Objective: Social skills group training (SSGT) for children and adolescents with autism spectrum disorder (ASD) is widely applied, but effectiveness in real-world practice has not yet been properly evaluated. This study sought to bridge this gap.

Method: This 12-week pragmatic randomized controlled trial of SSGT compared to standard care alone was conducted at 13 child and adolescent psychiatry outpatient units in Sweden. Twelve sessions of manualized SSGT (“KONTAKT”) were delivered by regular clinical staff. Participants (N = 296; 88 females and 208 males) were children (n = 172) and adolescents (n = 124) aged 8 to 17 years with ASD without intellectual disability. The primary outcome was the Social Responsiveness Scale rating by parents and blinded teachers. Secondary outcomes included parent- and teacher-rated adaptive behaviors, trainer-rated global functioning and clinical severity, and self-reported child and caregiver stress. Assessments were made at baseline, posttreatment, and 3-month follow-up. Moderator analyses were conducted for age and gender.

Results: Significant treatment effects on the primary outcome were limited to parent ratings for the adolescent subgroup (posttreatment: -8.3; 95% CI = -14.2 to -1.9; p = .012, effect size [ES] = 0.32; follow-up: -8.6; 95% CI = -15.4 to -1.8; p = .015, ES = 0.33) and females (posttreatment: -8.9; 95% CI = -16.2 to -1.6; p = .019, ES = 0.40). Secondary outcomes indicated moderate effects on adaptive functioning and clinical severity.

Conclusion: SSGT for children and adolescents with ASD in regular mental health services is feasible and safe. However, the modest and inconsistent effects underscore the importance of continued efforts to improve SSGT beyond current standards.


Key words: autism spectrum disorder, treatment, intervention, gender, adolescence

ASD admitted to regular mental health services, in whom neurodevelopmental and psychiatric comorbidity is commonplace. The primary study hypothesis was that SSGT as a complement to standard care would be superior to standard care only. A secondary aim was to explore the moderating effect of age and gender. This, to our knowledge, is the largest randomized trial of SSGT to date, and the first to evaluate effectiveness in a diverse sample of male and female children and adolescents in routine practice settings.

**METHOD**

**Study Design**

This was a 12-week multicenter, parallel-group, randomized, pragmatic clinical trial that included 296 youth aged 8 to 17 years with ASD. The trial was conducted at 12 child and adolescent psychiatry outpatient units and one academic clinical outpatient unit (Center of Neurodevelopmental Disorders at Karolinska Institutet [KIND]) in Stockholm and Örebro counties, Sweden, between August 2012 and October 2015. Coordinating activities, data management, and analysis were conducted at KIND. Table S1 (available online) provides detailed information. The study protocol was approved by the ethics review board in Stockholm and the clinical authorities of the two involved counties.

**Study Participants**

Eligible participants were children (7–12 years) and adolescents (13–17 years) with a clinical consensus International Classification of Diseases–10 (ICD-10) diagnosis of autism, atypical autism, Asperger syndrome, or pervasive developmental disorder not otherwise specified. The diagnosis was corroborated by ASD cutoffs (modules 3 or 4) met on the Autism Diagnostic Observation Schedule (ADOS), which was conducted by examiners clinically trained in ADOS. All patients had Full Scale IQs > 70 according to the Wechsler Intelligence Scale for Children (third or fourth edition) and a common comorbid psychiatric ICD-10 diagnosis of ADHD, anxiety disorder, or mood disorder, confirmed by the Kiddie Schedule of Affective Disorders and Schizophrenia. Exclusion criteria included clinically assessed self-injury, an ICD-10 diagnosis of conduct disorder, antisocial or borderline personality disorder, any psychotic disorder that would interfere with participation or require alternative treatment, and insufficient Swedish language capacities. The majority of participants (80%) were recruited by clinical referrals from the participating regular care units (Table S1, available online). Participants received an SEK 100 (€12) voucher as an incentive at the end of the study. Written informed consent was obtained from each participant and/or parent or legal guardian after the study’s aims and procedures had been fully explained.

