## School-based Social Skills Training for Young People with Autism Spectrum Disorders

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| **Key Words** | Autism spectrum disorders, Social skills training, School |
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School-based Social Skills Training for Young People with Autism Spectrum Disorders

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Conflict of Interest: Dr Renae Beaumont is the author of the Secret Agent Society Program and receives royalties on all program materials sold.

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Abstract

**Background:** Social skill deficits are a core feature of Autism Spectrum Disorders (ASD). Aspect (Autism Spectrum Australia) evaluated augmenting their existing school curriculum with a multimedia social skills program, the Secret Agent Society (SAS) Program, to see if it led to improvements in students’ social skills at school and home, and whether changes were sustained at 6- and 12-month follow-up. **Methods:** Eighty-four Aspect students participated in the study. Key outcomes were assessed with parent and teacher ratings of emotion regulation and social skills and with direct child social problem-solving measures. Assessment measures were completed at the beginning and end (pre-intervention) of a baseline non-intervention period (mean=25.38 weeks) where students engaged in the usual school curriculum. After baseline, students participated in the SAS Program, a 13-week intervention with child and parent sessions and a computer game, followed by 3- and 6-month booster sessions. The SAS Program was delivered by trained school staff in Aspect classrooms. Measures were readministered post-intervention and at 6- (parent and teacher only) and 12-month follow-up. **Results:** Random effects regression was used to model change on total scores of all outcome measures. No significant differences in total scores were found relative to pre-intervention on any outcome measure over the curriculum-as-usual period. Significant improvements relative to pre-intervention were found at post-intervention, 6- and 12-month follow-up for parent social skills ratings, and at 12-month follow-up for teacher social skills ratings. Significant improvements relative to pre-intervention were found on both child social problem-solving measures at post-intervention and 12-month follow-up. **Conclusions:** Gains in students’ social skills were found after participating in the SAS Program. Such gains were not found after receiving the curriculum-as-usual. These findings suggest the SAS Program may be effective for students with ASD in a school setting. **Keywords:** Autism spectrum disorders; Social skills training; School
Introduction

Autism Spectrum Disorder (ASD) occurs in around one percent of the population (Baird et al., 2006; Brugha et al., 2011). Deficits in social functioning and emotion recognition are seen in young people with ASD across the spectrum of cognitive and language abilities and have a pervasive and life-long impact (Gray et al., 2012; Howlin, Moss, Savage, & Rutter, 2013; Sofronoff, Attwood, Hinton, & Levin, 2007; Tonge, Brereton, Gray, & Einfeld, 1999). Social deficits in ASD include problems with: non-verbal communication; initiating and maintaining conversations; social-emotional reciprocity; interpreting and expressing emotions correctly; recognising and responding appropriately to others’ feelings, thoughts and intentions; developing and maintaining relationships; adjusting behaviour to social contexts; and engaging in interactive play with peers (American Psychiatric Association (APA), 2013).

Social deficits are apparent from the earliest years but often become more evident when children begin attending school, where problems in social interaction and understanding can have a profound impact on peer acceptance, academic achievement and mental health (Cappadocia, Weiss, & Pepler, 2012). Social difficulties frequently result in high rates of bullying (Little, 2001), social isolation and significant levels of anxiety, anger and depression (Sofronoff et al., 2007). These difficulties almost always persist into adulthood and have a negative impact on the ability to secure employment and live independently (e.g., Howlin et al., 2013). For teachers, too, the demands of coping with pupils with ASD can result in high levels of stress and burnout (Spears, Tollefson, & Simpson, 2001).

In order to maximise social inclusion it is crucial to identify treatments that effectively target social cognition and social skills difficulties in young people with ASD.

The effectiveness of social skills training

While intervention programmes designed for very young children with ASD have shown promise in addressing cognitive and behavioural deficits (Magiati, Tay, & Howlin, 2012), social behaviour has proved more resistant to change (Kasari & Patterson, 2012). There is no agreed approach for teaching social skills to young people with ASD and improvements in social functioning observed in
trial settings do not reliably generalise to real life situations (Kasari & Patterson, 2012). Recent reviews (Cappadocia et al., 2012; Flynn & Healy, 2012) describe a range of different interventions, including peer-mediated programmes, social skills groups, script fading procedures, pivotal response training, and video modelling, but there is no evidence that any one programme is more effective than others. Similarly, there is little evidence that social skills curricula developed for children with other psychological disorders are effective for children with ASD, as these often provide insufficient explicit instruction in nonverbal communication, emotion recognition or regulation, or in the steps that constitute prosocial behaviours (Krasny, Williams, Provencal, & Ozonoff, 2003; Tse, Strulovitch, Tagalakis, Meng, & Fombonne, 2007).

