# A pilot study of family-based management of behavioral excesses in young Iranian children with autism spectrum disorder

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## ARTICLE INFO

## ABSTRACT

*Objective:* Parent-mediated early behavioral interventions are considered as effective approaches in the treatment of children with Autism Spectrum Disorder (ASD). The majority of these interventions focus on social-communication deficits rather than behavioral excesses which severely irrupt child and family social life as well as the child's appearance behavior and learning processes. The study examines the effectiveness and feasibility of Family-based Management of Behavioral Excesses of Autism Program (FMBEAP) on Iranian families.
*Method:* This pre-post and follow-up intervention study involved 17 parents of children with DSM-5 diagnosis of ASD recruited from Tehran Autism Center. All parents conducted FMBEAP on their children while receiving 10-weekly group supervision on top of everyday on-line individual coaching. The study's measures were Repetitive Behavior Scale-R, video-monitoring of child-parent Interaction, Clinical Global Impression-Improvement Scale, Parental Self-Efficacy and Parenting Stress Index-short form. The measures were applied to the sample three times: pre and post-intervention and at one-month follow-up.
*Results:* The Results showed high and low order behavioral excesses significantly decreased at post-intervention and the follow-up. 15 out of 17 children reached to recovered or highly recovered at post-test. Parents showed significant improvements in self-efficacy and parenting stress scales. The intervention was highly accepted by them.
*Conclusion:* FMBEAP is shown to be a feasible, acceptable and effective intervention to improve autistic behavioral. The parents should also benefit from the program in terms of self-efficacy and parenting stress. FMBEAP is highly recommended for overcoming behavioral excesses along with those interventions focus on behavioral deficits in ASD.

## 1. Introduction

Autism spectrum disorder (ASD) is a major public health challenge affecting 6 per 1000 children worldwide (Elsabbagh et al., 2012). This neurodevelopmental disorder characterized by behavioral deficits along with behavioral excesses such as restricted, repetitive and stereotyped behaviors (American Psychiatric Association, 2013). Behavioral excesses are grouped into two categories: lower-order and higher-order behaviors. Lower order behaviors include motor actions (e.g. stereotyped behaviors, repetitive manipulation of objects, and self-injurious behaviors), whilst higher-order behaviors contain repetitive and cognitive or complex behaviors like compulsions, rituals, and routines, insisting on consistencies and restricted interests (Leekam et al., 2011; Szatmari et al., 2006). These behaviors have huge impact

on different aspects of cognitive functioning and psychosocial adjustments of the child. They would cause difficulties in the entrance to the educational environment (Sigafoos et al., 2009; Ryan, 2018) and impede the child's ability to establish meaningful social interactions (Conroy et al., 2005). Behavioral excesses also interfere with learning new skills and participating in daily life activities (Morrison and Rosales-Ruiz, 1997; Pierce and Courchesne, 2001; Loftin et al., 2008). Managing behavioral excesses is repeatedly described by parents as harder compared to reducing social- communication deficiencies (Dunst et al., 2011). In fact, these behaviors increase parenting stress and reduce parents' self-efficacy (Lecavalier et al., 2006; Giallo et al., 2013; Schutte et al., 2018).

The majority of available reports on therapeutic interventions of behavioral excesses (Raulston et al., 2019; Chugani et al., 2016;

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Lanovaz et al., 2011; Tse et al., 2018) pose some limitations: 1) They are mostly single case studies targeting one type of behavioral excess. Thus, the generalizability of the results is under serious question. 2) The recommended procedures can hardly be implemented at home. While these behaviors are initiated and gradually solidify during everyday life at home. 3) Some interventions, such as physical exercise (Oriel et al., 2011), auditory stimulation (Saylor et al., 2012), and pharmacotherapy (Rana et al., 2013) did not yield a significant effect. On the other hand, home/ parent-based interventions currently receive attention because these interventions can increase likelihood of positive effects. But most of the research investigated the effectiveness of these interventions on behavioral deficits, and behavioral excesses remain forgotten (Harrop, 2015). Additionally, comprehensive treatments such as the Denver model (Dawson et al., 2010) would not significantly influence behavioral excesses, either. Therefore, it is necessary to develop an effective treatment program for behavioral excesses in ASD.