**Intervention**

SSGT KONTAKT (draft English version and other material available upon request from the corresponding author) is a manualized, structured program for children and adolescents with ASD in the normative IQ range. It aims to improve social interaction and communication skills, social motivation, awareness of self and others, problem-solving capacities, and self-confidence. The program applies elements of cognitive-behavioral therapy (CBT), computer-based cognitive training, behavioral activation, psychoeducation, observational learning, and parent involvement through various mandatory, recurring, and variable treatment formats (see Tables S2 and S3, available online). Training sessions focus on understanding social rules and relationships, initiating social overtures, developing conversation skills, identifying and interpreting verbal and nonverbal social signals, managing conflicts, and developing social communication strategies. The teaching formats include individual goal identification, group discussions, social and role play, emotion-processing training, group activities, and tailored homework assignments aiming to facilitate generalization of skills to everyday life. Elements such as group discussions and role plays are applied more among the adolescents in the variable parts of the training, whereas more playful elements are used in the children’s group. Children are trained for 60 minutes and adolescents for 90 minutes per week in groups of 4 to 8 participants by 2 trainers. In this study, 12 sessions of increasing complexity were fully standardized. The intervention was delivered by 50 clinicians (39 psychologists, 5 social workers, 3 nurses, 2 special educators, and 1 speech and language therapist) with an average clinical ASD experience of 6 years (range, 1–36 years). They were systematically trained on the program, including theory, supervision, and feedback on recorded sessions (see Table S1, available online). After training, they were continuously supervised throughout the study to ensure the integrity of the SSGT. A checklist containing 11 items regarding protocol adherence and trainer skills in applying basic principles of the SSGT (e.g., positive reinforcement, modeling, prompting) was used to assess a random sample of 27 (25%) video- recorded sessions during monthly trainer meetings. Each item was scored “0” for no adherence, “1” for some adherence, and “2” for full adherence, and a mean score was derived across the items. Treatment fidelity was deemed adequate with a mean score of 1.65 (SD = 0.30).

**Standard Care**

Standard care included any ongoing support or intervention provided by regular health care services (child psychiatry, pediatrics, habilitation centers, speech and language therapy). Information on the standard care for all participants was retrieved from their medical records and included pharmacological treatments, occupational therapy, psychoeducation, general counseling, individual CBT, cognitive assistive technologies, and weighted blankets (Table 1).

**Randomization and Blinding**

The coordinating center randomly assigned eligible participants to SSGT or standard care using block randomization in a 1:1 ratio applying computer-generated random numbers (random.org) stratified within site and age group. Parents and trainers were aware of the treatment conditions. Teachers were blinded to treatment conditions; this was ensured by a teacher survey showing no awareness of SSGT participation beyond chance.

**Outcome Measures**

Change in total raw scores on the parent- and teacher-reported Social Responsiveness Scale (SRS) served as the primary outcome measure. The SRS is a 65-item Likert-type scale questionnaire to assess social communication and autistic traits, with scores ranging between 0 and 195 (higher values indicate greater severity) that has demonstrated sensitivity to behavior change in several SSGT studies as well as excellent psychometric properties. Secondary outcome measures were parent and blinded teacher ratings on the Adaptive Behavior Assessment System–II (ABAS-II), the trainer-rated Developmental Disabilities modification of the Children’s Global Assessment Scale (DD-CGAS), Ohio State University (OSU) Global Severity Scale for Autism (OSU Autism

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**TABLE 1**

<table>
<thead>
<tr>
<th>Outcome Measure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social Responsiveness Scale (SRS)</td>
<td>Change in total raw scores on the parent- and teacher-reported SRS served as the primary outcome measure. The SRS is a 65-item Likert-type scale questionnaire to assess social communication and autistic traits, with scores ranging between 0 and 195 (higher values indicate greater severity) that has demonstrated sensitivity to behavior change in several SSGT studies as well as excellent psychometric properties. Secondary outcome measures were parent and blinded teacher ratings on the Adaptive Behavior Assessment System–II (ABAS-II), the trainer-rated Developmental Disabilities modification of the Children’s Global Assessment Scale (DD-CGAS), Ohio State University (OSU) Global Severity Scale for Autism (OSU Autism...</td>
</tr>
</tbody>
</table>
TABLE 1  Demographic and Clinical Characteristics at Baseline by Treatment Group

<table>
<thead>
<tr>
<th>Variable</th>
<th>SSGT + Standard Care (n = 150)</th>
<th>Standard Care (n = 146)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (y)</td>
<td>Mean 12.05</td>
<td>Mean 11.59</td>
<td>.13</td>
</tr>
<tr>
<td>WISC, Full Scale IQ</td>
<td>Mean 96.95</td>
<td>Mean 98.13</td>
<td>.44</td>
</tr>
<tr>
<td>ADOS, social communication total</td>
<td>Mean 10.65</td>
<td>Mean 11.03</td>
<td>.36</td>
</tr>
<tr>
<td>Parental age (y)</td>
<td>Mean 45.53</td>
<td>Mean 46.40</td>
<td>.18</td>
</tr>
<tr>
<td>Parental education (y)</td>
<td>Mean 14.37</td>
<td>Mean 14.51</td>
<td>.70</td>
</tr>
</tbody>
</table>

