Effect of social skills training on interpersonal interactions of children with autism: an interventional research

Simegn Sendek Yizengaw

Department of Psychology, University of Gondar, Gondar, Ethiopia

Autism is a neuro-developmental disorder typically appears prior to the age of three years, and seriously limits the normal development of children. However, there is a wide variety of effective intervention programs and strategies designed to help children with autism. Hence, this research aimed to see the effect of social skills training on interpersonal interaction of children with autism. Using pre-post equivalent experimental and control group design, data were collected from a sample of eight children using Autism Social Skills Profile Rating Scale before and after the implementation of social skills training. Data were analyzed through frequency, percentage, mean, standard deviation, and independent samples t-test. The pre-intervention assessment revealed that participants of the experimental and the control groups did not significantly differ but both groups scored below half on the total scale point and almost one-third of the maximum score on social reciprocity and social participation sub-scales. The result of the intervention also indicated that children in both groups demonstrated positive changes in their overall social skills including the sub-scales. However, it was found out that the experimental group has greater mean scores as compared to the control group on total scale, social participation and social reciprocity subscales. But the increment on detrimental social behaviors subscale in the experimental group was with a decreasing rate. Based on this finding, it can be concluded that social skills training intervention improves social skills of children with autism. Therefore, it is recommended that further intensive and comprehensive intervention is very critical to more improve the social skills of children with autism.

Keywords: autism, Nehemiah autism center, social skills, children with autism

Introduction

Autism is a neurodevelopmental disorder typically appears prior to the age of three years (Benedict 2007, Corsello 2005). Still, there are no scientific evidences that show the specific underlying causes of autism (Day 2011). However, in the current understanding it is caused by a combination of gene and environmental factors (Lee 2011).

It is important to recognize that the prevalence rate of autism is increasing from time to time. For instance, the report of Autism Society of America in 2007 indicated that it is growing at an alarming rate of 10-17 percent per year in America (Wang and Spillane 2009). In addition, a report by Centers for Disease Control and Prevention in 2009 revealed that the prevalence of autism had risen to 1 in every 110 American children, with rates of 1 in every 70 boys and 1 in every 315 girls (Benedict 2007). Later on, based on the data collected across multiple areas of the United States in 2010, Autism and Developmental Disabilities Monitoring Network (2014) found that about 14.7 per 1,000 (one in 68) children were identified with Autism Spectrum Disorder (ASD) in which boys were almost 5 times more likely to be identified with ASD than girls. The other evidence in the same country estimated that the prevalence of ASD was 2.24%, a significant increase from the estimated annualized prevalence of 1.25% based on 2011–2013 data (Zablotsky *et al.* 2015). The recent report of Centers for Disease Control and Prevention in 2016 also revealed that the prevalence of ASD among children of aged 8 was 18.5 per 1,000 or one in 54 (Schuchat *et al.* 2020). These empirical evidences generally showed that the problem of autism is increasing from time to time.

The rate of increment may be much more in developing countries like Ethiopia where the issue of autism didn't get much attention and the prevalence is not known due to the lack of scientific evidence in the area. However, the people in the centers speak that the

Correspondence to: Simegn Sendek Yizengaw, Department of Psychology, University of Gondar, Gondar, Ethiopia. Email: simsen1973@gmail.com

number of parents' request to enroll their children to the autism centers increases from time to time.

According to the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) and other multiple research evidences, autism is a pervasive developmental disorder that affects children's development, including social interaction, communication and behavior patterns (Benedict 2007, Corsello 2005, Day 2011, Lee 2011, Lindgren and Doobay 2011, Reichow *et al.* 2012, Wilson 2010). That is, children with autism have difficulties in establishing and maintaining relationships, appropriate use of verbal and non-verbal communications, and shows restricted, repetitive and stereotyped patterns of behaviors.