Research into ASD-specific social skills interventions suffers from significant methodological limitations. These include small sample size; lack of appropriate comparison groups; inadequate descriptions of the methods or participants involved; wide variation in outcome measures; and lack of data on treatment fidelity, generalization or maintenance of gains post-intervention. Conclusions about the effects of intervention are also compromised by reliance on non-blinded outcome assessments and measures that are prone to bias, such as parent or teacher reports. The variety of procedures used makes it difficult to determine the active ingredients of interventions (Cappadocia et al., 2012; Flynn & Healy, 2012; Kasari & Patterson, 2012). One of the most significant limitations of these programmes is the lack of evidence demonstrating that results from trials transfer to real life settings. Thus, there is a need to focus on the implementation and evaluation of interventions in natural contexts and particularly to examine their utility in real world educational and community settings.

Beaumont and Sofronoff (2008) addressed some of these limitations by conducting a randomised control trial examining the efficacy of an 8-session social skills intervention called ‘The Junior Detective Training Program’ (since renamed as the ‘Secret Agent Society Program’). They employed comprehensive real world measures of social cognition and behaviours with multiple informants. They also examined persistence of treatment effects up to 5 months post treatment. Participants were young people with Asperger’s syndrome aged 8 to 11 years, all with an IQ in the average range. Compared with controls (n=23), the treatment group (n=26) showed greater improvements in parent-reported social skills and greater gains in knowledge of effective anxiety.
and anger management strategies. Teacher ratings of pupils' social competence also supported the efficacy of the programme. Treatment gains were maintained at 5-month follow-up.

The present study

Although promising, the Beaumont and Sofronoff (2008) study was limited by a number of factors. These included a lack of standardised diagnostic protocols, potential reporting biases arising from parents and teachers being both intervention participants and the primary evaluators of the programme, and lack of information on the longer-term benefits of the intervention. Participants, too, were not representative of the wider population of students with ASD, all being of average IQ and within a fairly narrow age range. Finally, this was an efficacy study delivered within a university setting and did not assess the effectiveness of the programme in an applied service delivery context, where financial, staffing and time constraints may affect outcomes (Chambless & Hollon, 1998).

The present study was designed to evaluate the programme within a broader age and intellectual ability range using both objective and subjective measures of social competence. The study was conducted within a specialist school setting operated by Aspect (Autism Spectrum Australia), the largest provider of autism-specific education in Australia.

The primary aims were to determine if the Secret Agent Society (SAS) Program led to improvements in: (i) social skills at home and school; (ii) emotional regulation and awareness; and (iii) social problem solving ability; and whether any improvements were sustained 6-months and 12-months after the cessation of the weekly intervention programme.

Methods

Ethical approval for the study was granted by the University of Sydney Human Research Ethics Committee and the Aspect Research Approvals Committee.

Participants

Participants were recruited from 15 ASD-specific specialist primary- and high-school satellite classes managed by Aspect (Autism Spectrum Australia). Aspect satellite classes operate in Department of Education and Communities and Catholic Education Commission regular schools.
throughout New South Wales, Australia. Aspect classes are small (5-15 students per classroom) and have at least one teacher and one teacher’s aide.

Families were sent study information sheets and parent consent forms. Requirements for participation were attendance at an Aspect satellite class and a diagnosis of ASD confirmed by a student’s enrolment with Aspect. All Aspect students must have a recent (<12mo) clinically confirmed diagnosis of ASD (including Autism Spectrum Disorder, Autism, Autistic Disorder, Asperger’s syndrome or Pervasive Developmental Disorder – Not Otherwise Specified) from a specialist medical practitioner or clinical psychologist. The student must fulfill the diagnostic criteria for ASD as per the DSM-IV-TR (Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision; American Psychiatric Association (APA), 2000) or ICD-10 International Classification of Diseases 10th Revision; World Health Organisation, 2010) and this must be supported by a standardised diagnostic assessment.

