

Social Cognition Interventional Program (SCIP) Based on the Theory of Mind (ToM) Effects on the Social Function of High-Functional Autistic Patients

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ABSTRACT

Objective: The present study has been carried out to develop social cognition interventional program (SCIP) based on Theory of Mind (ToM), and to investigate its effects on High-Functional Autistic (HFA) Children's Social function.

Methods: Present study was completely experimental and its participants were randomly assigned to an experimental or a control group (Among 14 HFA, 7 in experimental and 7 in controls were selected as a sample). Interventional programs were taught in 20 sessions. Scott-Bellini Autism Social Skills profiles (ASSP) were used as outcome measures. This profile had 45 Items with 4 subscales. The validity of this scale was confirmed by specialists and its reliability was estimated 0.940.

Results: the gathered data were analyzed using repeated measures and analysis of variance. The results showed that SCIP had a significant effect on participant's social function.

Conclusion: Based on the results, SCIP may be effective in and increasing social function in participants with HFA, and it led to modify their relation in 3 levels: making, maintenance and development.

1. Introduction

Autism is a brain disorder in which communication and interaction with others are difficult. The symptoms of autism may range from total lack of communication with others to having difficulties in understanding others' feelings. Because of the range of symptoms, this condition is now called autism spectrum disorder or ASD (Charman et al., 2011). High-functioning autism disorder (HFAD) is at one end of the ASD spectrum. Signs and symptoms are less severe than other forms of autism. In fact, a person with HFAD usually has average or above-average intelligence and they do not have the delayed language development that's typically found in people

with autism (Ridle et al., 2009). However, they may show other behaviors and signs similar to what's seen in other types of autism.

Impairments in social cognition and social functioning are defining as features of autism (Orsmond et al., 2004). Social-cognitive deficits include difficulties with emotion perception and theory-of mind (ToM), whereas social functioning deficits include problems interacting with others and developing positive social relationships. Impairments in social interaction lie at the core of definitions for HFA (Schlosser & Sigafos, 2008). Impaired social interaction has remained an important component in the diagnosis of ASD since Leo Kanner first described the disorder in 1943). Children with HFAD have widespread

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deficits in the orientation, recognition, and response to social and emotional cues (Hobson et al., 2009). Individuals with HFAD also demonstrate impairment in expressing the appropriate emotion required for a given situation (Baron-Cohen et al., 2008). But some studies indicated that the social and emotional abilities of children with HFAD cannot univocally be characterized as impaired. Under the structured and straightforward conditions of psychological studies, these children often show elementary social and emotional abilities. However, Research shows that children with HFAD impaired in their social-emotional understanding and fail to acknowledge the social regulatory element of emotions, despite their intact elementary emotional understanding. As well as children with HFAD often fail to translate their abilities into appropriate responses (Farran et al., 2011).

Various studies have shown that HFA children are impaired in their ability to understand representational mental states. These children have difficulties to understand that behavior is usually regulated by mental states, such as beliefs (thoughts, expectations etc.), desires (wishes, preferences) and intentions and not by the objective reality (Baron-Cohen, 2010). This insight, currently known as the Theory of Mind (ToM), became known to a wide audience when it was applied by Premack and Woodruff (1978) in their study with chimpanzees. Many studies have shown that the understanding of emotions or social interactions and having social function relies heavily on social cognition (Theory of Mind) understanding. ToM competence is often investigated by testing children's understanding of false belief.

As mentioned in literary children with HFA because of theory of mind impairment have serious problems in social cognition and social function. So far many treatments and interventional programs (likes; pecs, teach, aba,...) based on autism characteristics have been developed but all of them focused on autism challenging behaviors (self-injuries, tantrums,...) and limited just to treatment (clinic) settings with minimum generalizing other social lives. Today many treatment approaches suggest a kind of intervention that focus on social cognition. Based on research findings, social cognition interventional program improved some serious social problems (eye contact, making relationship, social double interaction and ...). Bauminger (2007) and Gevers et al. (2006) suggested that Interventions that target social cognition and social skills in autism showed positive effects. For the sake of social cognition effectiveness on social function we tried to develop a program with "Social cognition interventional program (SCIP)" topic and study its effect on children with HFAD social function in social setting.

In this research SCIP is a group intervention that originally designed based on the social cognition theories (theory of mind) for children with HFAD to improve social cognition, social skills, and community functioning. This study was designed by several components of social cognition (including; emotion recognition task, add-a-thought task, double interview task and pictures identifying task as well as theory of mind). In a pilot study, we found that SCIP was associated with improved performance in ToM and attritional style in a sample of inpatients with autism. Goal of this study was to develop an intervention program and examine its effects on social functions in children with high-functioning autism. We hypothesized those autistic patients who received SCIP showed greater improvements in social cognition and social functioning.