While there are several hallmarks of the disorder, deficiency in social skills is the most pervasive and universal feature of autism (Baer 2015, Day 2011, Fulton 2014, Ozdemir *et al.* 2008). So, it is clearly evident that one of the primary key characteristics of autism is impairment in reciprocal social interaction. According to Wing (as cited in Ozdemir *et al.* 2008) social interaction difficulties of individuals with autism are classified into three categories as lack of social recognition (interest in others), social communication (trouble in expressing one's self and having a limited understanding of body language), and social imitation and understanding (inability to understand the thoughts or feelings of others or to engage in imaginative play).

Several studies like by Lindgren and Doobay (2011), Lee (2011), and Reichow *et al.* (2012) also documented that the lack of interest in social interaction is inherent to individuals with autism. That is, children with autism have difficulties to establish and maintain meaningful interpersonal relationship with others, including making appropriate initiations and responding to the initiations of others. These children show specific manifestational characteristics such as prefer to play alone or avoid contact with others, inappropriate response to another's feelings, avoid eye contact and lack facial responsiveness, poor reading of social cues, failure to form peer relationships at appropriate developmental level, lack of social-emotional reciprocity, sharing enjoyment, taking another person's perspective and difficulty of sustaining conversation with others (American Psychiatric Association 2013, Day 2011, Lindgren and Doobay 2011, Wilson 2010). All these deficits make it difficult for children with autism to develop and maintain meaningful interpersonal relationships with family, peers, and other adults, which in turn limit the developmental milestones expected to achieve at each level of development.

It is also evident that, due to the interrelatedness and interdependence of developmental domains, 'deficits in social skills early in life can have a profound long term deleterious effect on children's overall development throughout the life' (Bellini and Peters 2008, Lindgren and Doobay 2011). Given the prevalence of autism is increasing and children with autism face social skills problems, intervention programs and strategies focusing on promoting social skills are necessary to offset the potential risk factors by improving the life of the victims.

Intervention program: Social skills training

There is a wide variety of effective intervention programs designed to help children with autism problems. Among these, Social Skills Training (SST) is the major area of intervention suited for effectively remediates deficiencies of children in interpersonal relationship that produces positive effects (Baer 2015, Benedict 2007, James 2005). It is an instruction planned to advance the acquisition and/or performance of social skills. SST has three primary purposes: promoting skill acquisition, enhancing existing skills, and facilitating the generalization of skills across settings and persons (Bellini and Peters 2008).

SST programs implemented early in life to teach children the necessary social skills attenuate subsequent social dysfunction (Rao *et al.* 2008). Social skills encompass both verbal and non-verbal behaviors usually taught how to use greetings, conversation strategies, imitation, sharing, how to making eye contact, initiate play, ask for help, request things, giving and acknowledging compliments (Day 2011, Rao *et al.* 2008). Scholars doing their research in the area of autism consistently highlights the positive impact of social skills intervention in enhancing the interpersonal skills of the victims. According to Lindgren and Doobay (2011), there is research evidences documented that teaching social skills to children with autism have beneficial effects. Intervention programs focusing on teaching these children key social skills, such as how to greet, share, imitate, ask for help, and respond to conversation of their partners effectively increase the duration and frequency of peer interactions (Morrison, Kamps, Garcia, and Parker, as cited in Koegel *et al.* 2012).

In strengthening this, the review made by Reichow *et al.* (2012) on five randomized controlled trials of social skills intervention revealed that participants receiving the treatment showed modest gains in social competence, have better friendship quality, and experience less loneliness as compared with the control group. To put these gains in more concrete terms, participants of these studies increase their repertoire of social skills from 123 to 147 after participating in the SST. An interventional research conducted by Day (2011) also revealed that three of the four students with ASD had increased significantly their social interactions after intervention was made.

