



Training Parents to Promote Communication and Social Behavior in Children with Autism: The Son-Rise Program

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Abstract

The Son-Rise Program is an intensive, child-centered approach to treatment of autism, incorporating strategies to promote child-initiated social interactions. Parent training is an important element of the treatment program, which is intended to be implemented in long-term home-based programs. In the present study, parents of children with autism who participated in two five-day parent-training courses in Son-Rise Program intervention (separated by several months) completed questionnaires and the Autism Treatment Evaluation Checklist prior to each course. Changes in scores were examined for parents who reported implementing (1) no treatment, (2) low intensity treatment, or (3) high intensity treatment in their homes in the interval between courses. Parents who administered Son-Rise Program intervention reported improvements in communication, sociability, and sensory and cognitive awareness in their children, with greater gains associated with greater hours of treatment per week. This study represents a first step in examining the effects of home-based Son-Rise Programs for children with autism.

Keywords: Autism; ASD; Parent training; Home-based treatment; Communication; Social behavior

Introduction

A variety of treatment approaches have been advanced to improve the social and communicative behavior of children with Autism Spectrum Disorder (ASD). Treatment options for ASD include applied behavior analysis (ABA) based on theories of learning and operant conditioning [1], less structured and more child-directed naturalistic behavioral methods [2-4], and developmental, social-pragmatic interventions that use developmental theory as a guide [5-10]. Although provided primarily in clinical settings, some treatment programs also incorporate parent training so that treatment principles may be applied in the home. ABA approaches train parents to use adult-guided behavioral teaching techniques with their children at home [11-13]. Naturalistic behavioral approaches, such as Pivotal Response Training [3,4,14], emphasize strategies that parents can use to increase the child's motivation to engage in communication and social interaction in the natural environment, and developmental approaches include parental training in techniques to enhance social interactions and joint attention [5,8,9,15].

Results of a growing number of studies show that caregivers can be trained to effectively implement autism therapies, including Pivotal Response Treatment [16-18], the DIR/Floortime model [19,20], the TEACCH model [21], and the Early Start Denver Model [22]. In addition, surveys of parents' engaged in training largely show that parent satisfaction is high [20,23,24]. However, studies are mixed with regard to how home-based, caregiver interventions affect social-communicative behavior in children with ASD. Several studies have demonstrated increases in language production [25], joint attention [24,26], and spontaneous imitation skills [27]. Other studies suggest, however, that parent-mediated intervention improves parent-child

social communication, but has little effect on autism symptoms. Based on a review of 27 studies, intervention provided by caregivers tends to primarily improve parent-child interactions [28,29].

Caregiver training is a crucial feature of the Son-Rise Program (SRP), a developmental approach for ASD intended to be implemented in intensive, long-term home-based programs. The SRP, developed by the parents of a boy with autism in the early 1970s, provides one-on-one intervention (child-adult dyads), in a distraction-free, naturalistic environment. The approach is intended to promote spontaneous, child-initiated social interactions. A central tenet of SRP is following the child's lead. Thus, social interactions and subsequent prompting by an adult occur only after the child initiates interaction with a communicative act such as head orientation, eye-contact, a gesture, and/or verbalization. An important component of following the child's lead is imitating (or "joining") the child's activities or movements, which has been shown to increase social-communicative behavior when used as part of developmental interventions [30-35]. SRP teaches adults to imitate the child's repetitive movements and/or other autistic behaviors for as long as is necessary until the child spontaneously initiates a communicative act. This is meant to serve as a bridge to social interactions such as shared activity and play. Since its inception, there have been several case study reports of children with ASD benefitting from SRP treatment [36-38], and one recent study empirically tested this approach [15]. Houghton et al. [15] examined the effects of an intensive one-week Son-Rise Program delivered by trained clinicians. Results showed significant increases in child-initiated social-communicative behaviors of the children who received treatment, while no changes were noted in the untrained control children. Additionally, the duration of episodes of social interaction and the total time that the children were socially and communicatively engaged with an adult increased for the treated children. However, no studies to date have examined the effects of home-based SRP

intervention provided by parents and other caregivers. The present study is a first step in evaluating the effects of home-based Son-Rise Programs (SRPs). In this study, parents of children with autism received a five-day parent-training course focused on the use of SRP methods. We examined changes in scores on the Autism Treatment Evaluation Checklist (ATEC) [39], which parents completed prior to an initial parent-training program and again several months later, and tracked the number of hours per week, in the interim, that SRPs were implemented in the home.

