



Effect of Intervention Training on the Mother-Child Relationship in Children with Autism: A Control Trial

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Abstract

Background: The disability to recognize emotional and mental states in others' facial expressions is acknowledged as one of the major developmental-behavioral problems in children with autism. Therefore, it is necessary to study the effect of facial emotion recognition training on the interaction skills of children with autism.

Objectives: The aim of this study was to investigate the effect of emotional facial recognition on the mother-child relationship in children with autism.

Methods: The present clinical trial was conducted based on a pre-test post-test design. Children aged 6-12 years with high- or moderate-functioning autism were assigned to two groups using the random block sampling method. Children in the intervention group were trained in 10 45-min sessions each week for 10 weeks using 40 images related to four situations of happiness, sadness, anger, and fear. The mother-child relationship questionnaire was completed one day before and one day after the intervention in both groups by the research assistant. Data were analyzed with SPSS software version 22.

Results: Emotional state training improved the mother-child relationship in the intervention group. There was also a statistically significant difference between the total scores of the mother-child relationship in the intervention group and the control group ($p < 0.000$).

Conclusions: The findings of this study suggest that teaching facial emotion recognition to children with autism can be very effective in promoting mother-child interaction and consequently, their interaction with society. Health officials can benefit from the findings of this study to improve facial recognition and consequently, the mother-child relationship.

Keywords: Facial Emotion, Training, Mother-Child Relationship, Children, Autism

1. Background

Autism, also referred to as autistic spectrum disorder, has been recognized as the third leading cause of impaired growth and development in children preceded by mental retardation and cerebral palsy (1). Major cognitive and behavioral deficits of this disease are often observed as early as 18 - 24 months of age; nonetheless, the definitive diagnosis can be made at 3 years of age (2). Available statistics show that we are facing more than a 6% increase in autism spectrum disorder in the world. In recent years, 0.5 - 1% of children have been diagnosed with autism worldwide

(3). The prevalence of this disease has increased 20 times in the last decade, so that one person in every 68 births in the world has autism (4). This ratio in Iran is one child with autism per 150 births (5). This issue will pose numerous daunting challenges to health care organizations in the foreseeable future (3). Children with autism are confronted with serious problems in cognitive, motor, and interactive domains affecting their verbal/behavioral development and social interactions in different situations. Consequently, these children need long-term treatment, rehabilitation care, speech therapy, and occupational therapy (6).

This imposes heavy costs on the healthcare system and families because they face challenges in financing and providing welfare and care facilities to their children (7). On the other hand, the characteristics of this disorder (the emergence of symptoms after a period of normal growth and development of the child and the lack of definitive treatments) as well as the inability of these children to talk and interact constructively with the world around them, make families of these children, especially their mothers as the primary caregiver. Therefore, their mothers experience severe psychological stress due to anxiety, depression, shame, confusion, and loss of personal liberties and recreation, leading to a severely affected emotional bond and mother-child relationship (8).

The mother-child relationship is a combination of behaviors, feelings, and expectations that are unique to mother and child. It is influenced by maternal personal characteristics, age, and education, as well as socio-emotional support she receives, family circumstances, and the child's temper and disease (9). Children with autism face multiple communication problems, they are unable to interact properly with the world around them and even have difficulty in communicating with their close friends or relatives and mothers (10). Therefore, some studies have shifted their focus onto the mother-child relationship in children with autism. The results of these studies have indicated that mothers who foster a stronger relationship with their children have achieved greater success in their education and care (11, 12). Therefore, the treatment teams, especially pediatric nurses, should take responsibility for supporting these mothers and increasing their participation in taking care of autistic children by developing family-centered care (13). Accordingly, mothers can develop an efficient relationship with their children and gain success in their education and care (14). Family-centered care is philosophical care and professional support for children and families with a special focus on the family (15). This approach to care strengthens family relationships and reduces the adverse effects of disease on children and families by the active participation of family members in daily care (16). In this regard, studies have demonstrated that the active involvement of mothers in the education of children with autism has improved the quality of children's education (52%) (17). In the same vein, in their study, Murphy et al. pointed out that the involvement of mothers in child education creates a positive family atmosphere. They added that parents' sense of self-sufficiency and competence is effective in the formation of children's appropriate behaviors and constructive social interactions (18). Therefore, the development of training based on family-centered care is one of the most important responsibilities of pediatric nurses in an effort to promote mother-child

