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Long-Term Treatment Outcomes for Parent-Assisted Social Skills Training for Adolescents With Autism Spectrum Disorders: The UCLA PEERS Program

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Long-Term Treatment Outcomes for Parent-Assisted Social Skills Training for Adolescents With Autism Spectrum Disorders: The UCLA PEERS Program

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Social deficits are a hallmark characteristic among adolescents with autism spectrum disorders (ASD), yet few evidence-based interventions exist aimed at improving social skills for this population, and none have examined the maintenance of treatment gains years after the intervention has ended. This study examines the durability of the Program for the Education and Enrichment of Relational Skills (PEERS), a manualized, parent-assisted social skills intervention for high-functioning adolescents

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with ASD. Targeted skills related to the development and maintenance of friendships were assessed 1–5 years following treatment for 53 adolescent participants and their parents. Results indicate that adolescents receiving PEERS maintained treatment gains at long-term follow-up on standardized measures of social functioning including the Social Skills Rating System and the Social Responsiveness Scale as well as in frequency of peer interactions and social skills knowledge. Perhaps due to parent involvement in treatment, results reveal additional improvements in social functioning at follow-up assessment.

KEYWORDS social skills, autism, Asperger's disorder, PEERS, long-term outcomes, adolescents

Autism spectrum disorders (ASD) are a continuum of diagnoses that include autistic disorder, Asperger's disorder, and pervasive developmental disorder—not otherwise specified (PDD-NOS). Collectively, ASD is characterized by deficits in communication, impairments in social interactions, and restricted and repetitive patterns of behavior (American Psychiatric Association, 2000). Deficits in social skills are the common impairment shared by all individuals with ASD, with some even proposing that poor social functioning is the most profound and defining difficulty faced by these individuals (Laushey & Heflin, 2000).

Social deficits often observed across the spectrum for adolescents with ASD include poor social communication, impaired social cognition, and lack of understanding of social cues. Poor social communication is often exhibited through one-sided conversational patterns in which the adolescent with ASD may be oververbose, perseverate on specific topics of personal interest, exhibit difficulty changing conversational topics, and pay little regard to the interest of his or her listener (Elder, Caterino, Chao, Shacknai, & De Simone, 2006; Klin, 2011). This inability to carry out a bidirectional conversation and take turns in conversations (Bauminger et al., 2008; Church, Alisanski, & Amanullah, 2000; Klin, 2011; Klin & Volkmar, 2003) makes it difficult for an adolescent with ASD to trade information with his or her social partner and find common interests (Laugeson & Frankel, 2010). One consequence of this failure to identify common ground with one's peer is that it becomes difficult to form friendships, particularly because friendships are often based upon common interests (Laugeson & Frankel, 2010). Consequently, adolescents with ASD perceive their friendships as less close, helpful, and intimate compared with typically developing adolescents (Bauminger et al., 2008). Impaired social cognition is another hallmark feature of ASD and often includes an overall lack of understanding of social causality (Baron-Cohen, Leslie, & Frith, 1985), along with difficulties in

expressing emotions, understanding the feelings of others, and empathizing (Baron-Cohen, 1995; Frith, 2004; Klin & Volkmar, 2003; Krasny, Williams, Provencal, & Ozonoff, 2003; Travis & Sigman, 1998). Such deficits make it difficult for adolescents with ASD to understand the perspectives of others or predict a person's behavior, consequently making it difficult to develop and maintain meaningful relationships.

Another characteristic of ASD involves lack of understanding of social cues, manifesting in many ways, including difficulty understanding the value and meaning of nonverbal elements of social interaction (Volkmar & Klin, 1998). For example, the use of social touch, gestures, and eye contact are often impaired in adolescents with ASD. Inability to interpret these social cues, assess the formality of social events, and act accordingly also appears to be in deficit (Griffin, Griffin, Fitch, Albera, & Gingras, 2006). This inability to understand social cues further complicates the ability to have successful social interactions or pursue friendships for adolescents with ASD.

Possibly due to a rise in complexity of social communication and greater need for the understanding of social cues that accompany developmental maturity, social deficits seen in childhood among those with ASD often become more pronounced during adolescence (Tantman, 2003) and adulthood (Klin & Volkmar, 2003), possibly leading to significant impairments in daily living and interpersonal relationships (Klin & Volkmar, 2003). Consequences of these deficits may include peer rejection, poor social support, and isolation with adolescents with ASD generally reporting higher levels of loneliness and poorer quality of friendships (Bauminger & Kasari, 2000; Bauminger et al., 2008; Capps, Sigman, & Yirmiya, 1995).

EVIDENCE-BASED SOCIAL SKILLS INTERVENTIONS FOR ADOLESCENTS WITH ASD

Although social skills training has become an increasingly popular method for helping individuals with ASD adapt to their social environment, a review of the research literature suggests there are very few evidence-based social skills interventions for adolescents with ASD (White, Koenig, & Scahill, 2007). With much emphasis on early intervention, most social skills treatment studies have targeted younger children on the autism spectrum. Among the limited number of social skills intervention studies conducted with the adolescent population, most have not been formally tested in terms of their efficacy in improving social competence or the development of close friendships, nor do they examine the maintenance of treatment gains months or years after the intervention has ended (Rao, Beidel, & Murray, 2008; White et al., 2007).

Previous research indicates that effective intervention strategies used for teaching social skills include time-limited social skills instruction using the

methods of behavioral modeling and role-playing demonstrations; behavioral rehearsal exercises in which the participants may practice newly learned skills; and coaching with performance feedback, conducted in small-group settings (Gresham, Sugai, & Horner, 2001). Additionally, key features known to enhance treatment outcome for adolescents with ASD include the use of evidence-based treatment manuals, didactic instruction presented using concrete rules and steps of social etiquette, and in vivo socialization homework assignments (Laugeson, Frankel, Gantman, Dillon, & Mogil, 2011; Laugeson, Mogil, Dillon, & Frankel, 2009; White et al., 2007).

Another important component of effective social skills interventions is the structured involvement of parents. Parents can significantly promote the acquisition of social skills for adolescents through the provision of direct instruction and supervision, support for the development of an appropriate peer network, and assistance in generalizing skills outside of the treatment setting (Frankel & Myatt, 2003; Frankel et al., 2010; Laugeson et al., 2011; Laugeson et al., 2009). Furthermore, through the continued promotion and reinforcement of newly learned social skills even after treatment has concluded, the inclusion of parents in social skills treatment may actually enhance long-term maintenance of treatment gains over time (Frankel et al., 2010; Laugeson et al., 2011).