The table presents demographic and clinical characteristics at baseline for participants in the SSGT + Standard Care and Standard Care treatment groups. The table includes data on age, WISC Full Scale IQ, ADOS social communication total, parental age, and parental education.

Adverse Effects

Parent-reported adverse events were collected at posttreatment and at follow-up using a treatment satisfaction questionnaire that inquired about drawbacks of the training and psychological, social, or other adverse effects considered to be related to the treatment (Table S1, available online). In addition, qualitative individual interviews were conducted in a subsample of children, adolescents, and their parents.

Statistical Analyses

Sample size calculation to test superiority of SSGT compared to standard care alone was based on medium effect sizes found in previous pilot studies of KONTAKT. A sample size of 144 participants per group was required to provide 80% power (1–β) at a two-sided 5% level and 5% attrition. Analyses were performed for the total sample and stratified by age group (children and adolescents) and gender (males and females). Primary and secondary analyses were conducted according to intention-to-treat principles including all randomized participants for whom data were available at baseline. Mixed-effect linear modeling (random regression), which uses all available data in longitudinal study designs and can handle missing data, was used to provide unbiased treatment effects. The model was specified by using time (baseline, posttreatment, follow-up), treatment group (SSGT + standard care vs. standard care), and the time by group interaction as fixed effects, with a random intercept for each participant. The results were presented as least-squares means from the mixed-effect models. The treatment effect was expressed as the group difference in the change of least-squares means from pretreatment to posttreatment/follow-up. The slope of the regression line was compared between treatment groups. Moderator analyses for age group and gender were conducted by including the three-way interaction of time by group by moderator, all main effects, and all lower-order interactions terms in the model. Effect sizes were estimated by dividing the group difference in the change of least-squares means from pretreatment to posttreatment/follow-up by the pooled standard deviation at pretreatment. Throughout the article, positive effect sizes favor SSGT. The analyses were conducted using R software version 3.2 and IBM SPSS statistics version 24.

RESULTS

A total of 366 children and adolescents were assessed for eligibility (Figure 1). Of these, 296 (208 boys, 88 girls) met the inclusion criteria. Participants were randomly assigned to 12-week SSGT (n = 150; children, 83; adolescents, 67) or standard care alone (n = 146; children, 89; adolescents, 57). There was a larger proportion of females among the adolescents (36.3%) than among the children (25.0%). The number enrolled varied across sites (11–39 participants). The study groups were similar at baseline for major demographic and clinical characteristics, with the exception that the standard care group received significantly more individual CBT and counseling (Table 1).

Primary Outcome Measures

Parent-rated SRS total scores decreased for both treatment groups from baseline to posttreatment (SSGT: 87.9 to 78.7; standard care: 87.9 to 81.8; treatment effect, −3.1; 95% CI = −7.2 to 0.9, p = .13, effect size [ES] = 0.13) and follow-up (SSGT: 87.9 to 77.3; standard care: 87.9 to 81.8; treatment effect, −3.8; 95% CI = −8.1 to 0.4; p = .08; ES = 0.16), but no
Although no significant group difference was observed for children (Table S5, available online, Figure 2B), adolescents showed a significantly larger change in parent-rated SRS for SSGT compared with standard care alone both posttreatment ($\Delta = 8.3$; $95\%$ CI $= -14.7$ to $1.9$; $p = .012$, ES $= 0.32$) and at follow-up ($\Delta = 8.6$; $95\%$ CI $= -15.4$ to $1.8$; $p = .015$, ES $= 0.33$) (Table S5, available online, Figure 2C). These effects were driven mostly by scores decreasing from higher symptomatology levels in the SSGT group at baseline among adolescents. The three-way interaction term (time by treatment group by age group) reached statistical significance from baseline to posttreatment ($p = .04$) but not from baseline to follow-up ($p = .08$).