In similar line, a study conducted by Block (2012) also found out that significant increment were seen in

children's social competencies on the total scale and subscales of ASSP after intervention as reported by teachers. That is, participants, on average increased their total social competencies (pre = 101.25, post = 129), and subscales including social participation (pre = 25.25, post = 31.75), social reciprocity (pre = 31.75, post = 43.5) and detrimental social behaviors (pre = 28, post = 33.25). Besides, Dekker *et al*. (2019) investigated the effectiveness social skills group training (SST) on late childhood using a randomized controlled trial. The result at post-treatment revealed that children who participated in SSTs had significantly improved social skills more than control the group. A review made by March-Miguez *et al*. (2018) also indicated that social skills intervention in children with autism reduces social anxiety; improves social interaction and communication, emotional regulation, and increase play and socialization. Additional information derived from the review of thirteen studies conducted on children with autism indicated that social skills training programs significantly improves social competence of the victims (Hotton and Coles 2016).

Though teaching social skills to children with autism is perhaps the most critical, implementing the program is often difficult (Benedict 2007). Because he reasoned out that the development of sophisticated social skills relies on attention to subtle social cues, timing of social response, and maintenance of attention on the activities of others but most children with autism have abnormalities in attention processes, which are major challenges that a social skills trainer often encounters.

Theoretical base of social skills training intervention

Based on the review of many research outputs, Benedict (2007) concluded that there is no evidence indicating that a single approach or model has been found greater intervention efficacy in addressing social skill deficits. Due to this reason, there is still a momentous debate among researchers regarding the most effective interventions for children with autism. Thus, according to this reviewer the growing body of literature suggests that a combination of behavioral and developmental-interactive models is recommended to use in SST. The current intervention is also based on the combination of Applied Behavior Analysis (ABA) and Developmental Social Pragmatic (DSP) models.

ABA Model - is an interventional approach grounded on the operant learning principles in order to improve socially significant behaviors using antecedents and consequences (Benedict 2007, Lindgren and Doobay 2011). It is a highly structured, adult-led, and intensive skill-oriented training approach (Awenus 2010: Lee 2011) that help children to develop positive social skills triggering behavior through the antecedents and maintaining it with reinforcements.

The model can be used with all ages and ability levels (Lindgren and Doobay 2011) its primary goals are to increase positive behaviors, to teach new skills, to decrease undesired behaviors, and to help children to use these new skills in different settings of interaction with other people (Lee 2011). According to Lee ABA model involves breaking down complex skills into smaller steps and teaching them through the use of clear instructions, rewards and repetition. In the application of this approach, a teacher or caregiver presents the stimulus, expect the child to respond, and reinforce the correct responses.

Several empirical studies have documented that ABA has a strong research base supporting its effectiveness for addressing the problems of children with autism including social interaction (Benedict 2007, Lindgren and Doobay 2011). However, ABA model has its own critics to apply similarly in different settings. According to different research findings reviewed by Awenus (2010), Benedict (2007), and Solomon *et al*. (2007), two major limitations can be identified. In the first place, since ABA training programs occur in highly structured environment; this limits variability in teaching style to promote the generalization of learned behaviors in other settings. Moreover, ABA needs intensive time for instruction that may compromise the implementation of the model with minimum cost in terms of effort, time, financial and material resources. Deterioration of learned skills without delivering contingent reinforcement (Ingersoll and Schreibman as cited in Awenus 2010) is also another limitation of the model.

DSP Model – it was developed in response to the criticisms that ABA is a highly structured approach which restricts the spontaneity nature of children learning through play in natural settings (Awenus 2010). It has also been referred as social or relationship or developmental approach. This model is based on Bruner's interactionist orientation and recommends the use of natural social interactions and social role models, which often occurs in the interaction between caregivers and children (Benedict 2007).

DSP model generally emphasizes to teach social skills through a play-based approach in a sequence that is developmentally appropriate (Benedict 2007, The Province of British Columbia 2015, Solomon *et al*. 2007) for the purpose of encouraging children to form positive and meaningful relationships with other people. This model advocates the interpersonal processes where caregivers of children with autism are considered to be primary facilitators of children's social relationship, which take place in everyday contexts. Caregivers are also responsible to make play materials and tasks fit with children's level of development, in the process caregivers initiate, scaffold, motivate, model, and redirect children's activities (Benedict 2007, Keen *et al*.

Table 1. Demographic characteristics of the samples.