Method

Participants

Participants included 49 parents (38 mothers; 11 fathers) of children diagnosed with ASD, and no other developmental disorder (e.g., intellectual disorder), by a licensed professional (i.e., pediatrician, psychologist, psychiatrist, or a team of professionals) and met DSM-IV criteria for autism. Participants ranged in age from 26-45 years, with years of education between 12 and 22 years. All participants lived with their autistic child in their home in the US (n=21), the UK (n=23), or other countries (n=5). Participation was voluntary, and all provided informed consent. The mean age of the children was 59.63 months (range=36-91 months). Most of the children (88%) had received treatment for autism prior to their parent's participation in the study; however, none had previously received SRP. Further, during the study,

the children received no other treatment for autism, although some attended school part time (n=21) or full time (n=19). All participants (parents) completed two parent-training courses at the Autism Treatment Center of America: an initial start-up course and an advanced course that took place at least 16 and not more than 24 weeks following the initial course. Prior to each course, all participants completed an online questionnaire about their child.

Questionnaire

The questionnaire included queries pertaining to demographics about the parents, their child, and their relationship to their child. It also included questions pertaining to previous intervention for autism treatments their child had received. Importantly, parents were asked whether or not they provided an SRP in their home for their child and, if so, they were asked to describe the intensity of the program (i.e., number of hours per week). Part of the questionnaire consisted of the Autism Treatment Evaluation Checklist (ATEC) [39], a caregiver-completed assessment that asks questions regarding autism symptoms in the domains of (a) speech, language, and communication, (b) sociability, (c) sensory and cognitive awareness, and (d) health and physical behavior (see http://www.autism.com/ind_atec). Each domain consists of several behaviors, which parents rate on 3- or 4-point graded scales based on the mannerisms of the child (e.g., [my child] knows [his or her] own name: (1) not true, (2) somewhat true, (3) very true).

	Scale I	Scale II	Scale III	Scale IV	
	Speech/ Language/ Communication	Sociability	Sensory and Cognitive Awareness	Health/ Physical Behavior	Composite Score
Percentile	Range: 0-28	Range: 0-40	Range: 0-36	Range: 0-75	Range: 0-179
Mild					
0-9	0-2	0-4	0-5	0-8	0-30
19-Oct	5-Mar	7-May	8-Jun	12-Sep	31-41
20-29	7-Jun	10-Aug	11-Sep	13-15	42-50
30-39	10-Aug	11	13-Dec	16-18	51-57
40-49	12-Nov	13-Dec	14-15	19-21	58-64
50-59	13-15	14-15	16-17	22-24	65-71
60-69	16-19	16-18	18-19	25-28	72-79
70-79	20-21	19-21	20-21	29-32	80-89
80-89	22-24	22-25	22-25	33-39	90-103
90-99	25-28	26-40	26-36	40-75	104-179
Severe					

Table 1: Range and percentile rankings for each of the four ATEC domains and the overall composite score.

Based on these responses, scores are computed for each domain. The range and percentile scores of each domain and of the overall composite score are listed in Table 1. Although more widely used

measures of autism severity, such as the Autism Diagnostic Interview-Revised [40] and the Autism Diagnostic Observation Schedule [41], have been employed to assess treatment effectiveness, these measures

were developed primarily to diagnose autism. In contrast, the ATEC was designed not as a diagnostic checklist but as a measure of change over time and can be completed by professionals and/or nonprofessionals (i.e., family members). Results from a study of 22 children with ASD showed that the ATEC has high internal consistency and is highly correlated with standardized measures of cognitive, language, and adaptive behavior skills [42]. This same study found that ATEC scores at age 4-6 years significantly predicted outcomes 5-6 years later, although there were large individual differences in ATEC score changes over time.