FOLLOW-UP STUDIES OF SOCIAL SKILLS INTERVENTIONS FOR ADOLESCENTS WITH ASD

The maintenance of newly acquired social skills over time is an important consideration for social skills training, yet assessment of maintenance of skill acquisition is rarely examined in treatment studies or clinical programs, calling into question how beneficial these programs are in the fullness of time (Kasari & Locke, 2011; White et al., 2007). Although there have been some follow-up studies of social skills interventions for school-age children with assessments ranging from 2 weeks to 9 months postintervention (Barry et al., 2003; Beaumont & Sofronoff, 2008; Bock, 2007; Castorina & Negri, 2011; DeRosier & Marcus, 2005; Frankel et al., 2010; Gena, Couloura, & Kymissis, 2005; Laushey & Heflin, 2000; Nikopoulos & Keenan, 2007; O'Connor & Healy, 2010; Sansosti & Powell-Smith, 2006; Wood et al., 2009), the literature for adolescents is much more limited. Only two follow-up studies of social skills training for adolescents with ASD appear to exist. White, Koenig, & Scahill (2010) conducted a 16-week social skills group intervention for early adolescents (ages 11–14). Participants demonstrated improvement postintervention in the areas of social communication and social motivation, but these gains were not sustained at a 3-month follow-up assessment, perhaps due in part to the lack of parent involvement. Based upon parent feedback, the authors acknowledged that the program might have been improved by

providing more information to parents about the content of the group and child participation during group. Laugeson et al. (2011) conducted a 14-week follow-up assessment of adolescents 12–17 years of age who participated in the *Program for the Education and Enrichment of Relational Skills* (PEERS), a parent-assisted social skills group intervention targeting friendship skills. Results at posttreatment indicated increased frequency of peer interactions; improved social skills knowledge; social responsiveness; and overall social skills in the areas of social communication, social cognition, social awareness, social motivation, assertion, cooperation, and responsibility as well as decreased autistic mannerisms. These gains were maintained at a 14-week follow-up assessment in all areas with the exception of social cognition. Additional treatments gains were also observed at follow-up in relation to improved teacher-reported social skills and decreased parent-reported problem behaviors in the areas of improved self-control and decreased externalizing behavior. These results suggest durability of improvement for the PEERS intervention at least 14 weeks following treatment. Perhaps due to the involvement of parents as social coaches during the intervention, skills acquired during treatment were likely promoted and reinforced even after the intervention had ceased, resulting in greater social skills generalization and maintenance of treatment effects.

Given the lack of understanding about the durability of social skills treatment outcomes and long-term benefits of social skills training, this study seeks to evaluate the long-term social outcomes of adolescents 1–5 years after completing the PEERS parent-assisted social skills treatment program. Researchers hypothesize that due to parent involvement in treatment, maintenance of treatment gains will be observed across all measures of social functioning.

METHOD

Participants

Fifty-three families participated in this study. Families were recruited from a sample of 82 former PEERS participants with ASD who had completed the program between October 25, 2006 and July 22, 2009 with at least 75% attendance. At the time of entering the PEERS treatment groups, adolescent participants were initially between 12 and 18 years of age ($M = 14.4$, $SD = 1.6$) and in Grades 6–12 ($M = 8.8$, $SD = 1.9$). Original inclusion criteria were that the adolescents (a) were attending middle or high school; (b) had social problems as reported by the parent; (c) had a previous diagnosis of either high-functioning autism, Asperger's disorder, or pervasive developmental disorder–Not otherwise specified (PDD-NOS); (d) had a verbal IQ greater than 70; (e) were fluent in English; (f) had a parent or family member who was fluent in English and willing to participate in the study; (g) had

no history of major mental illness (e.g., bipolar disorder, schizophrenia, psychosis); and (h) had an absence of hearing, visual, or physical impairments that precluded participation in outdoor sports activities. In order to allay any oppositional behavior exhibited by unmotivated teens or potential anxiety experienced by teens nervous about participating in a group treatment with strangers, the PEERS program only included motivated teens who verbally expressed an interest in participating in the intervention during the eligibility appointment. Additional criteria for participation in the follow-up study included not having participated previously in the Children's Friendship Training Program (Frankel & Myatt, 2003), from which the format and structure of PEERS was derived. Among the 82 potential participants recruited for the current study, 51 subjects participated in prior PEERS research studies (Laugeson et al., 2011; Laugeson et al., 2009), and 31 subjects participated in non-research-related social skills groups conducted through the University of California, Los Angeles (UCLA) PEERS Clinic. All participants received the PEERS curriculum as described in Laugeson & Frankel (2010) and were administered the same treatment outcome measures used in the current study.

Initial contact with former PEERS participants was made by the PEERS project coordinator or clinic coordinator by phone, mail, and/or e-mail. Among the 82 participants who completed pre- and posttest outcome assessments for the PEERS program between October 25, 2006 and July 22, 2009 and who had agreed to be contacted about future PEERS-related research, 23 subjects could not be reached, one subject stated he or she was unwilling to participate, and five subjects agreed to participate but failed to complete the follow-up assessment ("Noncompleters"; $n = 29$)

Among the 53 subjects choosing to participate in the current study ("Completers"; $n = 53$), the average age of adolescent participants at baseline (prior to receiving the PEERS intervention) was 14.3 years of age ($SD = 1.6$) and grade level was 8.6 ($SD = 2.0$), with 81% male ($n = 43$) and 19% female ($n = 10$). At follow-up assessment, the average age of participants was 17.5 years of age ($SD = 1.8$) and grade level was 11.4 ($SD = 1.8$). The sample of completers was 53% Caucasian ($n = 28$), 8% Hispanic ($n = 4$), 9% African American ($n = 5$), 13% Asian ($n = 7$), 2% Middle Eastern ($n = 1$), and 15% Unlisted ($n = 8$). The sample of noncompleters was 34% Caucasian ($n = 10$), 21% Hispanic ($n = 6$), 3% African American ($n = 1$), 17% Asian ($n = 5$), and 24% Unlisted ($n = 7$). The sample of noncompleters was 79% male ($n = 23$) and 21% female ($n = 6$). Information on family income and baseline school setting was not available. The mean time between baseline and follow-up assessment was 29.3 months ($SD = 10.2$) or approximately two and a half years. 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.

Measures

Assessment measures consisted of a battery of parent and adolescent questionnaires as well as a semistructured interview with the parents. With the exception of one standardized measure of social functioning, questionnaires were completed online using a web-based data collection site (<http://www.surveymonkey.com>), whereas the parent interview was conducted over the phone by the principal investigator. Specifically, information for the Friendships and Interventions Interview (FII; project developed) and the Social Skills Rating System (SSRS; Gresham & Elliot, 1990) were collected from parents over the phone. Informed parent consent and adolescent assent was also obtained during the phone interview. As an incentive to participate, families received a \$20 gift card for completing the study forms and the parent interview.