There have been some studies to investigate the effectiveness of parent-mediated behavioral interventions on behavioral excesses. For example, Boyd et al. (2011) investigated the impacts of the family-implemented intervention for behavioral inflexibility in a clinic setting. Their results showed that repetitive behaviors were decreased among 4 out of 5 children. Consequently, children's adaptive behaviors improved. Similarly, Grahame et al. (2015) studied the effects of parent-group intervention in managing repetitive behaviors of 3 to 7-year old children with ASD. Repetitive motor movements, rigidity, and sensory interests were not significantly modulated, after 8 weekly sessions intervention. Although a significant reduction in preoccupations with restricted patterns of interest and limited play were observed in the follow-up assessment. The positive effects would be maximized when implying during the early stages of life. Dawson et al. (2012) showed that early behavioral interventions could alter the course of brain development and are associated with normalized brain activity and thereby increase the most positive long-term outcomes. Other evidence pointed to the sustainability of effective early intensive behavioral interventions in community settings for children with ASD. Accordingly, home-based early bird intervention on behavioral excesses are required for different cultures.

Although the autism signs and the majority of center-based interventions are supposed to be culture-free, cultural issues such as family values, expectation from treatment, cultural attitudes towards diseases and available community support, play important roles in designing and outcomes of home-based interventions (Pitten, 2008; La Roche et al., 2018; Grinker et al., 2015). The aim of the current study is to introduce an early bird home-based intensive intervention to improve excessive behaviors in young Iranian children with ASD. The cultural issues were taken into account during the development of the program. The feasibility and efficacy of the program on behavioral excesses and parents' self-efficacy and parenting stress are also reported.

## 2. Material and methods

### 2.1. Sample and study design

This is a quasi-experimental research study without a control group with pre, post and follows up assessment. Participants were 17 parents of children with ASD (age 24–48 months, mean = 35.29 (SD = 7.15). Inclusion criteria were: a) diagnosis of ASD (DSM-5, 2013) established by at least a child psychiatrist and a consultant clinical psychologist, separately, in two different settings. b) age under 4 years old. c) no evidence of other medical problems. d) parent's ability to speak and read Persian. Exclusion criteria were: any evidence for severe psychological or neurological disorders, besides the main diagnosis (i.e. ASD) before or during the course of the study. b) enrolment in any other therapeutic interventions during the course of the intervention, except for medical treatment. The participants received "Family-based Managing of Behavioral Excesses Autism Program" (FMBEAP) during

10 weekly sessions.

### 2.2. Measures: Outcome measures for baseline and post-assessment

Demographic Data Form: This form was developed by the authors to gather demographic information of children and parents. This form was filled out by parents in the baseline. Stanford-Binet Intelligence Scale (SB-5) (Roid, 2003): This scale designed to assess a child's Intelligence and includes both Non-Verbal (NV) and Verbal (V) intelligence tests, as well as fluid reasoning, knowledge, quantitative reasoning, visual-spatial processing, working memory. This test was standardized by Roid in 2003. The SB-2 was conducted by a trained research psychologist in the baseline. Vineland Adaptive Behavior Scales (VABS) (VABS; Sparrow et al., 1984): This scale is a commonly used measure to evaluate several domains of adaptive behavior (communication, Daily living skills, socialization, motor skills) based on parental report of child's behavior in daily living activity (VABS; Speraw et al., 1984). This measure was also completed at the baseline. Clinical Global Impression- Improvement Scale (CGI-I) (Guy, 1976): The CGI-I is a 7-point scale that assesses the global improvement or change in patients. This scale allows the clinician to assess how much the impairment has improved or worsened compared to the baseline state. ratings are 1 = very much improved, 2 = much improved, 3 = minimally improved, 4 = not changed, 5 = minimally worse, 6 = much worse, 7 = very much worse. The clinicians rated independently global response to treatment based on all available information (RBS-R, VABS and video-recorded observation method in the clinic). Following Graham et al. (2015), subjects with scores 1 and 2 were considered as responders. This measure was used at the termination of the intervention (posttest). Repetitive Behavior Scale-Revised (RBS-R) (Bodfish et al., 2000): This scale contains 43 items with 4-point Likert scale (0 = never, 1 = sometimes, 2 = most of the time, 3 = always) (Bodfish et al., 2000). It contains six subscales including stereotyped behavior, self-injurious behavior, compulsions behavior, routine behavior, sameness behavior, and restricted behavior. This scale was completed by parents at 3 outcome assessment points (before and after intervention and follow-up). Video monitoring: A clinical observation of the child-parent interaction was video-recorded during playtime for about 30 min at the clinic. The monitoring took place at 3 outcome assessment points. Instructions about playing with children were provided to parents at any point. Parents were instructed to communicate with their children in the activity of accepting or refusing to use toys and encourage spontaneous communication and interaction for 30 min. Behavioral excesses were operationalized using the definitions and categorizations in Direct Observation of Repetitive Behaviors (DORBA) (Boyd et al., 2010): The duration and frequency of behavioral excesses were observed and graded during parent-child interaction. Lower order behavioral excesses, including repetitive behaviors, repetitive manipulation of objects, and repetitive forms of self-injurious behaviors as well as higher-order ones including compulsions, rituals, and routines, insisting on consistencies, restricted interests, and repeating a question were targeted as behavior samples. 0.20% of the sessions were coded and graded by two raters, separately. The duration of two videos was less than 30 min, yet they were also analyzed. Finally, data related to the frequency and duration of lower and higher-order behavioral excesses were divided by the total number of sessions and then were multiplied by 100. Parental Self-Efficacy Measure (PSAM) (Dumka et al., 1996): This measure has 10 items with 5 positive and 5 negative statements. This measure is independent of language and culture. It measures three main factors: a) parents' feelings about their parental abilities, b) their assurance about their successful performance regarding paternal roles and c) evaluation of their ability to manage their children's behavior (Dumk et al., 1996). This measure was used at 3 outcome assessment points (before and after intervention and follow-up). Parenting Stress Index - Short Form (PSI-SF) (Abidin, 1995): This is a short 36-question version of the main parenting index completed by parents as provided in Abidin (1995). Three subscales, including

