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ORIGINAL PAPER

The ABC's of Teaching Social Skills to Adolescents with Autism Spectrum Disorder in the Classroom: The UCLA *PEERS*® Program

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Abstract Social skills training is a common treatment method for adolescents with autism spectrum disorder (ASD), yet very few evidence-based interventions exist to improve social skills for high-functioning adolescents on the spectrum, and even fewer studies have examined the effectiveness of teaching social skills in the classroom. This study examines change in social functioning for adolescents with high-functioning ASD following the implementation of a school-based, teacher-facilitated social skills intervention known as *Program for the Education and Enrichment of Relational Skills* (*PEERS*®). Seventy-three middle school students with ASD along with their parents and teachers participated in the study. Participants were assigned to the *PEERS*® treatment condition or an alternative social skills curriculum. Instruction was provided daily by classroom teachers and teacher aides for 14-weeks. Results reveal that in comparison to an active treatment control group, participants in the *PEERS*® treatment group significantly improved in social functioning in the areas of teacher-reported social responsiveness, social communication, social motivation, social awareness, and decreased autistic mannerisms, with a trend toward improved social cognition on the Social Responsiveness Scale. Adolescent self-reports indicate significant improvement in social skills knowledge and frequency of hosted and invited get-togethers with friends, and parent-reports suggest a decrease in teen social anxiety on the Social Anxiety Scale at a trend level. This research represents one of the few teacher-facilitated treatment intervention studies demonstrating effectiveness in improving the social skills of adolescents with ASD in the classroom: arguably the most natural social setting of all.

Keywords Social skills · Autism spectrum disorder · PEERS · Friendship · Adolescents · School

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Introduction

Although deficits in social functioning are a hallmark feature among individuals with autism spectrum disorder (ASD), meta-analyses of social skills intervention studies for these individuals have not demonstrated large, socially important, long-term, or generalized changes in social competence (White et al. 2007; Rao et al. 2008; Reichow and Volkmar 2010; Matson et al. 2007). A probable explanation for weak outcomes may be that these interventions often take place in decontextualized settings, such as outpatient clinics or community mental health centers, leading to poor maintenance and generalization effects (Gresham et al. 2001).

Reichow and Volkmar (2010) performed a best evidence synthesis of social skills interventions for individuals with ASD, reviewing 66 studies published between 2001 and 2008. Although the most common intervention setting was the school for preschool-age children (19 out of 25 studies) and school-age children (20 out of 28 studies), only 3 out of

the 66 reviewed studies involved social skills interventions for adolescents, with none of these interventions taking place in a school setting (Reichow and Volkmar 2010). Thus, the lack of empirically supported school-based social skills interventions for adolescents with ASD represents a huge gap in the research literature.

The Individuals with Disabilities Education Improvement Act (IDEIA) requires that students with disabilities, including those with ASD, receive research-supported practices in the "least restrictive environment" (Sitlington and Clark 2007). The classroom is often considered to be the least restrictive environment for students with disabilities (Lang and Page 2011), as it is a true-to-life setting where children can naturally apply targeted skills. Moreover, interventions in the school or classroom setting provide the opportunity for youth with ASD to immediately practice and rehearse newly acquired social skills with similar age peers, likely leading to greater generalization (Laugeson 2014). A challenge in existing social skills intervention research for children with ASD is that social skills learned and rehearsed in laboratory or clinic settings may not necessarily be utilized and applied in daily life at home or in school (Reichow and Volkmar 2010). Therefore, effectiveness studies examining social skills interventions with a strong research base that can be easily implemented in the school setting are critical to the improvement of social skills for children and adolescents with ASD (Hart and Whalon 2011; Rao et al. 2008; White et al. 2007).

Unfortunately, reviews of the existing research on social skills interventions in the school setting show small effects. Moote et al. (1999) reviewed 25 school-based social skills intervention studies not specific to students with ASD. Included were studies conducted between 1986 and 1998 with participants in 5th–12th grade. Sixteen of these studies took place within regular education environments, eight within special education environments, and one in an academic day treatment setting. Fourteen of the studies reviewed reported beneficial effects for participants, nine reported limited or mixed results, and two concluded that the social skills intervention was no more effective than the control or comparison group. The authors noted that the field of school-based social skills training was at the early development and pilot testing phase and should be viewed with "cautious optimism" (Moote et al. 1999).

A more recent meta-analysis by January et al. (2011) reviewed 28 journal articles published between 1981 and 2007 assessing the effectiveness of classroom-wide interventions for the improvement of social skills in students of all ages. The focus of this meta-analysis was on proactive, rather than reactive, interventions that aim to reduce the number of students at risk for later disciplinary problems and school failure (January et al. 2011). All studies in the meta-analysis included classrooms with both socially competent children and those with social difficulties. Studies involving school interventions designed for children with diagnosable disorders such as ASD were not included in the analysis. The overall conclusion of this meta-analysis was that classroom-wide interventions targeting improvement in social behavior have a small effect size (0.15). However, the researchers found that interventions with more engaging, experiential approaches, such as those that include social activities and role-playing demonstrations, were more effective than interventions focused solely on discussion or instruction (January et al. 2011). When age of the participants was examined, they found that interventions in early childhood were generally more effective than interventions with older adolescent students. Yet, the authors advise that these results should be interpreted cautiously given the small number of classroom-wide social skills intervention studies implemented for adolescents. In response to the minimal overall effects of classroom-wide social skills interventions, the authors suggest that greater frequency of social skills instruction (interventions in this analysis averaged two administrations per week) and involvement of parents might be important to achieving stronger results (January et al. 2011).