Females receiving SSGT had a significantly larger change in parent-rated SRS than females receiving standard care alone posttreatment ($\Delta = 8.9$; $95\%$ CI $= -16.2$ to $1.6$; $p = .019$, ES $= 0.40$) but not at follow-up ($\Delta = -5.9$; $95\%$ CI $= -13.7$ to $1.0$; $p = .14$, ES $= 0.26$) (Table S6, available online, Figure 2D). No significant group difference was observed for males (Table S6, available online, Figure 2E). The three-way interaction term (time by treatment group by gender) did not reach statistical significance from baseline to posttreatment ($p = .08$) or from baseline to follow-up ($p = .56$). Sensitivity analyses with the sample split into four cells (male children, female children, adolescent males, and adolescent females) indicated no meaningful effect for children regardless of gender. There was a positive treatment effect for female adolescents in particular, which was partly attributable to less improvement in the standard care group (Table S7, available online).

Teacher-rated SRS did not suggest any significant treatment gains at posttreatment or follow-up (Table 2, Table S4, available online). The teacher-rated outcomes should be interpreted with caution, however, because of unsatisfactory
rates of complete data (see below). There was no effect of site on the primary outcome measures, indicating similar effects of SSGT training across participating centers.

Secondary Outcome Measures
SSGT was superior to standard care alone on secondary parent-rated outcomes of adaptive behavior on the ABAS-II (10.7; 95% CI = 1.5 to 19.8; \( p = .02, ES = 0.36 \)) and parental stress reductions on the PSS (\(-3.6; 95\% CI = -5.6 \text{ to } -1.5; \ p < .001, ES = 0.50 \)) at follow-up (Table 2, Table S8, available online). Moreover, trainer ratings indicated significantly greater improvement from baseline to follow-up in the SSGT group in global functioning on the DD-GAS (3.2; 95% CI = 1.5 to 4.9; \( p < .001, ES = 0.45 \)) and clinical severity on the OSU Autism CGI-S (\(-0.3; 95\% CI = -0.5 \text{ to } -0.1; \ p = .002, ES = 0.38 \)) (Table 2). There were no significant effects of SSGT on teacher-rated increase in adaptive behavior on the ABAS-II or participant-reported decrease of stress compared to standard care (Table 2). The overall pattern of results for secondary outcomes did not indicate substantial gender and age differences, and there were significant effects on several secondary outcomes regardless of age group and gender (Tables S5 and S6, available online).

Adverse Events
Parent-reported information was available for 143 of the 150 participants in the SSGT group posttreatment. Missed time in school due to training was reported by 19 (13.3%), increased stress by 6 (4.2%), increased behavioral problems by 1 (0.7%), decreased attention by 1 (0.7%), increased anxiety by 1 (0.7%), and increased fatigue by 1 (0.7%). Information was available from 118 parents at follow-up. Missed time in school was reported by 6 (5.1%), and increased stress by 1 (0.8%). Previously published interview data on a subsample of 11 participants and their parents revealed 1 adverse event in the SSGT group (increasing severity of social anxiety) and none in the controls.11

Attrition and Missing Data
A total of 22 participants (15%) in the SSGT arm did not complete the training, and 7 (5%) dropped out from standard care (Figure 1). There were no statistically significant differences between completers and noncompleters regarding clinical and demographic characteristics. Parent-rated data were incomplete for a total of 33 participants (22%) posttreatment and 43 participants (29%) at follow-up for SSGT, as well as 17 participants (12%) posttreatment and 40 participants (27%) at follow-up for standard care. Missing data were associated with lower IQ and higher parent-rated SRS at baseline, a pattern that was nearly identical for both groups. Trainer ratings were incomplete for 29 participants (19%) posttreatment and 41 participants (27%) at follow-up for SSGT, as well as 12 participants (8%) posttreatment and 28 participants (19%) at follow-up for standard care. Teacher ratings were incomplete for 77 participants (51%) posttreatment and 92 participants (61%) at follow-up for SSGT, as well as 63 participants (43%) posttreatment and 87 participants (60%) at follow-up for standard care.

