur on the SSIS-RS on the Problem Behaviours subscale only. While both the teacher and parent maintained the same mean score at pre- and post-test, differences arose in the raw scores of the subscales. For example, on the parent report externalizing stayed the same at pre- and post-test with a raw score of 2, while on the teacher report externalizing decreased from 4 to 1 from pre- to post-test. Furthermore, there was no change on the bullying subscale for both the parent and teacher report at pre- and post-test. Interestingly a large discrepancy in scores was observed on the internalizing subscale with the parent reporting a pretest score of 14 followed by a slight decrease, while the teacher reported a pretest score of 1 followed by a slight increase. In general, while both reports maintain consistent mean scores at pre- and post-test, numerous differences in the details were observed.

Table 16
Mean Scores on the Problem Behaviours Subscale on SSIS-RS Teacher and Parent Forms –Arthur

	Problem Behaviours	
	Pre-test	Post-test
Teacher	2.00	2.00
Parent	5.00	5.00

Sam: Table 17 illustrates the relationship between the parent and teacher reports on the SSIS-RS. Although the change on the teacher report was small, both parent and teacher reported an increase in positive behaviours associated with social skills and a decrease in negative behaviours associated with problem behaviours. The most significant increase was on the Self-

Control subscale, from 9 at pretest to 15 on post-test. Other subscales stayed the same or increased/decreased by one point. However, while the parent saw significant improvement on the assertion and engagement subscales, the teacher did not echo this improvement as both assertion and engagement scores remained the same at post-test in the teacher feedback. These findings indicate a relationship between the parent and teacher reports that move in the same positive direction but differ in the details, which are highlighted.

Table 17
Mean Scores of Social Skills and Problem Behaviours on SSIS-RS Teacher and Parent Forms – Sam

	Social Skills		Problem Behaviours	
	Pre-test	Post-test	Pre-test	Post-test
Teacher	11.14	11.71	3.50	3.25
Parent	13.14	14.00	9.50	5.75

Kevin: Table 18 demonstrates the relationship between the parent and teacher forms for Kevin on the SSIS-RS. Both the parent and teacher reported an increase in positive behaviours associated with social skills but move in opposite directions on the problem behaviours subscale. The teacher reported the most significant increase on the communication subscale, with a raw score moving from 8 to 13 at post-test, while the parent's raw scores changed from 7 to 10 at post-test. On the Problem Behaviours subscales, the teacher saw a decrease in the externalizing subscale from a raw score of 9 to 6 at post-test while the parent reported a raw score of 6 at pretest and 12 at post-test. These findings demonstrate a parallel relationship for the Social Skills subscale but diverging results for the Problem Behaviours subscale.

Table 18
Mean Scores of Social Skills and Problem Behaviours on SSIS-RS Teacher and Parent Forms –Kevin

	Social Skills		Problem Behaviours	
	Pre-test	Post-test	Pre-test	Post-test
Teacher	11.71	12.71	8.00	6.75
Parent	8.14	11.71	6.00	9.75

Observational Notes

Observational notes were taken on a weekly basis by the main author and the research assistant volunteer. PEERS® uses Socratic questioning to guide reasoning and help teens "understand and encode new information" (Laugeson & Park, 2014, p. 88). As such, the observational notes comprise mainly of answers to questions asked, which showcase the level of comprehension and provide insights into the teens' thought process.

Ali: Joke telling and humour were an area of inconsistency for Ali. There seemed to be discrepancies between the theoretical and applied aspect of this concept. While watching video clips of appropriate and inappropriate joke telling during Session 4, Ali correctly identified each situation. For example, while watching a clip where Chandler and Monica from the show Friends were making jokes while going through airport security, he said, "This is very serious, it's not the right time." Further, while watching a video of an older girl reading cat jokes from a book Ali noted, "They're (her friends) are not laughing with her." These comments highlight his comprehension of appropriate joke telling and the concept of humour feedback.

However, during Session 5 teens were asked to prepare two jokes for homework to share with their peers while monitoring humour feedback. Ali told two jokes that did not elicit the desired response. One of his jokes was, "If a dog were to sing a song, what would he sing? Uptown Funk." It was noted, "No one in the group laughed and got the joke" and "Ali could not explain it and looks a bit upset." This underlined that although he had prepared for the jokes, they did not seem funny to his peers and thus perhaps were unsuitable in content. As such, Ali seemed to experience difficulty with the practical aspect of joke telling.

Throughout the intervention, Ali's comments and answers to questions exhibited varying degrees of comprehension. At times he provided insightful comments, while other times his answers were not straightforward. For example, in Session 3 when asked who would you consider to be an appropriate friend, Ali answered, "Someone who is incognito like let's say we did something bad we want someone who is incognito, they're not going to tell on any employee or employer." Through discussion it was clarified that he meant a good friend could be someone he could trust. During Session 5 while discussing why someone would be turned away/down from a peer group, Ali answered, "Someone is forcing you to get into the group." With probing and further discussion he said, "Maybe they don't like you." Generally, it seemed Ali required some verbal support and explanation to communicate his message clearly. However, other times Ali provided clear and on target answers. During Session 5 when asked what happens if you are stuck and can't say any of the comebacks (to teasing) we were practicing, Ali quickly responded, "Body language!" This response demonstrated accurate and insightful thinking. In general, the observational notes provided some insight into Ali's varying degrees of comprehension of the intervention content.

Arthur: Observational notes for Arthur showed an interesting pattern of displaying behaviours that perhaps indicate he is not interested in the program while at the same time providing comprehensive insightful answers to questions. For example, in Session 3 when asked what kind of friend is not a good choice, he answered, "(Someone) who doesn't like penguin club memberships" while laughing. Minutes later when asked what is a geek, Arthur was the only one who answered correctly with, "Someone who is really into something." During Session 4 he exhibited "class clown" behaviour by picking up his chair (after Ali touched it), saying it was broken and going into the side room to get a new one while laughing. However, in the same

session while watching a video of an inappropriate mature joke, Arthur said, “If you have to explain the joke then it’s not a joke.” The above examples highlight a contrast between Arthur’s behaviour, on one side trying to be funny and perhaps disruptive and on the other paying attention and providing accurate comments.

