Title: How Does the Benson Relaxation Response Reduce Anxiety in Mothers of Children with Autism Spectrum Disorder (ASD)?

Authors: Ali Jalilvandi[1], Mohammad Reza Sheikhi[2], Anahita Khodabakhshi-Koolaee[1,*]

1. *Department of Psychology and Education, Faculty of Humanities, Khatam University, Tehran, Iran.*
2. *Psychiatric Nursing Department, School of Nursing, Qazvin University of Medical Sciences (QUMS), Qazvin, Iran.*

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Abstract

Background: Having a child with autism causes depression, anxiety, and distress in the parents. This study aimed to investigate the effect of Benson relaxation response on the anxiety of mothers of children with autism spectrum disorder.

Methods: It was a quasi-experimental study with pretest-posttest design and a control group. The subjects were 100 mothers with autistic children admitted to Shahid Zolfaghari Autism Support Center located in Tehran, Iran in 2023 who were selected using convenience sampling and were randomly assigned into two intervention and control groups (each with 50 participants). Participants in groups of 5-6 received Benson's relaxation method in eight steps. The steps were repeated until all groups had acquired the required skill. Then the subjects were asked to repeat this intervention twice a day for 30 days. The posttest was done after 30 days of relaxation sessions at home in both groups. The data were collected using the Beck Anxiety Inventory (BAI) and analyzed using descriptive statistics (mean and standard deviation) and inferential statistics (analysis of covariance (ANCOVA) and Paired difference t-test) in SPSS software, version 26. The significance level was set at $P<0.05$).

Results: The findings showed no statistically significant difference between the mean anxiety scores of the mothers in the intervention group (31.26 ±4.~~57~~ 58) and the control group (32.14 ±4. ~~8~~ 57) before the intervention (p-value > 0.05). However, after the intervention, a statistically significant difference was observed between the mean anxiety scores for the mothers in the intervention group (25.38 ±6.01) and the control group (33.04 ±4.41) ($t = 5.73$; $P = 0.001$). Also after controlling the effect of covariates, the participants' anxiety scores after the intervention showed a statistically significant difference ($F=52.76$, $p=0.001$).

Conclusion: The Benson relaxation response was effective in reducing the anxiety of mothers of children with autism spectrum disorder (ASD). Thus, psychiatric nurses and mental health professionals can use Benson relaxation response along with other treatments to improve the anxiety of mothers of children with ASD.

Keywords: *Benson Relaxation Response, Anxiety, Mothers, Children, Autism*

Highlights

- Mothers of children with autism spectrum disorder (ASD) experience high anxiety in child care and in their daily lives.
- Benson relaxation response as one of the most common and simplest relaxation methods can reduce anxiety.
- The present study indicated that Benson relaxation response is effective in reducing the anxiety of mothers of children with ASD.

Plain Language Summary

Mothers of children with Autism spectrum disorder (ASD) experience high levels of subjective and objective burden of care. This pressure of the caring can increase the anxiety level of these mothers. In this study, Benson relaxation response as a non-pharmacological treatment reduced the anxiety levels in mothers of children with autism.

1. Introduction

Autism spectrum disorder (ASD) is one the most common neurodevelopmental disorders in child psychiatry which is defined by major deficits in interactions and social communication, along with repetitive behaviors and limited tendencies (Minaabad et al., 2020). ASD is a complex developmental condition that is associated with persistent challenges in a child's social interaction, speech, and non-verbal communication and affects mother-child interaction (Liu et al., 2021). Having an autistic child in a family often causes irreparable damage to the family and severely affects the parents' mental health (Oti-Boadi et al., 2020). Parents of children with autism experience higher levels of anxiety and stress. Parental anxiety and stress are associated with harmful consequences for the mental and physical health of the parents and the child's performance (Neece et al., 2024).