parental stress, inefficient interactions between parents and children, and problematic characteristics of children are found in PSI-SF. It should be noted that PSI TOT indicates parents' total understanding of paternal stress. This measure was used at three outcome assessment points (before and after intervention and follow-up). Therapy Attitude Inventory (TAI) (Brestan et al., 1999): The TAI is a 10-item consumer satisfaction measure designed by Brestan et al. (1999) addressing the parent satisfaction with the process and outcome of therapy. Parents are asked to rate items on a scale from 1 (shows dissatisfaction about of therapy or worsening problems) to 5 (shows the maximum amount of satisfaction or improvement problems). The total score is between 10 and 50. This measure was used at mid-treatment, post-treatment, and follow-up. Treatment Fidelity: To assess the fidelity to treatment, 10% of the therapy sessions were independent rated by two evaluators in a random fashion, using a checklist (Johnson et al., 2007). Fidelity to the manual of each session was rated on a scale from 0 (purposes of therapist/ parents are not achieved) to 2 (purposes of therapist/ parents are completely achieved).

### 2.3. Study procedure

Parents of children who fulfill the inclusion criteria were invited for a group meeting including 3–4 couples or one of the parents. In the majority of cases, the mother accepted to participate in the study. During the first session, the process of the study was explained to them regarding ethical codes. Upon their acceptance, the stages of the study were explained to them. Then, initial assessments of the severity of behavioral excesses, adaptive behaviors, and intelligence were performed by the clinical psychologist. All parents (mothers in most cases) of the children with ASD were interviewed individually in a clinic. A trained evaluator blind to the study administered all of the measures mentioned above to the parents. All participants were able to write and speak in Persian. Parents received ten weekly, 90-minute sessions of the therapy. An online coaching service was also provided to them via short message service or telephone. After the final session, the posttest assessment was conducted by the trained interviewer blind to the study. This interviewer performed follow-up assessment one month after the final session.

### 2.4. Intervention

The FMBEAP is culturally semi-sensitive group therapy that aims the parents' skills to prevent or to overcome behavioral excesses using the ABA framework within the context of everyday life. The intervention, not only provides some information to parents, but also give a platform to practice the following skill: 1) To categorize the lower and higher-order behavioral excesses and their impacts on the child and his/her family social life, as well as the child's development. 2) To identify the anticipating and consequence of each behavioral excesses and plan appropriate therapeutic strategies that are effective for preventing these behaviors. 3) To engage the child with a wide range of pre-programmed interactions with the main theme of pleasure activities. 4) To apply the techniques across the waking time of the child by parents, relatives, and babysitters. This program contains ten core weekly sessions, one home visit, and one follow-up session (through the telephone and making an appointment, if required). Direct instruction, educational videos, practical exercises, and role-play with therapists were applied during sessions. The weekly assignment was given to parents. They videoed the target behaviors at home to share them with other parents at the beginning of the forthcoming session. A copy of the manual of intervention is available with the corresponding author. However, this intervention was developed based on Johnson et al. (2007) manual. Table 1 summarizes the major components of the FMBEAP.

