

Original Article

The effect of Son-Rise and Floor-Time programs on social interaction skills and stereotyped behaviors of children with Autism Spectrum Disorders: a clinical trial¹

O efeito dos programas Son-Rise e Floor-Time nas habilidades de interação social e comportamentos estereotipados de crianças com Transtornos do Espectro do Autismo: um ensaio clínico

Navid Mirzakhani^a , Shirin Asadzandi^b , Mansooreh Shahriar Ahmadi^b , Shafagh Saei^c ,
Marzieh Pashmdarfard^a 

^aDepartment of Occupational Therapy, School of Rehabilitation, Shahid Beheshti University of Medical Sciences, Tehran, Iran.

^bIslamic Azad University Central Tehran Branch, Tehran, Iran.

^cRehabilitation Research Center, department of occupational Therapy, School of Rehabilitation Sciences, Iran University of Medical Sciences, Tehran, Iran.

How to cite: Mirzakhani, N., Asadzandi, S., Ahmadi, M. S., Saei, S., & Pashmdarfard, M. (2022). The effect of Son-Rise and Floor-Time programs on social interaction skills and stereotyped behaviors of children with Autism Spectrum Disorders: a clinical trial. *Cadernos Brasileiros de Terapia Ocupacional*, 30, e3253. <https://doi.org/10.1590/2526-8910.ctoAO248732532>

Abstract

Autism Spectrum Disorder (ASD) is a neurodevelopmental disorder in which difficulty in social interaction skills and performing limited and stereotyped activities are among its symptoms. This study aims to determine the effect of Son-Rise and Floor Time programs on social interaction skills and stereotyped behaviors in children with ASD. The present study was a Clinical Trial. The participant were 60 children with ASD who were selected by convenience sampling method and randomly assigned to three groups (Son-Rise intervention, Floor-Time intervention, and control group with routine occupational therapy interventions). For data gathering, Autism Spectrum Screening Questionnaire, Gilliam Autism Rating Scale, and Autism Social Skills Profile were used, respectively. For data analysis, repeated measures and analysis of variance were used (two-way between and within- subjects). The results of data analysis showed that Son-Rise and Floor Time programs had a positive effect on social interaction skills of children with ASD, and reduced stereotyped behaviors of these children; Also,

¹The Ethics Committee of Shahid Beheshti University of Medical Sciences approved this study (Code of Ethics: IR.SBMU.RETECH.REC.1401.051).

Received on Jan. 30, 2022; 1st Revision on Feb. 14, 2022; 2nd Revision on May 9, 2022; Accepted on June 7, 2022.



This is an Open Access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

there is a significant difference between the effectiveness of Son-Rise and Floor-Time programs on social interaction skills and stereotyped behavior in the post-test, which is more effective in the Floor Time compared to Son-Rise program.

Keywords: Autistic Disorder, Social Interaction, Stigmatization.

Resumo

O Transtorno do Espectro do Autismo (TEA) é um transtorno do neurodesenvolvimento que tem entre seus sintomas a dificuldade nas habilidades de interação social e a realização de atividades limitadas e estereotipadas. O objetivo deste estudo foi determinar o efeito dos programas Son-Rise e Floor Time nas habilidades de interação social e comportamentos estereotipados em crianças com TEA. O presente estudo foi um Ensaio Clínico. Os participantes foram 60 crianças com TEA que foram selecionadas pelo método de amostragem de conveniência e distribuídas aleatoriamente em três grupos (intervenção Son-Rise, intervenção Floor-Time e grupo controle com intervenções de terapia ocupacional de rotina). Para a coleta de dados, foram utilizados o Autism Spectrum Screening Questionnaire, a Gilliam Autism Rating Scale e o Autism Social Skills Profile, respectivamente. Para a análise dos dados foi utilizada a análise de variância de medidas repetidas (bidirecional entre e dentro dos sujeitos). Os resultados da análise dos dados mostraram que os programas Son-Rise e Floor Time tiveram um efeito positivo nas habilidades de interação social das crianças com TEA e reduziram os comportamentos estereotipados dessas crianças; Além disso, há uma diferença significativa entre a eficácia dos programas Son-Rise e Floor-Time nas habilidades de interação social e comportamento estereotipado no pós-teste, que é mais eficaz no Floor Time comparado ao programa Son-Rise.

Palavras-chave: Transtorno Autístico, Interação Social, Estigmatização.

Introduction

Autism Spectrum Disorder (ASD) is a neurodevelopmental disorder that, according to the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5), is characterized by two major signs of impairment in social communication and interaction skills, limited and repetitive behaviors, interests, and activities (American Psychiatric Association, 2000). The problems related to social and communication interaction skills of these children include defects in social-emotional interaction, problems in non-verbal communication behaviors, and defects in creating, maintaining and understanding interpersonal relationships (Sadock & Sadock, 2011). Problems with limited and repetitive interests and activities also include: the person has stereotypical and repetitive physical movements or always uses objects in the same way; The person is strongly committed to the routine; Has very limited and fixed interests that are abnormal in intensity or amount of attention (for example, a strong attachment to unusual objects); Excessive or abnormal reaction to sensory stimuli or unusual interest in certain sensory aspects of the environment, For example, a person seems to be indifferent to pain, heat or cold, reacts strongly to certain sounds or objects, smells or

touches some objects excessively, shows great interest in some lights or rotating objects (Sadock & Sadock, 2011).

Occupational therapists use a variety of therapies to teach social interaction skills and reduce stereotyped behaviors in children with ASD, one of these therapies is Floor Time (Abazari et al., 2017). The Floor Time program is one of the most widely used interventional methods in children with ASD, which focuses on play and Activities of Daily Living (ADL) and is widely used by occupational therapists. The ultimate goal of Floor Time is to increase communication interaction, emotional, visual and play skills in children with ASD. This program provides a solution to improve a child's development based on individual differences and relationships that strengthens six basic skills: Self-regulation and interest in the world, intimacy, two-way communication, complex communication, emotional beliefs, and logical thinking. Improving the formation of these six dimensions is necessary for the intellectual and emotional development of the child and helps children with ASD to focus on skills such as communication and thinking (Mercer, 2017).