Of interest was Session 5 (Entering and Exiting a Conversation) where Arthur seemed to experience difficulty with the practical aspect of the concept taught. During the theoretical portion he was an active participant and provided on point answers. For example, when asked why it would be important to have a common interest before joining a conversation, he responded, “Because you will not have anything to say.” However, during behavioural rehearsal students were asked to practice entering a conversation with the peers and Arthur refused to participate. He was not able to explain his position. Speaking to mom later revealed that, “Arthur is realizing that having friends takes time and effort and he does not want to do that right now.”

Arthur’s somewhat disruptive behaviour and unwillingness to participate may indicate that he does not want to participate in the PEERS® follow-up program. However, at the same time he seemed interested in the material by paying attention, providing accurate responses and asking insightful questions. For example in Session 6 while we were role-playing teasing comebacks with Kevin, Arthur asked, “Why shouldn’t you answer their (the teasers) questions?” referring to the feedback I gave of Kevin engaging in dialogue with the teaser instead of just giving a comeback. Further, in Session 6 I noted, “Arthur laughs at my jokes and I see he is actually listening and perhaps processing the information.” Arthur may be experiencing an internal conflict whereby his uncertainties about friendship and peer interactions manifest in his behaviour.

Sam: Observational notes show that throughout the intervention Sam displayed a consistent interest in the content and active participation. From the first session I noted, "Sam was a very active participant, he put up his hand to answer questions and engaged with the material and me." His responses further showed his understanding and comfort with the material presented. In Session 3 when asked how do you know someone is accepting you into the group, he answered, "They'll try to interact with you more." He also mentioned that, "Looking at what people are wearing and doing will give you a clue as to what group they belong to."

Sam seemed at ease with both theoretical and practice aspects of entering and exiting a conversation. In Session 5 when asked why you should watch and listen before entering a conversation, he noted, "You can say something not related to the previous conversation." Furthermore, when asked why you should know one person before joining, he said, "Your friend can introduce you to the group." During behaviour rehearsal at the end of Session 5, Sam slipped into the conversation at ease and made appropriate comments that was true and sounded very natural. As such, he was aware of not only the rules surrounding entering the conversation but was also able to apply them appropriately. In general, observational notes suggest Sam was attentive as well as motivated to participate in the PEERS® follow-up program.

Kevin: Observational notes for Kevin portray a young man who is generally engaged, eager to please and actively participate but who uses mature topics to gain attention. From the onset of Session 1 it was noted Kevin, "Answered a lot of questions and engaged in the discussion." However, it was also noted, "His answers were a bit off topic or he was mentioning risky topics such as drugs." During Session 5, Kevin mentioned, "Dirty jokes are a good idea" and proceeded to tell a dirty joke. Further, in Session 7 while laughing he asked, "Can get-

togethers be inappropriate?" These comments can be interpreted as a want for attention or a need to be seen more mature and grown-up by his peers.

Simultaneously, Kevin contributed with valuable information when answering questions and was an active participant during behaviour rehearsals. During Session 3 when asked who would make an inappropriate friend, he said, "Someone who has a bad reputation" thereby showing clarity and understanding. During Session 5 he practiced slipping into the conversation with his peers and made an appropriate comment, "That's cool." Finally, during Session 6 Kevin remembered the "tease-the-tease" phrase taught during the last PEERS® session and seemed very proud when praised on his memory. In general, observational notes for Kevin provide additional information about his thought process and social skills knowledge.

Taken together, the findings from this study reveal the positive effects of the PEERS® follow-up intervention with a computer aspect for four teens and their parents. The possible implication for the data will be explored in the discussion below.

Discussion

The aim of this study was to evaluate the efficacy of the PEERS® follow-up with a computer component intervention program for improving social and friendship skills for teens with ASD. The overall treatment completion rate was 80%, as one teen-parent pair was unable to complete the program for personal reasons and the absentee rate was 5.6%. The results of this extension of the PEERS® intervention were encouraging, with improvements demonstrated in social skills, social skills knowledge and teen get-togethers.

In examining the effectiveness of the PEERS® follow-up intervention, the SSIS-RS results revealed improvements from pretest to post-test in overall social skills. The majority of cases demonstrated a decrease in problem behaviours on both the parent and student forms, in

line with previous PEERS® studies (e.g., Laugeson et al., 2009; Schohl et al., 2014). The QPQ teen report showed an increase in attended get-togethers for only 50% of teens and an increase in hosted get-togethers for only 50% of teens, supporting the Schohl et al. (2014) study which reported an increase in both attended and hosted get-togethers. The original PEERS® study (Laugeson et al., 2009), found only a significant increase in hosted get-togethers. Gantman et al. (2012) suggested attended get-togethers are a better indicator of treatment success, as they highlight the possibility of a mutual relationship not related to teens completing their PEERS® homework. In the current study, the two teens who increased their attended get-togethers may have been fostering reciprocal relationships during the intervention based on this view. Additionally, teens demonstrated an increase in social skill knowledge as measured by the TASSK. These findings are replicated in previous studies (Laugeson et al., 2009; Laugeson et al., 2012; Schohl et al., 2014; Yoo et al., 2014) and highlight the effectiveness of PEERS® in teaching the targeted social skills.