Variable		Experimental Group		Control Group		Total	
		n	%	*n*	%	*n*	%
Sex	Male	4	100	2	50	6	75
	Female	–	–	2	50	2	25
Average Age		8.5		8		8.25	

2007) that are helpful to promote children's social skills.

Previous research evidences confirmed that the implementation of DSP model has positive effects. For instance, Greenspan and Wieder (as cited in Solomon *et al.* 2007) indicated that 58 percent of children involved in the treatment showed improvements and no longer met the criteria for autism disorder on key measures after two years of intervention.

Therefore, identifying the appropriate developmental intervention programs and strategies need heightened urgency and extremely important for promoting the development of social skills in children with autism problem. Taking this into consideration, the current intervention was designed to improve the social skills of children with autism in Nehemiah Autism Center (NAC). Hence, efforts were underway to examine the effect of social skills training (SST) in improving interpersonal skills of children with autism.

Methods

Research Setting: NAC is found in Addis Ababa city administration. It was established with the initiation of families who have children with autism problems. Currently, the center has 40 children (32 males and 8 females) with autism; age range from 4 to 14 years. Children were categorized in three levels: level one, level two and level three. Children at level one learn self-help skills (feeding, dressing, hygiene, etc), those children at level two train about receptive order where as children at level three learn functional language and academic issues.

The total numbers of the staffs/service providers were 20. The staff consisted of psychologists, nurses and those who do not have certification in formal education. The ratio of service providers to children was 1:2. That is, one caregiver was responsible to care two children. The center provides training and education for children and parents.

Intervention Design: This intervention used a pretest, post-test, control group design. Children were equally assigned in to control and experimental groups based on their number, age, and class setting. Pre-test was administered by the researcher on all of 10 children found at level three who learn functional language and academic issues prior to intervention in order to ensure that participants of both groups have comparable equivalence on the level of their social skills. However, two children were excluded since they scored higher and far from others. Then, children in experimental group received social skills training for two months with four hours per week. The control group received services as usual provided through their center. At the end of the intervention, the same test was administered by the same person on both the control and experimental groups. Finally, the pre-test and post-tests scores of the control and experimental groups were compared to determine the effect of the intervention.

Participants: this research only consider children who reach at level three. Hence, a total of eight out of 10 children were recruited from NAC and equally clustered in to the experimental ($n = 4$) and control ($n = 4$) groups found in their particular and separate classrooms. All these children had been diagnosed with autism by the center and get special education services in it. As it is presented in Table 1 below, 4(100%) male experimental group, and 2(50%) male and another 2(50%) female control group were samples of the research. The samples of both the experimental and control groups ranges from five to eleven with an average age of 8.25 ($SD = 1.98$). Except one child all are found in late childhood period.

Instrument: Prior to design any professional intervention with regard to social interaction of children with autism, it is vital to select the appropriate social skill instrument and make try out ahead of using it to collect data before and after intervention.

According to previous literatures like by Block (2012), Hood (2010), and Wilson (2010), there are a variety of assessment tools currently available to measure social skills behavior or competency in children. Some of these tools include: Social Responsiveness Scale (SRS), Social Skills Improvement Scale (SSIS), Social Skills Rating Scale (SSRS), and Autism Social Skills Profile (ASSP). ASSP was selected to assess the social behavior of children since it was developed to measure particularly children with autism.

Autism Social Skills Profile originally developed by Bellini in 2006 (Block 2012) is used for assessing the level of social skills of 6 to 17 years of children with autism. It is a comprehensive assessment measure of social functioning in children with autism. ASSP has a total of 49 items consists of three subscales including social reciprocity, social participation/avoidance, and detrimental social behaviors. ASSP was developed not only as a tool for identifying specific social skills for targets of intervention but it can also be used as a formative assessment tool (Sansosti *et al.* 2010, Wilson 2010). It constitutes three sub-components including Social Reciprocity (refers active maintenance of social relationships and the demonstration of perspective-taking skills); Social Participation (addresses the level of engagement in social interactions); and Detrimental Social Behaviors (denotes socially inappropriate

behaviors that could lead directly to negative peer inter-actions) *(Block 2012)*.