There are several other therapeutic interventions associated with children with ASD that have not been adequately studied and this does not mean that they are ineffective. One of these interventions is the Son-Rise program. The Son-Rise program is a comprehensive, home-based program that helps families and caregivers to educate their children with ASD in the case of learning, development, and communication. This program is led by mothers (considers mothers as the most important and sustainable sources of education and inspiration for children) and is child-centered and is part of intensive interventions that are performed 5 days a week (15 hours per week) and runs in the form of communicational play (Liao et al., 2014; Pajareya & Nopmaneejumrulers, 2011). Williams & Wishart (2003) showed that although the performing of the Son-Rises program by mothers causes problems for them, but the level of stress in this family is not high, and this is one of the positive points of the role of mothers in the Son-Rise program and the effectiveness of the intervention largely depends on the mothers' understanding of the efficacy of the program (Williams & Wishart, 2003). The Son-Rise program includes three basic techniques, including joining or mimicking the child's movements, providing instant feedback on the child's initial interactions, and finally encouraging or expanding the child's responses or suggesting new activities (Houghton et al., 2013). This program helps mothers to teach children with ASD in terms of learning, development, and communication (Pajareya & Nopmaneejumrulers, 2011). In addition, the results of researches have shown that this method improves communication and social interaction skills of children with ASD (Liao et al., 2014; Pajareya & Nopmaneejumrulers, 2011; Williams & Wishart, 2003; Thompson & Jenkins, 2016).

Boshoff et al. (2020) In a systematic review study, showed that the Floor-Time program can be effective in improving the social interaction skills of children with ASD, but the number of studies in this field is not significant and more detailed studies are needed (Boshoff et al., 2020).

In another study conducted by Kahjoogh et al. (2020) to assess the effectiveness of the Son-Rise Program on improving social interaction and communication in children with ASD, a significant improvement in social interactions and communication

between children with ASD after receiving the Son-Rise program was obtained (Kahjoogh et al., 2020).

Among these, ASD is one of the disorders considered by occupational therapists. Occupational therapists strive to better understand of ASD and to use more effective and cost benefit educational methods, as well as to involve more mothers in the process of therapy of children with ASD. Since no study has compared the effectiveness of Son-Rise and Floor-Time programs on social interaction skills and stereotyped behavior in children with ASD, and research has examined each method separately. The present study was conducted to compare the effectiveness of Son-Rise and Floor-Time programs on social skills and stereotyped behavior in children with ASD.

Method

The present study was a Clinical Trial with a pre-test/post-test design.

Participants

The sample consisted of 60 children with ASD who were selected by available sampling from rehabilitation centers in Alborz province. The method of selecting the research sample was that the instructors of Alborz Rehabilitation Centers were asked to introduce the children with ASD who are in the age range of 6 to 8 years old and their mothers are willing to participate in the research, to the first author. The sample size in each subgroup was 20 children with ASD. These 60 children were randomly divided into three groups (two experimental groups and one control group). In this study, we used block randomization method for randomization. First of all we created 3 blocks based on the participants' age. A block of 6 years old children with ASD with 20 samples, A block of 7 years old children with ASD with 20 samples, and A block of 8years old children with ASD with 20 samples. Then, from each block in each selection, 3 samples were randomly selected, the first sample was in the Son-Rise group, the second sample was in the Floor-Time group and the third sample was in the control group. This procedure continued until 18 random samples (6 selections and 3 samples at a time) were selected from each block, and at the end the remaining 6 samples (2 from each block) were combined and 6 samples were randomly assigned to each group in two selections (each selection with three samples).

Inclusion criteria were: Children who have ASD diagnosis based on psychiatrist, pediatric neurologist or pediatrics, age range 6 to 8 years, children who referred to rehabilitation centers in Alborz province and were in Level 1 ("Requiring support") severity classifications Proposed DSM-5 autism spectrum criteria.

Exclusion criteria were: unwillingness to continue the programs, being absent for more than two sessions during the intervention, having other comorbid disorders and were in Level 2 ("Requiring substantial support"), and Level 3 ("Requiring very substantial support") severity classifications Proposed DSM-5 autism spectrum criteria.

Sixty eight participants were willing to take part in this study. Among them, 8 participants were excluded from the study as they did not meet the inclusion criteria. The remaining 60 participants were randomly assigned to the control (routine occupational therapy: 20) and intervention groups (Son-Rise: 20, Floor-Time: 20). All

60 participant remained in this study (43 boys and 17 girls with an average age of 7.00 years and a standard deviation of ± 0.82) and completed all the procedure.

The Figure 1 below shows the participant inclusion and exclusion criteria.