Table 1 about here

In total 84 children (75 male; 9 female) and their families were enrolled in the project. Children’s mean age was 10.7 years; mean receptive language age was 9.6 years and mean full scale IQ was 91.3. Most participants (73; 87%) had an IQ score in the average range (i.e. ≥70); seven (8%) had an IQ score <70 and four (5%) had no IQ score available. The mean parent-reported score for current autism symptomatology, as measured by the Social Communication Questionnaire – Current form (SCQ; Rutter, Bailey, & Lord, 2003), was 13.9. The average socioeconomic status rating, derived from postcode decile ratings using the Australian Bureau of Statistics Socio-economic Indexes for Areas, was 6.47, similar to the average of 6.0 for NSW and Australia as a whole. Full details of participant characteristics are outlined in Table 1.

Participant retention

Of the 84 students who completed initial assessments, 70 participated in the SAS Program (10 participants left their Aspect school prior to receiving the programme; 4 withdrew from the study due to family commitments). Sixty-eight participants completed the post-intervention assessment
(2 students withdrew from the study during the course of the programme) and 66 families participated in the follow-up assessments (2 students left their Aspect school and ceased study involvement during the follow-up period).

Measures

Child assessments took place at school. Cognitive and language assessments and social problem-solving measures were administered by trained research assistants and a supervising psychologist. Parent measures were completed by the child’s primary caregiver. Where possible, the same parent completed the questionnaires at each assessment point. Teacher measures of social skills were completed by teacher aides, if available, and by the same respondent at each assessment point, where possible. This was done to provide an independent measure of children’s social skills, given that many classroom teachers were also SAS Program facilitators.

Descriptive measures

Descriptive measures were completed upon enrolment in the study and used as control variables in data analysis.

Wechsler Abbreviated Scale of Intelligence (WASI; Wechsler, 1999) and Wechsler Intelligence Scale for Children: Fourth Edition (WISC-IV; Wechsler, 2003). In most cases IQ was assessed using the WASI, a brief measure of intelligence commonly used in research settings to provide an estimate of verbal, performance and full scale IQ scores. However, if the child had been assessed on the WISC-IV within the past 2 years, these scores were used instead.

Peabody Picture Vocabulary Test, Fourth Edition (PPVT-4; Dunn & Dunn, 2007). Receptive vocabulary skills were assessed using the PPVT-4.

Social Communication Questionnaire (SCQ; Rutter et al., 2003). Children’s level of autism symptomatology was assessed using the SCQ Current form. The SCQ Current form focuses on autism symptomatology over the past three months. The SCQ Current form is primarily used for treatment planning and change measurement; no clinical cut-off is available.
Outcome measures: social skills

Social Skills Questionnaire - Parent and Teacher forms (SSQ-P; SSQ-T; Spence, 1995).

The parent and teacher forms of the SSQ examine children’s competence in domains such as emotion regulation, nonverbal communication, interactive play, talking to others, and assertiveness. The 30-item questionnaires have good internal consistency (Spence, 1995), and have been used in previous studies examining the effectiveness of social skills programmes for high-functioning individuals with ASD (e.g., Beaumont & Sofronoff, 2008; Broderick, Caswell, Gregory, Marzolini, & Wilson, 2002; Mackay, Knott, & Dunlop, 2007; Sofronoff, Leslie, & Brown, 2004). Scores range from 0 (poor) to 60 (good).

Emotion Regulation and Social Skills Questionnaire – Parent & Teacher forms. (ERSSQ-P; ERSSQ-T; Beaumont & Sofronoff, 2008; Butterworth et al., 2013). The ERSSQ-P is a 27-item social skills and emotion regulation measure. The parent-version of the questionnaire has good internal consistency (α = .89) and good concurrent validity with the parent version of the SSQ (Beaumont & Sofronoff, 2008). A 25-item teacher version of the ERSSQ was developed for this trial and demonstrated high internal consistency (α = .92) and good concurrent validity (r=.72) with the teacher version of the SSQ-T (Butterworth et al., 2013). ERSSQ-P scores range from 0 (poor) to 108 (good). ERSSQ-T scores range from 0 (poor) to 100 (good).