Treatment outcome measures were collected at three testing time points (T1, T2, and T3). Baseline data (T1) were collected for each measure upon initial entry into the study (prior to receiving the PEERS treatment). Posttest assessment data were collected immediately after receiving treatment (T2). Long-term follow-up assessment data were collected 1–5 years following treatment (T3), with an average of 29 months to follow-up. Assessment of treatment outcome included the following measures:

Kaufman Brief Intelligence Test—Second Edition (KBIT-2; Kaufman & Kaufman, 2005). Baseline intellectual functioning was assessed using the K-BIT-2, which took approximately 25 min to administer. Normative data were available and expressed as standard scores with a mean of 100 and a standard deviation of 15. The KBIT-2 has been shown to be comparable to the Wechsler Intelligence Scale for Children—Fourth Edition (WISC-IV; Wechsler, 2003) in terms of its reliability and validity (Kaufman & Kaufman, 2005). The KBIT-2 was administered at T1 only.

Vineland Adaptive Behavior Scales—Second Edition, Survey Form (Vineland-II; Sparrow, Balla, & Cicchetti, 2005). The Vineland-II is a measure of adaptive behavior skills needed for everyday living for individuals and provides an assessment of functioning within the domains of communication, daily living skills, and socialization. The Vineland-II took approximately 30 min to complete. At baseline, parents rated the degree to which their teen exhibited each behavior item as "Never," "Sometimes/Partially," or "Usually." Domain and Adaptive Behavior Composite scores are presented as standard scores with a mean of 100 and a standard deviation of 15. Higher scores represented better adaptive functioning. Reliability coefficients for the Adaptive Behavior Composite score are in the mid 90s. Content validity has been established for each domain of the Vineland-II (Sparrow et al., 2005).

Social Communication Questionnaire (SCQ; Rutter, Bailey, & Lord, 2003). The Social Communication Questionnaire (SCQ), previously known as the Autism Screening Questionnaire (ASQ), evaluates communication skills and social functioning in children and teens who may have an autism spectrum disorder. The SCQ can be used to evaluate anyone over 4 years of age, as long as his or her mental age exceeds 2 years. The SCQ takes approximately 15 min to complete and produces results that can be helpful in treatment planning, educational intervention, and measurement of change over time. It is available in two forms—*Lifetime* and *Current*—each composed of 40 yes-or-no questions. The Current Form, which looks at present status over the past 3 months, was given at baseline directly to parents. The SCQ has good discriminative validity with respect to the separation of PDD from non-PDD diagnoses at all IQ levels, with a cutoff of 15 proving most effective. Participant scores < 15 were considered eligible for the study. SCQ scores were collected at baseline only.

Social Skills Rating System (SSRS; Gresham & Elliott, 1990). The SSRS is a 52-item parent 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 (Frankel et al., 2010; Laugeson et al., 2011; Laugeson et al., 2009). The SSRS took 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 rated items as “Never,” “Sometimes,” or “Very Often.” Derived by factor analysis, the SSRS provides standard scores along the dimensions of Social Skills and Problem Behaviors with a mean of 100 and a standard deviation of 15. Higher scores 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). The SSRS was completed at T1, T2, and T3 by all parent participants. Follow-up assessment of the SSRS was completed over the phone by a member of the research team.

Social Responsiveness Scale (SRS; Constantino, 2005). The SRS is a 65-item rating scale measuring the severity of autism spectrum symptoms as they occur in natural social settings. Completed by parents, the SRS provides a clear picture of a child’s social impairments, assessing social awareness, social information processing, capacity for reciprocal social communication, social anxiety/avoidance, and autistic preoccupations and traits. Although 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 (Laugeson et al., 2011; Wood et al., 2009). It is appropriate for use with children from 4 to 18 years of age and takes approximately 15 min to complete. The SRS is typically completed independently by parents and was therefore deemed appropriate for administration via web-based methods in the current study. The SRS provides a dimensional measure of ASD, with higher scores on the SRS reflecting greater degree of social impairment. Internal consistency on the SRS is excellent ($\alpha = .97$; Constantino & Gruber, 2005). Due to the fact that the SRS was published for the first time in 2005, baseline data were not available for a portion of the current sample. However, data were collected for 27 of the 53 participants through parent report at T1, T2, and T3.

The Quality of Play Questionnaire (QPQ; Frankel & Mintz, 2011). The QPQ consists of 12 items administered to parents and adolescents to assess the frequency of hosted and invited get-togethers over the previous month and to assess 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 (Frankel et al., 2010; Laugeson et al., 2011; Laugeson et al., 2009). It has demonstrated convergent validity with the SSRS Problem Behaviors scale ($r = 0.35, p < .05$) and significantly discriminated community from clinic-referred samples ($p < .05$). Parents and adolescents completed the QPQ at T1, T2, and T3.

Test of Adolescent Social Skills Knowledge (TASSK; Laugeson & Frankel, 2010). The TASSK is a 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 took approximately 5 min to complete and included sentence stems related to the didactic lessons in which adolescents were asked to choose the best option from two possible answers. Items were derived from key elements of each of the 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 given to adolescents at T1, T2, and T3.

Friendships and Interventions Interview (FII; see Appendices A and B). The FII is a semistructured parent interview used to collect data about current best friendships, including the types of activities engaged in together, how often the friends have get-togethers outside of school, and how close the friendship is judged to be. The FII also provides data on different programs and treatments in which the adolescent participated since completing the PEERS intervention. The FII was administered over the phone to parents at T3 only.

PEERS Treatment Intervention

The PEERS treatment intervention is a published manualized, parent-assisted, social skills program for adolescents with ASD, focusing on making and keeping friends and managing peer rejection and conflict (Laugeson & Frankel, 2010). The curriculum is based upon the principles of Children's Friendship Training (Frankel & Myatt, 2003), with core features adapted for adolescents with ASD to include (a) relevant portions of the social skills curriculum, (b) the use of parent assistance in the treatment, and (c) structural elements of the lesson format.