### 2.5. Statistical analyses

Data were analyzed by using the SPSS 21 software. The repeated measures analysis of variance and the Least Significant Differences (LSD) post hoc test were used. The effect size was calculated using the following equation: ES = (Mean at pretest - Mean at posttest)/pretest SD.

## 3. Results

### 3.1. Socio-demographic characteristics

As shown in Table 2, 15 children were boys, and 2 of them were girls. All subjects were diagnosed with autism. The range of total scores in GARS was 63 to 110. IQs ranged from 42 to 107, and 11 subjects (70.58) achieved an IQ > 70 (see Table 2).

### 3.2. Treatment fidelity

Based on the independent evaluation of 10% random sampling of therapy sessions, the therapist fidelity to the program was 91%, and parent attainment of session objectives was about 87%.

### 3.3. Satisfaction of treatment

Parents' satisfaction with the intervention was measured 3 times: mid-treatment, posttest, and follow-up. The mean scores were 40.11 (SD = 8.45), 43.67 (SD = 7.23), and 43.50 (SD = 6.09), respectively, meaning that they were well satisfied with all stages of data gathering. Overall parents had a positive attitude concerning the FMBEAP.

### 3.4. Efficacy outcomes

#### 3.4.1. Behavioral excesses

In this study, we first examined the effect of FMBEAP on the behavioral excesses using Parent ratings of the Repetitive Behavior Scale-Revised of children with ASD. To investigate the significance of changes observed in the behavioral excesses of children with ASD, repeated measures analysis of variance was used. Table 3 displays the mean and standard deviation of the behavioral excesses in three times (pretest, posttest, and follow-up). Table 3 also presents the results of repeated measures analysis of variance. Table 3 shows that the mean of the RBS-R's subscales was significantly reduced, from pretest to posttest and follow-up, with an effect sized ranging from 0.46 to 0.67. For instance, the mean score of the stereotyped behavior subscale declined from $6.94 \pm 4.17$ at pretest to $4.11 \pm 2.39$ at posttest (p < 0.011; with effect size = 0.67). Similarly, the mean scores of the self-injurious behavior subscale fell from $2.00 \pm 1.83$ at pretest to $0.82 \pm 0.88$ at posttest (p < 0.010; with effect size = 0.64). As mentioned earlier, a similar pattern was observed in other subscales the RBS-R (Table 3).

Table 4 shows the results of the least significant differences (LSD) in the post hoc test for multiple comparisons. According to Table 4, in the posttest and follow-up stages, stereotyped behaviors, self-injurious behaviors, compulsive behaviors, ritualistic behaviors, sameness behaviors, restricted behaviors have significantly decreased. These results suggest that the effects of the intervention were sustained even one month after the end of the intervention.

Table 5 demonstrates the results using repeated measures to examine the effect of the intervention on the behavioral excess indirect observation method. Table 6 shows the results of the post hoc test and paired comparison. A set of analyses on the Direct Observation of Repetitive Behaviors (DORBA) taken from videos indicated that repetitive behaviors were significantly decreased compared across the course of data collection (Table 5). Table 6 indicates the results of the least significant differences (LSD) in post hoc test for multiple comparisons. According to Table 4, in the posttest and follow-up stages, the

**Table 1**
Description of the Family-based Management of Behavioral Excesses of Autism Program (FMBEAP).

| Session | Objective | Activities |
|---|---|---|
| One | Introduction to the Program goals | - Introduce group members<br>- Discuss behavioral excesses, behavioral excesses recognition, negative impacts of behavioral excesses on child and parents, the importance of behavioral excesses' treatment and the role of the parent in treatment of behavioral excesses<br>- introducing the program and overall treatment goals |
| Two | Principles of applied behavior analysis | - Introduce functional behavior assessment, antecedents and consequences and behavior |
| Three | Prevention strategies (1) | - Teach the parents to modify the environment or activities of their child with the purpose of preventing the occurrence of behavioral excesses |
| Four | Prevention strategies (2) | - Teach the parents to engage the child with a wide range of pre-programed interaction including pleasure activities |
| Five | Teaching skills | - Teach parents to prompt and train their children to do adaptive behaviors instead of behavioral excesses such as shaping, analysis task and chaining |
| Six | Reinforcement | - Introduce the concept of reinforcement, types of reinforcement, principles of reinforcement<br>- Teach the parents to use reinforcement for increasing positive behaviors |
| Seven | Negative techniques | - Introduce the types of extinction such as attention extinction, tangible extinction and etc.<br>- Introduce response cost procedures |
| Eight | Differential reinforcement and techniques of response interruption and redirection | - Introduce Differential reinforcement procedures to behavioral excesses as well as to increase pro-social or desired behaviors<br>- Teach the parents to stop behavioral excesses of their child and prompt her/him to engage in a more appropriate, alternative behavior |
| Nine | Functional communication skills | - Teach the parents to replace behavioral excesses or subtle, less clear communicative behaviors of their child (e.g., reaching, leading) with more conventional communicative behaviors (e.g., pointing, picture exchange, signing, verbalizations). |
| Ten | Strategies for generalization and maintenance | - Teach strategies for generalization of adaptive behaviors to the parents<br>- Teach parents to develop strategies for consolidating positive behavior changes |