Outcome measures: social problem solving

Since parents and teachers were involved with both intervention delivery and assessment completion, the following two tasks were included as more independent measures of change in children’s skills. Both have been used in previous evaluations of treatment outcome for children with ASD (e.g., Beaumont & Sofronoff, 2008; Sofronoff, Attwood, & Hinton, 2005). The scoring is the same for both tasks and responses are recorded to eliminate the need for the child to write. Responses were scored by a rater blind to the time point at which the task was administered.
James and the Maths Test (Attwood, 2004a). This task examines children’s knowledge of appropriate anxiety management strategies. A story about a boy (James) who feels anxious about a maths test is read aloud to the child. The child is then asked to suggest strategies for James to cope with his anxiety; one point is awarded for each appropriate response.

Dylan is Being Teased (Attwood, 2004b). To examine participants’ knowledge of appropriate anger management strategies, the child is asked to generate ideas for how a story character (Dylan) can effectively cope with anger about being teased at school.

Intervention procedures

Treatment programme - The Secret Agent Society (SAS) Program. The SAS Program is a multimedia social skills programme for children with ASD (Beaumont & Sofronoff, 2008). The curriculum uses an espionage-themed computer game and other activities to teach children to recognise emotions in themselves and others; express feelings in appropriate ways; talk and play with others; solve social problems; and detect and manage bullying. Skills are taught through weekly group sessions with SAS trained facilitators. Generalisation of skills is facilitated through homework tasks, pocket-sized ‘code cards’ and visual supports for children to use across settings, parent information sessions, and handouts for children’s classroom teachers. Group session activities include discussion, role-playing, and skills practice using supplementary materials, such as posters, secret agent “gadgets”, and a board game. Children are encouraged to complete weekly “home missions” that involve playing the SAS computer game and practising learnt skills in everyday contexts. A Home-School Diary is used to monitor and reward children’s skill use at home and at school.

Prior to programme delivery, facilitators participated in a 2-day training course. The SAS Program was delivered to groups of three to six students by one or two facilitators over a 10 to 13 week period. Facilitators received weekly phone supervision sessions with CI Beaumont throughout. The programme consisted of 9 x 90 minute child sessions; 4 x 2 hour parent sessions; weekly teacher tip sheets provided to children’s satellite class teachers; and child booster sessions and parent phone calls 3- and 6-months after the end of weekly sessions. When treatment ceased, parents and teachers were provided with recommendations on how to continue to use the
programme strategies, including review of strategies and continued use of visual supports at home and school. After the end of SAS Program delivery, new teachers received a 2-hour training and information session at the start of the next school year to ensure all students had a classroom teacher familiar with SAS principles.

**Curriculum-as-usual programme.** During the non-intervention period (see below) all participants received the standard Aspect curriculum. Aspect provides specialist education to students with ASD via the *Aspect Comprehensive Approach for Education (ACAE)*. The ACAE is based upon the core competencies of autism, including social, communication, sensory, learning and behavioural needs, which are integrated into the NSW Board of Studies Curriculum (Keane, Aldridge, Costley, & Clark, 2012). Teaching strategies include play, cognitive strategies, peer-mediated intervention, using children’s strengths and interests, direct instruction, social skills groups, and extra-curricular activities. The Aspect curriculum involves several elements of social skills development, including recognition and expression of emotions, sharing attention, social interaction and play with peers, social perception, self-regulation, perspective-taking, and collateral skills. However, it does not include the Secret Agent Society Program’s extensive targeted focus on the development of emotion regulation and key related social skills.

**Intervention and assessment schedules**

Following the intake assessment, participants either went on to participate in the SAS Program immediately, or had a variable curriculum-as-usual non-intervention period prior to participation. Of the 84 participants, 26 participants commenced the SAS Program immediately and 58 participants had a non-intervention period.

Participants with a non-intervention period completed a pre-wait (Time 1) assessment at the start of this period. All participants completed assessments at pre-intervention (Time 2; immediately prior to commencing the SAS Program), post-intervention (Time 3; at the end of the SAS Program), and approximately 6-months (Time 4) and 12-months (Time 5) after the end of the intervention. The Time 4 assessment included parent- and teacher-report measures only.