2. Methods

This research was a true experimental research with time series (pretest-posttest, follow up) and control group design.

Participants

Statistical population of this research was all of HF autistic students, were recruited from primary schools for autism (N=69). 14 autistic children who got more than 150 scores in autism high functional scale and diagnosis HF within the autism spectrum were selected randomly as a sample group. The classification of these children was based on a diagnostic investigation, in which the children were observed by a psychiatrist and classified according to the DSM-IV criteria (American Psychiatric Association, 2002). The experimental group consisted of 7 HFA boys and control group were 7 boys with typically developing (mean age 11, range 9-13).

Intervention procedures

As mentioned before a designed program before advance implementation was conducted as a pilot study on a small group of target population (3 students) in 10 sessions, after completion of the defects, SCIP was conducted over a 14-week period (two session/week) with each session lasting 60 min. Each 60-minute session included a review of the agenda for the session, check-in, homework review, and activities related to the session topic. The original SCIP is comprised of two phases: contents and process. Contents which included "training tasks" (emotion recognition, add-a-thought, double interview and pictures identify as well as theory of mind) lasted 8 sessions, and process phase which was training periods lasted 20 or more session.

Table 1. Participant performance in first social function subscale (double social interaction).

Variable	Stage	Groups	N	Sum scores	Mean	SD
Double social interaction	Pre-test	Experiment	7	189	27	4.41
		Control	7	178	25.42	1.33
		Sum	14	167	26.21	4.04
	Post-test	Experiment	7	406	58	15.06
		Control	7	179	25.57	1.37
		Sum	14	585	41.78	21.08
	Follow up	Experiment	7	371	53	5.90
		Control	7	168	24	1.11
		Sum	14	539	38.5	15.50

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Finally, this study utilized a variety of techniques, including cognitive behavior therapy, video modeling, and parent helping parent or PHP modeling and peer modeling to teach a range of social cognitive and social interaction skills.

Measures

All children with HFAD had a verbal and performance IQ of >80, based on the Wechsler Intelligence Scale for Children-III (Wechsler et al., 1986). The children from the control groups were not explicitly tested on intelligence. However, they functioned adequately in regular elementary schools, and according to their teachers they showed intelligence within the 'normal' range. Scott-Bellini Autism Social Skills profiles (ASSP) were used for assessing participant's social function. This profile had 45 Items with 4 subscales. Validity of this scale confirmed by specialists and its reliability was estimated 0.940 (Bellini, 2007).

Gathered data were analyzed using repeated measures and analysis of variance (ANOVA). The results have shown that a significant difference between the scores of the two groups (experimental and control) in the pre-test and post-test. Of course the effectiveness of this program was relatively stable over time. The achieved results showed that social cognitive training were effective in improving social functioning in the experimental group.

Overall, results showed that social cognition training program serve an effective therapeutic strategy which can be used for high-functioning autistic individuals.

3. Results

Table summarizes the results of statistical analyses (ANOVA) to determine two groups' situations in double social interaction. As we can see table contents show that experimental group's scores are significantly higher than control group in posttest and relatively stable over follow up time.

Table 2, shows that mean square for first social function subscale (double social interaction) in the posttest with f ratio (66.01) and sig (0.0001) was increased in the treatment group compared to the control group. As well as this significant with f ratio (5.97) and sig (0.031) relatively were stabled over follow up time. So it demonstrated that training social cognition interventional program was significantly affected on first dimension of social function.

As shown in the Table 3, mean score for second social function subscale (social communication) in the posttest and follow up series is increased in the treatment group compared to the control group.

Table 4, shows within effects for second social function subscale (social communication) in the posttest with f ratio (35.01), sig (0.001) and follow up time with f ratio

Table 2. Test of within effects for first social function subscale (double social interaction).

	Factors	Sum of squares	df	Mean square	F	Sig
Source-time series	Pre-post tests	1008.000	1	1008.000	66.01	0.0001
	Post-follow tests	629.762	1	629.762	5.97	0.021

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Table 3. Participant performance in second social function subscale (social communication).