relationships in parents of children with autism (19). The disability to recognize and respond to emotional and mental states in others' facial expressions is one of the major behavioral-communication problems confronted by children with autism. Although this problem seriously limits the interaction of these children with family members and society, it has not yet been considered properly (20). The recognition of emotional states is considered an important factor in social communication. Moreover, due to the importance of facial expressions in establishing social relationships, a defect in this ability strongly affects the quality of interactions among these children (21). Accordingly, in recent years, several studies have assessed the effect of emotional state training on improving the social interactions of children with autism. These studies have indicated that organized education can improve the social interactions of these children with the world around them (22, 23). As Conallen and Reed stated in their study, the use of video clips improved the recognition of emotional states in different situations among children with autism and expanded their interactions with the world around them (2). Moreover, teaching appropriate emotional and behavioral states to these children can reduce some of the secondary problems of this disorder in autistic children and help them make progress with the recognition and responding to facial expressions (24). Therefore, an increase in the prevalence of autism in children worldwide and in Iran has highlighted the critical need for attention to the effect of teaching emotional facial expression recognition to autistic children to develop mother-child relationship.

2. Objectives

The present study aimed to assess the effect of facial emotion recognition training on the mother-child relationship in children with autism.

3. Methods

3.1. Study Design

The present study was a randomized controlled trial with two parallel (one intervention group and one control group) groups that was conducted in a single-blind manner in three centers providing services to children with autism affiliated with the Hamadan University of Medical Sciences in the west of Iran from January 2019 to August 2020.

3.2. Participants

Participants in the study were children with autism and their mothers. The sample size was estimated to be 27

cases for each group considering $\beta = 80\%$ and $\alpha = 0.05$ and according to the study by Conallen and Reed (2).

The inclusion criteria were as follows: the of age between 6 and 12 years, high or moderate-functioning based on the psychiatrist's report and the diagnostic and statistical manual of mental disorders (DSM IV) Guideline, obtaining a score of 22 from the instructor based on the Autism Spectrum Screening Questionnaire, ability to understand and perform empirical instructions, no other physical, cognitive-developmental, or mental disorders, no visual impairment, no change in the type and dose of drugs used by the child one month before the study, and the desire and consent of their parents to participate in this study. These children were selected and invited to participate in this study by available sampling. Afterward, they were assigned to the intervention (emotional facial training) and control (routine care) groups by block random sampling method. Exclusion criteria were absence in three or more training sessions and changes in the dose of the child's medication during the study.

After determining the sample size, a total of 53 children with autism were screened for eligibility; three autistic children had changes in the dose of their drug, and finally, 50 autistic children with provided written informed consent were enrolled and randomly assigned to one of two groups.

For this purpose, the word A was considered for the intervention group and the word B for the control group. Then, 24 blocks of 4 were written on a piece of paper and placed in a bag. Each time a piece of paper was come out accidentally from the bag by the subjects, those patients were assigned to the intervention and control groups accordingly (Figure 1).

3.3. Procedures

The facial emotion expression training in the intervention group was carried out in a room with a desk, a set of chairs, bookshelves, educational pamphlets, and facial emotion expression training booklets for children with autism. In this method, the children (accompanied by their mothers) were trained by the researcher in 10 sessions of 45 minutes each week for 10 weeks using 40 images related to four situations of happiness, sadness, anger, and fear. Mothers were present to learn how to teach the child emotional expressions and assist the researcher in training. For training, 40 different images related to the four states of happiness, sadness, anger, and fear (10 images from each state) were used. The child selected the appropriate emotional state appropriate to the target face with the help of the researcher and mother. All images depicted the face of a boy in an A5 size colored paper. The images were individually displayed from the frontal view,

