



RESEARCH ARTICLE

New approaches to social skills training: Blended group interventions for girls with social communication difficulties

Jeanne Wolstencroft¹  | Eleanor Kerry¹ | Hayley Denyer² | Alice Watkins³ | William Mandy⁴  | David Skuse¹

¹Great Ormond Street Institute of Child Health, University College London, London, UK

²King's College London, Social Genetic and Developmental Psychiatry Centre, London, UK

³Great Ormond Street Hospital, London, UK

⁴Faculty of Brain Sciences, Division of Psychology and Language Sciences, University College London, London, UK

Correspondence

Jeanne Wolstencroft Great Ormond Street Institute of Child Health, University College London, London, UK.
Email: j.wolstencroft@ucl.ac.uk

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Abstract

Social skills group interventions are increasing popular for children with social communication disorders but there is little evidence of their acceptability or effectiveness when delivered online. We report a feasibility study that adapted the Program for Education and Enrichment of Relational Skills (PEERS) to provide an intensive 8 week online delivery to female adolescents, blended with some face-to-face group meetings. A systematic multiple-case series design with case tracking was developed, comprising a 3-month baseline, a 2-month intervention and a 3-month follow-up period. Seven adolescents with Turner Syndrome and social communication difficulties (17–20 years) took part, together with their parents. Acceptability and feasibility were assessed by means of qualitative feedback and attendance rates. Changes in social adaptation were tracked using measures of social knowledge, social behaviour and autistic symptoms, plus anxiety and self-esteem. Attendance rates were consistently high and there were no dropouts. Qualitative feedback indicated the online format was acceptable to both the participants and their families. Objective outcome measures showed significant gains in social knowledge and improved social initiations from measures made during the pre-intervention baseline. This proof-of-principle pilot study demonstrated blended social skills interventions are both feasible and acceptable to adolescent females with social communication difficulties.

Lay Summary: Social skills groups are increasingly popular for children with social communication disorders, but there is little evidence for their use online. Psychological treatments that require weekly face-to-face sessions for both children and their parents are associated with practical difficulties, disrupting family life and school commitments. Our study, is the first to use a blended online and face-to-face social skills training program for adolescent girls with social communication difficulties. We showed that this new approach to treatment was acceptable to families and has a positive and significant impact on participant's social performance and social knowledge. This new treatment approach may increase the accessibility of treatment for adolescents and young adults, especially those with social communication difficulties.

KEYWORDS

autism, e-health, girls, intervention, online treatment, social skills training

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INTRODUCTION

Over the last 20 years there has been a substantial increase in the evidence base indicating the effectiveness of social skills training for children and young people with social communication difficulties in the context of autism spectrum disorder (ASD; Kasari, Rotheram-Fuller, Locke, & Gulsrud, 2012; Matson, Matson, & Rivet, 2007; Reichow, Barton, Boyd, & Hume, 2012; Reichow & Volkmar, 2010; Volkmar, Lord, Bailey, Schultz, & Klin, 2004). Most interventions were designed for male participants. To be acceptable and relevant to the needs of females with autistic traits they would require modification, in order to take into account their particular strengths and weaknesses (Hull et al., 2018). Many females with social communication disorders are capable of social imitation, which enables them to compensate quite effectively for their social differences in early- to mid- childhood (Hull et al., 2017). But by the onset of adolescence the complexity of socialisation increases, and imitation is often no longer sufficient. As the socio-cognitive gap widens between them and their peers during adolescence, girls on the autism spectrum struggle to build relationships with same-sex peers (Cridland, Jones, Caputi, & Magee, 2014; Jamison & Schuttler, 2017; Solomon, Miller, Taylor, Hinshaw, & Carter, 2012). They may become the targets of relational aggression and conflict (e.g. gossiping and social exclusion), and lack the capacity to cope effectively, leading to social withdrawal, anxiety and depression (Cridland et al., 2014; Sedgewick, Hill, Yates, Pickering, & Pellicano, 2016). Whilst many desire friendships with neurotypical female peers, few manage to sustain those relationships through the complex social world of adolescence (Sedgewick et al., 2016; Sedgewick, Hill, & Pellicano, 2018).

Social skills deficits in young people with ASD and ASD traits constitute an important target for intervention, especially those with normal-range intelligence, in mainstream educational settings. Unless managed effectively, impaired social communication skills can have a significant negative impact on academic, adaptive and psychological functioning (Coie, Terry, Lenox, Lochman, & Hyman, 1995; Elliott, Malecki, & Demaray, 2001; Spence, 1995). Social skills training programs must take into account the need to improve both social knowledge (such as social rules and etiquette) and social performance (the behavioural performance of social skills). Whilst there is good evidence that many such interventions are effective at teaching social knowledge (Gates, Kang, & Lerner, 2017), improvements in social performance are not as well documented, and have not been demonstrated convincingly (McMahon, Lerner, & Britton, 2013; Rao, Beidel, & Murray, 2008; Reichow & Volkmar, 2010; Schneider, 1992; White, Keonig, & Scahill, 2007).