SRP Parent/Caregiver Training

Each participant completed two five-day parent training courses focused on SRP procedures: an introductory course and a more advanced follow-up course. Both courses were provided at the Autism Treatment Center of America in Sheffield, Massachusetts. The initial course provided an overview of the principles of the Son-Rise Program and basic treatment goals and introduced caregivers to specific strategies used in treatment. The advanced course provided additional practice in delivery of treatment and development of treatment goals for their children. Training was provided in large groups, ranging from 48 to 121 participants (mean=102).

In the introductory course, participants were familiarized with the overall goals of SRP, including promoting the child's ability to relate to others and build meaningful social interaction by increasing eye contact and non-verbal communication, verbal communication, the duration of social engagement (i.e., interactive attention span), and flexibility (e.g., child allows variations in play activities, interacts with another person's chosen activity). Information regarding the frequency and intensity of treatment also was provided. Because the SRP is intended to be provided daily for as many hours per day as possible (up to 40 hours per week of one-to-one interaction between an adult trained in SRP methods and the child), SRP advocates that both parents and family members as well as volunteers from the community be recruited and trained to provide treatment.

Hence, part of the initial parent-training course was devoted to discussing information about recruiting and training volunteers and/or other family members to be part of the intervention team. Sometime also was spent on how to handle and resolve challenging behaviors, such as hitting, spitting, smearing feces, etc. Finally, parents were provided with counseling focused on dealing with emotional and attitudinal challenges (i.e., accepting their child's condition) and strategies to maintain emotional comfort, low stress levels, and motivation to implement the Son-Rise Program over time.

One overarching goal of SRP is to enhance child-initiated interactions between the child and caregiver. Therefore, parents were provided with methods for facilitating this type of interaction, including directly engaging in the child's autistic behaviors, a technique referred to as joining. Specifically, parents were taught and given practice with the technique of joining their child in his/her activity, particularly in repetitive, exclusive behaviors, including repetitive movements and self-stimulation (e.g., flapping, plate spinning), until the child initiates social contact of any kind, including eye-gaze toward the parent, a gesture, or verbalization. A second major component of treatment is providing immediate, naturalistic and affect-laden feedback for child-initiated social and communication behaviors.

Therefore, parents were given training in how to deliver naturalistic, warm, exaggerated praise and encouragement of their child's initiation attempts. Finally, SRP uses strategies to develop social ability and increase social interaction (i.e., to increase interactive attention span) by expanding on the child's initiated behavior, for example by prompting/requesting two word phrases when a child uses a single word, or by suggesting new activities. Parents were provided with instructions in these strategies, and they practiced them in small groups with other participants. Importantly, parent training emphasized that social interaction with the child occurs only after the child initiates it, and prompts to elicit additional social-communicative behavior only occur during child-initiated interactions. Social interaction continues until the child ceases to respond, at which time parents were taught to once again engage in joining, imitating whatever activity or motion the child performs until the next child-initiated social behavior occurs [15].

Parents also were familiarized with the concept of the playroom, a room in their home designated for provision of SRP. One of the cornerstones of SRP is that treatment is provided in an optimal learning environment – a familiar, non-threatening, distraction-free room. Thus, parents were instructed in how to design and set up a playroom in their homes, using neutral colors and non-stimulating lights, a set of age-appropriate toys, a small table and chairs, and other equipment [37].

Data analyses

Responses to two questionnaires completed by the 49 participants were examined and ATEC scores for each participant were computed at Time 1 (T1), prior to the initial parent training course and Time 2 (T2), prior to the second training course for each ATEC domain: (I) Speech/Language/Communication, (II) Sociability, (III) Sensory/Cognitive Awareness, and (IV) Health/Physical Behavior. Composite ATEC scores were also computed for each participant at T1 and T2.