Variable	Stage	Groups	N	Sum scores	Mean	SD
Social communication	Pre-test	Experiment	7	131	18.71	4.07
		Control	7	128	18.28	3.89
		Sum	14	259	18.5	4.04
	Post-test	Experiment	7	227	32.42	8.40
		Control	7	131	18.71	4.07
		Sum	14	358	25.57	11.95
	Follow up	Experiment	7	204	29.14	2.91
		Control	7	100	14.29	1.39
		Sum	14	304	21.71	8.01

(3.29) and sig (0.095). As seen treatment group condition in social communication were better than control group. So it demonstrates that training social cognition interventional program significantly were effected on social communication the second dimension of social function.

Like 1 & 3 tables, Table 5 shows that, mean score for third social function subscale (suitable social behavior) in the posttest and follow up series has increased in the treatment group compared to the control group.

Table 6, shows the relationship between effects of third social function subscale (suitable social behavior) in the posttest with f ratio (13.76), sig (0.002) and follow up time with f ratio (4.94) and sig (0.046). As seen treatment group condition in suitable social behavior were better than control group. So it demonstrates that training social cognition interventional program significantly were effected on suitable social behavior, the third dimension of social function.

4. Discussion

The first aim of this study was to investigate the social cognition and social function abilities of children with HFAD. It's clear that children with HFAD are capable of elementary theory of mind reasoning and have acquired knowledge about the basics of social interactions, but there is very little information about their more advanced

and applied skills and knowledge such as skills they may need in daily social functions.

The second aim of the current study was developing social cognition interventional program (SCIP). The next aim of the current research was teaching the developed program on treatment group and finally assessment its effects on HFAD patient's social function. As mentioned before (tables; 1, 3, 5) the results showed sizable difference between pretest and posttest scores of 2 group participants (treatment-control). Even this discrepancy relatively stabled over follow up time. As it can be seen in tables; 2, 4, 6 within effects for all subscales (double social interaction, social communication and suitable social behavior) of social function in pre-posttest and posttest- follow tests series were significant ($P < 0.05$). Finally results demonstrated that participants (treatment group) who received SCIP had statistically significant improvement in social function relative to other participants (control group) who not received SCIP.

Psychologists who deal with HFAD suggest that, social interacting or more social cognitive aspect is the most important feature of the development which should be reached in evolution process. Social cognition or in some texts, social thinking is the long-life capability which causes a child to become mature and adjust his or her behaviors to those of peers and other people in social settings (Capps et al., 2010).

Table 4. Test of within effects for second social function subscale (social communication).

Factors	Sum of squares	df	Mean square	F	Sig	
Source-time series	Pre-post tests	108.036	1	108.036	35.01	0.001
	Post-follow tests	131.250	1	131.250	3.29	0.005

Table 5. Participant performance in third social function subscale (suitable social behavior).

Variable	Stage	Groups	N	Sum scores	Mean	SD
Suitable social behavior	Pre-test	Experiment	7	123	17.57	4.42
		Control	7	114	16.28	1.9
		Sum	14	237	16.92	3.45
	Post-test	Experiment	7	217	31	7.65
		Control	7	112	16	1.52
		Sum	14	329	23.50	9.41
	Follow up	Experiment	7	177	25.28	3.72
		Control	7	102	14.57	2.14
		Sum	14	279	19.92	6.28

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Reviews of the literature indicate that children who are diagnosed with HFAD like other spectrum autism show significant impairment in social interaction include: problems with eye contact, nonverbal understanding, difficulties in double interaction and social reciprocity, making or initiating communication, having delays in spoken and receptive language, being stereotyped and having echolalia speech, and difficulties with play-both with peers and individually. As well as Children diagnosed with HFAD show a narrow pattern of behavior and interests, have repetitive behaviors, become preoccupied with objects and items also difficulties in understanding other people's mental state and how people differ in beliefs, desires, and needs (Shattuck, 2006).

Tager-Flusberg (1999) found that deficits in ToM were thought to underlie many of the challenges children with autism face in social situations, such as understanding vague language, reading non-verbal cues, and knowing when to approach potential social partners. These findings were therefore promising because improvements in social cognition may ultimately lead to improvements in social behavior.

Ozonoff et al. (1991), Baron-Cohen et al. (2010), Razza & Blair (2009) suggested, autistic children problems in social contexts were fundamental problems which caused by their impairments in theory of mind, central coherence and executive function and directly related to brain structure

and neurodevelopment qualification. In some clinical studies children with HFAD are basically capable of responding appropriately in social situations, but often do not see the necessity of such responses. While normally developing children seem to select, attend to and respond to relevant information without difficulties, it can be hypothesized that children with HFAD need to apply extra effort to put their responses in position or to make them online.