Turner Syndrome (TS) is a rare sex chromosome disorder (1 in 2500 female births) resulting in the complete or partial loss of one of the X chromosomes in females (Jacobs et al., 1997). It is one of the few genetic disorders affecting females that has consistently been associated with social communication deficits (McCauley, Kay, Ito, & Treder, 1987; Wolstencroft & Skuse, 2018). The latest TS Clinical Care Guidelines recommend trialling a social skills intervention called the Program for the Enrichment of Relationships and Social skills (PEERS; Gravholt et al., 2017).

PEERS is a social skills program designed for children and young adults with ASD, which aims to improve both social knowledge and social performance (Gantman, Kapp, Orenski, & Laugeson, 2012; Laugeson, Frankel, Mogil, & Dillon, 2009; Laugeson, Gantman, Kapp, Orenski, & Ellingsen, 2015; Schohl et al., 2014; Wolstencroft et al., 2018). It was designed, in the original format, to comprise 14 weekly face-to-face meetings with young people and their parents, attending parallel groups (Laugeson & Frankel, 2010). PEERS has been shown to improve social knowledge and social initiation behaviours in groups comprised exclusively of boys with ASD, and in mixed gender groups with boys and girls with ASD (Gantman et al., 2012; Laugeson et al., 2009; Laugeson et al., 2015; Schohl et al., 2014; Wolstencroft et al., 2018). There is also emerging evidence to suggest that PEERS is equally effective in boys and girls in mixed gender groups (McVey et al., 2017). However, evidence of its effectiveness in groups comprised solely of girls with social communication difficulties is currently lacking.

The delivery of interventions that require weekly face-to-face sessions for both children and their parents has been impossible during the current pandemic (Lee, 2020), and even during normal times is associated with practical difficulties, disrupting family life and school commitments. The acceptability of online social media technology to young people provides an unparalleled opportunity to develop novel approaches to delivering therapeutic interventions (Hollis, Livingstone, & Sonuga-Barke, 2020). Online therapy is believed to increase the accessibility of treatment for isolated and marginalised groups (Abbott, Klein, & Ciechomski, 2008; Griffiths, Lindenmeyer, Powell, Lowe, & Thorogood, 2006). Teenagers often prefer participation in internet-based than face-to-face treatment sessions (Sweeney et al., 2019), and this may be particularly true for those with social communication difficulties.

An increasing body of evidence demonstrates the efficacy of internet-based technology for the delivery of psychological interventions in both adults (Andersson & Cuijpers, 2009; Cuijpers et al., 2009; Cuijpers, van Straten, Andersson, & van Oppen, 2008; Gainsbury & Blaszczynski, 2011; Spek et al., 2007) and children (Hollis et al., 2017). A range of online approaches have been developed using diverse platforms, which entail varying levels of professional involvement (from blended

internet-based modules with personal support from a therapist, to individual self-guided therapy sessions). On the other hand, to the best of our knowledge, there has been no research on the feasibility of online group therapy for the management of social communication disorders.

We hypothesized that it would be both feasible and acceptable to adapt existing social skills training to provide blended online/face-to-face social skills training to groups of adolescent girls with Turner Syndrome and social communication problems. Using the PEERS therapeutic program, we hypothesized that pre-post improvements would be observed in social knowledge, social performance (including social initiation) and self-esteem, together with a reduction in social anxiety.

METHODS

Study design

Study centres and recruitment

Eligibility required participants to range in age from 17 to 20 years. They were recruited from the *Social Skills and Relationships in Turner Syndrome Study* (SOAR). Participants were eligible to take part in the intervention if they had significant social skills difficulties, without an associated intellectual disability and were not undergoing concurrent psychological treatment. All had been in mainstream education and had normal-range verbal and nonverbal intelligence. Other details are available from the full protocol (Wolstencroft, Mandy, & Skuse, 2019). The study was approved by the West London GTAC Ethics Committee (IRAS: 219817). Participant families lived throughout the south of England, and it would not have been feasible for them to travel into central London, where the research team was based, on a regular basis for the delivery of the intervention.

Procedure

We employed an uncontrolled systematic multiple-case series design with case tracking. The study lasted 8 months in total including a 3-month baseline, a 2-month intervention and a 3-month follow-up post-treatment. The programme was delivered intensively, with 14 lessons delivered in 11 sessions over an 8 week period, a reduction from the 14 group sessions conventionally delivered by PEERS. Ratings of their daughter's social behaviour were obtained from parents online at 4-weekly intervals throughout the course of the study. Other measures were administered online to parents and the young people on two occasions, pre- and post-intervention (Table 1).