ASSP is structured on a four point Likert type scale: *1 = never*, *2 = sometimes*, *3 = often*, *4 = always* and rated by parents, teachers, and other adults who are familiar with the child's social functioning. Most of the items are worded positively, but there are a few items at the end of the questionnaire stated negatively that needs reverse scoring. The total score of the tool ranges from 49 to 196 with the higher score indicates better social skills. The tool is designed to assess the last three months experiences of children in their social relationship.

ASSP is the widely used measures of social func-tioning. Previously, it was used in different researches and has 'excellent psychometric properties with respect to internal consistency, test-retest reliability, and con-current validity' (Bellini and Hopf as cited in Anderson 2009, Boyd and Ward 2013, Wilson 2010). For instance, as indicated in Boyd and Ward (2013), the coefficient of Cronbach's Alpha for the overall items was range from .85 to .94 and test–retest reliability was .90 for the entire sample. The reliability coefficient of the scale was .91.

In order to assess social skills of children with aut-ism in the study, ASSP was adapted. Being other prop-erties of the original ASSP considered, two major modifications were made on the tool in the current assessment. In the first place, the English version of the original instrument was translated in to Amharic to make it easily understood by the raters. Second, seven items that seems less related to the issue under investi-gation (e.g. maintains personal hygiene) were excluded from the original tool. Hence, the tool has 42 items with total scores range from 42 to 168 on the scale.

Similar to the original tool, the adapted instrument has four levels and three subscales: social reciprocity (20 items), social participation/avoidance (13 items), and detrimental social behaviors (9 items) with min-imum and maximum total scores lay between 20-80, 13-52, and 9-36 respectively.

After the tool was contextualized and translated into Amharic, piloting was conducted. The measure was dis-tributed to five teachers and request them to rate the overall levels of social skills of two children in their specific classrooms responsible to give care and support.

Next, all the questionnaires were collected and prop-erly checked about the presence of escaped items when rating was made. Fortunately, caregivers responded all items correctly. Then, every item got its own code and score in the SPSS version-20. Negatively stated items (e.g. engages in solitary activities in the presence of peers) were reversed during scoring.

In order to estimate the reliability index of the instrument, Cronbach Alpha was calculated. The result indicated that the reliability coefficient of the overall items was .94. Cronbach Alpha result also revealed that social reciprocity, social participation/avoidance, and detrimental social behaviors sub-scales have reliability value of .92, .91, and .70 respectively.

Regarding the validity of the instrument, two devel-opmental psychology professionals were invited to evaluate the instrument's face validity, clarity and understandability, and coherence of the items. Based on the valuable comments collected from the experts, items of the instrument were corrected for the final version.

Social Skills Training Intervention Strategies: The available evidences from a variety of programs and studies demonstrated that there are a range of interven-tion strategies or techniques developed on the basis of different models in order to effectively address social skill deficits in children with autism (Benedict 2007, Corsello 2005). According to Benedict some of the instructional strategies available for teaching social skills to children with autism take a behavioral approach and others take an interactive approach. Hence, SST strategies used in the present intervention were identified based on a combination of these models.

Considering the literatures from Baer (2015), Beaulieu (2009), Bellini and Peters (2008), Benedict (2007), Day (2011), and Loudon (2008), the current intervention is child-specific SST implemented in a group setting where the adults or trainers were the pri-mary agents of facilitating the social skills instruction. To put in a specific way, the SST was provided in a play-based approach through trainers-directed instruc-tion of social behaviors (such as initiating and respond-ing) by incorporating coaching, modeling, role playing/practice, performance feedback and reinforcement as the basic strategies during intervention.

Data Analysis: Data were collected during pre and post intervention. Prior to do any statistical analysis, the researcher went through careful data cleaning. The con-sistency of data scoring across all levels of the likert scale was also assured by double data entry. This was followed by reversing the negatively worded items into positive. Then, the items measuring the same variable or sub-scale were grouped together and ready for ana-lysis. The analyses were facilitated through IBM SPSS version 23. The data were analyzed through descriptive statistics including frequency, percentage, mean, and standard deviation. Independent samples t-test was employed to see the mean differences of the experimen-tal and control groups.