Examination of school-based social skills interventions specifically targeting students with ASD show similar results; but given the paucity of these intervention studies, further investigation is warranted. In a review of 13 social skills interventions for children with ASD, White et al. (2007) found only two interventions that took place in the school setting. Bellini et al. (2007) conducted a meta-analysis of 55 studies published between 1986 and 2005 to examine the effectiveness of school-based social skills interventions for children and adolescents with ASD. Interventions delivered in the child's typical classroom setting produced moderate intervention and maintenance effects and low generalization effects, whereas pullout interventions produced low to questionable intervention and maintenance effects and very low generalization effects. When compared across age groups, the highest intervention, generalization, and maintenance effects were noted for adolescents (Bellini et al. 2007); however, the number of interventions for adolescents was limited ($n = 9$).

While few studies exist for teaching social skills to adolescents in the school setting, several studies have been shown to be effective in improving social skills and social networks for school-age children with ASD (Chan et al. 2009; Kasari et al. 2012; Kamps et al. 1992; Pierce and Schreibman 1997; Harper et al. 2008; Morrison et al. 2001; Licciardello et al. 2008; Lang et al. 2011). A review by Flynn and Healy (2012) revealed that social skills groups in the classroom setting are scarce compared to other treatment formats like peer-mediated interventions. Among the 22 studies reviewed focusing on social skills and self-help skills in individuals with ASD, only three of these studies

used a social skills group method and all took place outside of the classroom (Flynn and Healy 2012).

While some social skills programs have been found to be effective for younger children in the school setting (Chan et al. 2009; Kasari et al. 2012; Kamps et al. 1992; Pierce and Schreibman 1997; Harper et al. 2008; Morrison et al. 2001; Licciardello et al. 2008; Lang et al. 2011), January et al. (2011) suggest that school-based social skills interventions are minimally effective for children with ASD and identify several limitations among existing studies. In their meta-analysis examining the effectiveness of classroom-wide social skills interventions, only one study systematically matched the type of intervention strategy with the type of skill deficits exhibited by individuals with ASD, and only half of the studies (14 out of 28) measured treatment fidelity (January et al. 2011). Furthermore, only 12 of the studies collected data on social validity, assessing whether teacher's found the interventions to be useful for their students. In a series of focus groups conducted with 49 special education teachers, Boardman et al. (2005) found that when selecting an intervention for their classroom, teachers do not consider whether an intervention is research-based, but rather, whether the intervention is feasible, appropriate for their students, and includes professional development support. Therefore, lack of consideration of population-focused instruction, treatment fidelity, and social validity may have contributed to the low effect size found in the January et al. (2011) meta-analysis.

In a review of teacher involvement in intervention research for children with ASD, Lang et al. (2010) examined 49 studies from 1996 to 2008, revealing that the most common classroom-based interventions included embedded instruction, social stories, and activity or picture schedule interventions. Teachers implemented these interventions in 38 of the 49 studies with the majority of those having positive results ($n = 34$), and the remaining studies showing mixed results ($n = 4$). Although one important consideration for teacher-implemented interventions is the ability of teachers to accurately implement a given intervention and to ensure that all elements of the intervention are followed according to protocol, intervention training procedures were described in only 17 of the 49 studies and treatment fidelity was reported in only 13 of the studies (Lang et al. 2010). Another important consideration relates to maintenance of treatment gains. Only 12 of the 49 studies examined by Lang et al. (2010) reported maintenance data ranging from 10 days to 1 year following the end of the intervention, all revealing positive results. Finally, the social validity data reported in these studies was generally favorable, suggesting that the interventions utilized in these studies were acceptable to teachers; however, many studies in this review included subjective measures of social validity and few studies used experimentally validated measures (Lang et al. 2010). Therefore, interpretation of positive results among teacher-facilitated intervention studies should be considered with caution given the scarcity of monitoring of treatment fidelity, maintenance of treatment gains, and adequate measurement of social validity.

Overall, the results from the existing research on school-based social skills interventions for adolescents with ASD are limited. Such interventions are more common with younger children (Bellini et al. 2007), yet there is evidence that early adolescence may be a particularly effective time to implement these critical interventions (January et al. 2011). The limited literature that does exist with this population in the school setting shows small effect sizes, thereby restricting the strength and importance of the findings (White et al. 2007; Bellini et al. 2007). Of greatest concern is the fact that the benefit of school-based social skills training for adolescents with ASD in less known, and yet is often provided as part of educational programs in the school (Hess et al. 2008). Given the mandate of IDEIA to provide research-supported practices to students with disabilities in the least restrictive environment (Sitlington and Clark 2007), the importance of identifying and investigating evidence-based social skills interventions for adolescents with ASD in the school setting is of paramount import.

The purpose of the current study is to test the effectiveness of a manualized, school-based, teacher-facilitated, social skills intervention for adolescents with ASD without intellectual disabilities in the classroom. *The Program for the Education and Enrichment of Relational Skills* (*PEERS*®) *Curriculum for School-Based Professionals* (Laugeson 2014) is a teacher-facilitated daily social skills class, adapted from an evidence-based social skills program for high-functioning adolescents with ASD, focusing on making and keeping friends and managing peer rejection and conflict (Laugeson and Frankel 2010). The efficacy and effectiveness of weekly 90-min parent/caregiver-assisted versions of the *PEERS*® intervention have been established in multiple clinical trials and randomized controlled trials with adolescents with ASD (Laugeson et al. 2009, 2012; Schohl et al. 2013; Chang et al. 2013; Van Hecke et al. 2013; Yoo et al. 2014) and young adults with ASD (Gantman et al. 2012), showing long-term maintenance of treatment gains even 1–5 years following the intervention (Mandelberg et al. 2014). However, the effectiveness of an adapted school-based version of the *PEERS*® curriculum using daily teacher-facilitated instruction in an educational setting has yet to be established.