Results

Participants reported providing 0 to 40 hours of SRP intervention per week in their homes. Therefore, we divided the large group into those who implemented (1) no SRP (n=10), (2) 6 to 20 hours of SRP per week (i.e., lower intensity; n=28), and (3) 22 to 40 hours of SRP per week (i.e., higher intensity; n=11). The children in the no SRP group ranged from 36-89 months old, those in the lower intensity group ranged in age from 37-91 months, and those in the high intensity group ranged from 36-88 months. The three groups did not differ significantly with regard to the age of the children ($F(2,46)=0.00$, $p=1.00$).

The age of the parents ranged from 29-46 years ($M=35.16$) and also was not significantly different across groups ($F(2,46)=0.46$, $p=0.64$). There was no difference across groups with regard to the number of weeks of SRP provided between T1 and T2 (range=16-24 weeks; $M=17.88$; $F(2,46)=0.2$, $p=0.79$). However, the three groups did differ with respect to parents' years of education (range=12-22 years; $M=14.67$; $F(2,46)=6.08$, $p<0.01$, $\eta_p^2=0.21$). Games-Howell post hoc tests indicated that the average years of education of parents who implemented no SRP ($M=12.8$) was significantly less than parents who implemented 6-20 hours ($M=14.5$) and 22-40 hours of SRP per week ($M=16.9$).

Table 2 displays the average ATEC scores at T1 and T2 reported by parents in the three participant groups. To examine group differences,

we conducted a MANOVA with change scores (i.e., T2-T1) in the four subscales of the ATEC as the dependent variables. The effect of group was significant (Pillai's Trace= $F(8,88)=7.5$, $p<0.01$, $\eta_p^2=0.41$). Significant differences across the groups were observed for the Communication scale ($F(2,46)=54.3$, $p<0.01$, $\eta_p^2=0.70$), the Sociability scale ($F(2,46)=26.8$, $p<0.01$, $\eta_p^2=0.54$), and the Sensory/Cognitive scale ($F(2,46)=3.6$, $p=0.04$, $\eta_p^2=0.14$), with no significant effect found for the Health/Physical scale ($F(2,46)=2.1$, $p=0.14$).

Tukey post hoc tests indicated that the three participant groups were significantly different from each other with respect to reported change in the Communication and Sociability scales (all pairwise comparisons $p<0.01$).

That is, parents who implemented low intensity treatment reported more improvement in their children than parents who implemented no treatment, and parents who implemented high intensity treatment reported more improvement than those who implemented low intensity treatment. Only the low intensity SRP group reported significantly greater change than the no treatment group in the Sensory/Cognitive scale ($p=0.04$), with a marginally significant difference between the high intensity group and the no treatment group ($p=0.08$). Figure 1 displays average change scores on the four ATEC subscales for the three participant groups.

ATEC Scale		No SRP	6-20 hrs/wk SRP	22-40 hrs/wk SRP
Communication	T1	13.4 (5.9)	13.8 (5.2)	21.9 (4.1)
	T2	13.2 (6.0)	10.0 (5.1)	13.6 (4.5)
	Change	-0.2 (0.6)	-3.8 (1.8)	-8.3 (2.4)
Sociability	T1	14.5 (5.7)	13.2 (5.4)	18.5 (2.4)
	T2	14.7 (5.7)	9.6 (5.4)	11.6 (1.9)
	Change	0.2 (1.1)	-3.6 (2.6)	-6.9 (2.0)
Sensory/Cognitive	T1	14.5 (7.5)	15.7 (6.7)	20.7 (7.1)
	T2	14.5 (6.4)	13.7 (7.2)	18.7 (6.7)
	Change	0.0 (1.6)	-2.0 (1.8)	-2.0 (3.0)
Health/Physical	T1	22.4 (7.2)	22.5 (10.2)	29.6 (11.5)
	T2	23.7 (8.0)	22.1 (9.3)	28.4 (10.9)
	Change	1.3 (3.9)	-0.4 (2.9)	-1.3 (1.7)
Composite	T1	64.8 (17.9)	65.1 (17.4)	90.8 (13.1)
	T2	66.1 (18.8)	55.4 (17.5)	72.4 (11.7)
	Change	1.3 (3.7)	-9.6 (6.2)	-18.5 (4.4)