Several interesting patterns emerged from the findings of the SSIS-RS Student, Parent and Teacher Forms. Firstly, based on the pre- and post-test mean scores, there was a discrepancy between parental and teen reports in the areas of social skills. With the exception of one case, teens generally scored themselves higher on the Social Skills subscale of the SSIS-RS as compared to their parents. Past research has seen similar trends in social informant discrepancies between parent and teen reports (Lerner, Calhoum, Mikami, & De Los Reyes, 2012; McMahon & Solomon, 2015; Vickerstaff et al., 2007). In the Lerner et al. (2012) study, 53 parent and teen dyads reported overall social skills using the Social Skills Rating System (SSRS) which includes four subscales; Cooperation, Assertion, Responsibility and Self-Control. The SSIS-RS used in this study is the revised and renormed version of the SSRS by the same authors. Both scales

measure similar constructs and "yield highly reliable and valid scores for key social behaviours" (Gresham, Elliott, Vance, & Cook, 2011, p. 42). Results indicated a significant difference between parent and teen reports on the teen's social skills with 75.4% of teens reporting themselves higher than parental reports (Lerner et al., 2012). McMahon and Solomon (2015) also found teens overestimated their social skills and this contributed to the discrepancy between parent and teen reports in social skills engagement on the SSRS.

Vickerstaff et al. (2007) suggest that the discrepancy between parental and child reports in social competence can be explained by parents being more aware of their child's social skills deficits as they were due to participate in social skills training. Parents with teens who reported greater social skills compared to parental reports had a lower sense of self-efficacy (Lerner et al., 2012). It may then be possible that parental reports are not a true representation of their teen's social skills but are rather influenced by the parent's perceived abilities and skills to handle their teen's social skill challenges. Thus, it continues to be difficult to ascertain whether the discrepancy is caused by teens over-inflating their skills or parents under-reporting their teen's social skill abilities (Lerner et al., 2012).

In the current study, teacher and parents ratings on the SSIS-RS moved in the same direction on the Social Skills subscale in the three cases where teachers completed the pre- and post-tests accordingly. Echoing findings from Laugeson et al. (2012) where 11 independent teacher ratings revealed improvements on the Social Skills subscale as reported by the SSRS from pretest to follow-up assessment. Vickerstaff et al. (2007) also found no difference between parent and teacher ratings of preteens social competence using the SSRS. This finding is not surprising as the social skills challenges of teens with ASD affect all contexts and aspects of social interactions, carrying over from the home to school environment (Vickerstaff et al., 2007).

Interestingly, one case displayed somewhat contrary evidence to the above findings. Although the teen, parent, and teacher reports followed the same patterns for the Social Skills subscale, there was a lack of agreement between multiple informants and in relation to other teens in this study on the Problem Behaviour subscale. Both Kevin and his father reported an increase in Problem Behaviours after the intervention with most subscales (i.e., externalizing, bullying, and internalizing) in the above average behaviour level. However, based on the teacher report, Kevin demonstrated a decrease in Problem Behaviours in the classroom after the intervention. Based on observational notes, Kevin started the intervention with a positive attitude, in Session 1 it was noted, "Kevin was engaged and seemed excited to participate and share his ideas and thoughts." He continued to partake in the weekly intervention by answering questions, engaging with the other students and actively participating in the icebreakers and behaviour rehearsals. This finding parallels that of Jespen, Gray, and Taffe (2012), who found moderate to strong agreements between parents and teens and little agreement between teacher and teen ratings of behaviour and emotional problems. The authors indicate parental-teen report agreement stems from shared experiences and communications while teacher-teen report discrepancy can be due to less communication and a lesser ability to observe internalized difficulties (Jespen et al., 2012). Thus, the evidence from this study and previous work suggest a pattern of inconsistent findings between teen-parent-teacher informant discrepancies on social skills and problem behaviours (McMahon & Solomon, 2015). Further studies are required to determine the underlying causes (i.e., methodology) of the varied findings.

One of the main contributions of this study was the use of visuals and videos during the interventions and the addition of weekly computer homework. Although the SSIS-RS revealed mixed results in terms of teen motivation and attention, notes from the intervention sessions

emphasize teen engagement, comfort and attentiveness with the technology used. Not surprising, previous research highlights that many teens with ASD prefer information presented in the visual format with technology being especially engaging (Odom et al., 2015). In fact, teens with ASD prefer using technology to other activities. Mazurek, Shattuck, Wagner, and Cooper (2012) found teens, ages 13 to 17, spent about 4.5 hours per day using screen-based media. In their literature review of 30 "technology assisted intervention and instruction" studies, Odom et al. (2015) used the CSESA (Center on Secondary Education for Students with Autism Spectrum Disorders) Technology Group framework - which includes the Human User, Activity, and Technology in a broader home, school, and community context – to examine the use of technology for teens with ASD. The authors suggest the use of a variety of technology teaching relevant activities/goals in naturalistic locations is an evidence-based practice (Odom et al., 2015).

With the computer component, teens completed online quizzes and assignments with high completion rates for quizzes (89%) and moderate completion rates for assignments (64%). Teen quiz and assignment completion rates were positively correlated with higher scores on the TASSK after the intervention, indicating teens that completed more quizzes and assignments seemed to gain more social skills knowledge. Furthermore, although the computer homework meant more time spent on homework by both teens and parents (in addition to the regular PEERS® homework), parents reported positive feedback in the ability of the homework to facilitate in depth discussion, clear up any misunderstanding and consolidate learning. In line with Karst et al. (2015) it may be that PEERS® follow up with the computer component had a positive impact on the organization of the household as parents and teens felt the computer aspect was significant and beneficial, notwithstanding the extra time and effort it necessitated.

Additionally, research indicates parental motivation in homework is the strongest predictor of the level of support they provide their children and their involvement in homework (Katz, Kaplan, & Buzukashvily, 2011). When parents find the homework and interaction valuable and meaningful, they have more positive emotions and less stress and in turn are more likely to exhibit behaviours that support the child's psychological needs during the homework (Katz et al., 2011).