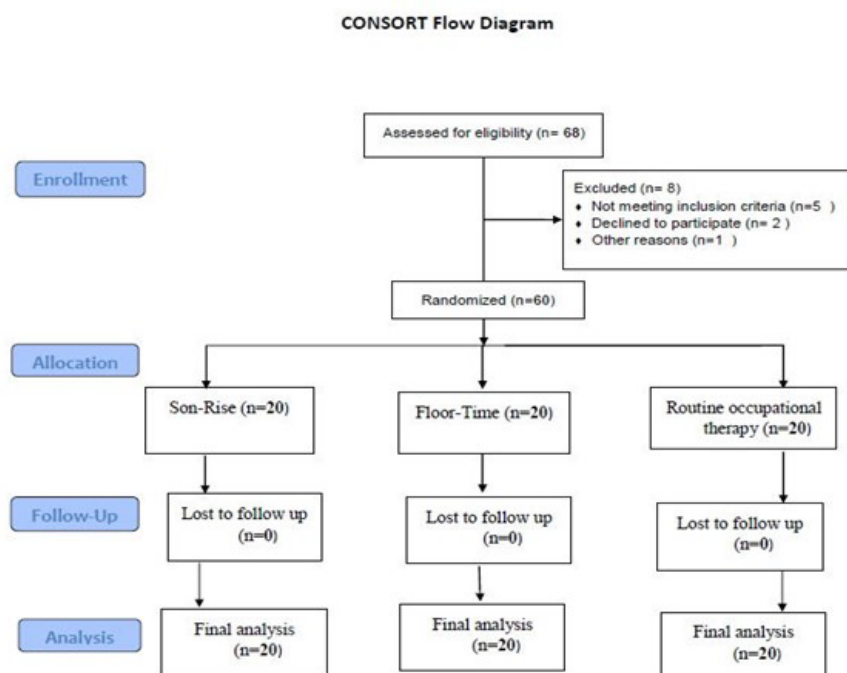


Figure 1. Consort flow diagram.

Ethical approval

All families were informed about the aim of the study. The mothers provided written Consent on behalf of the children. The Ethics Committee of Shahid Beheshti University of Medical Sciences approved this study (Code of Ethics: IR.SBMU.RETECH.REC.1401.051).

Outcome measure

Autism Spectrum Screening Questionnaire (AASQ)

This questionnaire was used to identify children with high-functioning ASD and is one of the most widely used autism screening tools in the world. The ASSQ filled in by mothers or teachers of children or adolescents (6 to 17 years of age). It is designed to be an initial screen for ASD especially in those with high or normal IQ, or those with only mild intellectual disability. The ASSQ assesses the child's problems in three areas: social interaction, language and speech delays and behavioral problems, consisting of 27 items/statements. The questionnaire is scored using a likert scale, with the following alternatives for each item: "not true" (0 points), "somewhat true" (1 point) and "certainly true" (2 points). All points are tallied up to produce a total score (maximum of 54 points), the test-retest reliability of the oriinal questionnaire was estimated to be

0.94 in the teachers' group (Ehlers et al., 1999). In Iran, the test-retest reliability of the questionnaire was estimated to be 0.467 in the parents' group and 0.614 in the teachers' group. Also, Cronbach's alpha coefficient obtained in the group of parents (0.77) and teachers (0.81) of normal children and parents (0.65) and teachers (0.70) of children with ASD showed that the items of the AASQ are suitable for screening high-functioning children with ASD in Iran (Kasechi et al., 2013).

Gilliam Autism Rating Scale (GARS-2)

This questionnaire was developed to identify individuals with ASD aged 3 to 22 years. The GARS-2 is a behavioral checklist developed for use by parents, teachers, and professionals to discriminate individuals who are autistic from those with other developmental disabilities. It is intended to be used in both clinical and research settings. This questionnaire consists of 42 questions that consist of three subscales (stereotyped behavior, communication and social interaction). The scale also has 14 questions about developmental disabilities, but scores of this section, were not included in the analysis. On this scale, raw scores are converted to autism index scores, in which scores above 90 with a higher than average probability and scores below 90 with a lower than average probability indicates the subject has autism. The subscales are scored on a 4-point Likert scale of never observed to frequently observe (Posserud et al., 2009). Cronbach's alpha coefficient of the stereotyped behaviors is 0.74, communication is 0.98 and social interaction is 0.73. GARS's Cronbach's alpha coefficient was 0.89. This coefficient indicates the high reliability of the scale, whereby diagnostic and therapeutic procedures are facilitated (Samadi & McConkey, 2014). In the present study, this test was used to measure the severity of autism to identify participants and also to measure social interaction and communication.

Autism Social Skills Profile (ASSP)

This assessment tool consists of 48 questions to assess the social behaviors of children and adolescents with ASD in the age range of 6 to 17 years. The ASSP contains three subscales, labeled Social Reciprocity, Social Participation/ Avoidance, and Detrimental Social Behaviors. This questionnaire can be completed by the parent, teacher and any other adult who is familiar with the child's social behaviors. The questions are graded on a four-point Likert scale from 1-4 (never-always) where higher scores indicate more positive social behaviors. The reliability of the questionnaire using the retest test reliability with a three-week interval was 0.97. The reliability of the components of Social Reciprocity was 0.96, Social Participation/ Avoidance was 0.74 and Detrimental Social Behaviors were 0.96 (Bellini & Hopf, 2007).

Procedure

After coordination and obtaining the code of research ethics (Code of Ethics: IR.SBMU.RETECH.REC.1401.051), the necessary coordination was done with the Department of Rehabilitation Centers of Alborz Province. Before submitting the questionnaires and data gathering, mothers were explained how to conduct the research and were informed about the research and established the necessary relationship with the work

too. After obtaining the written consent form of the children's mothers, the researcher made continuous contact with the samples for a week to enable mutual communication and accurate evaluation. To diagnose the level of autism in children, the researcher completed the GARS-2 and AASQ for all three groups. Then, for assessing the level of children's social interaction skills and to determine the level of stereotyped behaviors of all three groups the ASSP and GARS-2 were completed by the researcher respectively.

In the Floor-Time intervention group (n=20), continuously (for a period of 3 months and 15 hours per week) with the cooperation of parents at home in two areas of play and ADL received activities and all these interventions were performed by the researcher and mothers. In the control group (n=20), the usual classroom training was received. Regarding the duration of the intervention, according to previous research and available studies, the minimum time required for the effect of Floor-Time intervention was at least three months and at least 15 hours per week (Solomon et al., 2007; Greenspan & Wieder, 2009). In the Son-Rise intervention group (n=20) the communicational play method was used and it is considered as an intervention that was performed 12 to 15 hours 5 days a week (Rezaee Khoshkzari & Khodabakhshi Koolae, 2018) and in the control group (n=20) the usual classroom training was performed. After the interventions, post-test data were collected by completing the ASSP to assess the child's social interaction skills and the GARS-2 to determine the level of stereotyped behaviors immediately. Mothers were also reassured that their children's information would be kept confidential. Also, one month after finishing the intervention researcher completed the ASSP and GARS-2 questionnaires as follow-up.