Table 2: Means and standard deviations in ATEC scores at T1 and T2 for children who received no SRP, lower intensity SRP, and higher intensity SRP. Decreasing ATEC scores indicate behavioral improvement.

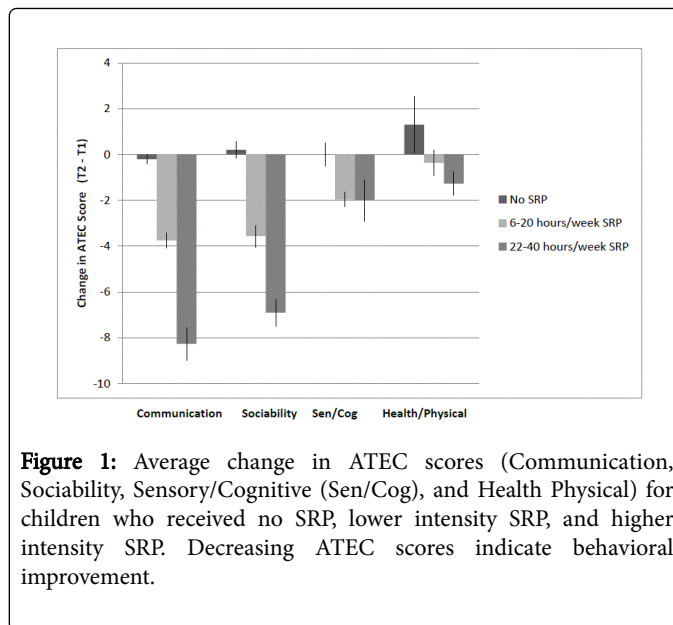


Figure 1: Average change in ATEC scores (Communication, Sociability, Sensory/Cognitive (Sen/Cog), and Health Physical) for children who received no SRP, lower intensity SRP, and higher intensity SRP. Decreasing ATEC scores indicate behavioral improvement.

It is important to note that a one-way ANOVA examining parental ratings of severity at T1, as assessed by the composite ATEC score, revealed a significant difference across these three participant groups ($F(2,46)=10.2$, $p<0.01$). Tukey post hoc tests indicated that the children in the high intensity SRP group were significantly more impaired at the beginning of the study than the children in the low intensity SRP group ($p<0.01$) and the children in the untreated group ($p<0.01$). However, the initial scores for the children in the low intensity SRP group were not significantly different from the untreated children ($p=0.99$).

Therefore, we conducted a second MANOVA with the same dependent variables (i.e., reported change in the four ATEC scales) with only the no SRP and the lower intensity (6-20 hours per week) SRP groups, which were matched in T1 composite ATEC scores. The effect of group on the dependent variables was significant (Pillai's Trace= $F(4,33)=10.0$, $p<0.01$, $\eta_p^2=0.55$). Parents of the treated children reported significantly more improvement than parents of the untreated children on the Communication scale ($F(1,36)=36.8$, $p<0.01$, $\eta_p^2=0.51$), the Sociability scale ($F(1,36)=20.0$, $p<0.01$, $\eta_p^2=0.36$), and the Sensory/Cognitive scale ($F(1,36)=9.6$, $p<0.01$, $\eta_p^2=0.21$). No significant effect was found for the Health/Physical scale ($F(1,36)=2.0$, $p=0.17$).