TABLE 1 Assessment schedule timeline

	Timeline	Assessments	
Screening	$T = 0$	PEERS screening interview SDQ (P, YP) WAIS-IV SRS	
Baseline	$T = 1$	SCP-1 (P)	
	$T = 2$ 4 weeks	SCP-2 (P)	
	$T = 3$ 8 weeks	SCP-3 (P)	
Intervention	$T = 4$ 12 weeks	SCP-4 (P, YP) SWS (P, YP) PEERS QSQ (P) PEERS TASSK (YP) RSE (YP) BAI (YP) SRS (P) SDQ (P)	
		$T = 5$ 16 weeks	SCP-5 (P)
		$T = 6$ 20 weeks	SCP-6 (P) SWS (P, YP) PEERS QSQ (P) PEERS TASSK (YP) RSE (YP) BAI (YP) SRS (P) SDQ (P, YP) IAQ (P, YP)
	Follow-up	$T = 7$ 24 weeks	SCP-7 (P)
		$T = 8$ 28 weeks	SCP-8 (P)
		$T = 9$ 32 weeks	SCP-9 (P, YP)

Note: Informants for each assessment are included in brackets. See Wolstencroft et al., 2019 for more details.

Abbreviations: BAI, Beck's anxiety inventory; IAQ, intervention acceptability questionnaire; P, Parent; PEERS, program for education and enrichment of relational skills; PEERS QSQ, PEERS quality of socialisation questionnaire; PEERS TASSK, PEERS test of adolescent social skills knowledge; RSE, Rosenberg self-esteem scale; SCP, social competence with Peers; SDQ, strengths and difficulties questionnaire; SRS, social responsiveness scale, second edition; SWS, spence social worries scale; WAIS-IV, Wechsler adult intelligence scale; YP, Young Person.

Data Accessibility

The study research data are available as a resource for the scientific community to maximize the value of the data for research and eventual patient and public benefit. Data are available upon request from the corresponding author.

MEASURES

Social performance

Social Competence with Peers (SCP)—scale completed by parents and young people: The SCP assesses the consequences of young people's interactions with peers such as the existence and duration of friendships or social

invitations (Spence, 1995). High scores are indicative of greater social competence.

Strengths and Difficulties Questionnaire (SDQ)—scale completed by parents and young people: The SDQ is a well-validated and normed behavioural screening questionnaire (interrater reliability $r = 0.86$; Goodman, Lam-ping, & Ploubidis, 2010). The SDQ includes scales that measure hyperactivity-impulsivity/inattention difficulties, emotional difficulties, peer difficulties and prosocial skills. These scales are combined to create a total difficulties score. High scores are indicative of greater levels of behavioural difficulty and scores above the 90th percentile predict raised probability of independently diagnosed psychiatric disorders (≥ 17 by parent report; ≥ 18 by self-report; Goodman, 2001).

PEERS Quality of Socialization Questionnaire (QSQ)—scale completed by parents and young people: The QSQ is designed to evaluate the quality of young people's socialization and frequency of get-togethers (Laugeson & Frankel, 2010).

Social knowledge

PEERS Test of Adolescent Social Skills Knowledge (TASSK)—self-rating by young people: The TASSK questionnaire evaluated what the participants learned from the intervention (Laugeson & Frankel, 2010). This outcome measure was designed to measure gains in social knowledge.

Autistic symptomatology

Social Responsiveness Scale, 2 (SRS-2)—rated by par-ents: The SRS-2 is a reliable and valid measure of the severity of autistic traits (internal consistency $\alpha = 0.95$; interrater reliability $r = 0.61$; Constantino & Gruber, 2007, 2012). The SRS-2 subscales measure Social Awareness, Social Cognition, Social Communication, Social Motivation, and Restricted Interests and Repetitive Behaviour (RRB). Raw scores are converted into T -scores normed for age and sex ($M = 50$; $SD = 10$). T -scores in the mild range are indicative of clinically significant deficits in reciprocal social behaviour that have a mild to moderate impact on everyday social interactions ($T = 60$ – 65). T -scores in the moderate range are indicative of substantial deficits in everyday social interaction and are typically associated with ASD of moderate severity ($T = 66$ – 75). T -scores in the severe range are strongly associated with a clinical diagnosis of an ASD ($T > 76$).

Anxiety, social anxiety and self-esteem

Rosenberg Self-Esteem Scale (RSE)—self-rated by young people: The RSE scale assesses global self-esteem (test-

retest reliability $r = 0.82$ – 0.88 ; internal consistency $\alpha = 0.77$ – 0.88 ; Blascovich & Tomaka, 1993; Rosenberg, 1965). High scores are indicative of positive self-esteem.