Ethical Considerations: Prior to engage in any work, the interventionist consulted the center director and requested permission with fully explaining the pur-poses of the intervention. Once permission was obtained, personal contact was made with teachers in order to assure informed consent about children's and

Table 2. Independent samples t-test results of experimental and control groups' social skill before intervention.

Scales	Experimental Group ($n = 4$)		Control Group ($n = 4$)		Total Score on the Scale	df	t
	M	SD	M	SD			
Social reciprocity	25.75	4.35	26.25	4.79	80	6	−.16
Social participation	19.50	1.91	17.25	2.06	52	6	1.56
Detrimental social behaviors	24.75	5.85	28.25	1.89	36	6	−1.14
ASSP Total	70	6.68	71.50	5.80	168	6	−.34

$p > .05$, M = Mean, SD = Standard Deviation, ASSP = Autism Social Skills Profile.

their participation after clarifying the main objective, benefits and nature of the intervention. Providentially, all of the teachers gave verbal informed consent to participate in the study together with their respective children. Parents were also informed by the teachers and they gave assent for their children's involvement in the intervention. The confidentiality of the data was also guaranteed to the teachers by making children's names anonymous and using code numbers instead.

Results
Pre-intervention results
In order to collect the baseline data about children's level of social skills of both the experimental and the control groups, teachers were requested to complete the ASSP questionnaire before intervention. The result is shown in Table 2 below.

As one can see from Table 2 above, participants of both the experimental group ($M = 70$) and control group ($M = 71.50$) scored below half out of the total point (168) on the ASSP scale. When it comes to the subscales, these groups were scored almost one third of the maximum expected score on social reciprocity and social participation sub-scales. Rather the mean values were nearest to the minimum expected score. This shows that the groups' values on these sub-scales were concentrated on the lowest level. However, participants in both groups scored relatively higher on detrimental social behaviors sub-scale. That is, they scored almost three fourth of the maximum expected value on the sub-scale.

The same table revealed that both the experimental group and the control group scored near equal on the ASSP and across the three sub-scales except the control group which has 3.50 more average points than the experimental group on detrimental social behavior subscale. Generally, there was no statistically significant mean difference between the experimental and the control groups in social skills as measured through ASSP and its subscales including social reciprocity, social participation and detrimental social behaviors.

After collecting the pre-intervention assessment data about the status of social skills of children, the researcher prepared a SST intervention plan. The plan was flexible and modified to include important issues in the implementation process that are helpful for children social interaction. All the activities included in the plan were identified in relation to the literature, and efforts were underway to make them contextualized.

Before beginning each day's training consultation, every teachers/caregivers got a hard copy of activities with their detailed procedures in pamphlet form. The major activities include: greeting with others and self-introduction; making and maintaining eye contact; group running, football game and pulling rope, invitation peers to play; team picture painting and rotation play; ball and balloon bouncing; pouring water via the pipe; covering someone with a cloth; posting stickers on someone's body; play dough; give and take play; and cultural music and dance. Brief orientations were provided to teachers in order to reach at a common consensus before the practice. The researcher was available to participate, clarify instructions, answer questions, and announce the transition to the next step of any multiphase activities. Based on the plan, the intervention occurred two times a week in the morning session and lasted eight weeks for a total of 32 h.

Under the consultations, numerous activities were performed to teach targeted social skills such as eliminating shyness and embarrassment feelings, initiating, responding to, and sustaining interactions, turn taking, sharing, and giving, teamwork, getting help, etc. Some of these consultations were conducted in the classrooms and others were in the field at the center. All these activities were implemented through modeling, role playing, guided practice/coaching, reinforcement and appropriate feedback.

Post-intervention results
Following the end of intervention activities, ASSP questionnaire was re-administered to the teachers to rate the level of children's social skills one week after the completion of all the ten sessions. Hence, this section presents the changes in social skills of children with autism due to the implementation of SST intervention.