Floor-Time program

The Greenspan model, or developmental model based on communication and individual disorders, introduces its interventional techniques under the name of Floor-Time. This intervention is performed by the therapist and mothers in two areas of play and ADL. In Floor-Time, the adult attracts the child through play and teaches him / her social interaction skills (Dionne & Martini, 2011). Floor-Time method is practically 20 to 30 minutes of child-centered play, but is not dedicated to playing with a child. Rather, it is a specific philosophy and technique used by mothers and other members of the treatment team who work with the child (Pajareya et al., 2019). This intervention has been performed by the therapist and mothers in two areas of play and ADL. In Floor-Time, the level of activity and period of attention of the child determines the direction of play or conversation instead of the pre-determined educational structure. Mothers are taught to watch their child's behavior (Rezayi & Lari Lavasani, 2017). The stages of play in the Floor-Time method start from the child's developmental position and proceed according to the levels of development.

Regarding the duration of the intervention, according to previous research and available studies, the minimum time required for the effect of Floor-Time intervention was at least three months and at least 15 hours per week (Solomon et al., 2007; Greenspan & Wieder, 2009), which in the present study it has been done in the same way. In this way, the child received training 12 hours a week at home by the mothers and 3 hours in the rehabilitation centers by the occupational therapist. Mothers' education was in the form of verbal and role modeling, evaluating their performance

cycles and providing the necessary feedback. First, the general principles and strategies were explained to the mothers, then the situations outside the clinic, such as feeding the child, getting dressed, bathing, sleeping and getting in the car, and how the mother treats the child inside the house were examined. Each of these positions was trained in modeling based on Floor-Time strategies. The other part of the parents' work was to play with their children based on Floor-Time for at least 20-30 minutes. In order to acquire the necessary skills in this field, mothers were asked to watch the therapist play with the child in rehabilitation centers during the therapy sessions and receive the necessary explanations during the play therapy. In each week, a weekly performance report was received from mothers, which included recorded hours of intervention. Although mothers had to take a video record from their interventions for checking by researchers. Researchers took feedback to the mothers for its accuracy and effectiveness. After three months of the intervention, the effectiveness of the intervention was evaluated by examining the scores obtained from the pre-test relative to each other (Mercer, 2017). Absence from more than two sessions also eliminated the treatment. The treatment protocol of Floor-Time interventions (Mercer, 2017) was as follows:

Session 1: Introduction and initial conversation with mothers for proper communication, talk about the importance of childhood and the disadvantages that will come with low social interaction skills for the child in the future.

Session 2: Examining the individual factors of children with emphasis on individual differences and mothers' guidance on how to react to these differences.

Session 3: Examining the importance of childhood, familiarity with children's growth and developmental stages, the effects of this period in the future and the need to try to improve parental performance in this period.

Session 4 and 5: Floor-Time method training including the principles and methods of this treatment.

Sixth and seventh sessions: Practical practice of Floor-Time play therapy between mother and child and in person or at home, recommending special play to each mother and following its quality during these two sessions, components and principles of Floor-Time method in practice between mother and the child was executed and the mothers' problems were examined and solved by their educators.

Session 8 and continue for three months: Practical implementation of play, observing mother and child play and examining the effect of performing Floor-Time play therapy from mothers' point of view and answering their questions in this regard.

Son-Rise program

Before the intervention, a face-to-face meeting was held at the rehabilitation center for the participants to prepare the play room and coordinate the intervention hours. The intervention was performed by holding an average of 12 to 15 hours per week for each participant. At the end of the intervention period, GARS-2 and ASSP questionnaires were taken again from all mothers of children. The treatment sessions were performed according to the protocol and techniques of the Son-Rise program. Joining the child, imitating repetitive behaviors and stereotyped movements, responding quickly and naturally to the child's interactive behaviors (admiration-acceptance), developing the child's response, motivation, engaging in new activities, and generalizing skills were the

main techniques of the program. The therapist first joins the child in all behaviors and activities, imitating when the child is involved in stereotyped movements and repetitive behaviors. The therapist engaged in parallel imitation with the child and showed interest in performing these movements. The imitation continued until the child paid attention to the therapist and entered into interaction. With the child's first attention and interactive behaviors, the therapist encouraged the child (with great joy and happiness) and responded immediately. The therapist then tried to expand the child's behavior and increase the duration of the interaction. If the child continued to interact, the therapist would suggest a new activity to the child in line with his or her interests and abilities. Began to cause another interaction on the part of the child.

Imitation technique: The therapist imitates all of the child's stereotyped behaviors. The therapist showed the child that he or she has accepted him or her and leads the child to a two-person play. For example, when a child repeatedly injects a piece of paper, the therapist does the same in front of the child but at a reasonable distance, until the child makes the first interaction (looking at the therapist, moving toward the therapist), Begins imitation continues. **Joining the child's activity:** The therapist joined the activity that the child has chosen and is involved in and accompanied the child in his / her activity. For example, when the child is involved in a play with car, the therapist also brought a car and tried to attract the child's attention and lead him to a two-person play. **Acceptance of all child behaviors without judgment:** The therapist allowed the child to move and play freely in the room and tried not to use the word no, do and so on. When the child interacts, the therapist uses energy, enthusiasm, and excitement to try to achieve their goals and expand the interaction with the child by making a difference in the child's activities. For example, while child playing with a car, the therapist tried to encourage the child to use words by saying the name of the car and the sound of the car.