Using an adapted curriculum of an evidence-based social skills intervention for high functioning adolescents with ASD (Laugeson 2014), the current study sought to examine the effectiveness of daily teacher-facilitated social

skills instruction through the *PEERS*® compared to daily instruction using another manualized social skills curriculum (Coucouvanis 2005). It was hypothesized that in comparison to an active treatment control group, students receiving the *PEERS*® *Curriculum for School-Based Professionals* (Laugeson 2014) would demonstrate greater improvement in overall social skills, social responsiveness, and peer engagement as measured by a battery of teacher, parent, and adolescent self-report measures.

Methods

Participants

Seventy-three adolescent participants along with their parents and teachers participated in the current study. All adolescents were attending *Village Glen Middle School*, a nonpublic middle school for students with ASD without intellectual disabilities. In order to be included in the study, adolescent participants had to have a previous diagnosis of autistic disorder, Asperger's disorder, or pervasive disorder-not otherwise specified (PDD-NOS) as determined by a reliable mental health professional based upon DSM-IV criteria (American Psychiatric Association 2000). Adolescents also needed to be willing to participate in the treatment portion of the study, had to be English speakers, and both adolescents and their parents needed to be willing to fill out forms at the beginning and end of study in order to be included. Adolescents with hearing or visual impairment, comorbid mood disorders, or major mental illness were excluded from study participation. At baseline, adolescent participants were between 12 and 14 years of age, with an average age of 13 years ($SD = 0.7$). Grade level ranged from 7th to 8th grade, with an average grade of 7.58 ($SD = 0.5$). Eighty-eight percent of participants were male ($n = 64$) and 12 % female ($n = 9$). All students had a previous diagnosis of an ASD without intellectual disability from either a licensed clinical psychologist, a school district school psychologist, and/or a representative of the California Regional Center. The ethnic background of the sample was 69 % Caucasian ($n = 50$), 14 % Hispanic/Latino ($n = 10$), 5 % African American ($n = 4$), 4 % Asian American ($n = 3$), 4 % Middle Eastern ($n = 3$), and 4 % Unknown ($n = 3$).

Eight teachers at two campuses of the *Village Glen Middle School* also participated in the study. Teachers were recruited through school administrative personnel who informed them of the proposed study and allowed interested teachers to participate. In order to be included in the study, teachers had to agree to implement a manualized social skills training program daily in their classrooms, receive training and consultation on the program, and be willing to complete pre- and post-test assessments of their students functioning. Teachers were between the ages of 29–59 years, with an average age of 37 ($SD = 9.77$). The teachers were mostly female (87.5 %; $n = 7$), and were fairly ethnically diverse with 50 % Caucasian ($n = 4$), 25 % Asian American ($n = 2$), 12.5 % Hispanic/Latino ($n = 1$), and 12.5 % African American ($n = 1$). Teaching experience ranged from 4 to 11 years with an average of 6.6 years ($SD = 3.2$). All teachers had more than 3 years experience working with students with autism and other special needs and held a minimum Level 1 Education Specialist Credential with a college degree and some graduate school training.

The study was conducted under University Institutional Review Board approval through the UCLA Office of the Protection of Research Subjects. Researchers complied with the *American Psychological Association* ethical standards in the treatment of participants and in obtaining informed consent and assent.

Measures

Assessment measures consisted of a battery of adolescent, parent, and teacher questionnaires regarding adolescent social functioning. Treatment outcome measures were collected at two testing time points (T1 and T2). Baseline assessment data (T1) were collected for each measure upon initial entry into the study (prior to receiving social skills treatment), while post-test assessment data were collected immediately after receiving treatment (T2). Assessment of treatment outcome included the following measures collected at T1 and T2:

Social Responsiveness Scale (SRS; Constantino 2005)

Completed by parents and teachers, the SRS is a 65-item rating scale measuring the severity of autism spectrum symptoms as they occur in natural social settings. The SRS provides a clear picture of the adolescent's social impairments, assessing social awareness, social information processing, capacity for reciprocal social communication, social anxiety/avoidance, and autistic preoccupations and traits. It is appropriate for use with children from 4 to 18 years of age and takes approximately 15 min to complete. The SRS provides a dimensional measure of ASD, with higher scores on the SRS reflecting greater degree of social impairment and lower scores signifying less impairment. Internal consistency on the SRS is excellent ($a = 0.97$; Constantino and Gruber 2005). While the SRS is primarily used as an autism diagnostic screening tool, it has been shown to be sensitive to changes in social functioning among children with ASD (Wood et al. 2009; Laugeson et al. 2012; Schohl et al. 2013; Van Hecke et al. 2013; Yoo et al. 2014). The SRS was completed by parents and teachers at T1 and T2 to assess treatment outcome.