Beck's Anxiety Inventory (BAI)—self-rated by young people: This scale is a widely used self-report measure used for measuring the severity of anxiety in children and adults. High scores are indicative of increased social anxiety (internal consistency $\alpha = 0.92$ – 0.94 ; test-retest reliability $r = 0.75$; concurrent validity with the Hamilton Anxiety Rating Scale is $r = 0.51$; Beck, Steer, Ball, Ciervo, & Kabat, 1997).

Spence Social Worries Scale (SWS)—rated by parents and young people: The Spence Social Worries Scale is a psychological questionnaire designed to identify symptoms of social phobia and other forms of anxiety, in children and adolescents (Spence, 1995). High scores are associated with greater levels of social anxiety. The parent and teacher forms are reported to have excellent internal validity (internal reliability $\alpha = 0.84$ – 0.94 ; Spence, 1995).

Intervention acceptability

Intervention Acceptability Questionnaire (IAQ)—rated by parents and young people: The Intervention Acceptability Questionnaire was developed to assess post-intervention satisfaction with the procedure (see Appendix S1).

Intervention and online adaptations

PEERS for Adolescents is a manualised treatment that consists of 14 weekly face-to-face 90 min lessons (Laugeson & Frankel, 2010). The Adolescent Program was judged more suitable than the Young Adults Program for this group due to their relatively low level of social maturity. There were two concurrent groups, one for the young people with social communication difficulties, and the other for their parents. In order to minimise travel requirements, only the first, middle and final PEERS sessions were administered face-to-face in London. We considered that an initial face-to-face session could enhance subsequent participation. All other sessions were administered using virtual meeting rooms hosted by Adobe Connect (Table 2). Adobe Connect is online video-conferencing software that allows for large group discussions in a main meeting room or several concurrent small group discussions in 'hangout' venues. The platform meets the highest information governance security standards (ISO 27001).

Each PEERS group session is structured, and requires the following tasks to be completed by the young people participating: (a) homework is set; (b) prior homework is reviewed; (c) a didactic lesson is delivered on social interaction; (d) social skill rehearsal is practised; (e) a novel

TABLE 2 Session schedule and didactic lessons

Session	Didactic lesson	Delivery
1 <i>T</i> = 4	Conversational Skills I: Trading Information	Face-to-face
	Conversational Skills II: Two-Way Conversations	
2	Conversational Skills III: Electronic Communication	Virtual meeting room
3	Choosing Appropriate Friends	Virtual meeting room
4	Appropriate use of humour	Virtual meeting room
5 <i>T</i> = 5	Peer Entry I: entering a conversation	Face-to-face
	Peer Entry II: exiting a conversation	
6	Get-togethers	Virtual meeting room
7	Good sportsmanship	Virtual meeting room
8	Rejection I: teasing and embarrassing feedback	Virtual meeting room
9	Rejection II: bullying and bad reputations	Virtual meeting room
10	Handling disagreements	Virtual meeting room
11 <i>T</i> = 6	Rumours and gossip	Face-to-face
	Graduation and termination	

Note: The programme was delivered intensively, with 14 lessons delivered in 11 sessions over an 8 week period. Face to face groups were delivered on Saturdays and virtual groups were delivered on Wednesday evenings. Two lessons were delivered during the face to face sessions with an hour lunch break between lessons.

activity is facilitated, (f) there is parent and young person group reunification. The main differences between the PEERS face-to-face protocol and the adapted virtual meeting-room were that we did not facilitate parent and young person reunification at the end of sessions, and we did not introduce any novel group activity. The lessons were delivered by means of a PowerPoint presentation and the participation points were logged in the meeting notes 'pod' on Adobe Connect. Role-plays were conducted by the group facilitators during the online and face to face groups. Online links to the PEERS video role-plays were also sent to participants by email after each session. Behavioural rehearsal was conducted in small online breakout rooms during the online sessions. The conventional PEERS protocol recommends that from week 7 participants engage in a group activity (playing games outdoors) whilst practising their newly acquired skills. As it was impractical to introduce such outside activities to the online community, we replaced them with the Awkward Situations game, developed by the research team as a substitute task. The Awkward Situations game presents the group with a social dilemma and four multiple choice answers presented as a poll. Once the group answered the poll, they are encouraged to discuss their answers with the group. The multiple choice answers are designed so that none of the answers is

wholly satisfactory; the objective is to reach a consensus on how best to handle the situation through group discussion. The educational objectives of this game are threefold; (1) it promotes group bonding and demonstrates that everyone encounters social dilemmas; (2) it reinforces the social etiquette rules learnt throughout the programme; and (3) it encourages participants to resolve social dilemmas through discussions with their peers (see Appendix S1). All PEERS didactic lessons were delivered according to the conventional protocol (Table 2; Laugeson & Frankel, 2010).