To examine the association between amount of treatment provided and reported change in behavior, we conducted correlations between the hours per week of SRP treatment and change scores (i.e., T2-T1) for the composite ATEC scores and each of the four subscales. For these analyses, we included only the 28 children who received 6-20 hours of SRP per week because the children who received higher intensity SRP were significantly more impaired at pre-treatment, as noted above. Hours of treatment provided was significantly correlated with reported improvement in the composite ATEC score ($r=-0.87$, $p<0.01$; see Figure 2). With regard to the four subscales, hours of treatment was significantly correlated with reported improvement in the Communication scale ($r=-0.82$, $p<0.01$) and the Sociability scale ($r=-0.76$, $p<0.01$), but not the Sensory/Cognitive scale ($r=-0.34$, $p=0.08$). The correlation with the Health/Physical scale was significant ($r=-0.49$, $p<0.01$), but this relationship was primarily due to parents

who implemented low amounts of treatment reporting some increases in health/physical impairments (Figure 3).

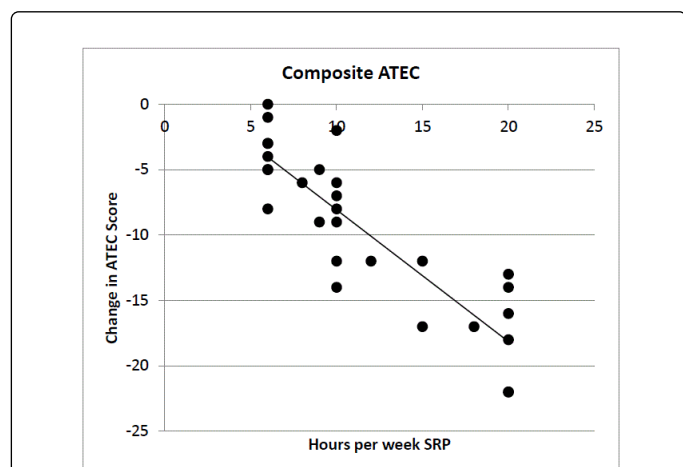


Figure 2: Correlation between hours per week of SRP and change in composite ATEC scores for children who received between 6 and 20 hours of treatment per week. Lower ATEC scores reflect greater change in performance.

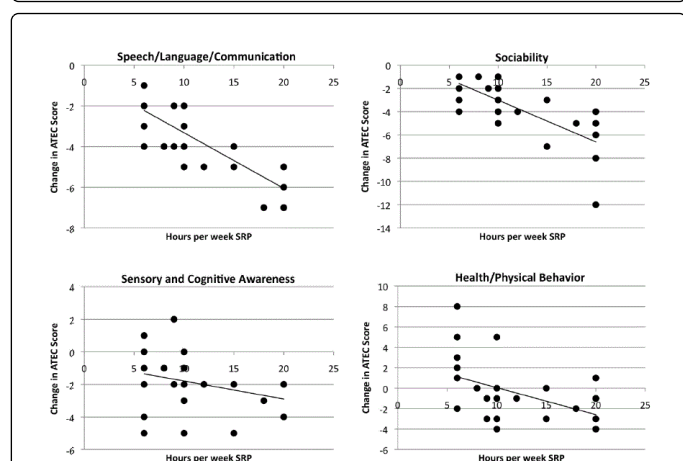


Figure 3: Correlations between hours per week of SRP and change in each of the four ATEC subscales for children who received between 6 and 20 hours of treatment per week. Lower ATEC scores reflect greater change in performance.

Discussion

The present study provides preliminary evidence of positive effects of home-based, parent-implemented Son-Rise Programs on the behavior of children with autism, as measured by parent-reported Autism Treatment Evaluation Checklist (ATEC) scores. Although the reported effects of treatment were relatively small, parents who implemented 6-20 hours per week of SRP reported significantly more improvement in their children's communication, social behaviors, and sensory and cognitive awareness than parents who implemented no treatment. Parents who implemented higher intensity SRP (i.e., 22-40 hours per week) reported more improvement in communication and

social behaviors than those who implemented lower intensity treatment. Furthermore, among parents who implemented 6-20 hours of SRP per week, the amount of treatment provided was significantly and strongly correlated with reported improvements in children's communication and sociability.