Numerous studies point to the importance of parental involvement in ASD treatment (e.g., McConachie & Diggle, 2007) and there is consensus that more research is needed to pinpoint the exact details of parental involvement that make it a success; one detail may be the continuity of the involved parent. In this current study, three out of the four cases involved the mother completing the parent training on a weekly basis and participating with the teen during the computer homework. In Kevin's case, the father attended the weekly session, while the mother assisted during the computer homework. Kevin completed less quizzes and assignments than his peers and did not do any homework after week 5 for quizzes and week 4 for assignments. This may be a direct result of lack of continuity in parental involvement. It is possible Kevin's mother did not find the homework interaction as valuable or meaningful because she was not directly involved in the weekly parental training and this had a direct influence on Kevin not completing all of his homework. This suggests the PEERS® follow up program with computer homework may be more effective when there is a consistent parent involved in both aspects of the program.

Homework difficulty could also be explained by difficulties in Executive Functioning (EF) skills. Endedijk, Denessen, and Hendriks (2011) found that students who experienced difficulties with skills related to EF (i.e., flexibility, planning, monitoring) also experienced homework difficulties, based on parental reports. The authors suggest students receive support in

two different ways, developing executive skills such as teaching organizational strategies or the use of cuing procedures specifically for homework (Endedijk et al., 2011). In conjunction with having a consistent parent participate, Kevin may have benefited from strategies which target executive functioning to maintain his homework completion.

Implications for Practice

This study aimed at extending current findings relating to the PEERS® intervention by introducing a computer component in the form of additional homework. The addition of CAT into the intervention generated positive results for both parents and teens with implications for practice. Using technology, specifically personal computers and the Internet, to help teach social skills for teens with ASD may be considered a successful and motivating approach that enhances learning of key skills. The PEERS® program would benefit from a technological component, both during the intervention and as an addition to the weekly homework. These additions would be motivating for students, increasing their participation and attention during the intervention and increasing their social skills and social skills knowledge as evident in this study.

Incorporating CAT into instruction also facilitates the continuity of the intervention across different contexts and different individuals involved in the teen's education (Root, Stevenson, Davis, Geddes-Hall, & Test, 2016). As in this study, parents who are involved in their teen's interventions are able to work in a familiar environment, such as the home, to reinforce learned concepts, enable discussion using real life problems, and clear up misunderstanding while simultaneously following the intervention as outlined by a professional. Based on findings from this study, parental continuity is recommended as a required aspect of the intervention.

Limitations/Future Research

There were some limitations to the present study that warrant discussion. Primarily, this study had a very small sample size that did not permit statistical analysis. As such statistical significance could not be determined and accurate comparisons to other PEERS® studies was challenging. This is not surprising as the exact date of the PEERS® follow-up session was unknown and schedule conflicts and previous teen engagements hindered the process. There are a number of family factors that could have also influenced the fidelity of the program and the parents' ability to fully participate. Education level, personal schedules, other siblings requiring care, and/or individual family dynamics can all influence the implementation of the intervention (Burrell & Borrego, 2012). Notably parents of children with ASD experience higher levels of stress compared to typically developing children and this can aversely impact treatment. Osborne et al. (2008) found that children made fewer treatment gains in time-intensive treatments when parenting stress was high and parents were less likely to use the techniques from the intervention. Since the PEERS® program is time-intensive, parental stress must be taken into consideration. Furthermore, the length of the follow-up warrants attention as only selected PEERS® topics were covered over the course of an 8-week intervention instead of the original 14 weeks. As such, the original program was not strictly followed and this may have impacted post-test results.

Finally, the sample consisted of four Caucasian males making findings less generalizable to a larger, diverse population. This study also did not have a control group, as it would have been beneficial to compare results between teens that did the PEERS® follow-up to a delayed treatment group. Additionally, a third group who participated in the follow-up without the computer component might have identified the effects of the specific components of the intervention. A larger sample and control group may "strengthen validity and guide future treatment adaptations and development" (Laugeson et al., 2015, p. 3988). Another limitation was

the possibility of biased teacher and parental reports since teachers were not blind to the nature of the intervention and parents were directly involved.

There are a number of suggestions for future research. The field of technology is rapidly evolving with a wide range of technological devices becoming more available for individuals with ASD. Keintz et al. (2013) categorized the available technology into eight platforms: personal computers and the internet, video and multimedia, mobile devices, shared active surface, virtual and augmented reality, sensor and wearable technology, robotics, and natural user interfaces. This study touched upon one of these platforms, personal computers and the internet, and future research could further develop the PEERS® website to include interactive components and built in error correction and reinforcements (Knight, McKissick, & Saunders, 2013). Alternatively, a wider range of technology can be utilized with the PEERS® program. For example, virtual reality supports role-playing by utilizing numerous contexts and perspectives, enabling users to practice social skills in a safe space prior to applying them in real scenarios, and is less intimidating then face-to-face interactions when learning new skills (Keintz et al., 2013).

Future research should incorporate teen participation in the development of the technological aspect of this intervention. Research already indicates that when teens with ASD participate in their IEP (Individual Education Plan) process that it is positively and statistically related to parental satisfaction with the IEP process and the school (Barnard-Bark, David, Ivey, & Thomson, 2009). Further, including teen voices through a focus group will enable researchers to understand what aspects of the technology appeals most, what is motivating, and what would help teens increase generalization of the new skills. This concept not only has the possibility of enhancing the intervention, but also touches upon the larger need of fostering self-determination

among teens with ASD, which has been linked to positive outcomes and success (Wehmeyer, 1998). As such, including teen input in the creation of the program may lead to an increase in parental satisfaction and teen self-determination.