Social Skills Rating System (SSRS; Gresham and Elliott 1990)

The SSRS is a 52-item questionnaire (secondary form) assessing adolescent cooperation, assertion, responsibility, and self-control, as well as internalizing and externalizing behaviors. The measure is commonly used to assess treatment outcome in social skills training interventions and has been shown to be sensitive to change in social functioning among high-functioning youth with ASD (Laugeson et al. 2009, 2012; Frankel et al. 2010; Mandelberg et al. 2014). The SSRS takes approximately 10 min to complete and taps into social competence through inquiry about interactions with age-mates, performance on household/classroom tasks, use of free time, and academic competence. Items include "Starts conversations rather than waiting for someone to talk first," for example. Parents and teachers rate items as either "Never," "Sometimes," or "Very Often." Derived by factor analysis, the SSRS provides standards scores along the dimensions of Social Skills and Problem Behaviors with a mean of 100 and a standard deviation of 15. Higher score on the Social Skills Scale reflect better social functioning, whereas lower scores on the Problem Behaviors Scale suggest better behavioral functioning. The SSRS has high construct validity, correlating significantly with other established measures of child social behaviors, with good internal consistency (Cronbach's $\alpha = 0.65$–0.87) and test–retest reliability (0.77–0.87). This measure has been used extensively to identify children who need special services and who develop behavioral problems in a follow-up sample of over 4,000 children (Forness et al. 1998; Redden et al. 1999). Gresham and Elliott (1990) report test–retest reliability of 0.87, and correlations between parent and teacher reports ($r = 0.36$) are statistically significant ($p < .0001$). The SSRS was completed by parents and teachers at T1 and T2 to assess treatment outcome.

Quality of Play Questionnaire (QPQ; Frankel and Mintz 2011)

The QPQ consists of 12-items administered to parents and adolescents assessing the frequency of hosted and invited get-togethers over the previous month, as well as the level of conflict during the last hosted get-together. The QPQ was developed through factor analysis on 175 boys and girls. This scale has been used as an outcome measure in previous studies testing the effectiveness of social skills training (Laugeson et al. 2009, 2012; Frankel et al. 2010). It has demonstrated convergent validity with the SSRS Problem Behaviors scale ($r = 0.35$, $p < .05$), and significantly discriminated community from clinic-referred samples ($p < .05$). The QPQ was completed by adolescents and their parents at T1 and T2 to assess treatment outcome.

Social Anxiety Scale (SAS; La Greca and Lopez 1998)

The SAS consists of 22-items and takes approximately 10 min to complete. It was developed to assess social anxiety experienced by adolescents in the context of their peer relations. Completed separately by adolescents and their parents, items include "I/My child gets nervous when talking to peers he/she doesn't know very well," for example. Parents and adolescents rate items on a 5-point Likert scale as "Not at All" (1), "Hardly Ever" (2), "Sometimes" (3), "Most of the Time" (4), or "All of the Time" (5). The SAS has been found to have good convergent validity with the Social Phobia and Anxiety Inventory for Children (SPAI-C) in a sample of 1,147 adolescents aged 13–17 years. A significant, positive correlation was found between the SAS and SPAI-C, showing that these measures assess related but relatively independent constructs of social anxiety and phobia. The fit indices of confirmatory factor analyses are comparable to those obtained in prior studies and support the hypothesized models of the SAS and SPAI-C. Internal consistency is good and 12-month test–retest reliability modest for both measures. The SAS was completed by adolescents and their parents at T1 and T2 to assess treatment outcome.

Friendship Qualities Scale (FQS; Bukowski et al. 1994)

The FQS is an adolescent self-report measure of the quality of best friendships. Comprised of 23-items rated on a 5-point Likert scale, it took approximately 5 min to complete. Participants were instructed to keep in mind their one "best friend" while completing this measure. Items were rated as either "Never" (0), "Hardly Ever" (1), "Sometimes" (2), "Usually" (3), or "Always" (4). Items fall into five categories: Closeness, Companionship, Conflict, Helpfulness, and Security. Sample items include: "I think about my friend even if my friend is not around" (Closeness); "If my friend or I do something that bothers the other one of us, we can make up easily" (Security); or "My friend and I can argue a lot" (Conflict), for example. Average ratings are obtained for each category and reverse scored when appropriate. The FQS was completed by adolescents at T1 and T2 to assess treatment outcome.

Piers-Harris Self-Concept Scale-Second Edition (PHS-2; Piers 1984)

The PHS-2 is a 60-item adolescent self-report measure that takes approximately 10 min to complete, assessing teens' self-esteem and self-concept. The PHS-2 is widely used in both schools and community clinics. It is often administered as a routine classroom screening to identify children who might benefit from further evaluation, and it is commonly

used in clinical settings to determine specific areas of conflict, coping, defense mechanisms, and appropriate intervention techniques. Factor scores are provided on six subscales: Physical Appearance and Attributes; Intellectual and School Status; Happiness and Satisfaction; Freedom from Anxiety; Behavioral Adjustment; and Popularity. In addition, two validity scales identify biased responding and the tendency to answer randomly. Test items are simple descriptive statements, written at a second-grade reading level. Children indicate whether each item applies to them by selecting a "yes" or "no" response. The PHS-2 uses T-scores with a mean of 50 and a standard deviation of 10. The Total Score reflects overall self-concept, while subscale scores provide more detailed interpretation. Nationally representative norms are based on a sample of nearly 1,400 students, ages 7–18, recruited from school districts throughout the U.S. The PHS-2 was completed by adolescents at T1 and T2 to assess treatment outcome.

Test of Adolescent Social Skills Knowledge (TASSK; Laugeson and Frankel 2010)

The TASSK is a 26-item criterion-referenced measure developed to assess treatment changes related to adolescent knowledge about the specific social skills taught during the *PEERS*® intervention. Completed by the adolescent, the test takes approximately 5 min to complete, and includes sentence stems related to the didactic lessons in which adolescents are asked to choose the best option from two possible answers. Items are derived from key elements of each of the *PEERS*® didactic lessons. Higher scores reflected greater knowledge of adolescent social skills. The TASSK has been shown to be sensitive to treatment effects, and has a coefficient alpha of 0.56. This moderate level of internal consistency was found to be acceptable, given the large domain of questions on the scale. The TASSK was completed by adolescents at T1 and T2 to assess treatment outcome.