The PEERS intervention consisted of 90-min sessions, delivered once a week over the course of 12–14 weeks (Laugeson & Frankel, 2010). Parents and adolescents attended separate concurrent sessions that instructed them on key elements about friendships. Adolescent groups were comprised of approximately 8–11 middle and high school teens who expressed a wish to learn to make and keep friends. Parent and adolescent group leaders were licensed clinical psychologists with previous experience conducting social skills groups for adolescents and expertise in working with youth with ASD. A minimum of two coaches (per cohort) assisted the group leaders throughout the duration of treatment, all of whom were psychology graduate students with experience working with children and adolescents. Coaches were fully trained and supervised in all aspects of the intervention and were responsible for assisting with role-playing demonstrations, providing performance feedback to adolescents during behavioral rehearsal exercises, and monitoring homework compliance and treatment fidelity to ensure that all aspects of the intervention were conducted.

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, e-mailing, and online safety; (c) developing friendship networks, including identifying peer groups and extracurricular 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 exit 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 bullying, including identifying strategies for handling cyberbullying 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 & Frankel, 2010).

Key elements of the PEERS intervention were taught didactically through instruction of simple rules and steps of social etiquette (i.e., rules of behavior enforced by the peer group) using ecologically valid social skills based on the norms established by socially accepted teens. Didactic lessons were followed by role-playing demonstrations in which the group leader and coaches modeled the social skills being taught. Newly learned skills were then rehearsed by adolescents in session through structured socialization activities during which they received performance feedback from the group leader and coaches. Repetition and rehearsal of these skills was further promoted through parent-supervised homework assignments to promote generalization of skills. Parents were instructed on ways in which they could help their teen overcome obstacles to weekly socialization homework assignments through coaching. In order to minimize parent-teen conflict during the completion of these assignments, the level of parental involvement was individually negotiated each week with the help of the treatment team.

Adherence to treatment protocol was monitored by trained research assistants and coaches through weekly fidelity sheets outlining the major components of the manualized intervention, ensuring that each participant received the same instruction.

Statistical Analyses

The primary purpose of this study was to detect the differences, across three different time points, of social skills functioning (SSRS Total Social Skills score, SRS Total score), frequency of problem behaviors (SSRS Problem Behaviors scale), frequency of get-togethers (QPQ), and adolescent social skills knowledge (TASSK). Subscales on the SSRS and SRS were not included in the analyses to avoid diluting power calculations. All analyses were performed using SAS/STAT software (Version 9.2, SAS Institute Inc., Cary, NC 2008) and SPSS Version 17. To determine if sample selection factors influenced long-term outcome, *t* tests for independent samples were used to compare baseline differences between participants completing the current study (Completers) with those who were in the original study but did not complete the current study (Noncompleters). Because the goal of the present study is to monitor the change in scores over different periods of time, a one-way repeated measure analysis of variance (ANOVA) was conducted to detect differences across three different time points on the full data set of all participants. Because the data can be thought of as a randomized complete block design in which participants are the “blocks” and the three times are “treatments,” we assumed a general correlation structure for the three time points and analyzed the data using multivariate techniques. Once the

differences were detected, pairwise contrasts were used to further examine the differences between T1 and T2, T1 and T3, and T2 and T3. More specifically, outcome variables were compared between T1 and T2 to see if this subsample showed significant improvement at posttesting. Outcome variables were compared between T2 and T3 to see if any variables showed significant return toward baseline values. Finally, outcome variables were compared between T1 and T3 to see if improvement in outcome variables was maintained at follow-up. Cronbach's alpha coefficient was computed to measure the degree of internal consistency among item responses on the SRS and SSRS.

RESULTS

Table 1 compares the mean baseline demographic characteristics of Completers with Noncompleters. Results failed to reveal any significant demographic differences between Completers and Noncompleters in any of the variables examined (ps all $> .05$).

Table 2 presents the means and standard deviations for T1, T2, and T3 and the p values for the repeated measure ANOVA analysis. P values for the differences at different time points were included as well. Inspection of the table reveals that posttreatment means at T3 for all outcome variables were significantly improved from baseline ($p < .05$). Social skills as measured

TABLE 1 Mean Demographic Characteristics and Baseline Outcome Variables of Participants Who Completed T3 Assessments Versus Noncompleters

Variable	Completers ($N = 53$) M (SD)	Noncompleters ($N = 29$) M (SD)
Baseline age	14.3 (1.6)	14.6 (1.6)
Baseline grade	8.6 (2.0)	9.0 (1.6)
Percent male	81	79
Percent Caucasian	53	37
KBIT composite	97.2 (20.0; $n = 33$)	95.6 (19.1; $n = 18$)
VABS composite	72.4 (9.8; $n = 33$)	70.3 (8.4; $n = 18$)
SCQ	17.7 (7.1; $n = 33$)	17.4 (5.8; $n = 18$)
SRS Total Score (T1)	78.9 (10.4; $n = 27$)	73.8 (9.9; $n = 13$)
SSRS Total Social Skills (T1)	79.4 (10.5)	79.1 (11.6)
SSRS Total Problem Behaviors (T1)	114.2 (13.7)	117.3 (15.9)
QPQ–Parent Report		
Total get-togethers (T1)	1.8 (2.7)	1.6 (3.2)
QPQ–Teen Report		
Total get-togethers (T1)	2.2 (4.2)	1.6 (3.3)
TASSK (T1)	53.3 (11.8)	54.1 (15.6)

KBIT = Kaufman Brief Intelligence Test; VABS = Vineland Adaptive Behavior Scales; SCQ = Social Communication Questionnaire; SRS = Social Responsiveness Scale; SSRS = Social Skills Rating System; QPQ = Quality of Play Questionnaire; TASSK = Test of Adolescent Social Skills Knowledge.

TABLE 2 Comparison of Baseline (T1), Posttreatment (T2), and Long-Term Follow-Up (T3) Measures

Variable	T1	T2	T3	<i>p</i> value ^d
SRS (<i>n</i> = 27)				
Total SRS Score ^a	78.9 (10.4)	71.0 (13.2)*	67.8 (13.7)§, †	<.001
SSRS (<i>n</i> = 53)				
Total Social Skills ^b	79.4 (10.5)	88.7 (11.9)*	94.6 (13.1)§, †	<.001
Total Problem Behaviors ^b	114.2 (13.7)	106.6 (11.7)*	95.4 (9.0)§, †	<.001
QPQ (<i>n</i> = 53)				
Parent report				
Total get-togethers ^c	1.8 (2.7)	4.3 (2.7)*	4 (5.3)§	<.001
Teen report				
Total get-togethers ^c	2.2 (4.2)	5.6 (8.5)*	4.2 (4.5)§	.050
TASSK (<i>n</i> = 53) ^c (% correct)	53.3 (11.8)	85.5 (14.1)*	70.9(15.8)§, †	<.001