**Table 2**
Demographic data for all families.

| | | |
|---|---|---|
| Child mean age (in months) | | 35.29 (SD = 7.15) |
| Child age range | | 24- 47 |
| Mother mean age (years) | | 33.47 (SD = 2.69) |
| Father mean age | | 37.52 (SD = 4.33) |
| Mean total GARS scores | | 81.23 (SD = 14.55) |
| GARS total score range | | 63- 110 |
| | | N(%) |
| Gender | | |
| Male | | 15 (88.23) |
| Female | | 2 (11.76) |
| IQ | | |
| Average impaired or delayed (≥80) | | 6 (35.29) |
| Borderline impaired or delayed (70-79) | | 6 (35.29) |
| Mildly impaired or delayed (55-69) | | 4 (23.52) |
| Moderately impaired or delayed (40-54) | | 1 (5.88) |
| Range | | 42- 107 |
| Two-parent family (%) | | 17 (100) |
| Parent education | Fathers<br>n (%) | Mothers<br>n (%) |
| High school diploma | 3 (17.64) | – |
| Bachelor | 8 (47.05) | 12 (70.58) |
| Masters | 2 (11.76) | 1 (5.88) |
| Ph D | 4 (23.52) | 4 (23.52) |

compulsions/rituals/sameness behaviors, restricted interest, verbal rituals/repetitive question asking, motor/vocal stereotypy, object stereotypy and self-injury have significantly decreased. This finding

suggests that the effects of the intervention were maintained over one month following the end of the intervention. Thus, the source of data in Table 3 are parents' self-report, but Table 5 represents the same set of data gathered from video monitoring of parent-child interaction. Interestingly, both set of data yielded a significant reduction of behavioral excess with an acceptable effect size. Scientific evidence is in favor of the efficacy of the intervention.

This was also shown on the CGI-I scale. Fourteen of 17 subjects (88%) were rated much improved (n = 7) or very much improved (n = 8) by the independent evaluator. The two subjects were rated as minimally improved and not changed.

### 3.4.2. Parent self-efficacy and parenting stress

Table 7 presents the results of repeated measures for examining changes in Self-Efficacy and Parenting stress. Table 8 shows the results of paired comparison. The results showed that parent self-efficacy and parenting stress assessments were significantly changed in the posttest compared to the pretest. The mean parent self-efficacy improved from 38.78 ± 9.81 at pretest to 45.76 ± 9.56 at posttest (p > 0.001; Effect size = 0.69). The mean parenting stress scores reduced from 93.73 ± 9.15 at pretest to 88.17 ± 10.38 at posttest (p > 0.001; Effect size = 0.60).

Table 8 presents the results of the least significant differences (LSD) by post hoc test for multiple comparisons. According to Table 8, in the posttest and follow-up measurement stage, self-efficacy has increased and parenting stress has decreased. This finding suggests that, even

**Table 3**
Descriptive statistics and the results of repeated measures for Parent ratings of the Repetitive Behavior Scale-Revised Scale.