Procedures

The current study investigated the effectiveness of a 14-week teacher-facilitated social skills training program for middle school students with ASD in a nonpublic school setting. The research was conducted under the auspices of *The Help Group—UCLA Autism Research Alliance*, which is an innovative partnership between The Help Group and UCLA, aimed at developing and testing evidence-based practices for individuals with ASD in the community and school setting. Participants were recruited from middle school classes at the *Village Glen Middle School*, a nonpublic school serving adolescents with ASD and other social communication impairments, which is part of The Help Group's specialized day school programs. Students in eight classrooms across two campuses participated in the study, receiving 30 min of daily social skills instruction over the course of a 14-week semester term. Classrooms were comprised of 10-14 students between 7th and 8th grade. Social skills instruction was provided in homeroom classes by each participant's primary teacher during a pre-determined social skills lesson period. In order to avoid treatment contamination, middle school students in four classrooms across one campus received social skills instruction through the implementation of *PEERS*®. Students in four middle school classrooms at a different campus received the customary social skills scope and sequence utilized at the *Village Glen School*, which was based on another published manualized intervention known as *Super Skills* (Coucouvanis 2005). All students of the *Village Glen Middle School* were offered the opportunity to participate in the study, but were not mandated to do so; yet all students, whether they were participating in the research or not, received one of the two social skills treatments in the classroom depending on their campus location.

Assessment of treatment outcome was measured via data collection of parent, teacher, and adolescent self-reports of social functioning at two time points: pre-test (T1) and post-test (T2). Parents were mailed study forms via USPS pre-addressed stamped envelopes, while teachers were hand-delivered study forms, and students received group oral administration of forms in their classrooms by research personnel. As an incentive to participate, teens received a large school-based graduation party and ceremony at the end of treatment, as well as self-selected graduation prizes $10–$20 in value upon completion of the study.

Description of the PEERS® Curriculum

The *PEERS® Curriculum for School-Based Professionals* (Laugeson 2014) consisted of daily 30-min lessons, delivered 5 days per week over the course of a 14-week semester term. In order to prepare teaching staff for implementation of the intervention, teachers and teacher aides assigned to the treatment condition were trained and supervised in all aspects of the intervention; receiving 3 h of initial training on the manualized intervention prior to implementation, and 1 h of weekly supervision/consultation from the principal investigator, who is also the co-developer of the intervention. Key elements of the intervention were taught using evidence-based methods of instruction (Laugeson and Park 2014; January et al. 2011) and were provided directly by teaching staff without the assistance of the research team. Didactic instruction about simple rules and steps of social etiquette related to making and keeping friends and handling peer conflict and peer rejection were provided using ecologically valid social skills based on the norms established by

socially accepted teens. Didactic lessons were followed by role-play demonstrations of targeted skills between teachers and teacher aides. Newly learned skills were rehearsed in the classroom by all students, while teens received performance feedback from teaching staff during behavioral rehearsal exercises. Socialization homework assignments were given to generalize skills outside of the school setting, and were reviewed by students and teaching staff at the beginning of each week. Parents also received psycho-education about skills needed for teens to develop and maintain friendships via weekly parent handouts, which were sent home through classroom communication logs by the teaching staff. Through these handouts, parents were provided instruction about how to help their teen make and keep friends and assist their teen in expanding their social network through the enrollment in extracurricular activities. The extent to which parents utilized these parent handouts was not monitored in the current study.

Adherence to treatment protocol was monitored by teacher aides through daily fidelity sheets outlining the major components of the manualized intervention, ensuring that each class received the same instruction and all aspects of the intervention were covered. Weekly didactic lessons included: (a) conversational skills, including verbal and nonverbal forms of communication; (b) electronic forms of communication, including phone calls, text messaging, instant messaging, emailing, and online safety; (c) developing friendship networks, including identifying peer groups and extra-curricular activities in which to find sources of potential friends; (d) appropriate use of humor, including learning to pay attention to humor feedback from others; (e) peer entry strategies, including how to join conversations with other adolescents; (f) peer exiting strategies, including how to assess receptiveness during peer entry and what to do when these attempts fail; (g) good host/guest behavior during get-togethers, including how to organize a successful gathering with friends; (h) good sportsmanship, including how to appropriately behave during games and sports; (i) strategies for handling teasing, including distinguishing teasing from embarrassing feedback and handling verbal teasing through the use of appropriate behavioral responses; (j) handling physical bullying, including identifying strategies for handling cyber bullying and physical threats from others; (k) changing reputations, including long-term strategies for altering a bad reputation; (l) resolving arguments with friends, including specific steps for problem solving disagreements; and (m) managing rumors and gossip, including behavioral strategies for minimizing the damage caused by gossip (Laugeson and Frankel 2010; Laugeson 2013, 2014). See Table 1 for a review of the weekly didactic lessons and corresponding socialization homework assignments.

Description of the Active Treatment Control Group

Students in the four middle school classrooms not receiving the *PEERS*® curriculum were assigned to receive the general scope and sequence social skills curriculum provided by the *Village Glen Middle School*. This curriculum is based upon a manualized social skills intervention (*Super Skills*; Coucouvanis 2005) targeting similar skills as those taught in *PEERS*®. Fundamental social skills targeting the development and maintenance of relationships for adolescents with ASD were discussed and presented by teaching staff through didactic instruction during daily 30 min social skills instruction in the classroom delivered 5 days per week over the course of a 14-week semester term. Targeted skills included fundamental social skills such as appropriate use of eye contact and voice volume; social initiation skills such as starting a conversation with someone; getting along with others, including acknowledging others and following directions; and social response skills, such as reciprocity during conversations.