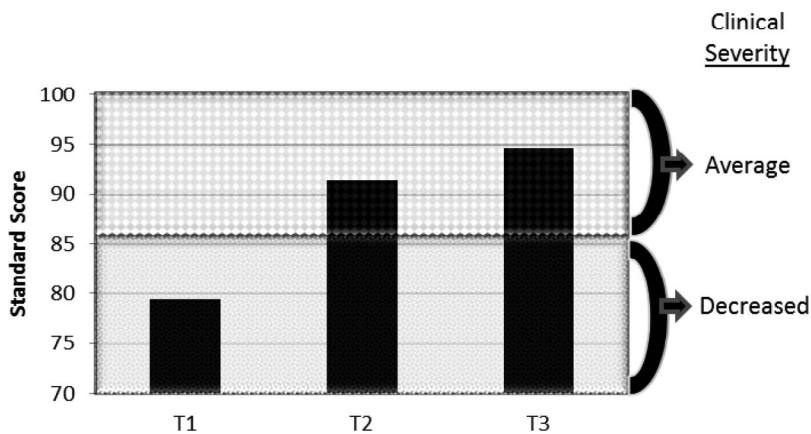
SRS = Social Responsiveness Scale; SSRS = Social Skills Rating System; QPQ = Quality of Play Questionnaire; TASSK = Test of Adolescent Social Skills Knowledge.

^a*t* scores. ^bStandard scores. ^cRaw scores. ^dRepeated analysis of variance *p* value.

*T2 value significantly different from T1 at *p* < .05.

§T3 value significantly different from T1 at *p* < .05.

†T3 value significantly different from T2 at *p* < .05.

**FIGURE 1** Social Skills Rating System social skills scale. T2 and T3 results significantly improved compared to T1, *p* < 0.05.

on the SSRS improved significantly from T1 to T2 for total social skills and remained significantly improved at T3 (Figure 1). Similarly, SSRS problem behaviors improved from T1 to T2 and remained significantly improved at T3 (Figure 2).

The SRS was only measured on 27 of the 53 participants because it was introduced as an outcome measure midway through the study. However, participants administered the SRS showed significantly improved total social responsiveness from T1 to T2 that was maintained at T3 (Figure 3).

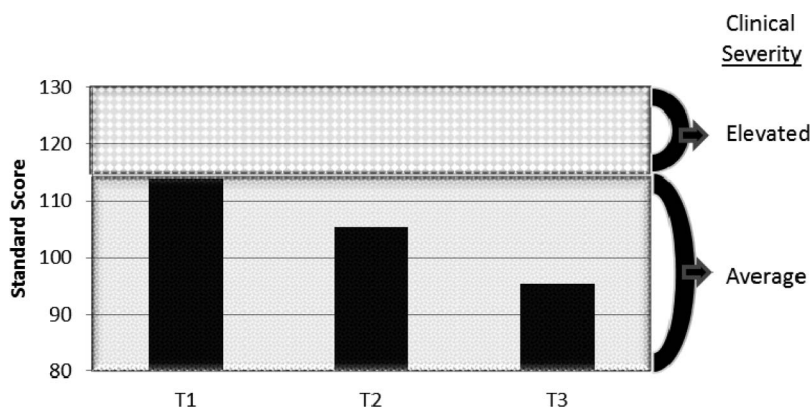


FIGURE 2 Social Skills Rating System problem behaviors scale. T2 and T3 results significantly improved compared to T1, $p < 0.05$.

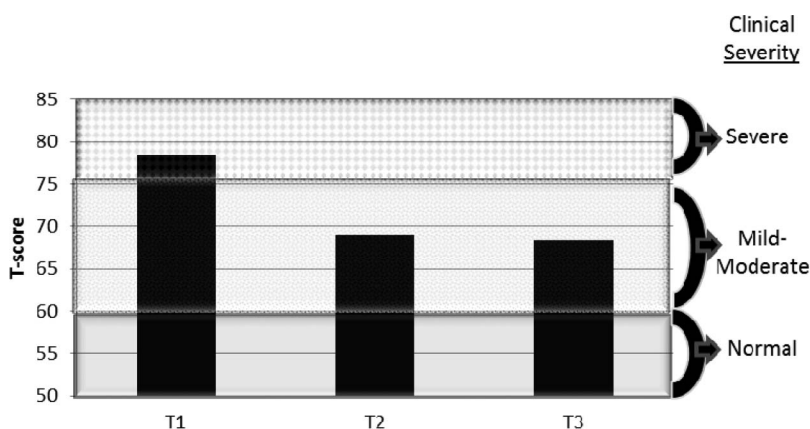


FIGURE 3 Social Responsiveness Scale total and subscales. T2 and T3 results significantly improved compared to T1, $p < 0.05$ ($N = 27$).

The frequency of get-togethers in the previous month was assessed and found to increase significantly from T2 compared with T1 according to parent and adolescent reports and remained significant at T3 in both instances (Figure 4).

Social skills knowledge increased significantly from T1 to T2. At T3, social skills knowledge remained significantly improved compared with T1, although knowledge had regressed significantly compared with T2 (Figure 5).

Data was collected on 52 of the 53 participants on the FII. One participant failed to complete the parent interview but completed all other study forms. According to FII findings, 33% of adolescents (17/52) at follow-up assessment were reported to have been involved in some form of social skills

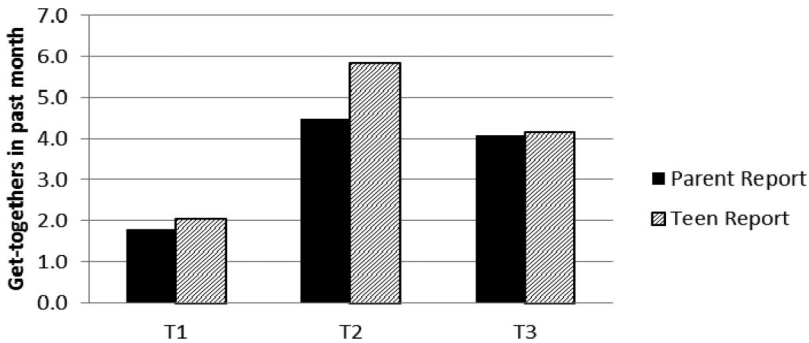


FIGURE 4 Quality of Play Questionnaire frequency of get-togethers. All T2 and T3 results significantly improved compared to T1, $p < 0.05$.