Parent, school staff and child measures were completed at slightly different times, depending on assessment scheduling and questionnaire return. The average duration between the
pre-wait and pre-intervention assessments (non-intervention period) was 25.38 weeks (range=3.43 to 60.00 weeks), compared with an average duration between the pre- to post-intervention assessments (intervention period) of 18.64 weeks (range=3.71 to 37.43 weeks). The non-intervention period was intended to act as a control time and was significantly longer than the intervention period across the combined measures ($t(105)=4.973, p<.001$). The average duration between the post-intervention and 12-month follow-up assessments was 54.17 weeks (range=43.14 to 69.86 weeks). For the combined parent and school staff measures, on average there were 36.26 weeks between post-intervention and 6-month follow-up (range=11.29 to 53.00 weeks), and 20.54 weeks between 6- and 12-month follow-ups (range=6.14 to 40.71 weeks).

**Treatment fidelity**

To check treatment fidelity, programme facilitators completed checklists covering the content and processes for each child or parent session. The mean percentage of programme activities completed by facilitators was 94.28% per child session ($SD=8.52$, range=50-100%) and 97.12% ($SD=4.66$, range=82-100%) per parent information session. A minimum of 27% of child sessions and 50% of parent information sessions for each group were randomly videotaped. Videotaped sessions were coded by one of three independent raters to assess accuracy of self-reported checklist data. Two of the raters were trained to a 94% inter-rater agreement level with the first primary rater before independently coding session footage. The mean percentage agreement between the self-report session checklist and independently coded session footage data was 92.66% ($SD=6.31$, range=75-100%).

**Statistical analysis**

Although it was initially intended to use Full Scale IQ as the IQ control variable, Performance IQ (PIQ; $M=95.89$, $SD=19.44$) was significantly higher than Verbal IQ (VIQ, $M=90.59$, $SD=17.90$); $t(79)=-2.66, p=.009$), so PIQ scores were used as a control variable in place of FSIQ scores. Random effects regression was used to model each outcome total score as a function of occasion of measurement (with pre-intervention (Time 2) as the reference occasion), age at pre-
intervention, gender, PIQ, PPVT-4 standard score and SCQ Current total score. This is an intention-to-treat analysis, taking account for each person at each time point for which they provide data on this set of variables. A missing data point does not incur 'casewise deletion', nor are assumptions made about outcomes not changing from previous values. In the analyses there was one time-dependent (repeated measures) variable, occasion of measurement, which was the main focus of interest. The other explanatory variables (control variables) were measured once and vary only between people.

Results

Tables 2 & 3 about here

Table 2 presents the pre-wait, pre-intervention, post-intervention, 6-month follow-up and 12-month follow-up means and standard deviations for total scores on all outcome measures. Table 3 provides a summary of the random effects regression analyses. Results that are significant at the p<.01 level or lower are highlighted.

To investigate the possibility that outcome effects were dependent on the degree of autism symptomatology, a model was also estimated that included SCQ Current score by occasion interactions. As no interaction was significant, the model without interactions is presented.

Social skills outcomes

The parent-reported Social Skills Questionnaire (SSQ-P) and Emotion Regulation Social Skills Questionnaire (ERSSQ-P) scores both showed patterns of considerable post-intervention improvement (effect sizes .46, .64 respectively) followed by smaller continued improvements at 6- and 12-month follow-up compared to pre-intervention (effect sizes .67 and .73, respectively, for 6-month, and .79 and .77, respectively, for 12-month follow up). SSQ-P and ERSSQ-P scores were negatively associated with Social Communication Questionnaire (SCQ) Current score, with moderate effects in the order of decreases of one point in outcome for a one point increase in SCQ
Current score (effect sizes .62, .60, respectively). There was no evidence that scores were associated with age, gender, PIQ, or receptive language ability (PPVT-4 standard score).

For the corresponding school staff reported versions of these two measures (SSQ-T and ERSSQ-T), a sizeable post intervention improvement was not evident until 12-month follow-up (Time 5), with effect sizes (compared to pre-intervention) of .46 and .68, respectively.

Social problem-solving outcomes

The child social problem solving measures, James and the Maths Test (James) and Dylan is Being Teased (Dylan), were administered four times (omitting the 6-month follow-up occasion). Both showed sizeable improvements at post-intervention (effect sizes .70 [James] and .84 [Dylan]), which were maintained at 12-month follow up (effect sizes .83, .57, respectively), compared to pre-intervention. Both measures showed evidence of negative association with SCQ Current scores, with moderate effects (.27, .32, respectively).