Table 3 above revealed that children showed positive changes in their overall social skills including the subscales. The last column shows the difference in the mean scores of the participant children before and after SST intervention. As it is indicated in this column, the total ASSP mean score was increased from 70 to 91.25 with a range of 21.25. Similarly, mean scores of social participation changed from 19.50 to 28.50 followed by

Table 3. Descriptive statistics of ASSP and subscales for the experimental group across the pre- and post-intervention assessments.

Scales	Pre-intervention		Post-intervention		Post-pre Mean Difference
	M	*SD*	*M*	*SD*	
Social reciprocity	25.75	4.35	32.75	2.87	7
Social participation	19.50	1.91	28.50	2.38	9
Detrimental social behaviors	24.75	5.85	28	5.48	3.25
ASSP Total	70	6.68	89.25	5.85	10.25

M = Mean, SD = Standard Deviation, ASSP = Autism Social Skills Profile.

social reciprocity improved from 25.75 to 32.75, and detrimental social behaviors increased from 24.75 to 28 with mean ranges 9, 7, and 3.25 respectively.

Mean was used to measure and compare the changes between the pre- and post-intervention ratings of the experimental and control groups. As it is depicted in Table 4 above, the findings showed that both the experimental and the control groups demonstrated positive changes after the implementation of the intervention. Even if this is the case, it was found that the experimental group has greater mean scores as compared to the control group on total ASSP, social participation and social reciprocity subscales. Though both groups showed increments in mean scores, the experimental group scored lower than the control group on detrimental social behaviors subscale of ASSP after SST intervention. That is, children in the treatment group showed more improvements in their social skills than the control group. With regard to this, the last column of the same table shows the difference of difference (i.e. the difference in the experimental group minus the difference in the control group), where such mean changes purely attributed to SST intervention.

In order to see whether these mean changes between the experimental and the control groups due to intervention across ASSP total and its sub-scales are statistically significant or not, independent samples t-tests were employed and depicted in Table 5 below.

The result of independent samples t-test in Table 5 revealed that statistically significant differences were observed between the experimental and the control groups on total ASSP $t(6) = 2.96$, $p < .05$ (two-tailed), and social reciprocity $t(6) = 2.51$, $p < .05$ (two-tailed) and social participation $t(6) = 5.06$, $p < .05$ (two-tailed) sub-scales with all Cohen's d values of large effect.

Discussion

The level of social skills of children with autism was measured before and after the intervention. The results of the baseline or pre-intervention assessment revealed that there were no statistically significant difference between the experimental and the control group on ASSP and its sub-scales (social reciprocity, social participation and detrimental social behaviors). That is, children of both the experimental and the control

groups gained almost similar mean scores but below 50% of what were expected at a maximum point on the measurement scale. The mean score was nearer to the second level on the scale, where majority of the raters chosen the option 'sometimes' most frequently.

With regard to the social reciprocity and social participation subscales, children of both groups had average scores closer to the lowest level on the scale of measurement. This shows that raters repeatedly selected the option 'never' for most of the participant children. But the mean score of these children on detrimental social behaviors subscale was above average, which was nearer to the third level (the choice 'often' frequently rated) on the scale. These results generally showed that children were not good in making and maintaining social interactions, rather they demonstrate withdrawal from social participation and show socially inappropriate behaviors in interaction.

Based on these baselines, intervention was conducted and post-intervention assessment data were collected. The result revealed that both of the experimental and the control groups showed increment in mean scores of social skills and across all subscales. However, the experimental group has greater mean scores as compared to the control group on total ASSP, social participation and social reciprocity subscales scores.

In order to see the amount of social skills changes due to SST intervention, the difference of difference in means (i.e. pre-post mean difference of the experimental group minus pre-post mean difference of the control group) were calculated. The differences were positive on ASSP, social reciprocity, and social participation, except detrimental social behaviors. That is, the differences were 12.5, 6, 6.75, and −2 for ASSP, social reciprocity, social participation, and detrimental social behaviors respectively. This means that children in the treatment group showed more improvements in their social skills than the control group since; the SST intervention improved children's social reciprocity and social participation by at least six mean scores and minimized detrimental/negative social behaviors by an average of two mean points.