and the child was asked to select each image to fit the target face without any explanation. Each time the child recognized an image correctly, he/she was encouraged by the mother and researcher, and the next image was displayed. Nonetheless, in case of a wrong answer, the researcher or mother asked the patient to "try again", followed by an indirect reference to the correct answer. This process was repeated. In the event of the repetition of the wrong answer, the correct answer was directly referred to and continued until the recognition of the correct answer. In each session, four pictures (one picture related to each emotional state) were taught to the child. The mother accompanied the researcher and learned how to teach. Whenever the mother expressed her desire and readiness to teach the child, she was entrusted with this task. This mother-directed training was supervised by the researcher to ensure its accuracy and quality.

In this study, the assistant researcher, who was not aware of the allocation of individuals in the intervention and control groups, collected the demographic information and Mother-Child Relationship Questionnaire after completion by mothers in both groups one day before and one day after the intervention.

3.4. Instruments

3.4.1. Demographic Characteristics Form

This questionnaire included information regarding age, gender, economic status, number of children, number of children with disease other than autism, number of children with autism and the severity of their autism, age of parents, parents' education, parents' occupation, living with parents or living in single-mother and single-father families). The face and content validity of this questionnaire was evaluated in the current study.

3.4.2. Mother-Child Relationship Questionnaire

This questionnaire was designed by Ross in 1961 and is one of the most important questionnaires for assessing the mother-child relationship. It contains four subscales, namely acceptance, overprotection, leniency, and rejection, which are rated based on a 5-point Likert scale. Each subscale consists of 12 items, yielding a total of 48 items. In this questionnaire, the items 1 - 39 have a positive score, while the items 40-48 have a negative score. The numerical value for each answer is regarded as the raw score. To obtain the raw score of each subscale, the score of the items of each domain are added together. The higher score of the acceptance subscale and the lower scores of the other subscales indicate a better relationship. Face and content validity, as well as the reliability of this scale, were confirmed. The reliability of this scale using test-retest for