DISCUSSION
SSGT is presumably the most frequently used intervention for individuals with ASD without intellectual disability. This

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**TABLE 2** Primary and Secondary Outcome Measures, Week 12/Posttreatment, and 3-Month Follow-Up

<table>
<thead>
<tr>
<th>Measure (Rater)</th>
<th>Assessment Point</th>
<th>Change Scores</th>
<th>95% CI</th>
<th>( p )</th>
<th>Effect Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>SRS [parent]</td>
<td>Posttreatment</td>
<td>-3.1</td>
<td>-7.2 to 0.9</td>
<td>.13</td>
<td>0.13</td>
</tr>
<tr>
<td></td>
<td>Follow-up</td>
<td>-3.8</td>
<td>-8.1 to 0.4</td>
<td>.08</td>
<td>0.16</td>
</tr>
<tr>
<td>SRS [teacher]</td>
<td>Posttreatment</td>
<td>5.8</td>
<td>-1.3 to 12.9</td>
<td>.11</td>
<td>-0.22</td>
</tr>
<tr>
<td></td>
<td>Follow-up</td>
<td>5.3</td>
<td>-2.4 to 13.1</td>
<td>.18</td>
<td>-0.21</td>
</tr>
<tr>
<td>ABAS-II [parent]</td>
<td>Posttreatment</td>
<td>11.9</td>
<td>3.3 to 20.6</td>
<td>.01</td>
<td>0.40</td>
</tr>
<tr>
<td></td>
<td>Follow-up</td>
<td>10.7</td>
<td>1.5 to 19.8</td>
<td>.02</td>
<td>0.36</td>
</tr>
<tr>
<td>ABAS-II [teacher]</td>
<td>Posttreatment</td>
<td>-0.9</td>
<td>-13.3 to 11.6</td>
<td>.89</td>
<td>-0.02</td>
</tr>
<tr>
<td></td>
<td>Follow-up</td>
<td>-0.7</td>
<td>-14.4 to 13.0</td>
<td>.92</td>
<td>-0.01</td>
</tr>
<tr>
<td>DD-CGAS [trainer]</td>
<td>Posttreatment</td>
<td>2.4</td>
<td>0.8 to 4.1</td>
<td>.004</td>
<td>0.34</td>
</tr>
<tr>
<td></td>
<td>Follow-up</td>
<td>3.2</td>
<td>1.5 to 4.9</td>
<td>&lt;.001</td>
<td>0.45</td>
</tr>
<tr>
<td>CGI-S [trainer]</td>
<td>Posttreatment</td>
<td>-0.3</td>
<td>-0.5 to -0.1</td>
<td>&lt;.001</td>
<td>0.41</td>
</tr>
<tr>
<td></td>
<td>Follow-up</td>
<td>-0.3</td>
<td>-0.5 to -0.1</td>
<td>.002</td>
<td>0.38</td>
</tr>
<tr>
<td>CiS [child self-report]</td>
<td>Posttreatment</td>
<td>0.0</td>
<td>-0.1 to 0.1</td>
<td>.76</td>
<td>-0.03</td>
</tr>
<tr>
<td></td>
<td>Follow-up</td>
<td>0.0</td>
<td>-0.1 to 0.1</td>
<td>.97</td>
<td>0.00</td>
</tr>
<tr>
<td>PSS [parental self-report]</td>
<td>Posttreatment</td>
<td>-3.6</td>
<td>-5.6 to -1.5</td>
<td>&lt;.001</td>
<td>0.50</td>
</tr>
<tr>
<td></td>
<td>Follow-up</td>
<td>-3.6</td>
<td>-5.6 to -1.5</td>
<td>&lt;.001</td>
<td>0.50</td>
</tr>
</tbody>
</table>

Note: ABAS-II = Adaptive Behavior Assessment System II; CGI-S = Ohio State University (OSU) Autism Clinical Global Impression—Severity; CiS = Children in Stress; DD-CGAS = Developmental Disabilities modification of the Children’s Global Assessment Scale; PSS = Perceived Stress Scale; SRS = Social Responsiveness Scale.

Effect SizeChange Scores 95% CI \( p \) Effect Size

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The study is the largest randomized trial of SSGT to date, and the first to evaluate its effectiveness in routine care. We demonstrate a small to moderate added value of SSGT in terms of improvements on ratings of autism-related symptomatology and adaptive functioning compared to standard care, although the effect on the primary outcome was limited to adolescents and females and was observed only by unblinded parents. The intervention was well tolerated, and 85% of the participants completed the training. Missing school due to training was the only frequently reported negative effect. Our overall pattern of findings is consistent with those of previous trials.\(^5\)\(^6\)