RESULTS

Missing data

There were no missing data from the parent assessments. One data point is missing from one young person on the SCP at follow-up.

Participants

Eligible participants from the SOAR study were approached. During the PEERS screening interviews, seven young women and their parents expressed a strong desire to participate in the intervention. The mean age of the sample was 18.7 years ($SD = 1$; range 17–20). All participants were British; one participant was of mixed white and black Caribbean ethnic origin, all other participants were of white or Caucasian ethnic origin.

No participants had a clinical diagnosis of ASD. On the parent screening measures all but one of the young women scored in the "high" range on the SDQ's Peer Difficulties scale. On the SRS-2, three young women scored in the normal range for autistic traits, two in the mild range and two in the moderate range. No participant was intellectually disabled, and all scored over 70 on the verbal subtest of the WAIS-IV (FSIQ $M = 96.6$; $SD = 12.7$; range 79–110); five were in full time education (college or university) and two were employed.

Intervention attendance and adherence

Attendance at the parent (85.7%) and young person (97.4%) groups was high. In the young person group no participant missed more than one session. In the parent group no participant missed more than three sessions. No participants dropped out.

Outcomes

Social performance

Visual analysis of the parent report SCP scores showed an improvement in social competence from baseline to

immediately post-intervention (Figure 1). SCP scores during the extended baseline were stable and improved over the course of the intervention (T4–T6, Figure 1). Gains in social competence were maintained during the 3 month follow-up period for most participants.

A one-way repeated measures ANOVA was conducted on the parent SCP scores. Mauchly's test indicated the assumption of sphericity had been violated ($\chi^2[35] = 0, p = 0$), therefore, degrees of freedom were corrected using Greenhouse–Geisser estimates of sphericity ($\epsilon = 0.38$). The main effect of time on SCP scores did not reach significance ($F[3,18] = 2.72, p = 0.075$).

Exploratory paired samples t-tests between the pre- and post-intervention parent SCP scores (T4 vs. T6) revealed a significant improvement in social competence ($t[6] = -2.52, p = 0.045; M_{T4} = 9.14, SD_{T4} = 2.79; M_{T6} = 10.86, SD_{T6} = 2.54$), with a medium effect size ($\delta = 0.64$; Table 2). The same comparison for the young people SCP scores was non-significant with a small effect size ($t[6] = -1.45, p = 0.2, \delta = 0.27; M_{T4} = 12.29, SD_{T4} = 3.73; M_{T6} = 13.29, SD_{T6} = 3.55$).

Due to the small sample size and nonnormally distributed data, Wilcoxon signed rank tests were conducted on subsequent analyses. To account for multiple comparisons Bonferroni corrections were applied to the level of significance. After multiple corrections some effects will not remain significant, therefore effect sizes were used to give an indication of clinical significance.

Social performance was also assessed using the Strengths and Difficulties Questionnaire (SDQ) Peer Difficulties scale and the Quality of Socialisation Questionnaire (QSQ). Parents reported improvements over baseline on the SDQ Peer Difficulties scale and more get-togethers on the QSQ, but these improvements were not statistically significant. After corrections for multiple testing there were no significant differences in pre/post measures as rated by the young people or their parents on the SDQ or the QSQ (Table 3).

Social knowledge

The young people answered significantly more questions correctly on the TASSK questionnaire of social knowledge after the intervention. The effect size was very large ($Z = -2.36, p = 0.02, \delta = 4.2$, Table 3).

Autistic symptomatology

Parent ratings of the SRS-2 total score showed significant reductions in autistic behaviours after the intervention ($z = 0.46, p = 0.03$, Table 3). Post-hoc comparisons were conducted on the SRS-2 subscales, none of which reached significance after corrections for multiple comparisons. However, small to medium effect sizes were observed on all the subscales ($\delta = 0.30$ – 0.61). The largest effect sizes were obtained on the social awareness ($\delta = 0.61$) and social motivation subscales ($\delta = 0.51$).

Anxiety, social anxiety and self-esteem

Changes in anxiety (generalised and social) and self-esteem were measured using the Beck's Anxiety Inventory (BAI), Social Worries Scale (SWS) and Rosenberg Self-Esteem (RSE) respectively.