All teachers assigned to implement the active treatment control curriculum were previously trained on the general scope and sequence social skills curriculum and had more than 2 years experience implementing the intervention in their classrooms as part of a school-wide social skills training model. Teachers assigned to the active treatment control condition did not receive instruction on the *PEERS*® curriculum during the current study, but were given a 3-h training overview on the *PEERS*® curriculum at the end of the study, should they wish to implement the intervention in future classes.

Results

All analyses were performed using SAS/STAT software (version 9.2, SAS Institute Inc, Cary, NC, 2008) and SPSS version 17. Table 2 presents mean demographic variables for each group. Chi Square tests for age, grade, gender, and ethnicity all failed to reach significance (p's $> .05$).

Outcome measures were converted to difference scores (DS), where positive DSs indicated improvement for the TASSK, QPQ, and SSRS and negative DSs indicated improvement for the SRS. Results are presented in Table 3.

GLM was used to evaluate treatment outcome data (see Table 3). The false discovery rate (FDR) (Benjamini and Hochberg 1995) was used to control for multiple hypothesis testing and adjusted p values are presented in Table 3. Results revealed that teens in the Treatment (*PEERS*®) Group reported greater improvement in knowledge of social skills on the TASSK (mean DS = 6.52) in comparison to teens in the Active Treatment Control (*Super Skills*) Group [mean DS = 0.00; $F(1, 71) = 61.70$, $p < .001$, $d = 1.88$].

Table 1 Overview of the *PEERS®* *curriculum*

Week	Didactic lessons	Description of the lessons	Homework
1	Introduction and trading information	Teens are taught how to trade information during conversations with peers in order to find common interests	Teens practice trading information on the phone with a classmate
2	Conversational skills	Teens are instructed on key elements of having a two-way conversation with peers	Teens practice trading information on the phone with a non-classmate
3	Electronic communication	Teens learn about the appropriate use of voicemail, email, text messaging, instant messaging, and the Internet in further developing pre-existing friendships	Teens practice using electronic forms of social communication
4	Choosing appropriate friends	Teens are introduced to the social hierarchy of social groups in schools and begin to identify groups they might fit in with. Teens begin to identify extra-curricular activities based on their interests	Teens begin to pursue extra-curricular activities and identify potential social groups where they begin trading information with members of these groups
5	Appropriate use of humor	Teens learn the basic rules around appropriate use of humor and learn to pay attention to their humor feedback to determine if they are more of a joke-teller, joke-receiver, or joke-refuser	Teens pay attention to their humor feedback to determine if people are laughing at them, laughing with them, or not laughing at all
6	Peer entry strategies	Teens are given instruction about the precise steps involved in joining group conversations with peers	Teens practice entering group conversations with peers
7	Peer exit strategies	Teens are taught how to assess receptiveness during peer entry and how to gracefully exit conversations when they are not accepted	Teens practice entering and exiting group conversations with peers
8	Get-togethers	Teens are given instructions about how to plan and implement successful get-togethers with friends	Teens organize and host a get-together with potential friends not affiliated with *PEERS®*
9	Good sportsmanship	Teens are taught the rules of good sportsmanship	Teens practice good sportsmanship while playing videogames, computer games, board/card games, and sports
10	Handling verbal teasing	Teens are taught how to appropriately respond to verbal teasing from peers. Teens learn to differentiate between teasing (i.e., verbal attacks) and embarrassing feedback and how to alter their behavior in response to the latter	Teens practice handling verbal teasing appropriately when relevant
11	Handling physical bullying and bad reputations	Teens are given strategies for handling physical bullying and how to change a bad reputation	Teens implement new strategies for handling bullying and physical threats from peers when relevant
12	Handling arguments and disagreements	Teens are given instruction about the important elements necessary to resolving arguments and disagreements with peers	Teens practice handling arguments with peers when relevant
13	Handling rumors and gossip	Teens are given concrete strategies for minimizing the effects of rumors and gossip	Teens practice handling rumors and gossip appropriately when relevant
14	Graduation party and ceremony	Teens are given a review of the skills taught in the *PEERS®* curriculum	Teens are rewarded with a graduation party and ceremony on the last day of the week

Teen-reported hosted get-togethers on the QPQ showed greater improvements in frequency of teen initiated social interaction in the Treatment Group (mean DS = 2.05) in comparison to the Active Treatment Control Group [mean DS = −1.82; $F(1,71) = 11.50$, $p < .01$, $d = 0.82$]. Teen-reported get-togethers as invited guests on the QPQ also showed significant differences in frequency of reciprocal social interaction in the Treatment Group (DS = 0.08) in comparison to the Active Treatment Control Group [mean DS = −1.42; $F(1,71) = 6.46, p < .02, d = 0.59$]. Teachers in the Treatment Group reported significantly greater reduction in ASD symptoms relating to social responsiveness on the SRS (mean DS = −4.28) than teachers in the Active Treatment Control Group [mean DS = 0.56; $F(1,71) = 7.55$, $p < .01$, $d = -0.63$]. SRS-T subscale analyses revealed significant improvements in the Treatment Group in comparison to the Active Treatment Control Group in the areas of teacher-reported Social Awareness [$F(1,71) = 4.87$, $p < .03$, $d = -0.52$], Social Communication [$F(1,71) = 6.07, p < .03, d = -0.57$], Social Motivation [$F(1,71) = 5.06, p < .03, d = -0.52$], and decreased Autistic Mannerisms [$F(1,71) = 6.53$, $p < .02$, $d = -0.59$]. The Social Cognition subscale showed significant improvements in the Treatment Group in comparison to the Active Treatment Control Group at a trend level [$F(1,71) = 3.39, p < .06, d = -0.42$], according to teacher