ASD as an early-onset and most common neurodevelopmental disorder causes lifelong problems (Dollion et al., 2024; Amireh & Omer, 2018). The latest Centers for Disease Control and Prevention (CDC) survey estimates that approximately 1 in 36 children in the United States (US) are diagnosed with ASD and that the condition affects all racial, ethnic, and socioeconomic groups. ASD is almost 4 times more common among boys than among girls (Maenner et al., 2023). In Iran, The prevalence of Autism in the total sample is equal to 0. 1% (10 per 10 000), with a 2: 1 male-to-female ratio (Mohammadi et al. 2019).

About one third of parents of children with autism report high levels of stress clinically, which indicates their need for therapeutic interventions (Davis and Carter, 2008). Mothers with autistic children have a high level of psychological problems and their psychological health varies depending on the severity of the autism disorder of the child (Benson, 2009). Anxiety is generally defined as a mental state characterized by preoccupation, feelings of stress, physical changes, intrusive thoughts, or frequent worries (APA, 2013). Issues related to the care of an autistic child are possible predictors of parental stress, anxiety, and depression (Yassin, 2023). These underlying issues include the severity of autism symptoms (Rivard et al., 2014), child problematic behavior (Estes et al., 2013), financial concerns caused by therapeutic and educational expenses (Thomas et al., 2016), exposure to social stigma (Weiss et al., 2014), and the onset of marital problems (Hartley et al., 2010).

However, most studies in this field have suggested that the primary predictors of parental stress, anxiety, and depression are the severity of symptoms, challenging child behavior, and lack of social support (Yassin, 2023). Mothers generally show a wide range of emotions such as anger, sadness, crying, and grief. Besides, they are worried about the reactions of the public, relatives, and close ones to their child's autism, and sometimes they think that there is probably a solution that will end all their problems (Sotgiu et al., 2020). Stress, depression, and psychological distress adversely affect mothers' performance in life. Increasing levels of anxiety, depression and stress of the mother reduce her parenting abilities, which in turn can have negative effects on the psychological and physical health of the child (Alibekova et al. 2022; Rafii, et al., 2024). However, Relaxation strategies can be helpful in reducing overall levels of anxiety and tension over time (Hamdani et al., 2022).

Different relaxation techniques are used for different mental disorders, such as diaphragmatic breathing which is used for panic attacks, autogenic exercise for stress, and progressive muscle relaxation and Benson relaxation method (BRM) which are used for anxiety (Lindquist et al., 2018). There are various pathways to yield the Benson relaxation response (e.g. meditation, muscle relaxation, different breathing techniques, and yoga) (Benson, 1983; Ibrahim et al., 2019). The relaxation response is associated with reducing the autonomic nervous system's activity and reduced oxygen utilization (Benson et al., 1975). The main goal of Benson relaxation response is to strengthen self-confidence and self-respect (Benson, 1983). Otherwise, BRM is one of the most common and simplest relaxation methods (Ebrahimi and Adib-Hajbaghery, 2022). It is a non-pharmacological, behavioral method, and the easiest to learn to handle stress and anxiety (Ibrahim et al. 2019; Walsh et al., 2007).

There is a greater tendency to use complementary medicine to treat maternal anxiety compared to chemical treatments due to its low cost, ease of use, and no complications. Benson relaxation response as a key element for the effects of meditation, is one of the complementary medicine methods to relieve stress. By focusing on four basic elements (i.e. a calm environment, a comfortable position, a mental device such as a word to focus, and a passive attitude), this method reduces an individual's stress (Anisah and Maliya, 2021). Benson relaxation response, in addition to its many benefits and easy administration, is

uncomplicated and a person can use it independently (Najafi Ghezeljeh et al., 2016). When relaxation is performed, the parasympathetic system becomes dominant and patients become calmer and thus can overcome psychological symptoms such as anxiety, depression, and fatigue (Abu Maloh et al., 2021). It is very clear that parents of children with autism, especially their mothers, endure severe psychological distress and have special needs at every stage.