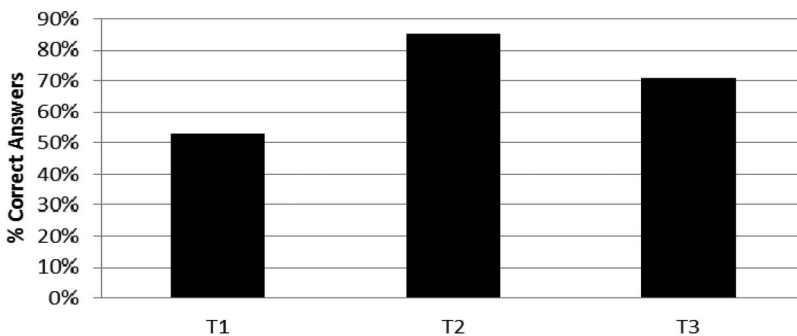


FIGURE 5 Test of Adolescent Social Skills Knowledge. T2 and T3 results significantly improved compared to T1, $p < 0.05$.

training after having participated in PEERS. Only one of these social skills groups was reported to involve parents. The source of these programs varied and included programs provided by the school district, Regional Centers, and private agencies. Although 78% of parents (41/52) rated the PEERS program as being “very helpful” socially for their adolescent, only 41% of those receiving additional social skills training following PEERS (7/17) rated these other social skills programs as “very helpful” socially for their adolescent.

Fifty-eight percent of adolescents (31/52) were on psychotropic medications at the time of follow-up assessment, and 44% of adolescents (23/52) were in some form of individual therapy. Thirty-three percent of adolescents (17/52) were receiving both medication and individual therapy. Twenty-three percent of adolescents (12/52) were receiving complementary medicine strategies, and 6% of adolescents (3/52) were receiving medication, individual therapy, and complementary medicine.

Seventy-nine percent of adolescents (41/52) were involved in some extracurricular activity at follow-up assessment, with 76% of parents of those adolescents (31/41) reporting that these extracurricular activities were “very

helpful” for their adolescent socially. Only 15% of adolescents (6/52) were involved in extracurricular activities that were primarily for a special needs population.

T3 assessments also revealed that 75% of adolescents (38/51) reported having at least one friend with whom they were at least “pretty close” at follow-up. By parent impression, 87% of parents (45/52) reported their adolescent having at least one friend with whom they were at least “pretty close.” Fifty-two percent of parents (27/52) reported that one of their teen’s close friends had “social skills problems.” This social skills problem was known or suspected to be an autism spectrum disorder in 70% of these cases (19/27).

On our collected data, Cronbach’s alpha for SRS Total was 0.818 and for SSRS Social Skills was 0.878; both met the criteria for acceptable internal consistency (higher than 0.80). Cronbach’s alpha for SSRS Problem Behaviors was 0.672, which was borderline acceptable but within the expected metrics for the SSRS. These results suggest that our results on these measures are coherent.

DISCUSSION

The findings from this study suggest that the PEERS intervention, an evidence-based, parent-assisted, manualized social skills group treatment, is effective in improving friendship skills for high-functioning adolescents with ASD, with most improvements being maintained at long-term follow-up 1–5 years after treatment. Whereas the research team chose to look at a broader sample (1–5 years posttreatment), a smaller subgroup consisting of those 2–5 years posttreatment ($n = 36$; 68% response rate, 34.3 months average time from intervention) also showed a similar background and response rate on all measures analyzed.

Previous studies examining the efficacy of PEERS have shown overall improvement in adolescent social skills as reported by parents and teachers on standardized measures of social skills and social responsiveness (SSRS and SRS, respectively) following completion of the intervention (Laugeson et al., 2011; Laugeson et al., 2009). Adolescents have also been shown to exhibit improved social skills knowledge and increased frequency of peer interactions as a result of treatment (Laugeson et al., 2011; Laugeson et al., 2009). Short-term follow-up assessment of PEERS treatment outcomes suggests that most treatment gains are maintained 14 weeks following treatment, with some additional treatment gains related to decreased problem behaviors and teacher-reported social skills observed on the SSRS.

The current long-term study sought to assess the durability of PEERS treatment outcomes 1–5 years after completion of the intervention. Results

are very promising, revealing that participants showed continued improvement in social skills and social responsiveness at follow-up assessment; building even further upon the initial gains observed at posttest assessment and short-term follow-up. Improvements in social functioning from baseline to follow-up assessment as measured by the SSRS reveal a standard deviation increase in overall social skills and nearly a 1.5 standard deviation decrease in problem behaviors, suggesting changes that are not only statistically significant but also clinically meaningful. Furthermore, scaled score values on the SSRS at posttreatment and long-term follow-up are within the average range on the social skills and problem behaviors scales in comparison with typical teenagers. Past research on the SSRS shows that these results are not expected to normalize naturally for children with ASD over time (Gresham & Elliott, 1990). Wang, Sandall, Davis, and Thomas (2011) showed in other research that even with subjective improvement in social symptoms, the SSRS shows limited change over time. Further, Howlin (2000) noted that social skills deficits for children with ASD tend to increase rather than diminish with age. Consequently, improvements in social functioning observed at posttreatment and follow-up assessment on the SSRS are arguably a very consequential finding and not likely due to developmental maturation alone.

Durability of treatment gains on the SRS, a standardized measure of social responsiveness in youth with ASD, also reveal excellent long-term maintenance of treatment effects following the PEERS intervention, with total overall social responsiveness improving by one standard deviation and moving from the severe clinical range to the mild-moderate range. These findings, like those of the SSRS, are not only statistically significant but they also are clinically meaningful in that they reflect consequential and noticeable change maintained over considerable time (1–5 years).

Additional long-term findings suggest that adolescents not only exhibited increased social skills knowledge from baseline to posttreatment and long-term follow-up but also the frequency of peer interactions demonstrated through get-togethers with friends significantly increased at posttreatment and long-term follow-up. At follow-up, a large proportion of get-togethers were initiated by peers (not just participants), according to both parents (43%) and teens (62%). This finding implies a greater level of peer acceptance and friendship reciprocity. This finding is also clinically meaningful in that the ultimate goal of PEERS is to help adolescents learn to make and keep friends. Possibly due to significant parent involvement through social coaching even after treatment, this level of social reciprocity suggests enhanced goal attainment 1–5 years postintervention.