Conclusion

Teens are often under-represented in the research currently being conducted on ASD. As such this study attempts to fill this gap by incorporating teens, social skill intervention and CAT. The finding from the present study are encouraging; suggesting the PEERS® follow-up with a computer component appears to lead to numerous benefits in the realm of social skills. Moreover, results showed a majority of teens decreased their problem behaviours while improving their social skills and increasing the frequency of get-togethers and social skills knowledge. Reviewing key PEERS® topics in conjunction with using technology during the intervention as well as the use of personal computers and the Internet during homework led to the aforementioned gains. Although it is not possible to isolate the exact correlations between variables, this study provides a detailed descriptive analysis and supports the PEERS® program in the development of social skills and the use of technology in intervention and instruction as part of data gathering to determine best practices. This study further highlights the critical role of parents in their ability to foster the building blocks for social skills. Parents can provide context specific coaching, skill maintenance, and content revision which leads to improving generalizability. Finally, the use of technology has shown to be effective and efficient when introducing, reinforcing and motivating the learning of critical social skills for teens with ASD. As Kevin said in Session 1, “Anything with computers, I am in!”

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Appendices

Appendix A – PEERS® Application Form

PEERS® (Program for Education and Enrichment of Relation Skills) Application Form

1. Date: _____

2. Name of Teen: _____ ☐ Male ☐ Female

3. Date of Birth: ____/_____/_____ (day/month/year) **Grade**: _____

4. Parents/Guardian contact information:

Mother's Name: _____

Telephone: (_____)_____ email address: _____

Mailing Address: _____

Father's Name: _____

Telephone: (_____)_____ email address: _____

Mailing Address: _____

5. Family Situation ☐ Two-parents ☐ Single-parent ☐ Adoptive parents

☐ Foster parents ☐ Other: _____

6. Does the parent/guardian completing this application have the legal authority to sign for this child's participation? ☐ Yes ☐ No

7. Do both parents legally need to consent for child's participation? ☐ Yes ☐ No

8. Emergency Contact (Include name, phone number, relationship to applicant):

_____

_____

9. Present School

Name: _____

Full address:

_____

_____

Teacher's Name: _____ Telephone: (_____)_____

10. At school, does your child follow:

☐A regular program at a grade level appropriate for his/her age

☐ An adapted program (appropriate grade level but follows individual program adapted to his/her needs)

☐A specialized school or class

☐Other: _____

11. Has your child received a diagnosis on the autism spectrum? ☐Yes ☐ No

12. This program will address social skills development. What are the therapeutic goals you and your teen would want to work on? Please describe:

Parent's Goals: _____

_____

Teen's Goals: _____

_____

13. Are there any concerns that we should be aware of (i.e., medical, behavioural, major mental illness, physical disability)**?:**

_____

_____

14. Is there a history of aggression toward self, others or property? ☐ Yes ☐ No

If yes, please describe:

_____

15. Are parents/guardians willing to join a weekly parent/guardian support group?

☐ Yes☐ No

16. Who will attend the sessions?

☐ mom ☐ dad ☐ step-mom ☐ step-dad ☐ foster mom ☐ foster dad

☐ adoptive mom ☐ adoptive dad ☐other: _____

SIGNATURE:

Parent/Guardian : _____ Date: _____

Appendix B – PEERS® Follow-up Parent Participation Questionnaire

PEERS® Follow-up Parent Participation Questionnaire

Please let us know:

1. What parts of the PEERS® follow-up program have been most valuable to you as a parent?

2. What parts of the PEERS® follow-up program do you feel have been most valuable to your teen?

3. How do you feel about the added computer homework?

4. What were the benefits and/or challenges with the homework presented in the computer format?

5. What aspect did you or your teen like about the computer portion?

6. What aspect did you or your teen dislike about the computer portion?

7. What subjects would you like to see covered or reviewed in a subsequent PEERS® session?

8. If you could change anything about PEERS® follow-up what would it be?

   If there is anything else you like to add that was not covered by the above questions, please feel free to share it with us.

Appendix C – Sample of Quality of Play Questionnaire (QPQ) Parent Form

Quality of Play Questionnaire – Parent (QPQ-P)

We would like the information on your teen's friendships. We **only** want to know about the friends that your teen has invited for a **get-together.** Do not consider friends who only did homework together.

Please indicate how many get-togethers your teen has **hosted in the past month:** _____.

Please fill in the **first names** of the friends who have attended a get-together **hosted by your teen in the past month**. If your teen has not had any friends over for a get-together in the past month, leave the section below blank.

Friend's first name _____ Friend's first name _____
Friend's first name _____ Friend's first name _____
Friend's first name _____ Friend's first name _____
Friend's first name _____ Friend's first name _____

What the teens did during the last visit you observed:
Consider the last get-together your teen hosted in which you were around to see or hear what was happening. Circle the number below that describes how true the preceding statement is.

	Not at All	Just a Little	Pretty Much	Very Much
They did things without each other	0	1	2	3
They did not share games, personal items, etc.	0	1	2	3
They got upset at each other	0	1	2	3
They argued with each other	0	1	2	3
They criticized and teased each other	0	1	2	3
They were bossy with each other	0	1	2	3
They allowed a sibling to join the get-together unexpectedly	0	1	2	3
They allowed other teens to join the get-together unexpectedly	0	1	2	3
They needed a parent to solve problems	0	1	2	3
They annoyed each other	0	1	2	3

Appendix D – Sample of Quality of Play Questionnaire (QPQ) Adolescent Form

Quality of Play Questionnaire – Adolescent (QPQ-A)

Please indicate how many get-togethers you **hosted in the last month**_____
Please list the **first names** of all of the friends who have come to a get-together hosted by you the past month. Do not include friends who only came to do homework. If you did not have get-togethers in the past month, leave the section below blank.

Friend's first name _____ Friend's first name _____
Friend's first name _____ Friend's first name _____
Friend's first name _____ Friend's first name _____
Friend's first name _____ Friend's first name _____

What did you do during the last get-together?
Consider the **last get-together you hosted.** Circle the number that describes how true the sentence is.