Asking the child: By increasing the interaction between the child and the therapist and building trust in the child, the therapist asked the child to do something, for example, asking the child to give him one of his cars or to look at him.

According to the main principles of Son-Rise, it is necessary to use all techniques to create and maintain interaction, and these steps must be followed in order, which in the present study, these steps and the principles mentioned were followed in order.

Statistical analysis

For data analysis the SPSS22 software was used. The significance level was set at 0.05. In order to analyze the data, the analysis of variance test with repeated measures (within/between subjects) and in order to compare the mean scores during different stages (pretest, post-test, follow up), the Bonferroni post hoc test was used.

Results

The 60 children with ASD (43 boys and 17 girls, Minimum: 6 years, Maximum: 8 years) participated in this study. The mean and standard deviation of the age of the participants in this study was 7.00 years and ± 0.82 . Table 1 shows the demographic characteristics of the participants of each group.

Table 1. Demographic characteristics of the participants of each group.

Variables	Son-Rise (N= 20)	Floor-Time (N=20)	Control Group (N= ` 10)
Children age, mean (SD)	7.15 (0.81)	6.9 (0.85)	6.2 (0.82)
Children sex (Males: Females)	14:6	15:5	14:6
Parental age, mean (SD)	39.4 (1.07)	33.3 (0.90)	38.2 (0.94)
Parent marital status (Married:Single)	19:1	20:0	18:2

The results of the effect of Son-Rise and Floor-Time programs on social interaction skills of children with ASD

The results of multivariate tests to examine the difference between the mean scores of social interaction skills of control groups, Son-Rise and also the difference between the mean scores of social interaction skills of control groups and Floor-Time and the difference between mean scores of social interaction skills of Son-Rise groups and Floor-Time is presented in Table 2.

Table 2. Multivariate within/Between subject effects test for comparison of social interaction skills of control groups and Son-Rise method / control group and Floor-Time method/ Son-Rise method and Floor-Time method.

	Effect	Value	F	Hypothesis df	Error df	P value	Effect size		
Comparison of change in social interaction skills of control groups and Son-Rise method	Within Subject	Pillai's Trace	0.726	14.251	6	150	0.001	0.363	
		Wilk's Lambda	0.279	22.057	6	148	0.001	0.472	
		Hottelling's Trace	2.571	31.275	6	146	0.001	0.562	
		Roy's Largest Root	64.094	64.094	3	75	0.001	0.719	
	Between Subject	Pillai's Trace	0.669	12.560	6	150	0.001	0.334	
		Wilk's Lambda	0.35	16.825	6	148	0.001	0.406	
		Hottelling's Trace	1.767	21.494	6	146	0.001	0.469	
		Roy's Largest Root	1.730	43.259	3	75	0.001	0.634	
	Comparison of change in social interaction skills of control groups and Floor-Time method	Within Subject	Pillai's Trace	0.812	17.074	6	150	0.001	0.406
			Wilk's Lambda	0.201	30.292	6	148	0.001	0.551
			Hottelling's Trace	3.898	47.426	6	146	0.001	0.661
			Roy's Largest Root	3.881	97.024	3	75	0.001	0.795
Between Subject		Pillai's Trace	0.764	15.442	6	150	0.001	0.382	
		Wilk's Lambda	0.246	25.028	6	148	0.001	0.504	
		Hottelling's Trace	3.018	36.720	6	146	0.001	0.601	
		Roy's Largest Root	3.005	75.113	3	75	0.001	0.750	
Comparison of change in social interaction skills of Son-Rise method and Floor-Time method		Within Subject	Pillai's Trace	0.904	20.614	6	150	0.001	0.452
			Wilk's Lambda	0.100	53.199	6	148	0.001	0.683
			Hottelling's Trace	8.923	108.563	6	146	0.001	0.817
			Roy's Largest Root	8.918	222.958	3	75	0.001	0.899
	Between Subject	Pillai's Trace	0.292	4.268	6	150	0.001	0.146	
		Wilk's Lambda	0.709	4.624	6	148	0.001	0.158	
		Hottelling's Trace	0.409	4.974	6	146	0.001	0.170	
		Roy's Largest Root	0.406	10.146	3	75	0.001	0.289	

F: Fisher; P value: Probability value.

The results showed that all multivariate tests are significant, which the main reason for this is the existence of the main effect related to the repetition factor (pre-test, post-

test and follow-up) and the interactive effect between groups and repetition (ie the existence of differences between groups during the measurement steps).

Paired comparisons of Son-Rise and Floor-Time to examine the differences between social interaction skills scores during the intervention are presented for each of the control groups in Table 3. Based on the results obtained in the Son-Rise method group as well as the Floor-Time method, the difference between the mean scores of the pre-test with the post-test and follow-up is significant ($p < 0.05$). Post-test and follow-up have significantly increased compared to the pre-test, which indicates the effectiveness of Son-Rise and Floor-Time methods on social interaction skills of children ASD. However, the difference between post-test scores and follow-up scores in both methods was not significant ($p < 0.05$), which indicates the stability of treatment effects over time. In the control group, the difference between the scores of the pre-test with the post-test and follow-up and also the difference between the scores of the post-test and the follow-up scores in both groups were not significant ($p < 0.05$).

Table 3. Bonferroni post hoc test to evaluate the difference between social interaction skills scores for each of the control groups, Son-Rise method and Floor-Time method.