| Measure | Pretest | Posttest | Follow-up | SS | MS | Df | F | P | ES[a] |
|---|---|---|---|---|---|---|---|---|---|
| RBS-R | Mean ± SD | Mean ± SD | Mean ± SD | | | | | | |
| Stereotyped behavior | 6.94 ± 4.17 | 4.11 ± 2.39 | 4.00 ± 2.03 | 96.11 | 80.54 | 1.19 | 7.40 | 0.011 | 0.67 |
| Self-Injurious behavior | 2.00 ± 1.83 | 0.82 ± 0.88 | 0.76 ± 0.83 | 16.51 | 13.60 | 1.21 | 7.44 | 0.010 | 0.64 |
| Compulsive behavior | 4.70 ± 4.66 | 2.35 ± 1.61 | 2.11 ± 1.40 | 69.64 | 67.82 | 1.02 | 7.72 | 0.013 | 0.50 |
| Ritualistic behavior | 5.05 ± 3.09 | 2.88 ± 3.12 | 2.76 ± 2.48 | 56.74 | 44.90 | 1.26 | 9.08 | 0.004 | 0.56 |
| Sameness behavior | 8.29 ± 7.11 | 5.00 ± 5.50 | 4.47 ± 4.57 | 145.92 | 118.70 | 1.22 | 22.72 | 0.001 | 0.46 |
| Restricted behavior | 5.00 ± 3.42 | 2.76 ± 2.01 | 2.88 ± 2.14 | 53.80 | 47.77 | 1.12 | 7.86 | 0.010 | 0.65 |

SS: sum of squares; MS: mean square.

[a] ES = (Mean at Pretest - Mean at Posttest) /Pretest SD.

**Table 4**
Results of LSD post hoc test for behavioral excesses in the Repetitive Behavior Scale-Revised Scale.

| Behavioral excess | stage | Mean Difference | Std. Error | P |
|---|---|---|---|---|
| Stereotyped behavior | Pretest-Posttest | 2.82 | 1.03 | 0.044 |
|  | Pretest-Follow-up | 2.94 | 1.03 | 0.034 |
|  | Posttest-follow-up | 0.11 | 0.34 | 1.000 |
| Self-Injurious behavior | Pretest-Posttest | 1.17 | 0.43 | 0.044 |
|  | Pretest-Follow-up | 1.23 | 0.42 | 0.031 |
|  | Posttest-follow-up | 0.59 | 0.16 | 1.000 |
| Compulsive behavior | Pretest-Posttest | 2.35 | 0.85 | 0.043 |
|  | Pretest-Follow-up | 2.58 | 0.92 | 0.037 |
|  | Posttest-follow-up | 0.23 | 0.13 | 0.311 |
| Ritualistic behavior | Pretest-Posttest | 2.17 | 0.74 | 0.003 |
|  | Pretest-Follow-up | 2.29 | 0.66 | 0.010 |
|  | Posttest-follow-up | 0.29 | 0.36 | 1.000 |
| Sameness behavior | Pretest-Posttest | 3.29 | 0.67 | 0.001 |
|  | Pretest-Follow-up | 3.82 | 0.76 | 0.001 |
|  | Posttest-follow-up | 0.52 | 0.29 | 0.285 |
| Restricted behavior | Pretest-Posttest | 2.23 | 0.82 | 0.046 |
|  | Pretest-Follow-up | 2.11 | 0.67 | 0.019 |
|  | Posttest-follow-up | −0.17 | 0.28 | 1.000 |

after one month after the end of the intervention, the changes remained.

## 4. Discussion

The current study provides some evidence for feasibility, acceptability and the efficacy of FMBEAP to improve behavioral excesses in Iranian young children with ASD. Parents' self-reports along with the results of video monitoring, showed that the FMBEAP could reduce high-order and low-order behavioral excesses during a short period of time. This might be due to the fact that the strategies were implemented by parents during waking time. Although the implementation of the intervention in daily life was appeared to be very difficult, it was, however, doable and acceptable by the Iranian families.

Our findings on the efficacy of FMBEAP are consistent with Boyd et al. (2011) but inconsistent with Graham et al. (2015). In the latter study, teachers and parents didn't report any significant changes in motor movements, rigidity and sensory interests of the delayed intervention group. Although the immediate intervention group showed a reduction in preoccupation. This discrepancy may be due to different methods and materials used in the two studies. Boyd et al. (2011) investigated the effects of a family-implemented treatment for behavioral inflexibility (FITBI) of children with ASD using single-case research. They found that FITBI could reduce high and low order behavioral excesses in 4 out of 5 subjects. Their theoretical approach is similar to our study as well as Waters et al. (2018). This might be a justification for observed consistency between the results of the three studies, in one hand; and efficiency of the behavioral approach to managing the behavioral excesses, on another. According to this approach, behavioral excesses in children with ASD could be triggered by automatic reinforcement (Lewis et al., 1987), negative reinforcement or avoiding