Table 2 Mean demographic and baseline variables for the treatment (*PEERS*®) group and active treatment control (*Super Skills*) groups (standard deviations are in parentheses)

Variable	Group		*p*
	Treatment $n = 40$	Active treatment control $n = 33$	
Age (years)	12.68 (0.67)	12.74 (0.68)	ns
Grade	7.69 (0.47)	7.47 (0.51)	ns
Percent male	92.1	87.5	ns
Percent Caucasian	73.7	68.8	ns

reports. Complete parent-reports at T1 and T2 were available for only 23 % of the sample ($n = 17$) due to poor response rates from parents. However, results revealed that parents in the Treatment Group, who were independent raters of social behavior and uninvolved in treatment, reported a trend toward decreased social anxiety on the SAS (mean DS = 3.17) in comparison to parents in the Active Treatment Control Group [mean DS = −8.60; $F(1,15) = 4.24$, $p < .06$, $d = 0.95$]. DSs on all other measures were non-significant.

Discussion

Results from the present study suggest that the *PEERS*® *Curriculum for School-Based Professionals* (Laugeson 2014) as a teacher-facilitated school-based social skills program is effective in improving the social functioning of high-functioning middle school adolescents with ASD. Findings indicate that in comparison to an active treatment control group (Coucouvanis 2005), participants receiving the *PEERS*® intervention demonstrated overall improvement in social responsiveness on the SRS (Constantino 2005) as reported by teachers on a standardized measure of social functioning, particularly in the areas of improved social motivation, social awareness, social communication, and decreased autistic mannerisms. A trend toward improved social cognition was also observed on the SRS according to teacher report. Parent reports of adolescent social functioning in a small portion of the sample ($n = 17$) revealed significant differences in social anxiety on the SAS (La Greca and Lopez 1998) between those receiving the *PEERS*® intervention and those in the active treatment control from pre- to post-assessment, although these findings should be interpreted with caution given the small sample size. In addition, adolescent self-reports of social functioning demonstrate increased frequency of hosted and invited get-togethers on the QPQ (Frankel and Mintz 2011) and improved social skills knowledge on the TASSK (Laugeson and Frankel 2010) as a result of the *PEERS*® intervention. Increased frequency of get-togethers with same-aged peers is particularly noteworthy in that it suggests greater social engagement with peers through self-initiation (hosted get-togethers) and peer-reciprocity

Table 3 Mean difference scores for outcome variables for treatment (*PEERS*®) group and active treatment control (*Super Skills*) group (standard deviations are in parentheses)

Variable	Group		*F*	*p*	Adjusted *p*	*d*
	Treatment $n = 40$	Active treatment control $n = 33$				
Teen measures						
TASSK-R[a]	6.52 (4.02)	0.00 (2.83)	61.70	<.001	<.001	1.88
QPQ host[a]	2.05 (5.83)	−1.82 (3.29)	11.50	.001	.012	0.82
QPQ guest[a]	0.08 (2.26)	−1.42 (2.78)	6.46	.016	.069	0.59
Teacher measures						
SRS-T total[b]	−4.28 (6.24)	0.56 (8.84)	7.55	.004	.032	−0.63
SRS-T social awareness[b]	−3.13 (7.85)	0.82 (7.47)	4.87	.025	.069	−0.52
SRS-T social cognition[b]	−4.10 (7.24)	−0.44 (9.81)	3.39	.058	.127	−0.42
SRS-T social communication[b]	−4.00 (6.82)	0.65 (9.36)	6.07	.022	.069	−0.57
SRS-T social motivation[b]	−4.00 (8.35)	0.35 (8.23)	5.06	.026	.069	−0.52
SRS-T autistic mannerisms[b]	−2.93 (6.69)	2.09 (10.07)	6.53	.019	.069	−0.59
Parent measures						
SAS social anxiety	3.17 (8.39)[c]	−8.60 (15.47)[d]	4.24	.057	.127	0.95

[a] Raw scores

[b] T scores

[c] $n = 12$

[d] $n = 5$

(invited get-togethers), rather than a pattern of social isolation, loneliness, or rejection as is commonly seen among adolescents with ASD (Bauminger and Kasari 2000; Tantam 2003).

Findings from the current study are important for a number of reasons. Studies investigating the effectiveness of social skills training for individuals with ASD suggest that few evidence-based interventions exist for adolescents (White et al. 2007; Rao et al. 2008; Reichow and Volkmar 2010). Therefore, the current study demonstrates the benefit of an empirically supported treatment for an understudied and perhaps underserved population. The current study is also important in that it involves the adaptation of an evidence-based treatment for teens with ASD in the school setting using teacher-facilitation. Previous studies examining the efficacy of *PEERS*® investigated the benefit of a parent-mediated model of social skills instruction for adolescents with ASD (Laugeson et al. 2009, 2012; Schohl et al. 2013; Van Hecke et al. 2013, Yoo et al. 2014). Given the fact that not all parents are able or even willing to participate in treatment, yet all adolescents are required by law to attend school, adapting the existing intervention for the school setting using teachers as interventionists may promote use with a much larger population of adolescents with ASD. Moreover, by utilizing teachers as social skills interventionists in the classroom, we increase the opportunity to provide social coaching in a natural setting through teachable moments, possibly promoting greater maintenance of treatment gains over time.