One of the short-term goals of the PEERS intervention is to have parents help adolescents generalize social skills to more natural settings through parent social coaching, whereas a long-term goal is for adolescents to exhibit improved social competence through independent use of appropriate social

skills leading to the development and maintenance of meaningful relationships. One major mechanism by which the PEERS intervention may be contributing to the positive long-term social outcomes of adolescents with ASD may relate to exposure to opportunities to practice social skills with true friends. This exposure may occur through parent-supported enrollment in extracurricular activities and/or regularly organized get-togethers with friends, both of which are critical elements of the PEERS curriculum. Teens, both with and without social difficulties, learn and enhance social skills through practice with peers in a reciprocal manner during get-togethers and other forms of social engagement. The aim is that the PEERS intervention would set in motion new friendships and social experiences that would perpetuate this enhanced learning in a more natural and transactional manner through parental support and reinforcement through positive social experiences with peers. The long-term results of this study suggest that a majority of PEERS participants did in fact have close friendships at long-term follow-up as reported by parents and adolescents. It was noteworthy that half of the adolescents with close friendships at long-term follow up were close friends with another teenager with known or suspected social skills deficits themselves. Although our analysis did not find clear differences between the adolescents whose friends had known or suspected social deficits, this would be an interesting area for further study.

Limitations

There are some limitations to this study that are important to address. One limitation is the inability to collect data from the complete sample of original PEERS participants. Response rate was limited by the research team's ability to connect with all families many years after the intervention. This is not surprising given the fact that the original research had not been designed as a long-term follow-up project. Nonetheless, a response rate of 64% is relatively large for a study of this type. Nonresponders also did not significantly differ from responders on demographic or baseline measures; thus, the researchers feel selection bias in the current study is limited.

A second limitation relates to the fact that this study utilized parent and adolescent rating scales as primary outcome measures, yet parents and adolescents were active participants in the intervention. Given the possibility that parents and adolescents might have been susceptible to bias, additional third-party assessments (e.g., teacher reports) and behavioral observations would have been beneficial toward further establishing the validity of the findings. The financial constraints of the study made the use of behavioral assessments impossible. The use of teacher reports was not pursued given the fact that the likelihood of obtaining accurate teacher assessments from the same teachers (who would not likely have had continuous contact with the adolescents for years) or from different teachers (who would naturally

have different reporting biases) was not a promising data collection method. Although teacher reports in future long-term follow-up studies would still be laden with methodological limitations, behavioral observations collected at all testing time points are recommended for future research.

A third limitation of this study is that researchers were unable to use a control group to assess long-term outcomes of the program. As a result, it is not possible to fully determine the extent to which the PEERS treatment specifically impacted change from baseline, particularly because some subjects participated in additional treatments after attending PEERS. However, the pattern of treatment gains being similar at T2 and T3, but different from T1, strongly suggests that changes in social functioning were set in motion by the PEERS intervention.

A final limitation of this research is the lack of comprehensive diagnostic assessment. Although all participants had a previous diagnosis of ASD from a reliable mental health professional, due to the financial constraints of the researchers, a comprehensive diagnostic evaluation verifying these diagnoses was not possible. In the future, it would be beneficial to conduct a comprehensive diagnostic assessment using standardized measures like the Autism Diagnostic Interview–Revised (ADI-R; Le Couteur, Lord, & Rutter, 2003) and/or the Autism Diagnostic Observation Schedule (ADOS; Lord, Rutter, DiLavore, & Risi, 2001) to corroborate diagnoses.

Conclusions

The present findings are encouraging and consequential, suggesting that the PEERS parent-assisted, manualized method of social skills training appears to lead to long-term sustained benefits 1–5 years following treatment. Decreased problem behaviors and improved overall social skills, social responsiveness, social skills knowledge, and frequency of peer interactions are maintained over time, suggesting durability of treatment effects. Results show a majority of adolescent participants and their parents cite close friendships at long-term follow-up. Although it is not possible to isolate the exact causes of change over time without a randomized control group, this study provides support for the potential of social skills training groups to produce long-standing social change in the lives of adolescents with autism spectrum disorders.

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APPENDIX A Friendships and Interventions Interview–Parent Form (Semistructured Interview)

Teen's Name _____

Teen's Date of Birth _____

Teen's Current Grade _____ (if already graduated high school, please enter graduation year)

Parent's Current Marital Status (choose one)

- 1- Married
- 2- Separated
- 3- Divorced
- 4- Widowed
- 5- Never Married

How would you rate the PEERS intervention that your child attended? (choose one)

- 1 – Not helpful
- 2 – A little helpful
- 3 – Pretty helpful
- 4 – Very helpful
- 5 – Extremely helpful

How would you compare your child's social skills prior to PEERS with his or her skill?

IN THE MONTHS AFTER THE PROGRAM (choose one)

- 1 – Worse
- 2 – The same
- 3 – A little improved
- 4 – Somewhat improved
- 5 – Very much improved
- 6 – Extremely improved

CURRENTLY (choose one)

- 1 – Worse
- 2 – The same
- 3 – A little improved
- 4 – Somewhat improved
- 5 – Very much improved
- 6 – Extremely improved

Friendships

(please complete one page for each of your child's closest friends up to a total of 3):

Friend's First Name and Last Initial _____

Friend's Current Approximate Age _____

Friend's Gender: Male/Female

How long have they been friends?

- 1 - < 6 months
- 2 - 6–11 months
- 3 - 1 year
- 4 - 2 years
- 5 - > 2 years

How did your child meet this friend?

- 1- Neighborhood
- 2 - School
- 3 - Summer activity
- 4 - Extracurricular activity
- 5 - Online through family
- 6 - Through friends
- 7 - Other _____

How far away from your house does this friend live? (circle one)

- 1 - Same block
- 2 - Walking distance
- 3 - 5-min drive
- 4 - 15-min drive
- 5 - 30+ min drive
- 6 - Another city

How many times does your child see this friend **per month for a get-together?**

- 1 - Less than 1 time
- 2 - 1 time
- 3 - 2 times
- 4 - 3 times
- 5 - 4–8 times
- 6 - More than 8 times

Do you think/know if this friend has any of the following issues:

- 1 - Social skills problems
- 2 - Developmental delay
- 3 - Emotional problems
- 4 - Behavior problems
- 5 - Psychological problems
- 6 - Autism spectrum disorder

What does your child like to do with this friend? (mark 3 MOST FREQUENT things)

- 1 - Board/Card games
- 2 - Video games
- 3 - Talk on phone
- 4 - Talk in person

- 5 - Imaginary games
- 6 - Do schoolwork
- 7 - Movies
- 8 - Sports
- 9 - Sleepovers
- 10 - Go out to eat
- 11 - Go to mall/stores/shopping
- 12 - Go for walk
- 13 - Computer
- 14 - Share hobbies
- 15 - Other _____

How many other peers are typically around when your child hangs out with this friend?