The young people rated themselves as being slightly more anxious in a general sense after the intervention (BAI). This difference did not reach a conventional level of statistical significance (small effect size), and the pre- and post-intervention scores were both in the "low anxiety" range (Beck, Epstein, Brown, & Steer, 1988). Parents and young people did not report changes in social anxiety on the SWS after intervention. The self-esteem rating also remained unchanged after the intervention; the young people's self-esteem scores were similar to those expected of their age-matched peers (Table 3; $M_{(norm)} = 17$ vs. $M_{(TS)} = 19.67$; Sinclair et al., 2010).

Intervention acceptability IAQ

The intervention was rated as acceptable to participants. 100% of the young people rated taking part in the group

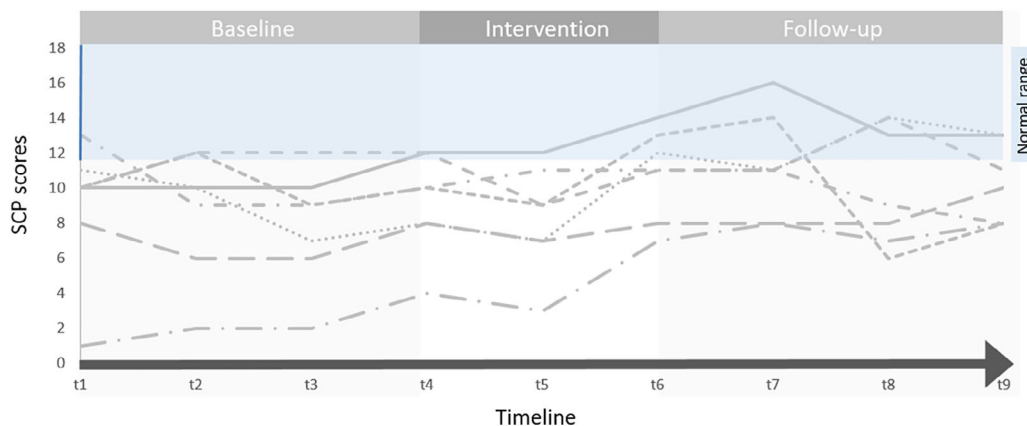


FIGURE 1 Graph of parent SCP scores from baseline to follow-up. Each line represents an individual participant's SCP scores by parent report from baseline to follow-up. Normal range for the SCP shaded in blue ($M = 14.8, SD = 3.12$)

TABLE 3 Secondary outcome measures pre/post scores

Assessment		Preintervention (t4)		Postintervention (t6)		<i>z</i>	<i>p</i>	<i>d</i>
		Median	IQR	Median	IQR			
Social knowledge								
YP	TASSK	14	7	25	3	-2.36	0.02	4.2
Social performance								
SDQ								
P	Peer problems	4	3	3	1	-1.29	0.2	0.72
	Total difficulties	8	13	8	8	-1.55	0.12	0.46
YP	Peer problems	3	2	3	3	-0.45	0.66	0.09
	Total difficulties score	8	16	9	12	-2.23	0.03	0.3
Quality of socialisation questionnaire								
P	Organised get-togethers	1	2	3	3	-2.06	0.04	0.04
	Invited get-togethers	2	2	2	2	-1.41	0.16	0.16
YP	Organised get-togethers	2	3	2	1	-0.86	0.39	0.35
	Invited get-togethers	1.71	1	2	1	2	-0.38	0.71
Autistic symptomatology								
P	SRS-2 T Score Total score	64	16	55	14	0.46	0.03	0.46
	- Awareness	59	9	49	4	0.61	0.2	0.61
	- Cognition	58	21	53	21	0.3	0.04	0.30
	- Motivation	59	15	56	8	0.51	0.03	0.51
	- Communication	63	16	56	12	0.36	0.09	0.36
	- RRB	66	25	58	14	0.33	0.15	0.33
Anxiety, social anxiety and self-esteem								
YP	Rosenberg self-esteem	19	8	19	6	0	1	0.04
	Beck anxiety inventory	7	8	11	12	-1.98	7	0.32
P	Social Worries Scales	9	8	7	7	-2.37	0.02	0.18
YP	Social Worries Scales	9	8	8	6	-0.74	0.46	0.15

Low scores on the SRS-2 are indicative of less autistic symptomatology. Significance level adjusted for multiple comparisons (Bonferroni alpha = 0.05/5 = 0.01). Large effect size ≥ 0.8 , Medium effect size ≥ 0.5 and Small effect size ≥ 0.2 .

Abbreviations: P, Parent report; YP, Young person report.

as “very helpful” and 93% of parents thought their daughters’ social ability had improved at the final follow-up assessment (Table 4).

Qualitative comments highlighted the acceptability of the intervention to families. Participants were very positive about the blended online and face-to-face format (Box 1). Young people and their parents described improvements in confidence, social motivation/initiation and gains in social knowledge (Box 1).