Group	Variables	Stage	Stage	Mean difference	Sandard error	P value	
Control	Social Reciprocity	Pretest	Post test	0.280-	0.288	1	
			Follow up	- 0.100	0.318	1	
		Post test	Follow up	0.180	0.322	1	
	Social Participation	Pretest	Post test	0.430-	0.237	0.233	
			Follow up	- 0.350	0.316	0.824	
		Post test	Follow up	0.080	0.328	1	
	Detrimental Social Behaviors	Pretest	Post test	-0.370	0.296	0.659	
			Follow up	0.285	0.221	0.616	
		Post test	Follow up	0.655	0.286	0.083	
	Son-Rise	Social Reciprocity	Pretest	Post test	-2.900	0.288	0.001
				Follow up	-2.220	0.318	0.001
			Post test	Follow up	0.680	0.322	0.124
Social Participation		Pretest	Post test	-2.230	0.237	0.001	
			Follow up	-1.755	0.316	0.001	
		Post test	Follow up	0.475	0.326	0.461	
Detrimental Social Behaviors		Pretest	Post test	-2.850	0.296	0.001	
			Follow up	-2.450	0.221	0.001	
		Post test	Follow up	0.400	0.286	0.511	
Floor-Time		Social Reciprocity	Pretest	Post test	-4.450	0.352	0.001
				Follow up	-3.750	0.366	0.001
			Post test	Follow up	0.700	0.378	0.216
	Social Participation	Pretest	Post test	-3.350	0.293	0.001	
			Follow up	-2.995	0.367	0.001	
		Post test	Follow up	0.395	0.340	0.760	
	Detrimental Social Behaviors	Pretest	Post test	-4.200	0.323	0.001	
			Follow up	-3.605	0.321	0.001	
		Post test	Follow up	0.595	0.301	0.166	

The results of the effect of Son-Rise and Floor-Time programs on stereotyped behaviors of children with ASD

The results of multivariate tests to examine the difference between the mean scores of stereotyped behaviors of control groups, Son-Rise and also the difference between the mean scores of stereotyped behaviors of control groups and Floor-Time and the difference between mean scores of stereotyped behaviors of Son-Rise groups and Floor-Time is presented in Table 4. The results showed that all multivariate tests are significant, which the main reason for this is the existence of the main effect related to the repetition factor (pre-test, post-test and follow-up) and the interactive effect between groups and repetition (ie the existence of differences between groups during the measurement steps).

Table 4. Multivariate within/Between subject effects test for comparison of streotype behaviors of control groups and Son-Rise method / control group and Floor-Time method/ Son-Rise method and Floor-Time method.

Effect		Value	F	Hypothesis df	Error df	P value	Effect size	
Comparison of change in stereotype behaviors of control groups and Son-Rise method	Within Subject	Pillai's Trace	0.422	13.511	2	37	0.001	0.422
		Wilk's Lambda	0.578	13.511	2	37	0.001	0.422
		Hotelling's Trace	0.730	13.511	2	37	0.001	0.422
		Roy's Largest Root	0.730	13.511	2	37	0.001	0.422
	Between Subject	Pillai's Trace	0.526	20.499	2	37	0.001	0.526
		Wilk's Lambda	0.474	20.499	2	37	0.001	0.526
		Hotelling's Trace	1.108	20.499	2	37	0.001	0.526
		Roy's Largest Root	1.108	20.499	2	37	0.001	0.526
Comparison of change in stereotype of control groups and Floor-Time method	Within Subject	Pillai's Trace	0.608	28.662	2	37	0.001	0.608
		Wilk's Lambda	0.392	28.662	2	37	0.001	0.608
		Hotelling's Trace	1.549	28.662	2	37	0.001	0.608
		Roy's Largest Root	1.549	28.662	2	37	0.001	0.608
	Between Subject	Pillai's Trace	0.654	34.947	2	37	0.001	0.654
		Wilk's Lambda	0.346	34.947	2	37	0.001	0.654
		Hotelling's Trace	1.889	34.947	2	37	0.001	0.654
		Roy's Largest Root	1.889	34.947	2	37	0.001	0.654
Comparison of change in stereotype behaviors of Son-Rise method and Floor-Time method	Within Subject	Pillai's Trace	0.784	67.132	2	37	0.001	0.784
		Wilk's Lambda	0.216	67.132	2	37	0.001	0.784
		Hotelling's Trace	3.629	67.132	2	37	0.001	0.784
		Roy's Largest Root	3.629	67.132	2	37	0.001	0.784
	Between Subject	Pillai's Trace	0.209	4.887	2	37	0.013	0.209
		Wilk's Lambda	0.791	4.887	2	37	0.013	0.209
		Hotelling's Trace	0.264	4.887	2	37	0.013	0.209
		Roy's Largest Root	0.264	4.887	2	37	0.013	0.209

Paired comparisons of Son-Rise and Floor-Time to examine the differences between social interaction skills scores during the intervention are presented for each of the control groups in Table 5. Based on the results obtained in the Son-Rise method group as well as the Floor-Time method, the difference between the mean scores of the pre-test with the post-test and follow-up is significant (p <0.05). Post-test and follow-up have significantly decreased compared to the pre-test, which indicates the effectiveness of Son-Rise and Floor-Time methods on social interaction skills of children ASD.

However, the difference between post-test scores and follow-up scores in both methods was not significant ($p < 0.05$), which indicates the stability of treatment effects over time. In the control group, the difference between the scores of the pre-test with the post-test and follow-up and also the difference between the scores of the post-test and the follow-up scores in both groups were not significant ($p < 0.05$).

Table 5. Bonferroni post hoc test to evaluate the difference between stereotype behaviors scores for each of the control groups, Son-Rise method and Floor-Time method.