requests (Kodak et al., 2003), positive reinforcement for social attention (Wacker et al., 1998), positive objective reinforcement (Derby et al., 1992), unsocial objectives (for instance, obtaining or avoiding the internal sensory consequence) (Reese et al., 2005), and deprivation from adequate environmental stimulation (Berkson et al., 2001). Holding the same theoretical point of view, at least three strategies can be used to manage the excess behaviors: (1) Consequence-based interventions: which supposed to disrupt excessive behavior-reinforce relationships. (2) Specific antecedent-based interventions that modify the environmental triggers of any given behavior excesses, and 3) General antecedent-based interventions enrich the child's environment or to teach adaptive skills to the child (Boyd et al., 2012). All of these strategies were adopted in the FMBEAP. Parents were trained to conduct a functional behavioral analysis (antecedent, behavior, and consequence). So, they were able to identify the triggers of behavioral excesses, analyze these behaviors, and design an appropriate intervention. Also, some of the antecedent-based environmental modifications have been used to remove any time slot for the incidence of behavioral excesses; as a result, the child was less likely to engage in those behaviors. In addition, environmental enrichment allowed the families to provide their children non-contingent access to appropriate reinforcements (e.g. preferred objects) to not engage in the behavioral excesses (Sigafoos et al., 2009). Using of consequence-based intervention strategies such as extinction, the families were able to remove the reinforcement after behavioral excesses. Some other consequence-based strategies such as differential reinforcement and response interruption and Response interruption/redirection have also been used to encourage children to engage in appropriate behaviors instead of behavioral excesses (Boyd et al., 2011). Notably, all of these strategies were conducted during the waking time of the child. This may be the main key for high efficacy of the FMBEAP during a short period of time.

**Table 5**
Descriptive statistics and the results of repeated measures for Direct Observation of Repetitive Behaviors.

| Measure | Pretest | Posttest | Follow-up | MS | SS | df | F | P | ES[a] |
|---|---|---|---|---|---|---|---|---|---|
|  | Mean ± SD | Mean ± SD | Mean ± SD |  |  |  |  |  |  |
| Compulsions/ rituals/sameness behavior | 16.07 ± 8.09 | 12.00 ± 3.90 | 11.82 ± 3.45 | 196.75 | 180.81 | 1.08 | 6.81 | 0.018 | 0.50 |
| Restricted interest | 10.98 ± 7.79 | 7.09 ± 4.30 | 6.87 ± 4.02 | 181.15 | 150.51 | 1.20 | 10.56 | 0.003 | 0.49 |
| Verbal rituals/repetitive question asking | 9.21 ± 10.10 | 5.58 ± 6.15 | 5.23 ± 5.35 | 165.03 | 151.71 | 1.08 | 9.22 | 0.007 | 0.35 |
| Motor/vocal stereotypy | 17.29 ± 11.59 | 9.73 ± 7.44 | 9.65 ± 7.55 | 654.50 | 645.88 | 1.01 | 13.41 | 0.002 | 0.65 |
| Object stereotypy | 20.39 ± 9.63 | 14.81 ± 4.37 | 14.78 ± 4.03 | 352.88 | 341.02 | 1.03 | 7.14 | 0.016 | 0.57 |
| Self-injury | 9.21 ± 7.02 | 5.76 ± 4.99 | 5.01 ± 4.65 | 170.56 | 164.54 | 1.03 | 10.25 | 0.005 | 0.49 |

SS: the sum of squares; MS: mean square.
[a] ES = (Mean at Pretest - Mean at Posttest) /Pretest SD.

**Table 6**

Results of LSD post hoc test and Direct Observation of Repetitive Behaviors change multiple compressions.

| Variable | stage | Mean Difference | Std. Error | P |
|---|---|---|---|---|
| Compulsions/rituals/sameness behavior | Pretest-Posttest | 4.07 | 1.51 | 0.048 |
| | Pretest-Follow-up | 4.25 | 1.62 | 0.056 |
| | Posttest-follow-up | 0.18 | 0.39 | 1.000 |
| Restricted interest | Pretest-Posttest | 3.88 | 1.66 | 0.013 |
| | Pretest-Follow-up | 4.10 | 1.21 | 0.012 |
| | Posttest-follow-up | 0.21 | 0.43 | 1.000 |
| Verbal rituals/repetitive question asking | Pretest-Posttest | 3.62 | 1.18 | 0.022 |
| | Pretest-Follow-up | 3.98 | 1.29 | 0.022 |
| | Posttest-follow-up | 0.35 | 0.29 | 0.753 |
| Motor/vocal stereotypy | Pretest-Posttest | 7.56 | 2.04 | 0.006 |
| | Pretest-Follow-up | 7.63 | 2.09 | 0.007 |
| | Posttest-follow-up | 0.07 | 0.20 | 1.000 |
| Object stereotypy | Pretest-Posttest | 5.55 | 2.01 | 0.042 |
| | Pretest-Follow-up | 5.60 | 2.13 | 0.055 |
| | Posttest-follow-up | −0.11 | 0.30 | 1.000 |
| Self-injury | Pretest-Posttest | 3.45 | 1.19 | 0.032 |
| | Pretest-Follow-up | 4.19 | 1.21 | 0.010 |
| | Posttest-follow-up | 0.74 | 0.18 | 0.003 |

Interestingly, parents' self-efficacy and parenting stress were improved following the intervention. That might be a secondary gain from FMBEAP.