Crick & Dodge (1984) developed a model about social functioning. According to their model, social functioning includes five steps: encoding, interpretation and representation, goal selection, deciding on the response to take, completing the selected behavior. Based on the Crick & Dodge it seems that; autistic children have serious impairment in all factors of Crick & Dodge social functioning model. Similar Tager-Flusberg, Baron-Cohen and Crick and Dodge's present study findings confirm that HFAD unfortunately has serious difficulties to gain skills related to social cognition and social function because of mind theory and executive function and other neurodevelopment impairments.

Therefore training interventional programs based on the social cognition theory (ToM) can be improved HFADs social functions as SCIP could be improved in this study.

This study like other studies has some limitations include the true-experimental nature of the design. A true

Table 6. Test of within effects for third social function subscale (suitable social behavior).

	Factors	Sum of squares	df	Mean square	F	Sig
Source-time series	Pre-post tests	124.321	1	124.321	13.76	0.002
	Post-follow tests	168.583	1	168.583	4.94	0.016

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randomized control design with larger samples and other control conditions would be optimal to test the efficacy of SCIP. Another limitation is related to test completion by patient's parents or teachers because of patient disabilities in reading test items which can lead having bias ideas. generally speaking, these results are clearly preliminary, so they should be interpreted with caution.

Finally, this study suggests that HFAD children because of social cognitive impairments need treatments program which do not limit just behavior improvement but it needs to make cognitive scheme their cognitive-behavior treasury. Also based on significant importance of social interaction in social living, it is recommended that the social skills course or training program can be administered and set in academic schedule.

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References

- Baron-Cohen, S. (2010). Understanding other minds. *Journal of Child Psychology and Psychiatry*, 60, 210-219.
- Baron-Cohen, S., Wheelwright, S., Hill, J., Raste, Y & Plumb, I. (2008). The "Reading the Mind in the Eyes" Test Revised Version: A study with normal adults, and adults with Asperger syndrome or high functioning autism. *Journal of Child Psychology and Psychiatry and Allied Disciplines*, 42(2), 241-251.
- Bauminger, N. (2007). Group social-multimodal intervention for HFASD. Brief report. *Journal of Autism and Developmental Disorders*, 37(8), 1605-1615.
- Bellini, S., & Hopf, A. (2007). The development of the Autism Social Skills Profile: A preliminary analysis of psychometric properties. *Journal of Autism and Other Developmental Disabilities*, 22(2), 80-87.
- Charman, T., Drew, A., Baird, C., & Baird, G. (2011). Measuring Early Language Development in Preschool Children with Autism Spectrum Disorder Using the MacArthur Communicative Development Inventory (Infant Form). *Journal of Child Language*, 30(1), 213-236.
- Capps, L., Yirmiya, N., Sigman, M. (2010). Understanding of simple and complex emotions in non-retarded children with autism. *Journal of Child Psychol Psychiatry*, 39(7), 1169-1182.
- Farran, E. K., Branson, A., King, B. J. (2011). Visual search for basic emotional expressions in autism; impaired processing of anger, fear and sadness, but a typical happy face advantage. *Journal of Research in Autism Spectrum Disorders*, 5(1), 455-462.
- Gevers, C., Clifford, P., Mager, M., & Boer, F. (2006). Brief report: A theory-of-mind-based social-cognition training program for school-aged children with pervasive developmental disorders: An open study of its effectiveness. *Journal of Autism and Developmental Disorders*, 36(4), 567-571.
- Hobson, R., Lee, A., & Hobson, J. (2009). Qualities of symbolic play among children with autism: A social-developmental perspective. *Journal of Autism and Developmental Disorders*, 39(1), 12-22.
- Orsmond, G. I., Krauss, M. W., Seltzer, M. M. (2004). Peer relationships and social and recreational activities among adolescents and adults with autism. *Journal of Autism and Developmental Disorders*, 34(3), 245-265.
- Ozonoff, S., Pennington, B. F., & Rogers, S. (1991). Executive function deficits in high-functioning autistic individuals: Relationship to theory of mind. *Journal of Child Psychology and Psychiatry*, 32(7), 101-105.
- Schlosser, R. W., & Sigafos, J. (2008). Communication Intervention for Children With Autism Spectrum Disorders. In J.L. Matson (Ed.), *Clinical assessment and intervention for autism spectrum disorders* (pp. 299-326). Oxford, UK: Elsevier Science, Inc.
- Tager-Flusberg, H., & Sullivan, K. (2004). A second look at second-order belief attribution in autism. *Journal of Autism and Developmental Disorders*, 24(5), 577-586.