	Not at All	Just a Little	Pretty Much	Very Much
We did things without each other	0	1	2	3
We did not share games, personal items, etc.	0	1	2	3
We got upset at each other	0	1	2	3
We argued with each other	0	1	2	3
We criticized and teased each other	0	1	2	3
We were bossy with each other	0	1	2	3
We allowed a sibling to join the get-together unexpectedly	0	1	2	3
We allowed other teens to join the get-together unexpectedly	0	1	2	3
We needed a parent to solve problems	0	1	2	3
We annoyed each other	0	1	2	3

Appendix E – Sample of Test of Adolescent Social Skills Knowledge (TASSK)

Test of Adolescent Social Skills Knowledge (TASSK)

Instructions:
The following items are about making and keeping friends. After you read each of them, 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. The goal of a conversation is to:
    - Make sure the other person likes you
    - Find common interests

3. One of the rules for having a two-way conversation is to:
    - Be an interviewer
    - Do not be an interviewer

4. When you are *first* getting to know someone, it is important to be:
    - Funny and silly
    - Serious

5. When you are calling a friend on the telephone, you should:
    - Tell him or her your first and last name and where you go to school
    - Have a cover story for calling

6. When you are calling a peer on the telephone, you should:
    - Avoid cold calling
    - Let him or her do most of the talking

7. After you make a joke, it is a good idea to pay attention to:
    - Whether the other person is laughing
    - Your humor feedback

8. It is *always* a good sign if someone laughs at your jokes:
    - True
    - False

9. When you are trying to join a conversation, the *first* thing you should do is:
    - Watch and listen to observe the conversation
    - Make a comment about what they are saying

10. When joining a conversation, you should wait for:
    - Someone to invite you to talk
    - A pause in the conversation

11. If you try to join a conversation and the people are ignore you:
    - Slip out of the conversation
    - Make sure they can hear you

12. If you try to join 10 different conversations, on average how many time out of 10 are you likely to be rejected:
    - 7 out of 10
    - 5 out of 10

13. If another kid teases you or calls you a name, you should:
    - Tease the tease
    - Tell an adult

14. When someone teases you, the best think to do is:
    - Ignore that person and walk away
    - Act like what he or she said did not bother you

15. If someone spreads a rumour about you that is not true, you should:
    - Confront the person who started the rumour
    - Spread a rumour about yourself

16. If someone is gossiping behind your back, you should:
    - Let that person know that the gossip hurts your feelings
    - Act amazed that anyone would believe the gossip

Appendix F- Lesson Plan Overview

Session Date	Didactic Lesson	PEERS® Homework	Computer Homework
0 Jan. 28, 2017	Welcome Back Meeting	N/A	N/A
1 Feb. 4, 2017	Two-Way Conversation	-In-group call -Practice trading info with parent	-Review PowerPoint -10 question quiz -Identify character mistakes in two conversations
2 Feb. 11, 2017	Electronic Communication	-In-group call -Practice trading info with parent -Source of Friend	-Review PowerPoint -10 question quiz - Identify mistakes in two Snapchat messages
3 Feb. 18, 2017	Choosing Appropriate Friends	-In-group call -Out-group call -Sources of friends -Personal item	-Review PowerPoint -10 question quiz -Write the beginning of a phone conversation
4 Feb. 25, 2017	Appropriate Use of Humour	-In-group call -Out-group call -Source of Friends -Humour Feedback -Personal Item	-Review PowerPoint -10 question quiz -Write 2 jokes that follow the guidelines and you are comfortable telling
5 Mar. 4, 2017	Entering and Exiting a Conversation	-In-group call - Out-group call - Humour Feedback -Personal Item -Slip into Conversation	-Review PowerPoint -10 question quiz - Write about your experience of slipping into or out of a conversation
6 Mar. 18, 2017	Teasing and Embarrassing Feedback	- Get together -Tease-the-tease -Slipping into conversations	-Review PowerPoint -10 question quiz -Provide advice to 2 characters who are getting teased
7 Mar. 25, 2017	Rumours and Gossip	- Get together -Tease-the-tease -Slipping into conversations	-Review PowerPoint -10 question quiz -Provide advice to a character that experiences rumours.
8 Apr. 1, 2017	Review and Post Measures	N/A	N/A
9 Apr. 8, 2017	Graduation Party	N/A	N/A

Appendix G – Week 1 Computer Homework

Session 1 – Two-Way Conversation- QUIZ

1. Why is it important to trade information during a two-way conversation?
   a. To keep the conversation going
   b. To get to know each other

2. What does answering your own question mean?
   a. Share something related to yourself about the topic
   b. Ask yourself the same question

3. Why is it important to share the conversation?
   a. So things don't get boring
   b. So everyone has a chance to speak

4. How can getting too personal make the other person feel?
   a. Uncomfortable
   b. Embarrassed

5. Circle an example of a close-ended question.
   a. What is your favourite movie?
   b. What kind of video games do you like?

6. Circle the most appropriate follow-up question to the follow topic:
   "What kinds of ice cream do you like?"
   a. Have you tried the new ice cream shop called the Diperie?
   b. How does eating ice cream make you feel?

7. What is a conversation hog?
   a. Someone who talks all the time, brags about themselves, interrupts the other person, and doesn't ask any questions
   b. Some who talks all the time, brags about themselves, and asks the other person what they like to do

8. What is the problem with acting silly when you are first getting to know someone?
   a. They may think you are not very smart
   b. They may not understand your humour and think you are making fun of them

9. If you are speaking too quietly or too loudly during a conversation, the person may:
   a. Avoid speaking to you in the future
   b. Tell other people you don't know how to speak

10. How far away should you stand from someone when having a conversation?
    a. It doesn't matter
    b. About an arm's length away

Session 1 – Two-way Conversation – Assignment

Instructions: write what each character did wrong in each of the 2 conversation scripts. Think back to the two-way conversation rules for assistance.