This intervention result was directly consistent with the previous research findings of Block (2012), which revealed that social skills intervention enhances total social competencies, social participation, and social

Table 4. Mean score differences of the pre-post SST intervention across sub-scales.

Variable	Experimental Group ($n = 4$)			Control Group ($n = 4$)			Mean Change due to Intervention
	Pre	Post	Difference	Pre	Post	Difference	
Social reciprocity	25.75	32.75	7	26.25	27.25	1	6
Social participation	19.50	28.50	9	17.25	19.50	2.25	6.75
Detrimental social behaviors	24.75	28	3.25	28.25	33.50	5.25	−2
ASSP Total	70	89.25	21.25	71.50	80.25	8.75	10.50

ASSP = Autism Social Skills Profile.

Table 5. Independent sample t-test results showing social skills of post intervention across the experimental and control groups.

Variable	Experimental Group ($n = 4$)		Control Group ($n = 4$)		df	t	Cohen's d
	M	SD	M	SD			
Social reciprocity	32.75	2.87	27.25	3.30	6	2.51*	1.26
Social participation	28.50	2.38	19.50	2.65	6	5.06*	2.53
Detrimental social behaviors	28	5.35	33.50	1.29	6	−1.98	1.00
ASSP Total	89.25	5.85	80.25	4.57	6	2.96*	1.48

*$p < 0.05$, M = Mean, SD = standard deviation, ASSP = Autism Social Skills Profile.

reciprocity, but minimizes detrimental social behaviors. The current intervention also made the experimental group scored significantly on social skills than the control groups. This is similar with Day (2011) and Reichow *et al.* (2012) who pinpointed out that social skills intervention significantly increases social interactions of children with autism disorder. Moreover, scholars like Dekker *et al.* (2019), Hotton and Coles (2016), and March-Miguez, *et al.* (2018) consistently pinpointed the positive effect of social skills training in enhancing the social competence of children with autism, which reduces anxiety related to social interaction; improves communication, increase emotional regulation and socialization.

There are some limitations inherent to the present interventional work that needs to be noted. In the first place, the intervention was conducted for a short period of time. In addition, the intervention was focused on children, rather than involving parents and typically developing peers who can have immense contribution in stimulating children and better serve as models in their interaction with others. Hence, the intervention lacked comprehensiveness. The number of participants were also very small, and only quantitative data were collected solely from a rating scale. All these limitations may affect to make generalizations about the effect of the intervention.

Concluding remarks

Based on the findings of this research, it can be concluded that SST intervention positively impacted children with autism. That is, SST improves the social skills of children with autism problem. Hence, SST intervention can bring more positive changes in social skills of these children, if the intervention becomes more intensive and comprehensive. The current intervention was targeted only child-specific intervention, but it becomes more comprehensive if there were modifications of the physical and social environment, and made collateral and peer-mediated interventions.

Therefore, future interventions need to involve parents, typically developing children, and more number of teachers and targeted children. In addition, it is also important to triangulate the assessment data using multiple quantitative and qualitative data collection instruments considering more number of participant children. Moreover, the changes in social skills of children with autism problem due to the current intervention was not at the expected level, hence, efforts should underway to design and implement SST intervention for a longer period of time with frequent consultation to see more improvements in them.

Lessons learned

In this interventional study, the researcher understood that the area of autism is not get enough attention from the concerned body which manifested through the presence of large number of children on the waiting list at the center. There was also the lack of trained professionals like developmental and clinical psychologists who provide care and support for these children. One more important lesson learned during the practice was that working with children with autism is so challenging. But if there is a firm commitment with an appropriate investment of time, energy/effort and financial cost, positive changes are likely to come in social skills of children with this problem.

ORCID

Simegn Sendek Yizengaw http://orcid.org/0000-0003-0567-0006

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