To maximize generalizability of the results and to demonstrate applicability in clinical practice, this pragmatic trial aimed for heterogeneity in several aspects. No fewer than 50 clinicians from 13 regular care units were involved in delivering the intervention. The study population comprised children and adolescents with ASD who were typically admitted to mental health services. A substantial proportion were female. Heterogeneity can, on the other hand, lead to dilution of the treatment effects, which may partially account for the mixed results of this study. The analyses indicated that the effects were moderated by age, and possibly also by gender. A potentially more favorable outcome for adolescents than for children might have several explanations. First, the intensity of training is 30 minutes longer per session for adolescents than for children. The decision to restrict the children’s sessions to 60 minutes was based on clinical experience, and reflects how the training is delivered in clinical practice. Ninety-minute training sessions have not been found useful for children, as their attention span, motivation, and cooperativeness tend to decline after 1 hour. Still, the large difference in dose precludes direct comparison between children and adolescents. Second, we estimate that homework might have been more beneficial and consistently applied by older participants. Adolescents with ASD encounter higher social expectations and demands than do children,\(^28\) and thus might be more motivated to improve their social skills. Children, on the other hand, needed more support to complete their assignments. Third, neural maturation and the development of associated cognitive functions\(^29\) required to acquire social skills might not always be sufficiently developed in children. The gender-specific results, suggesting that the intervention possibly is more effective for females than for males, are novel and groundbreaking. Previous trials have included too few females to address this issue properly. The previous, largest published trial, including only 15 females in total, found that the female subsample descriptively showed a stronger improvement than the male subsample.\(^6\) Although research on gender differences in ASD is an emerging field,\(^30\) we are among the first to report gender differences regarding treatment response.

In terms of recommendations, the results from the moderator analyses should not be overstated. The relatively modest effects found in the present and previous

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**FIGURE 2** Means and 95% CIs for parent-rated Social Responsiveness Scale (SRS) scores for the total group and separately by age group and gender.

**A** Total Sample

**B** Children

**C** Adolescents

**D** Girls

**E** Boys
trials rather point to a need for improved SSGT techniques for all participants. Increased quality of feedback, additional strategies to maintain focused practice and motivation, making the content more developmentally appropriate, and sustained training appear as potential areas of further improvement. Indeed, extended training beyond 12 weeks might be one of the most logical and promising areas to explore. Most SSGT programs evaluated to date have lasted no more than 3 to 4 months, which is far less than the time devoted to many other interventions for individuals with ASD (e.g., early intensive behavioral intervention implying many hours of training per week over years). Notably, a wish for continued training after completion of the program has been expressed by participants and their parents.  

Some study limitations should be noted. First, the validity of the teacher ratings was undermined by an unsatisfactory response rate. As a consequence, our conclusions are based on unblinded ratings. Although we cannot rule out the possibility that the estimated effects to some extent reflect bias, the inconsistent results across measures and subgroups are not readily explained by bias. Still, development of practical and valid observational measures for blinded observers is of great importance for the future progress of research in this field. Due to our discouraging experience with teacher ratings, we would suggest alternative routes such as blinded ratings of video recordings. Overall, more sensitive and relevant outcome measures are needed. In particular, an increased focus on long-term functional outcome and quality of life would provide a valuable basis for clinical decisions and health economic analyses. Second, without an active control group, we cannot rule out that simply joining a group of peers with similar difficulties might account for the observed gains. However, in accordance with the principles of pragmatic trials, the paramount objective was to determine whether SSGT added value to standard care. Moreover, a previous qualitative responder analysis indicated that improvements are likely to be associated with certain elements of the program, rather than merely the group setting. Third, the large number of analyses increases the risk of type I errors. In interpreting our findings, it therefore seems appropriate to focus more on the overall pattern of results than on any specific result. Finally, other potential sources of bias were the somewhat higher rate of missing data in the intervention group, and that the standard care group received more individual CBT and counseling, which might have led to an underestimation of the true effect of SSGT.

We conclude that for adolescents, especially females, a 12-week SSGT was superior to standard care alone, with small to moderate positive effects on social responsiveness, general clinical severity, and adaptive functioning. For children, on the other hand, significant gains were observed on secondary outcomes only. The applicability in clinical practice was demonstrated by the routine clinical settings, the regular staff delivering the intervention, and the inclusion of clients typically referred to child and adolescent psychiatry. Given the lack of other proven treatment options, SSGT could be a valuable complement to standard care. However, further efforts to improve the training are needed to move beyond the current standard. Awaiting more research on how the training should be optimized for different subgroups, clinicians are advised to adhere to the manual but may continue training with an increased degree of tailoring after completion of the 12-week program.

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