Group	Stage	Stage	Mean difference	Standard error	P value
Control	Pretest	Post test	-0.400	0.290	0.528
		Follow up	0.350	0.431	1
	Post test	Follow up	0.750	0.476	0.369
Son-Rise	Pretest	Post test	2.200	0.290	0.001
		Follow up	1.875	0.431	0.001
	Post test	Follow up	-0.325	0.476	1
Floor-Time	Pretest	Post test	3.800	0.352	0.001
		Follow up	3.450	0.390	0.001
	Post test	Follow up	-0.350	0.333	0.900

Discussion

One of the main problems of children with ASD is communication and socialization issues and stereotyped behaviors, so researchers and professionals have always tried to minimize these problems through educational and rehabilitation approaches. Based on this, various treatment methods such as Pivotal Response Treatment, Treatment and Education of Autistic and Related Communication Handicapped Children, Picture Exchange Communication System, Social Stories and Applied Behavior Analysis have been developed based on different approaches, all of the above are trying to target the main symptoms of autism, which are social communication problems and stereotyped behaviors.

Among the various approaches that have been devised to address these problems, Floor-Time and the Son-Rise programs are helping families and mothers to learn about children with ASD in terms of communication and learning. These therapeutic approaches seek to strengthen children's communication, social interaction skills and reduce their stereotyped behaviors by joining the child's behaviors, playing with them, providing immediate feedback on social skills, and introducing new activities to continue communication and interaction skills. The results of various studies also confirmed that these methods improve communication and social interaction skills and reduce stereotyped behaviors in children with ASD (Kahjoogh et al., 2020; Bellini & Hopf, 2007).

The aim of this study was to compare the effect of two methods of Son-Rise and Floor-Time programs on social interaction skills and stereotyped behaviors in children with ASD. The results of data analysis showed that Son-Rise and Floor-Time methods have an effect on social interaction skills and stereotyped behavior of children with ASD. A comparison of these two methods also showed that there is a significant difference between the effectiveness of Son-Rise and Floor-Time methods on social interaction skills. Also, comparing the effectiveness of the Son-Rise and Floor-Time methods on

stereotyped behavior also showed that the rate of reduction of stereotyped behavior in the Floor-Time method is higher compared to the Son-Rise method. In the study of Mercer (2017) regarding the Floor-Time method on social interaction skills and reducing stereotyped behavior that was performed on 200 children aged 22 months to 4 years with ASD for 2 to 5 years, it was found that the Floor-Time method have had a positive effect on social interaction skills and stereotypes behaviors of children with ASD (Mercer, 2017). Dionne & Martini (2011) also showed that the use of Floor-Time in children with ASD, if done by mothers as their primary caregiver, has a significant positive effect on improving social interaction skill and reducing stereotyped behaviors in these children (Dionne & Martini, 2011). As a result, it was shown that the result of present study like various studies confirmed that the Floor-Time method is effective in improving stereotyped behavior and social interaction skills in children with ASD.

In a study by Houghton et al. (2013) on the effect of the Son-Rise program on the stereotype behavior and social interaction skills of children with ASD, the results showed that social interaction skills of children with ASD increased compared to children in the control group (Houghton et al., 2013). Thompson & Jenkins (2016) in a post-education study of mothers based on the Son-Rise program, determined its effect on communication and social behaviors of children with ASD. The results showed that the experimental groups had a significant improvement in communication and social interaction skills, and cognitive awareness compared to the control group. The results also showed that longer intervention time is associated with better results in stereotype behaviors (Thompson & Jenkins, 2016). In the present study, it can be stated that one of the reasons that led to the Floor-Time method compared to Son-Rise method has a better and more significant effect in reducing the stereotyped behavior of children with ASD is the longer duration of intervention by the Floor-Time method, so it can be suggested that in future studies, the duration of the Son-Rise method be extended and the duration of the intervention be evaluated in reducing the stereotypical behavior of children with ASD.

In a study, Williams & Wishart (2003) explored the experiences of mothers of children with ASD in running the Sun-Rise program. In this study, they showed that although the implementation of the intervention by mothers causes problems for them, but the level of stress in this family is not high and this is one of the positive points of the role of mothers in the Sun-Rise program. The researchers also found that the effectiveness of the intervention largely depended on mothers' perceptions of the program's usefulness (Williams & Wishart, 2003). Based on this study and the mothers study it is recommended that the Son-Rise program be performed in children with ASD by their mothers, especially the mother, as the primary caregiver.

Kahjoogh et al. (2020) in their study showed that the participants in the group of the Son-Rise Program showed a significant improvement in their social interaction skills compared to the control group.

Conclusion

The Son-Rise and Floor-Time programs could be used as an effective programs to improve the social interaction skills and stereotype behaviors of children with ASD. According to the results, this two approach have a positive effect on the social interaction skills but comparing the effectiveness of the Son-Rise and Floor-Time methods on

stereotyped behavior also showed that the rate of reduction of stereotyped behavior in the Floor-Time method is higher compared to the Son-Rise method. Social interactions can be improved over a short time span, but stereotype behaviors likely need more sessions and long-term treatment.

Acknowledgements

The authors' thanks and gratitude goes out to all the children with ASD and mothers of the children with ASD who participated in this study and also the authors appreciated the occupational therapists who help the researchers in completing the instruments.