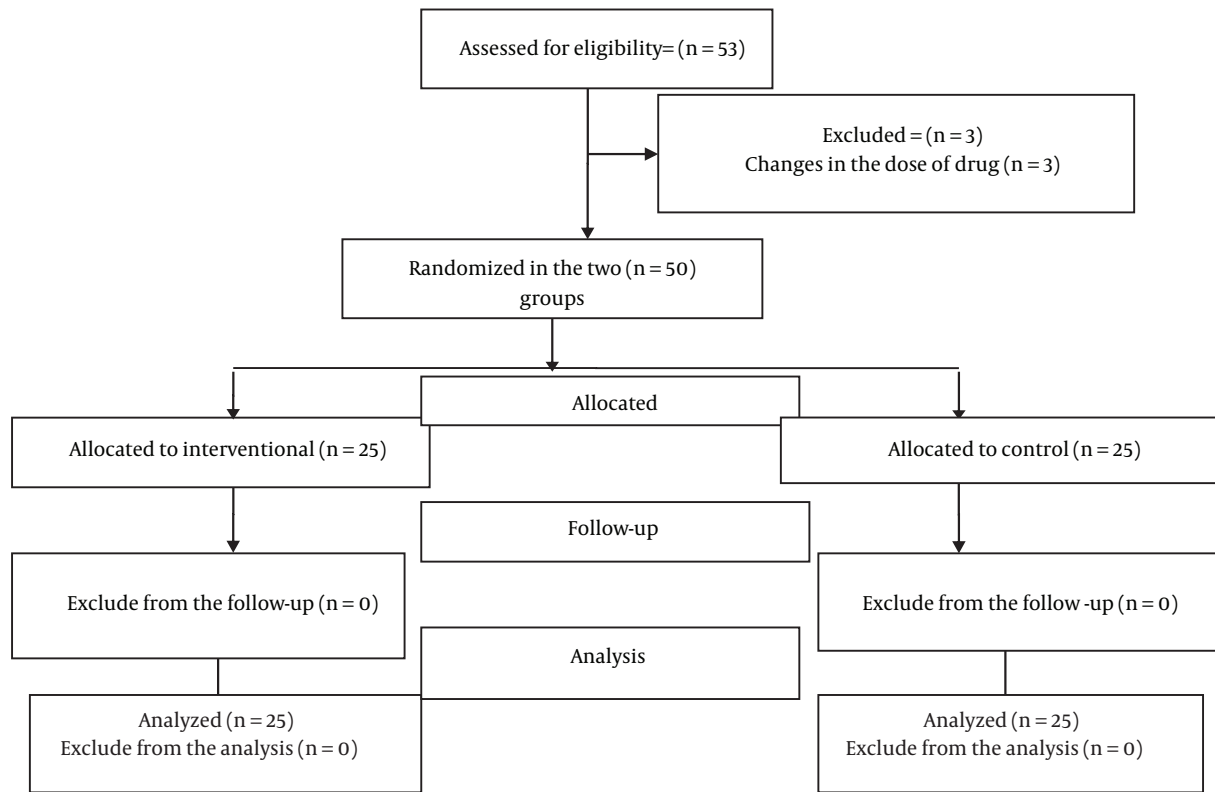


Figure 1. The study design

subscales was as follows: acceptance: 0.77, overprotection: 0.78, leniency: 0.71, and rejection: 0.72, and for the whole scale was reported to be 0.80 (25).

3.5. Data Analysis

Data were analyzed by SPSS software (version 22) using descriptive statistics (e.g., mean, standard deviation, number, and percent). The paired *t*-test was used to compare the mean scores of the mother-child relationship before and after the intervention in each group, while the independent *t*-test was utilized to compare the mean scores of the mother-child relationship between two groups. A *P*-value of 0.05 was considered statistically significant.

3.6. Ethical Considerations

The study design was approved by the Ethics Committee of the Hamadan University of Medical Sciences (Umsha.rec.1399.330) and recorded at the Iranian Registry of Clinical Trials (IRCT 20190703044082N1). Before obtaining voluntary consent, the participants were informed of the study purpose, methods, anticipated benefits and risks

of participation, and their freedom to discontinue participation and withdraw their consent at any time. The written informed consent was obtained from all the parental after providing them with sufficient information on the study.

4. Results

4.1. Demographic Information

Out of 50 children with autism that participated in two groups, 41 cases (82%) were boys, and the majority of them (30 (60%)) had moderate-functioning autism in both groups. The mean age of children in the intervention control groups was 10.56 ± 2.15 and 10.46 ± 2.32 years, respectively.

The majority (22 cases, 44.0%) of mothers of autistic children in this study had a diploma degree and were self-employed. The mean age of mothers of autistic children in the intervention and control groups was 36.12 ± 3.71 and 35.57 ± 3.38 years, respectively. There was no statistically significant difference in demographic characteristics between the intervention and control groups ($P > 0.05$) (Table 1).

Table 1. Socio-demographic Information of the Participants in the Intervention and Control Groups^a

Socio-demographic Variables	Intervention Group	Control Group	P-Value
Gender of the children			0.228 ^b
Female	4 (16.0)	5 (20.0)	
Male	21 (84.9)	20 (80.0)	
Marital status of mothers			0.552 ^b
Married	22 (88.0)	23 (92.0)	
Divorced	3 (12.0)	2 (8.0)	
Single	0 (0.0)	0 (0.0)	
Mother's education			0.531 ^b
Illiterate	2 (8.0)	3 (12.0)	
Primary	7 (25.0)	5 (20.0)	
High school (diploma)	10 (40.0)	12 (48.0)	
University	6 (24.0)	5 (20.0)	
Mother's job			0.417 ^c
Self-employed	10 (40.0)	12 (48.0)	
Employee	6 (24.0)	7 (25.0)	
Housewife	9 (36.0)	6 (24.0)	
Number of children			0.324 ^b
1	4 (16.0)	2 (8.0)	
2	15 (60.0)	18 (72.0)	
3 and more	6 (24.0)	5 (20.0)	
Living place			0.173 ^c
Hamden	15 (60.0)	13 (52.0)	
Out of Hamden	10 (40.0)	12 (48.0)	
Level of autism in children			0.204 ^c
High-functioning	10 (40.0)	10 (40.0)	
Medium-functioning	15 (60.0)	15 (60.0)	
Age of children (y)	10.56 ± 2.15	10.46 ± 2.32	0.183 ^d
Age of mothers (y)	36.12 ± 3.71	35.57 ± 3.38	0.586 ^d