Discussion

The principal aim of the present study was to determine whether delivering the SAS Program to young people with ASD within a school setting could lead to (i) enhanced social skills in both home and school settings; (ii) improvements in emotional regulation and awareness; and (iii) improvements in social problem-solving ability.

The study found significant and positive changes on all measures designed to assess social competence (see Table 3). These changes were not seen during the curriculum-as-usual period. Further, whereas data on the longer term effects of other interventions have often been very limited, this study showed that any gains found immediately post intervention were maintained up to 12 months. Indeed there were small continued improvements for some parent and school staff ratings of social skills following the end of the programme.

The study included a relatively large sample of young people with a mixed age and IQ range. Results showed no association between scores on any outcome measure with age, gender, performance IQ, or receptive language abilities. Whilst participants with higher autism symptomatology had lower scores on average over all occasions on parent and child measures of
social skills than those with lower autism symptomatology scores, there was no evidence to
support that different response rates to the program were related to autism symptomatology.

There are a number of methodological issues that limit conclusions about the direct effect
of the intervention on children’s behaviour. First, due to practical issues associated with delivering
interventions in ‘real world’ school settings, participants were not randomized. Second, not all had
a baseline non-intervention period, and this non-intervention period varied across participants.
However, this variability was accounted for in the statistical analysis.

Is it justified, therefore, to attribute improvements in young people’s social skills to their
participation in the programme? First, could the reported changes simply be a consequence of
children’s natural development over time? This is unlikely, given that there was no significant
improvement noted during the non-intervention period during which they received the standard
Aspect school curriculum for children with ASD. Alternatively, could the observations be explained
by measurement error? This also seems unlikely given that the direction of findings was consistent
across a range of measures of very different types and from different sources. Further, could
improvements be due to a placebo effect? It is possible that parents and school staff wished to
confirm any positive expectations and hopes of improvements from the programme. This possibility
arises as two of the principal outcome measures (the SSQ and the ERSSQ) were completed by
school staff and parents. However, two other child-based measures (the James and Dylan tests)
were scored by a researcher blind to the child’s pre- or post-intervention status and both these
measures found changes that corresponded with the unblinded measures. Further, school staff
measures were primarily completed by teachers’ aides who were not directly involved with program
delivery. It is notable, too, that improvements on some measures continued to be found during the
post programme delivery follow-up period. There is no ready reason why a placebo effect would
act in this way (Walach & Maidhof, 1999). It would seem reasonable, therefore, to conclude that
the changes observed are likely attributable to the effects of the intervention.

The finding of improvements in at least some of the parent and school staff ratings of social
skills after the period of active programme delivery is of interest. This may reflect that the
techniques learned during the intervention period continued to be applied afterwards and produced
further skill learning. In this sense, the follow-up evaluation in this study is not the same as a typical test of maintenance of effect after an intervention is entirely stopped.

Finally, the study sought to extend data on the efficacy of the SAS Program derived from previous trials by examining its effectiveness in a real-world setting, namely in a number of classes for young people with ASD. It is a considerable challenge to do so, given the constraints of a school curriculum and the many contingencies and unpredictable eventualities of school life. The fidelity of trainers to the programme was assessed, and found to be well maintained throughout, suggesting feasible delivery of the SAS Program by school staff within a school setting. To further examine this issue, we collected a substantial body of school administration, teacher and parent reports on various practical aspects of programme delivery. It is necessary to analyse these data to determine whether the costs of programme delivery in such settings outweigh the identified benefits. Our analyses of this set of programme delivery data and the lessons they provide for future programme delivery will be reported in a separate manuscript.

Conclusion

We found that, in a school setting, the emotion regulation and social skills of young people with ASD showed improvements following delivery of the SAS Program; these improvements were not seen following participation in the curriculum-as-usual. This suggests the SAS Program may be an effective programme for use in schools that serve young people with ASD.