DISCUSSION

Our study, the first to administer an intensive blended online and face-to-face social skills training program for adolescent females with social communication difficulties, demonstrated both feasibility and effectiveness. Delivering the PEERS intervention in this way is acceptable to families and has a positive and significant impact on participant’s social performance and social knowledge.

The patterns of improvement that we observed most strongly indicated changes in the domains of social knowledge, as evidenced by improvements in the TASSK scores ($\delta = 4.2$). This is consistent with previous research on the effectiveness of social skills interventions for young people on the autism spectrum, which has reported that social knowledge is more susceptible to change than social performance (Gates et al., 2017). In this study, changes in social performance were limited to improvements in social initiation (QSQ). Both parents and young people reported an increase over the period of intervention in the number of participant-arranged get-togethers, although there was no equivalent increase in the number of get-togethers initiated by friends.

The relationship between social knowledge and social performance has not been subject to previous investigation; questions that could influence the design and interpretation of social skills training program such as ‘could the benefit of increased social knowledge lead to greater social initiation?’ remain unanswered. One might hypothesize that

TABLE 4 Intervention acceptability questionnaire (IAQ) answers

Intervention acceptability questionnaire answers	
Parent	
How would you compare your daughter's social ability prior to PEERS with her social ability now	Improved 100%
For your daughter, this intervention was:	Very helpful 100%
The parent training group was:	Very helpful 100%
Overall, how would you rate the PEERS group that your daughter attended?	Very helpful 100%
Would you recommend taking part in the PEERS program to other families?	Definitely 100%
Young People	
How would you rate the PEERS group overall?	Very helpful 100%
Do you feel that the PEERS group helped you improve your social skills?	A lot 85%
Has taking part in the PEERS program made you feel more confident in social situations?	A lot 71% A little 29%
Has taking part in the PEERS programme made you feel less anxious about social situations?	A lot 43% A little 57%
Did you enjoy taking part in the PEERS program?	A lot 100%
Would you recommend taking part in the PEERS program to a friend?	A lot 71% A little 29%
Do you feel like you have changed since taking part in the PEERS program?	Definitely 43% Possibly 57%

greater social knowledge and awareness could decrease the anxiety that people with social communication disorders experience in social interaction, thereby lowering barriers to their initiating social contacts.

Benefits to social confidence could accrue from the homework component of the training program, which requires participants to organise get-togethers with their peers. The weekly homework is set during PEERS meetings, which constitute a safe space for participants to share their experiences of successful and failed social initiations and somewhere they can problem-solve with their peer group. Participants in the program were volunteers who had relatively high motivation, thus it might have been predicted that there would have been improvements in social motivation on the SRS-2 scales. The combination of social knowledge and social motivation are likely to be pre-requisites for successful social performance.

We hypothesised there would be improvements in generalised anxiety, social anxiety and self-esteem after the intervention. However, this was not the case. Generalised anxiety scores increased after the intervention, but remained within the "normal" range. Neither the parents nor the young people reported changes in their social worries. Previous research has suggested that PEERS is associated with reductions in social anxiety (Schohl

et al., 2014). It's unclear whether these differences are due to differences in the measure sensitivity, sample size, the characteristics of the participant group or the blended study design. Future research should compare the differences in anxiety outcomes for PEERS conducted remotely and face-to-face. The standardised self-esteem measure scores remained unchanged before and after intervention, and the scores were in line with those expected for age and gender matched peers. This is in contrast with the participants' qualitative comments, which highlighted substantial gains in confidence after the intervention, comments that were supported by our clinical observations. Perhaps standardised measures of self-esteem are not sufficiently sensitive to detect changes in self-esteem in this group. Alternatively, changes in self-esteem could have been specific to social interaction and did not generalise to a more holistic sense of self-worth.

Feasibility and acceptability

Teaching social skills in an online environment was feasible. Both the parents and the young people reported high levels of satisfaction with the PEERS intervention. There was high compliance and none of the participants dropped out. Furthermore, participants enjoyed taking part in the intervention using the online meeting rooms. Participants had no technical difficulty in joining the online sessions, unless they were experiencing internet connectivity issues locally.

The use of the blended online and face-to-face approach has the potential to facilitate access to treatment and reach patients that live in geographically remote areas or who are unable to travel due to physical health disabilities. Many participants would not have been able to commit to taking part in the program if it had required multiple face-to-face sessions. In this age group a common concern was the fear of missing school or revision time for exams in order to travel to a face-to-face intervention.

The pilot focused on the feasibility of the blended delivery format to adolescent females. No attempt was made to alter the content of the protocol for PEERS delivery, hence it remained more appropriate for males. Participants provided feedback on the content of the program, and it became clear to us that it will require further adaptation to meet the needs of adolescent girls with social communication difficulties. For example, the nature of the teasing and bullying experienced by boys and girls can be qualitatively very different, and in this group of girls it was inappropriate to provide coaching in 'good sportsmanship' which is a feature of the original PEERS program.