Results from the literature have indicated that the parents of children with ASD suffer from high-level parenting stress (das et al., 2017), which is positively correlated with the severity of behavioral excesses (Bishop et al., 2007). In this study, parenting stress and behavioral excesses were decreased following the implementation of the FMBEAP. In addition, parents of children with autism confront stigma and its related psychological problems (Liao et al., 2019). It seems that the group sessions of FMBEAP can help these parents to reduce psychological issues related to stigma, accept the child's disorder, and cope with stigma. The effect of parent-implemented, group interventions on stigmatization, should be specifically explored in further studies.

The results of the present study are promising, but it should be interpreted with caution because of some limitations. The main limitation is the absence of a control group. Also, some measures of the study were completed by the parents who were aware of the purpose of the study. Furthermore, the relatively small sample size makes it difficult to generalize the findings to the general population of children with ASD. Moreover, parents participating in this study were well educated, so they were able to understand and apply therapeutic techniques and also search on the Internet for more information. Also, the mean age of mothers and fathers participated in this study was almost 33 and 37 years old, respectively. So, they had high levels of motivation and energy to follow the treatment process. Therefore, we should be cautious in generalizing these results to other populations. Also, psychotherapy interventions should be adapted to clients' cultural context. This issue seems to be neglected to design a treatment program for a family of children with ASD who migrated to developed countries. Designing a

**Table 8**

Results of LSD post hoc test Parent Self-Efficacy and Parenting stress changes multiple compressions.

| Variable | stage | Mean Difference | Std. Error | P |
|---|---|---|---|---|
| Self-efficacy | Pretest-Posttest | −7.17 | 1.33 | 0.001 |
| | Pretest-Follow-up | −7.47 | 1.46 | 0.001 |
| | Posttest-follow-up | −0.29 | 0.46 | 1.000 |
| PSI-SF | Pretest-Posttest | 4.52 | .70 | 0.001 |
| | Pretest-Follow-up | 5.58 | .70 | 0.001 |
| | Posttest-follow-up | 1.05 | .13 | 0.001 |

treatment program sensitive to the culture of developing countries can be used to help clients with ASD who migrated to developed countries (sritharan and koola, 2019).

## 5. Conclusion

The results of the current study provide preliminary support for applicability, acceptability, and affectability of FMBEAP. This program can use as an early parent-based treatment along with center-based interventions in ASD. Thus, we recommend the use of this program as a first-line, early treatment of behavioral excesses in ASD. If the findings of this study are confirmed by others, this program can be considered as an appropriate, early intervention for use in clinical settings, thereby decreasing the use of medical intervention to treat behavioral excesses. Future investigations should examine the effectivity of the FMBEAP in different settings and cultures with a larger sample size and maybe some modifications. Some randomized controlled trials using independently rated outcome measures with long term follow-up may

**Table 7**

Descriptive statistics and the results of repeated measures for Parent Self-Efficacy and Parenting stress.

| Measure | Pretest | Posttest | Follow-up | MS | SS | df | F | P | ES[a] |
|---|---|---|---|---|---|---|---|---|---|
| | Mean ± SD | Mean ± SD | Mean ± SD | | | | | | |
| Self-efficacy | 38.58 ± 10.38 | 45.76 ± 9.56 | 46.05 ± 10.08 | 608.58 | 529.46 | 1.14 | 25.89 | 0.001 | 0.69 |
| PSI-SF | 93.70 ± 9.15 | 88.17 ± 10.38 | 88.11 ± 10.61 | 299.56 | 283.89 | 1.05 | 52.23 | 0.001 | 0.60 |

SS: sum of squares; MS: mean square.

[a] ES = (Mean at Pretest - Mean at Endpoint) /Pretest SD.

also provide more detailed information about the long-term effects of this program.

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## Declaration of Competing Interest

The authors declared that they have no conflict or competing interests.

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