Conversation 1
Jake: "Hey Mark. What have you been up to?"
Mark: "Not much, but I did recently create my first video game!"
Jake: " Oh that's crazy! Once during summer computer camp, we learned how to program and at the end made our own games too!"
Mark: "That sounds cool, what was your…"
Jake: "…mine was awesome, it had all these robots and aliens in it that were taking over planet Earth and you had to figure out a way to kill them off"
Mark: "Nice man, do you still..."
Jake: "…and of course everyone wanted to know where I had come up with the idea but I really couldn't share my secrets and this made the game even bigger because it all became like a mystery."
Mark: "Well did you let…"
Jake: "…finally I had to like show them because they kept bugging me and wouldn't leave alone and they thought it was super cool and everyone wanted to play all the time."
Mark: (looks bored)

What mistakes did Jake make in this conversation? Write and explain at least 3.

Conversation 2
Noah: "Hey man, how's it going?"
Jose: "Not bad, you?"
Noah: "Yeah ok. I was actually wondering what kind of sports you like playing?"
Jose: "I don't actually play any sports."
Noah: "oh ok, cool, well what about watching them on TV. What kind of sports do you like watching?"
Jose: "ummm, I don't watch sports and I don't play sports."
Noah: "Well, what do you like to watch on TV?"
Jose: "Nothing, I don't watch any TV."
Noah: "What? No TV?!?! That's crazy. What's wrong with you? Everyone watches some TV!"
Jose: "Listen, I gotta go. It's time for my Robotics Club. See ya"

Identify and explain at least 2 mistakes that Noah made and 1 mistake that Jose made during the conversation.

Appendix H – Week 2 Computer Homework

Session 2 – Electronic Communication- Quiz

1. Why should you have a cover story when calling someone?
   a. It's a good way to start the conversation.
   b. It gives the reason you are calling.

2. "Hey, what are you doing?" – Is this a good example of a cover story?
   a. No
   b. Yes

3. What are the rules for ending a phone call?
   a. Wait for a pause, give a cover story, tell the person how wonderful they are and say goodbye.
   b. Wait for a pause, give a cover story, tell the person it was nice to chat, you will see them later and say goodbye.

4. Do you always have to leave your phone number when you are leaving a message?
   a. No, because a friend will already have your number
   b. Yes, because you want to be 100% sure they will call you back

5. Who should you use cover stories with, in emails, text or on social media?
   a. People you don't know well
   b. Everybody

6. What is cold calling?
   a. Contacting someone who has not given you their contact information
   b. Contacting someone numerous times

7. How many friend requests should you send to one person?
   a. 1
   b. Between 2-3 depending on how close you are

8. What is the two-message rule?
   a. Leave a maximum of two messages via each of the following: text, voice mail, and email
   b. Leave a maximum of two messages combined via text, voice mail and email

9. What is wrong with leaving more than two messages?
   a. It can get annoying and the person may think you are weird

b. You are at risk of getting too personal

10. Why is it a bad idea to accept invitations to be "friends" with strangers on social media?
    a. It's actually a good idea and a good way to have more friends
    b. They can be dangerous or a predator

Session 2 – Electronic Communication – Assignment

Instructions: Read each Snapchat message and answer the related questions. Think back to the lesson on Electronic Communication.

For each message write and explain **<u>two</u>** mistakes that were made when writing this Snapchat message.

Appendix I – Week 3 Computer Homework

Session 3- Choosing Appropriate Friends- Quiz

1. Which one is a good suggestion for choosing friends?
   a. Someone who is more popular and smarter than you?
   b. Someone who likes the same things as you?

2. What does the term "geek" refer to?
   a. Someone that has interest and exceptional skill in a certain area
   b. Someone who is into video games and comic books

3. Why is having a crowd or group important?
   a. Makes you look way cooler and shows everyone you have friends
   b. Protects you from individual teasing and makes you look stronger and more protected

4. How can you tell which group someone hangs out with?
   a. Based on their appearance or interests
   b. Based on their personality

5. What is one way to know you've been accepted by a group?
   a. The other kids in the group will invite you to do things
   b. The other kids in the group will put off your invitation to do things

6. What is one way to know you have NOT been accepted by the group?
   a. They don't accept your social media friend requests
   b. They contact you only once a month

7. How can you find certain groups at school?
   a. Look around and observe, checking out activities and appearance
   b. Ask friends and teachers

8. What can a teen do if a group does not accept them?
   a. Keep trying at least 2 times to fit in
   b. Try to find a new group

9. How many groups can a teen fit in with?
   a. No specific number as it is based on interests
   b. About 2-3

10. What are “floaters”?
    a. Teen who can’t find their special interest
    b. Teens who float from one group to another

Session 3 – Choosing Appropriate Friends – Assignment

Instructions: Write the beginning of a phone conversation following the rules from Session 2 on how to start a conversation (Slide 5 from Electronic Communication). This can be a conversation you’ve already had or one you are planning to have.

Appendix J – Week 4 Computer Homework

Session 4 – Appropriate Use of Humour- Quiz

1. Why is it important to be serious when you are first getting to know someone?
   a. They may not understand your sense of humour.
   b. Being serious is the first steps to friendship.

2. You should NEVER repeat a joke to someone who has heard it?
   a. TRUE – a joke can only be told one time.
   b. FALSE – it's ok if someone asks you to say it again.

3. An example of an immature joke is:
   a. An inside joke
   b. A knock-knock joke

4. What is an "insult joke"?
   a. A joke that is silly.
   b. A joke that makes fun of another person.

5. Why is telling "dirty jokes" a bad idea?
   a. It gives you a bad reputation and people won't want to be your friend.
   b. It makes you look sensitive and immature.

6. What is the problem with using "inside jokes"?
   a. They are not funny.
   b. People not in on the joke will feel left out.

7. When is a good time to tell a joke?
   a. During class or in between classes
   b. During get-togethers or parties

8. What is humour feedback?
   a. The reaction you get after you've told a joke.
   b. When someone is laughing AT you instead of WITH you.

9. An example of someone laughing AT you is:
   a. They laugh really loud.
   b. They laugh before the joke is over.

10. An example of someone laughing WITH you is:
    a. They laugh and smile at the punch line.
    b. There is a long pause before they laugh.