References

- Abazari, K., Malekpour, M., Ghamarani, A., Abedi, A., & Faramarzi, S. (2017). Impact of individual differences intervention (Floortime) based on parents' expressed emotion on children's social skills with high-functioning autism disorder. *Majallab-i Ravanpizishki va Ravanshinasi-i Balini-i Iran*, 23(3), 260-277. <http://dx.doi.org/10.29252/nirp.ijpcp.23.3.260>.
- American Psychiatric Association – APA. (2000). *Diagnostic and Statistical Manual of Mental Disorders (DSM-IV)*. Philadelphia: APA.
- Bellini, S., & Hopf, A. (2007). The development of the autism social skills profile: a preliminary analysis of psychometric properties. *Focus on Autism and Other Developmental Disabilities*, 22(2), 80-87. <http://dx.doi.org/10.1177/10883576070220020801>.
- Boshoff, K., Bowen, H., Paton, H., Cameron-Smith, S., Graetz, S., Young, A., & Lane, K. (2020). Child development outcomes of DIR/Floortime TM-based Programs: a systematic review. *Canadian Journal of Occupational Therapy*, 87(2), 153-164. <http://dx.doi.org/10.1177/0008417419899224>.
- Dionne, M., & Martini, R. (2011). Floor time play with a child with autism: a single-subject study. *Canadian Journal of Occupational Therapy*, 78(3), 196-203. <http://dx.doi.org/10.2182/cjot.2011.78.3.8>.
- Ehlers, S., Gillberg, C., & Wing, L. (1999). A screening questionnaire for Asperger syndrome and other high-functioning autism spectrum disorders in school age children. *Journal of Autism and Developmental Disorders*, 29(2), 129-141. <http://dx.doi.org/10.1023/A:1023040610384>.
- Greenspan, S. I., & Wieder, S. (2009). *Engaging autism: using the floortime approach to help children relate, communicate, and think*. New York: Da Capo Lifelong Books
- Houghton, K., Schuchard, J., Lewis, C., & Thompson, C. K. (2013). Promoting child-initiated social-communication in children with autism: Son-Rise Program intervention effects. *Journal of Communication Disorders*, 46(5-6), 495-506. <http://dx.doi.org/10.1016/j.jcomdis.2013.09.004>.
- Kahjoogh, M. A., Pishyareh, E., Gharamaleki, F. F., Mohammadi, A., Someh, A. S., Jasemi, S., & Zali, M. M. (2020). The Son-Rise Programme: an intervention to improve social interaction in children with autism spectrum disorder. *International Journal of Therapy and Rehabilitation*, 27(5), 1-8. <http://dx.doi.org/10.12968/ijtr.2018.0148>.
- Kasechi, M., Behnia, F., Mirzaei, H., Rezaiani, M., & Farzi, M. (2013). Validity and reliability of Persian version of high-functioning autism spectrum screening questionnaire age 7-12. *Pajouhan Scientific Journal*, 12(1), 45-54.
- Liao, S. T., Hwang, Y. S., Chen, Y. J., Lee, P., Chen, S. J., & Lin, L. Y. (2014). Home-based DIR/Floortime intervention program for preschool children with autism spectrum disorders: preliminary findings. *Physical & Occupational Therapy in Pediatrics*, 34(4), 356-367. <http://dx.doi.org/10.3109/01942638.2014.918074>.
- Mercer, J. (2017). Examining DIR/Floortime™ as a treatment for children with autism spectrum disorders: a review of research and theory. *Research on Social Work Practice*, 27(5), 625-635. <http://dx.doi.org/10.1177/1049731515583062>.

- Pajareya, K., & Nopmaneejumruslers, K. (2011). A pilot randomized controlled trial of DIR/Floortime™ parent training intervention for pre-school children with autistic spectrum disorders. *Autism, 15*(5), 563-577. <http://dx.doi.org/10.1177/1362361310386502>.
- Pajareya, K., Sutchritpongsa, S., & Kongkasuwan, R. (2019). DIR/Floortime® parent training intervention for children with developmental disabilities: a randomized controlled trial. *Sirinaj Medical Journal, 71*(5), 331-338. <http://dx.doi.org/10.33192/Smj.2019.51>.
- Posserud, M. B., Lundervold, A. J., & Gillberg, C. (2009). Validation of the autism spectrum screening questionnaire in a total population sample. *Journal of Autism and Developmental Disorders, 39*(1), 126-134. <http://dx.doi.org/10.1007/s10803-008-0609-z>.
- Rezaee Khoshkzari, G., & Khodabakhshi Koolae, A. (2018). The effectiveness of floor time play on anxiety in children with asperger disorder and burden among their mothers (a single case study). *Journal of Pediatric Nursing, 4*(4), 50-59.
- Rezayi, S., & Lari Lavasani, M. (2017). The study of role of motor skills for predicting social skill and challenging behavior in children with autism spectrum disorders. *Psychology of Exceptional Individuals, 7*(25), 19-33. <http://dx.doi.org/10.22054/jpe.2017.21418.1545>.
- Sadock, B. J., & Sadock, V. A. (2011). *Kaplan and Sadock's synopsis of psychiatry: behavioral sciences/clinical psychiatry*. USA: Lippincott Williams & Wilkins.
- Samadi, S. A., & McConkey, R. (2014). The utility of the Gilliam autism rating scale for identifying Iranian children with autism. *Disability and Rehabilitation, 36*(6), 452-456. <http://dx.doi.org/10.3109/09638288.2013.797514>.
- Solomon, R., Necheles, J., Ferch, C., & Bruckman, D. (2007). Pilot study of a parent training program for young children with autism: the PLAY Project Home Consultation program. *Autism, 11*(3), 205-224. <http://dx.doi.org/10.1177/1362361307076842>.
- Thompson, C. K., & Jenkins, T. (2016). Training parents to promote communication and social behavior in children with Autism: the Son-Rise program. *Journal of Communication Disorders, Deaf Studies & Hearing Aids, 4*(1), 1-7. <http://dx.doi.org/10.4172/2375-4427.1000147>.
- Williams, K. R., & Wishart, J. G. (2003). The Son-Rise Program intervention for autism: an investigation into family experiences. *Journal of Intellectual Disability Research, 47*(4-5), 291-299. <http://dx.doi.org/10.1046/j.1365-2788.2003.00491.x>.

Author's Contributions

Navid Mirzakhani, Shirin Asadzandi and Mansooreh Shahriar Ahmadi contributed to the design and implementation of the research, Shafagh Saei, Marzieh Pashmdarfard and Navid Mirzakhani contributed to the analysis of the results, Marzieh Pashmdarfard contributed to the writing of the manuscript. All authors approved the final version of the text.

Corresponding author

Marzieh Pashmdarfard
e-mail: Mpashmdarfard@sbums.ac.ir

Section editor

Prof.a. Dra. Ana Allegretti