^a Data are presented as No. (%) or mean ± SD.

^b Fisher's exact test

^c Chi-square test

^d Independent t-test

4.2. Mother-Child Relationship Among Children with Autism

Before the intervention, the control and intervention groups were not statistically significantly different in the mother-child relationship score ($P = 0.741$). Nonetheless, the paired t-test demonstrated a statistically significant difference in the score of the mother-child relationship in the intervention group after the intervention ($P = < 0.000$). Moreover, the independent t-test revealed a statistically significant difference between the intervention and control groups in terms of mother-child relationship score ($P < 0.000$; [Table 2](#)). A statistically significant difference

was also observed between the scores of the mother-child relationship in all domains in the intervention group in pre-test and post-test, as well as between the two intervention and control groups in post-test ([Table 3](#)).

5. Discussion

The present study showed the positive effects of facial emotion recognition training in children with moderate-functioning autism. Moreover, it was found that educating

Table 2. Comparison of the Mother-Child Relationship in the Intervention and Control Groups^a

Critical thinking	Pre-test, Mean \pm SD	Post-test, Mean \pm SD	Mean Change, X \pm SD	Confidence Interval	t	P-Value ^b
Intervention	37.26 \pm 3.44	58.11 \pm 3.65	-7.21 \pm 5.33	7.67, 2.58	1.04	< 0.000 ^c
Control	36.98 \pm 2.86	37.17 \pm 2.03	-5.72 \pm 3.97	6.44, 1.15	1.21	< 0.82
t^d	1.06	3.12	3.76			
P-value	0.741	< 0.000 ^c				
Confidence interval	0.33, 0.72	1.03, 2.87				

^a Data are presented as Mean \pm standard deviation (SD).^b Paired t-test^c Significant^d Independent t-test**Table 3.** Comparison of the Dimensions of the Mother-Child Relationship in the Intervention and Control Groups

Areas	Pre-test, Mean \pm SD	Post-test, Mean \pm SD	Mean Change, X \pm SD	P-Value ^a
Acceptance				
Intervention group	35.11 \pm 1.87	52.74 \pm 2.23	8.75 \pm 1.07	< 0.0001 ^c
Control group	35.21 \pm 1.63	35.77 \pm 01.86	0.48 \pm 0.43	0.461
P-value ^b	0.362	< 0.0001 ^c		
Overprotection				
Intervention group	38.98 \pm 1.43	25.72 \pm 1.04	-10.94 \pm 1.22	< 0.0001 ^c
Control group	39.11 \pm 1.65	38.97 \pm 1.13	0.54 \pm 0.23	0.324
P-value ^b	0.422	< 0.0001 ^c		
Overindulgence				
Intervention group	49.37 \pm 1.78	29.48 \pm 1.11	-18.84 \pm 2.67	< 0.0001 ^c
Control group	48.96 \pm 2.35	47.38 \pm 0.61	0.71 \pm 0.66	0.472
P-value ^b	0.87	< 0.0001 ^c		
Rejection				
Intervention group	36.16 \pm 1.78	24.88 \pm 1.12	-10.96 \pm 2.84	< 0.0001 ^c
Control group	36.08 \pm 1.86	36.38 \pm 1.80	0.53 \pm 0.26	0.528
P-value ^b	0.87	< 0.0001 ^c		