Session 4 – Appropriate Use of Humour - Assignment

Find and write two jokes you are comfortable telling and that follow the joke guidelines from class.

Appendix K – Week 5 Computer Homework

Session 5 – Entering and Exiting a Conversation – Quiz

1. Who should you use "slipping into conversation" rules with?
    a. Everyone at school and in extracurricular activities.
    b. With groups of teens you are trying to get to know better and where you know at least one person.

2. Why should you wait and listen to a conversation before trying to join?
    a. To check if it's interesting.
    b. To check what people are talking about and if you have something to contribute.

3. What are you waiting for before slipping into a conversation?
    a. Brief pause or break in the conversation.
    b. One of the group members to ask you to join the conversation.

4. What should you always have before joining a conversation?
    a. A reason to join and something to contribute
    b. A script in your head about how the conversation will go

5. How can you tell if you are accepted into a conversation?
    a. The group directs comments or questions at you.
    b. The group closes the circle.

6. How can you tell someone does not want to talk to you?
    a. They ignore your comments and questions and make little eye contact
    b. They act silly around you.

7. What should you do if you are not accepted into the conversation?
    a. Immediately try 2-3 more times.
    b. Walk away and try a different group.

8. Why should you walk away casually and calmly?
    a. Because you don't want to seem bothered by the group not letting you into their conversation.
    b. Because you don't want to scare people off.

9. Once you are accepted in the conversation, you will stay in.
    a. FALSE – sometimes you are only partially accepted and then shut out
    b. TRUE – the people in the group are now your friends and they will want to talk.

10. Why should you have a brief cover story if you need to exit the conversation after already joining it?
    a. Because leaving without saying anything would be abrupt.
    b. Because the group cares where you are going.

Session 5 – Entering and Exiting Conservation - Assignment

Write one example of how you either entered or exited a conversation this week.

Appendix L – Week 6 Computer Homework

Session 6 – Teasing and Embarrassing Feedback – Quiz

1. Who should use "tease-the-tease" comebacks?
    a. Anyone who is getting bullied at school.
    b. Anyone who is experiencing verbal aggression from peers.

2. Why do teens tease?
    a. They are feeling bored.
    b. They are trying to get a reaction out of you, push your buttons or put on a show.

3. What is "tease-the-tease"?
    a. Strategies that show the teaser you are not bothered by what they said.
    b. Strategies that will make the teasing stop 100%.

4. Who should you never use tease-the-tease strategies with?
    a. Parents, teachers, and adults.
    b. A peer who is teasing you.

5. Why is it important to act like what the teaser said doesn't bother you?
    a. It makes the teasing less fun.
    b. It will make you feel less hurt.

6. Why is making fun of the teaser a bad idea?
    a. Makes you look like the bad guy and you can get in trouble.
    b. They can physically hurt you.

7. Why should a tease-the-tease comeback be short?
    a. To interact less with the teaser.
    b. To show that you don't care.

8. What should you do if you are not comfortable with giving a verbal response to the teasing?
    a. Shrug your shoulders, shake your head and walk away.
    b. Tell an adult.

9. What is the next step after you have said your comeback?
    a. Look away or slowly walk away.
    b. Nothing.

10. What should you do if someone is physically aggressive with you?
    a. Use other strategies.
    b. Use a tease-the-tease comeback.

Session 6 – Teasing and Embarrassing Feedback - Assignment

Provide advice to each character on what they should say and do in each situation.

Scenario 1
Mark is packing up his school bag at his locker. He is getting ready to go home. Jake comes over and says, “That is one nasty jacket! Did you find it in the garbage?”

How should Mark react? What should he say and do?

Scenario 2

Clare, Noah, and Jonathan are sitting in the cafeteria and having lunch. Dylan and his group of friends walk over and say to Noah, “Hey Noah, want to hear a joke?” “You’re so ugly, when you walk into the bank they turn off all the cameras.” Dylan and his friends then laugh loudly.

How should Noah react? What should Noah say and do?

Appendix M – Week 7 Computer Homework

Session 7 – Rumours and Gossip - Quiz

1. When are rumours and gossip common?
    a. Throughout life and everyday situations.
    b. In middle and high school

2. Why do teens spread rumours and gossip?
    a. They are putting on a show.
    b. As a form of retaliation, revenge or to damage a reputation.

3. Some teens spread gossip because?
    a. They get attention and feel important.
    b. They are bored and need something interesting to do.

4. Why is it a bad idea to be friends with a ***gossip***?
    a. Gossips are likely to spread rumours about you if they get mad.
    b. Because it makes you seem like a gossip too.

5. Should you spread a rumour about someone who has been gossiping about you?
    a. NO – it is hurtful and people may not want to be friends with you.
    b. YES – it will teach people to stop gossiping about you.

6. Should you show others that you are upset by the rumour?
    a. NO – this makes it look like you have something to hide.
    b. YES – this way people will understand that they hurt your feeling.

7. What is the problem with confronting the source of the gossip?
    a. It shows your feelings.
    b. It might result in an argument or fight.

8. Why is it a good idea to act amazed when you hear a rumour about yourself?
    a. It makes the rumour seem silly and discredits the source of the gossip.
    b. To cover your true feelings.

9. What does spreading a rumour about yourself mean?
    a. Acknowledge the rumour and telling everyone how stupid it is.
    b. Gossiping about yourself.

10. What effect does spreading a rumour about yourself have?
    a. It will kill the original rumour.
    b. It will embarrass the person who spread the rumour in the first place.

Session 7 – Rumours and Gossip - Assignment

Scenario

Ms. Jones's math class had a very difficult algebra test. Most students got poor marks except for Ryan. He got 90%, which was the highest grade in the class. Later that day, another student in the class named Mark started telling everyone that Ryan had cheated on the test and that's how he got his high mark.

What should Ryan do and say to deal with the rumour?