Although the current study was successful in improving the overall social skills and social responsiveness of teens with high-functioning ASD, there are a few limitations to these findings worthy of note. One limitation relates to the lack of a randomized control trial (RCT) design. Although RCTs are the preferred method for establishing treatment benefit (Reichow and Volkmar 2010), and previous studies using the *PEERS*® intervention in outpatient University settings have utilized RCTs (Laugeson et al. 2009; Gantman et al. 2012; Schohl et al. 2013; Van Hecke et al. 2013, Yoo et al. 2014), the randomization of students to treatment in the current study was not feasible given constraints in the school setting. Specifically, students received social skills instruction in their designated homeroom class as was customary at the *Village Glen Middle School*. Therefore, students could not be randomly assigned to treatment conditions without disrupting the structure of the educational environment. Furthermore, in order to avoid treatment contamination across classrooms, randomization to treatment condition was limited to campus rather than classroom, with one campus receiving the *PEERS*® intervention and the other receiving the active treatment control. Although the research team attempted to avoid treatment contamination, it is difficult to know to what extent treatment fidelity was maintained across conditions given the use of teacher aides as monitors of treatment fidelity. Therefore, future studies should include monitoring of treatment fidelity by members of the research team. Employing an RCT is also recommended when feasible.

Another limitation of the current findings is the lack of comprehensive diagnostic assessment. Although all participants had a previous diagnosis of an ASD without intellectual disability from a reliable mental health professional and were in fact attending a nonpublic school for students with ASD, due to the financial constraints of the research, a comprehensive diagnostic evaluation verifying diagnoses of all 73 participants was not possible. In future, it would be beneficial to conduct a comprehensive diagnostic assessment using standardized measures like the Autism Diagnostic Interview-Revised (ADI-R; Le Couteur et al. 2003) or the Autism Diagnostic Observation Schedule (ADOS-2; Lord et al. 2012) to corroborate diagnoses. Additionally, the current study utilized teacher and adolescent rating scales as primary outcome measures. Given the fact that teachers and adolescents are active participants in the intervention and might be susceptible to bias, additional third party assessments like those obtained through parent reports in the current study or behavioral observations, as recommended by Reichow and Volkmar (2010), would be beneficial toward establishing the validity of the findings. While behavioral observations of the 73 participants in the current study were not financially viable in the current study, researchers did attempt to collect independent ratings of behavior through parent reports of social functioning. However, extremely poor response rate resulted in less than 25 % of the sample obtaining complete parent data from pre- to post-test. Although findings from parent-reports on the SAS (La Greca and Lopez 1998) did demonstrate a trend toward changes in social anxiety from pre- to post-test assessment, the generalizability of this finding is questionable given the small sample size. Future studies investigating the benefit of school-based social skills interventions might do well to provide incentives to parents for completing independent behavioral ratings of adolescent social functioning to improve response rates. In fact, in a subsequent unpublished study using the *PEERS*® intervention in the school setting (manuscript in preparation), simply offering a $20 gift card to parents for completing outcome measures resulted in a greater than 90 % response rate for 146 participants.

Another limitation of the current research is the lack of knowledge regarding the benefit of parent participation in the intervention. As described previously, parents in the *PEERS*® intervention received weekly parent handouts outlining the social skills being taught in the classroom. However, very little is known about the benefit of these handouts and whether parents actually read the material or attempted to provide

assistance in the targeted areas. The previously mentioned unpublished study examining the utility of the school-based *PEERS*® intervention with 146 participants will investigate this question through a study utilizing teacher-facilitation with varying degrees of parent participation.

Finally, examination of other school-based models of social skills training delivery methods, such as peer-mediated interventions, would be an interesting line of query in future studies. Peer-mediated interventions are perhaps the most common school-based approach to social skills interventions for children with ASD (Lang et al. 2011), and while several studies have been shown to be effective in improving social skills and social networks for school-age children (Chan et al. 2009; Kasari et al. 2012), the benefit of this approach for older adolescents with ASD in less known. In fact, a review by Flynn and Healy (2012) revealed that social skills groups in the classroom setting are scarce compared to other intervention formats like peer-mediated interventions. Among the 22 studies reviewed focusing on social skills and self-help skills in individuals with ASD, only three of these studies used a social skills group method and all took place outside of the classroom. The remaining 19 studies included peer-mediated interventions, Pivotal Response Treatment, script fading procedures, and video modeling. Unlike the social skills groups, all 19 studies took place in an education setting. While the three social skills groups examined in the Flynn and Healy (2012) paper showed the interventions to be somewhat effective, they did not appear to have as many overall advantages as the peer-mediated interventions. This may be due to the fact that the social skills groups did not take place in natural settings (e.g., classrooms), possibly limiting generalization and maintenance of the skills taught. Therefore, social skills groups may be more effective and beneficial for those who are higher functioning when they are conducted in the school setting.

In conclusion, even given methodological limitations, the current study is important in that it provides an evidence-base for teaching social skills in the school setting using teacher facilitation. Utilizing this method of treatment delivery will not only allow educators to reach a greater number of adolescents with ASD than is afforded by more traditional intervention methods (e.g., community-based treatment), but will also allow teachers and school district personnel to provide assistance to adolescents with ASD in learning the basic rules of social etiquette needed to develop and maintain meaningful relationships in arguably the most naturalistic adolescent social setting of all—the classroom.

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