This finding is in keeping with previous research, indicating that the intensity of training is an important factor related to the outcome of autism interventions. A study of 245 children with ASD receiving early intensive behavioral intervention found that the number of hours of clinically delivered treatment per month significantly predicted treatment progress [43]. Children with ASD receiving high intensity interventions also have shown greater gains in intellectual and educational functioning [44] and in measures of language, daily living skills, and social behavior [45] relative to those receiving lower intensity interventions. Based on the results of the present study – the first to our knowledge to examine the effects of treatment intensity associated with treatment provided in the home – intensity of treatment also extends to home-based interventions. Further research comparing the effects of SRP with other home-based treatments and controlling for the intensity of intervention will be informative with regard to the effect of intensity relative to other components of treatment on changing child behaviors.

Results of the present study should be considered preliminary. Because we did not have access to the children whose parents served as participants in the study, we were unable to administer standardized assessments of the children's cognition, communication, and other abilities. Consequently, we were not able to determine whether the children were matched across participant groups on all relevant variables. Neither were we able to examine the relationship between parents' ratings of child behavior and more objective measures of autism severity. Green et al. [29] found that parent-mediated treatment improved parent-child social communication but had little effect on more distal indicators of autism severity. Similarly, results from the present study may reflect changes within parent-child interactions, more generally, but not necessarily improvement in autism symptoms. Parental observations of changes in their children's behavior are a valuable measure of treatment effectiveness. Further research, however, is needed to determine the outcome of parent-mediated, home-based treatment for ASD using standardized, widely used measures of autism as well as caregiver assessments.

Furthermore, limited data on parents' implementation of treatment is an issue in many studies of home-based interventions [46]. Because all participants in the present investigation lived long distances from the center where parent training took place, we were unable to directly observe treatment as it was administered and address the fidelity of intervention. We also relied on parent reports of the number of hours per week that treatment was provided. Notably, the decision of whether and how much treatment to provide was made by the parents, rather than by random group assignment.

Despite these challenges, studies of caregiver-administered intervention are greatly needed to determine their effectiveness in improving symptoms of ASD. Parent-based programs offer the distinct advantages of maximizing one-on-one, individualized treatment in a naturalistic home environment. Research suggests that relatively brief, intensive parent education can lead to successfully implemented autism treatment in the home and increases in children's communication ability that is maintained over time, which is particularly advantageous for families who live far distance from autism treatment centers [17]. In addition to parent training in a clinic

setting, preliminary research suggests that parent training in autism intervention can be conducted successfully by experienced teachers in schools [47] and by therapists using internet video conferencing [48]. Furthermore, once parents have learned intervention techniques, they may be able to recruit and train other caregivers to aid in the treatment process [49].

The Son-Rise Program offers these important benefits. Moreover, the approach is flexible in that families have the freedom to decide how much time to devote to intervention. Although data from this study and others [43-45] show that intervention provided with greater intensity may result in greater behavioral improvement, it is notable that in the present study parents who implemented relatively low intensity treatment reported more improvement in their children than parents who provided no treatment.

Results of the present study provide initial support for using the parent-delivered Son-Rise Program, designed for administration in the home environment. Parents of children with autism who implemented SRP in their homes reported improvements in their children's communication, social skills, and sensory and cognitive awareness, with greater gains associated with more hours of parent-administered SRP. These results are in line with those of Houghton et al. [15], who found significant increases in communicative behaviors and time spent engaged in child-initiated social interactions in children with ASD who underwent intensive clinician-delivered SRP. Although further research is needed, the findings of Houghton et al. [15] and of the present study place the Son-Rise Program among other available treatments for ASD, as a viable and potentially successful approach for improving social-communicative behavior in children with ASD.

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