Strengths, limitations and future directions

The patterns of improvement observed in this study are different to those reported in face-to-face trials

BOX 1**Feedback on online meeting rooms:**

“I liked the online platform. Found it relatively easy to use.”

“The online meeting rooms worked really well, especially with everyone’s busy schedules. I’m not sure I would have been able to take part if we had to go to London every week.”

“I think it’s a good way of connecting people without worrying about a location or transport.

They were especially useful during the week where you’re busier.”

“I think this was a good method of communication because we all live in different parts of the country.”

“Found the face to face more useful but obviously the practicalities of travelling are difficult.”

Feedback on perceived benefits:

“My daughter wouldn’t organise get-togethers as she was worried about rejection. She now knows that most of the time it’s not rejection, but the other person is busy at that particular time. She is now confident enough to suggest more dates, etc. She is actually excited to arrange social things with one friend at a time as she finds this better for herself.”

“I think she’s more likely to take the initiative to organise social events. Better within a two-way conversation.”

“Has made her more positive and confident. Given her tools to use, open questions, dealing with disagreements, etc.”

“It built her confidence to try to join groups, make calls and plans and not to be too worried if someone says no. the sharing of experiences has really helped to open up the topics for us to discuss.”

“It has helped me to come out of my shell and be more confident.”

“I now don’t worry about things as much, as I now have a set of rules and ideas to help me.”

“I am more confident that I could deal with situations better, some issues such as difficulty hearing will always make me a bit anxious about social situations but PEERS has definitely helped.”

“Social situations will still be slightly nerve-racking (like if it is a party with a lot of people you don’t know) but it’s given me the reassurance and confidence that I can handle them.”

“Yes, before this I used to not like organising get-togethers but now I have more courage to organise them.”

of PEERS. This feasibility study was conducted on a small sample and included a number of modifications compared to the traditional programme, including a blended approach and a condensed programme. Now that the blended approach has been shown to be acceptable to families, future studies will need to examine separately the impact of the mode of delivery (online, face-to-face, blended), and the impact of a condensed programme on social and wellbeing outcomes. It is possible that the maximum efficacy of PEERS is reached delivering the programme over 14 weeks face-to face, however this remains to be determined. There is some evidence to suggest that abbreviated versions of PEERS produce some, but not all of the benefits observed in the face-to-face programme (Marchica & D’Amico, 2016). During the coronavirus pandemic social skills training may be limited to online-only approaches. It is likely that there are also differences in outcomes for participants in blended versus online-only approaches, which only well-designed randomised control trials will be able to disentangle. Furthermore, it is likely that there are sub-groups of

participants who respond better to one delivery approach than another. In the absence of trial evidence, our pragmatic recommendations for practitioners conducting groups online during the pandemic are to spend more time building group cohesion, practice skills in online break-out rooms and focus homework on organizing remote get-togethers (via telephone or video-call) or joining online clubs. Acquiring online social etiquette and skills will be invaluable in a post-pandemic world.

Parents and young people typically report improvements in social skills after taking part in social skills interventions, but their reports may be influenced by expectancy biases (McMahon et al., 2013). An independent evaluation of their social behaviour, such as that provided by teachers, does not necessarily agree (Gates et al., 2017; Kaat & Lecavalier, 2014). Future studies of the effectiveness of blended online delivery will need to employ unbiased observer reports. If teacher reports are not available, alternatives include structured observations or peer-rated measures such as social network connectivity maps (Kasari, Locke, Gulsrud, & Rotheram-Fuller, 2011).

The biggest subjective improvements noted by the parents and young people, as described by their qualitative responses to the acceptability questionnaire, were gains in confidence. We did not have any metric for self-confidence in the standardised self-esteem measure. Future research will need to consider alternative assessment measures to capture this potential change.

Future research should also examine how to help girls with social communication difficulties recognise peer victimisation and relational aggression. In our experience, common signs include being exploited by apparent friends because of their social naivety.

CONCLUSION

This feasibility study successfully demonstrated the acceptability of blended social skills training with a group of adolescent girls who experienced moderate social communication difficulties. Despite the fact the study was small-scale, there were significant and positive improvements identified in both social knowledge and social behaviour. The potential value and cost-effectiveness of providing online group interventions for social skills training in adolescents with social communication disorders is worthy of further investigation.

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CONFLICT OF INTEREST

The authors declare no conflicts of interest.

ORCID

Jeanne Wolstencroft  <https://orcid.org/0000-0001-6160-9731>

William Mandy  <https://orcid.org/0000-0002-3564-5808>

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SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section at the end of this article.

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