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Key points
- This study evaluated the effectiveness of the Secret Agent Society (SAS) Program at improving social skills in young people with autism spectrum disorders (ASD), compared to the curriculum-as-usual within an autism-specific school setting.
- The SAS Program was delivered by school staff to teach students emotion regulation, social skills and social problem-solving.
- Improvements in students’ social skills were found after participating in the SAS Program, as reported by parents, school staff and via child measures, whereas no improvements were found after students’ received the curriculum-as-usual.
- Results suggest the SAS Program could be effectively used in school settings to teach social skills to young people with ASD.
References


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¹ Wechsler Abbreviated Intelligence Scale (WASI) or Wechsler Intelligence Scale for Children (WISC-IV); ² Peabody Picture Vocabulary Test, Fourth Edition (PPVT-4); ³ Social Communication Questionnaire – Current form (SCQ).
### Table 2 Means and standard deviations for outcome measures total scores

<table>
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<td>SSQ-P</td>
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<td>9.9</td>
<td>33.2</td>
<td>10.0</td>
<td>37.4</td>
<td>10.2</td>
<td>40.6</td>
<td>10.7</td>
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<td>37.9</td>
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<td>ERSSQ-P</td>
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<td>13.8</td>
<td>58.9</td>
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<tr>
<td>ERSSQ-T</td>
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<td>1.7</td>
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<td>Dylan</td>
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*Note:* SSQ-P/T=Social Skills Questionnaire – Parent and Teacher; ERSSQ-P/T=Emotion Regulation and Social Skills Questionnaire – Parent and Teacher; James=James and the Maths Test; Dylan=Dylan is Being Teased; Time 1=pre-wait; Time 2=pre-intervention; Time 3=post-intervention; Time 4=6-month follow-up; Time 5=12-month follow-up.
## Table 3 Random effects regressions of outcome measure total scores on occasion of measurement and participant characteristics

<table>
<thead>
<tr>
<th>Occasion#</th>
<th>SSQ-P</th>
<th>SSQ-T</th>
<th>ERSSQ-P</th>
<th>ERSSQ-T</th>
<th>James</th>
<th>Dylan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time 1 (pre-wait)</td>
<td>0.35</td>
<td>0.47</td>
<td>1.06</td>
<td>0.64</td>
<td>0.24</td>
<td>0.27</td>
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<tr>
<td>Time 3 (post-intervention)</td>
<td>4.92**</td>
<td>1.38</td>
<td>8.64**</td>
<td>2.74</td>
<td>1.22**</td>
<td>1.40**</td>
</tr>
<tr>
<td>Time 4 (6-m follow-up)</td>
<td>7.12**</td>
<td>3.49</td>
<td>9.79**</td>
<td>4.21</td>
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<td>-</td>
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<tr>
<td>Time 5 (12-m follow-up)</td>
<td>8.40**</td>
<td>5.46**</td>
<td>10.40**</td>
<td>9.40**</td>
<td>1.01**</td>
<td>0.95**</td>
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<tr>
<td>Age at pre-intervention</td>
<td>0.81</td>
<td>0.87</td>
<td>1.20</td>
<td>.49</td>
<td>0.13</td>
<td>0.19</td>
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<tr>
<td>Gender (female)</td>
<td>4.44</td>
<td>6.05</td>
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<td>1.21</td>
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<td>PIQ</td>
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<td>-0.14</td>
<td>-0.01</td>
<td>-0.16</td>
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<td>PPVT-IV standard score</td>
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<td>0.19</td>
<td>-0.02</td>
<td>.20</td>
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<tr>
<td>SCQ Current total score</td>
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<td>-0.48</td>
<td>-1.28**</td>
<td>-.28</td>
<td>-0.06*</td>
<td>-0.09**</td>
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<td>Intercept</td>
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<td>30.97</td>
<td>56.82</td>
<td>47.02*</td>
<td>0.04</td>
<td>0.73</td>
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</table>

No. of Observations / No. of participants

<table>
<thead>
<tr>
<th></th>
<th>205 / 64</th>
<th>234 / 63</th>
<th>205 / 64</th>
<th>230 / 63</th>
<th>204 / 63</th>
<th>204 / 63</th>
</tr>
</thead>
</table>

*Note: SSQ-P/T=Social Skills Questionnaire – Parent and Teacher; ERSSQ-P/T=Emotion Regulation and Social Skills Questionnaire – Parent and Teacher; James=James and the Maths Test; Dylan=Dylan is Being Teased; PIQ=Performance IQ; PPVT-4=Peabody Picture Vocabulary Test, Fourth Edition; SCQ=Social Communication Questionnaire – Current form.

#Reference occasion is pre-intervention

*p<.01.  **p<.001.