^a Paired t-test^b Independent sample t-test^c Significant

children with moderate-functioning autism causes behavioral development and improves the interaction skills of these children. Furthermore, in the present study, there was a statistically significant relationship between the mother-child relationship and marital status, mothers' age and education, and children's level of autism (26). In agreement with the findings of the present study, some studies have also acknowledged that the age and education of parents, child's level of autism, and family stability affect the parent-child relationship in children with autism (27). In the pre-test stage, mothers of children with autism participating in the present study stated that their children were reluctant to interact with others, even their moth-

ers. In line with the findings of the current study, Heidary et al. stated that autistic children were reluctant to interact with their family members, and even their mothers (28). In their study, HasanPour et al. also pointed out that the initial mother-child relationship in children with autism was weak and inefficient (1). In the mentioned study, facial emotion recognition training in children with high- and moderate-functioning autism improved and enhanced their interactions with their mothers.

In agreement with the findings of the present study, other studies have reported the constructive and beneficial effects of facial emotion recognition training in children with high-functioning autism (2, 21). HasanPour et al.

reported that mothers of children with autism complain about their children's inability to recognize emotional and mental states in others' facial expressions (1). Conallen and Reed declared that inability to recognize emotions in others' facial expressions severely impairs the effective and appropriate interactions among these children. Facial emotion recognition training improves and enhances the interactions of these children with their mothers (2). Krysko and Rutherford revealed that young children with autism performed poorly in the recognition of angry faces. This disability could seriously limit their interaction and sometimes makes them experience anger and harassment. Therefore, facial emotion recognition training can help these children in the recognition of emotional states in others' facial expressions and improve their interactions with the world around them (29).

Along the same lines, Farran et al. reported that children with autism are slow to process emotional states of fear, anger, and sadness, which in turn affects their effective and constructive interaction with others, including family members, and especially mothers. Therefore, facial emotion recognition training can improve their social interactions (21). In a similar vein, Ghasempour et al. examined the effect of recognizing emotional states in others' facial expressions on the social skills of children with autism. Their results demonstrated that facial emotion recognition training enhanced the social interaction skills of children with autism (30).

Finally, it can be argued that facial emotion recognition training improves and enhances mother-child interaction in autistic children. Accordingly, the high prevalence of autism in Iran and worldwide highlights the critical need for meticulous and thoughtful planning to improve the interaction skills of these children. In this regard, the findings of the current study would be of great help to health officials and policymakers in improving the quality of autistic children's interaction with their parents and community in various dimensions.

5.1. Limitations of the Study

One of the notable limitations of the present study was the lack of participation of fathers of autistic children, probably due to their busy schedules. Therefore, it is suggested that future studies evaluate the effect of facial emotion recognition training on the interaction of autistic children with other family members, especially fathers. Moreover, the small sample size was another limitation of the current study. In this regard, it is recommended that similar studies in the future be conducted in different communities with larger sample sizes to more accurately estimate the effects of facial emotion recognition training on the mother-child relationship in children with autism. The

results of these large-scale studies would be of great help to managers and policymakers in the implementation of more comprehensive measures to support these parents and improve their children's interactions with the world around them.

5.2. Conclusions

Mothers of children with autism in the present study showed overprotection and leniency towards their children due to their inability to recognize emotional states and interact properly. However, after being trained for facial emotion recognition, they could read and properly respond to the emotional states of their mothers and others, as well. Consequently, their parents were more receptive to these children, behaved well toward them, and discontinued overprotection and leniency. They also derived great satisfaction from interacting with autistic children and reported a better mother-child relationship.

Footnotes

Authors' Contribution: FM, FM, F CH, MS, and MR were involved in the conception of the study and designed the study. They were responsible for data collection. S KH analyzed the data. FM, FM, and F CH drafted the primary manuscript.

Clinical Trial Registration Code: IRCT 20190703044082N1.

Conflict of Interests: There are no conflicts of interests.

Ethical Approval: The study design was approved by the ethics committee of the Hamadan University of Medical Sciences (UMSHA.rec.1399.330)

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Informed Consent: The written informed consent was obtained from all the parents after providing them with sufficient information on the study.

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