- 1 - No one else (just the 2 of them)
- 2 - 1 other kid
- 3 - 2 other kids
- 4 - 3 other kids
- 5 - 4 or more other kids

How close would you describe your child's friendship with this friend?

- 1 - Not at all close
- 2 - Somewhat close
- 3 - Pretty close
- 4 - Very close
- 5 - Extremely close

School settings (please complete one page for each school your child has attended since being in the PEERS program)

School's Name _____ Grades attended at this school _____
 Average Class Size _____ Dates attending this school _____

Type of classroom (select one):

- 1 - Mainstream/General Education
- 2 - Honors/Advanced Placement
- 3 - Special Needs–Mixed (different types of disability)
- 4 - Special Needs–Uniform (same type of disability)
- 5 - Mixed Mainstream and Honors/Advanced Placement
- 6 - Mixed Mainstream and Special Needs
- 7 - Home School

Additional programs/assistance at this school (if yes, describe program/subject):

- 1 - Aide/Shadow _____
- 2 - Tutoring _____
- 3 - Mentoring _____
- 4 - Therapy _____

5 - Pull Out _____

6 - Other School-Based Programs _____

Was there any social skills training given at this school? Yes/No

If yes, then please answer for each program:

Length of the program _____ Frequency of the program _____

Number of kids in the program _____

Did the program involve: Parents Teachers

Description of program _____

Your rating of the social skills program (select one):

1 - Not helpful

2 - A little helpful

3 - Pretty helpful

4 - Very helpful

5 - Extremely helpful

Overall satisfaction with this school (select one):

1 - Not satisfied

2 - A little satisfied

3 - Pretty satisfied

4 - Very satisfied

5 - Extremely satisfied

Has your child experienced any social or academic difficulties at this school?

If so, explain:

Extracurricular/Community Programs

(please complete one page for each program your child has attended since being in the PEERS program)

Program/Activity _____

Dates attending this program _____

Length of attendance _____

Frequency of attendance _____

Type of activity:

1 - Sport

2 - Games

3 - Club

4 - Music

5 - Student government

6 - Youth group

7 - Religious organization

8 - Educational program

9 - Other: _____

Describe Activity _____

Number of kids/teens in activity _____

Other kids were

- 1 - Gifted
- 2 - Typical
- 3 - Special Needs
- 4 - Mixture of Typical and Special Needs

For your teen, from a social perspective, this activity was

- 1 – Not helpful
- 2 – A little helpful
- 3 – Pretty helpful
- 4 – Very helpful
- 5 – Extremely helpful

Psychological Interventions/Other Therapies

(please complete one page for each intervention in which your child has participated since being in the PEERS program)

Intervention/Therapy _____

Dates of this Intervention/Therapy _____

Length of attendance _____

Frequency of attendance _____

Type of intervention:

- 1 - Individual therapy
- 2 - Family therapy
- 3 - Parent skills training (Limit setting)
- 4 - Group therapy (size of group _____)
- 5 - Social skills training

Describe Intervention _____

For your teen, this intervention was

- 1 – Not helpful
- 2 – A little helpful
- 3 – Pretty helpful
- 4 – Very helpful
- 5 – Extremely helpful

Medications

(please fill out the following for your child's medication history; use extra pages if needed):

Please use the following scale for benefit:

- 1 – Not helpful / 2 – A little helpful / 3 – Pretty helpful / 4 – Very helpful / 5 – Extremely helpful

Please list any/all psychiatric medications your child has taken (okay to use approximate dates):

Medication	Start Date	Stop Date	Used Before (B)/During (D)/After (A) PEERS	Benefit (see scale above)	Reason for stopping
			B D A	1 2 3 4 5	
			B D A	1 2 3 4 5	
			B D A	1 2 3 4 5	
			B D A	1 2 3 4 5	
			B D A	1 2 3 4 5	
			B D A	1 2 3 4 5	
			B D A	1 2 3 4 5	
			B D A	1 2 3 4 5	
			B D A	1 2 3 4 5	
			B D A	1 2 3 4 5	
			B D A	1 2 3 4 5	
			B D A	1 2 3 4 5	
			B D A	1 2 3 4 5	
			B D A	1 2 3 4 5	
			B D A	1 2 3 4 5	

Other/Nontraditional Interventions (i.e., Herbal, Dietary, Holistic, etc.)

(please complete one page for each intervention in which your child has participated since being in the PEERS program)

Intervention _____

Dates of this Intervention/Therapy _____

Length of attendance _____

Frequency of attendance _____

Type of intervention

- 1 - Vitamin – circle one: High Dose/Regular Dose
- 2 - Herbal
- 3 - Nontraditional medicine (Dimethylglycine (DMG), intravenous immunoglobulin (IVIG), secretin, probiotic, chelation, etc.)
- 4 - Dietary (gluten-free diet, etc.)
- 5 - Mind-body intervention (biofeedback, hypnosis, sensory integration, etc.)
- 6 - Homeopathic
- 7 - Manipulation (massage, hippotherapy, etc.)
- 8 - Energy therapy (acupuncture, etc.)

Describe Intervention _____

For your teen, this intervention was

- 1 – Not helpful
- 2 – A little helpful

- 3 – Pretty helpful
- 4 – Very helpful
- 5 – Extremely helpful

APPENDIX B Friendships and Interventions Interview–Teen Form (Questionnaire)

Friendships (**please complete one page for each of your closest friends up to a total of 3**):

Friend's First Name and Last Initial _____

Friend's Current Approximate Age _____

Friend's Gender: Male/Female

How long have you been friends? < 6 months/6–11 months/1 year/2 years/
> 2 years

How did you meet this friend?

Neighborhood/School/Summer activity/Extracurricular activity/Online
through family/Through friends/Other _____

How far away from your house does this friend live? (choose one)

Same block/Walking distance/5-min drive/15-min drive/30-min drive/
Another city

How many times do you see this friend **per month for a get-together?**

Less than 1 time/1 time/2 times/3 times/4–8 times/more than 8 times

What do you like to do with this friend? (mark 3 MOST FREQUENT things)

- Board/Card games Video games Talk on phone Talk in person
- Imaginary games Do schoolwork Movies Sports
- Sleepovers Go out to eat Go to mall/stores/shopping
- Go for walk Computer Share hobbies Other _____

How many other kids are usually around when you hang out with this friend?
(choose one)

- 1 other kid (3 total people)
- 2 other kids (4 total people)
- 3 other kids (5 total people)
- 4 or more other kids (6 total people or more)

How close would you describe your friendship with this friend? (circle one)

- 0 – Not at all close
- 1 – Somewhat close
- 2 – Pretty close
- 3 – Very close
- 4 – Extremely close