Given the research gap concerning the effectiveness of Benson relaxation response in reducing the anxiety of parents of children with autism, the present study attempted to find out if Benson relaxation response is effective on the anxiety of mothers of children with autism. The insights from this study can also contribute to developing training programs for parents of children with autism and counselors in autism support centers. Moreover, the findings of this study can have some implications for taking measures to reduce the problems faced by parents and their autistic children. To this end, this study aimed to investigate the effect of Benson relaxation response on the anxiety of mothers of children with autism.

2. Materials and Methods

This quasi-experimental study was conducted using an equivalent group, pretest-posttest design. The subjects were selected voluntarily using convenience sampling from mothers with autistic children admitted to Shahid Zolfaghari Autism Support Center in Tehran. A total of 100 subjects were selected based on the inclusion criteria and were randomly assigned into two intervention and control groups using permuted block randomization (each with 50 subjects (Diagram 1). The sample size was estimated using the Fleiss sample size estimation equation (Fleiss et al. 1980), where $\beta = 0.51$, $P_0 = 0.91.5$, $P_1 = 0.98$, $r = 0.90$, and $\alpha=0.05$. Accordingly, considering 20% sample attrition, the sample size in each group was estimated to be 54 people. Based on this formula, the effect size for this sample is at medium level. The criteria for enrollment in the study were; 1- having at least a diploma, 2- being in the age range of 30 to 50 years, 3- not suffering from psychological disorders according to the Structured Clinical Interview for DSM-5 (SCID-5) and based on psychiatrist's diagnosis,

4- willingness to attend group meetings, 5- being married and, 6- expressing willingness to participate in the study. The exclusion criteria were 1- not doing exercises during treatment sessions, 2- failure to continue the exercises provided in training sessions at home and, 3- attending other psychological intervention sessions during the study.

Instruments

Demographic information questionnaire:

Demographic data included mothers' age, education, and occupation, and also the number of children and their age.

Beck Anxiety Inventory (BAI): In 1988, Aaron Beck introduced this inventory to measure the severity of clinical symptoms of anxiety. This 21-item self-assessment tool measures anxiety symptoms on a four-point Likert scale (0 = not at all, 1 = mildly, 2 = moderately, and 3 = severely). The scores of the inventory range from 0-63. In this scale, 0-7 indicates minimal anxiety, 8-15 mild anxiety, 16-25 reflects moderate anxiety, and 26-63 shows severe anxiety (Beck et al., 1988). Its internal consistency (alpha coefficient) was equal to 0.92 and its reliability was assessed as equal to 0.75 using the test-retest method within a one-week interval, and the correlation between the items varied from 0.30 to 0.76 (Beck et al., 1988). Toledano-Toledano et al. (2020) also estimated the reliability of this tool equal to 0.90 (Toledano-Toledano et al. 2020). This questionnaire was translated into Persian in 2005 and its reliability was reported as 0.74 (Ghassemzadeh et al, 2005). In this study, the internal consistency (Cronbach's alpha) of the scale was estimated at 0.90.

Procedure

The BAI was first administered as the pre-test to the participants in both groups. Then, instructions on how to implement Benson's relaxation were taught to the participants of the intervention group. They received the training in groups of 5-6. The relaxation response training was performed based on the procedure proposed by Benson and Klipper (1975) in 8-step (Table 1). The steps were repeated until all groups acquired the required skill. The

duration of each session was between 20 and 25 minutes. The training was given by a psychologist at the Shahid Zolfaghari Autism Support Center. The subjects were asked to repeat this procedure twice a day for 30 days. The researcher encouraged the participants to continue their home exercises through phone calls and made sure that the exercises continued according to the program. The posttest was done after 30 days of relaxation sessions at home in both groups. To comply with ethical considerations, the procedure was also implemented for the control group after the posttest.

Table 1. The Benson relaxation response intervention adapted from Benson and Klipper (1975)

Steps	Content of the relaxation session
1	The participant sits or lies down in a comfortable position in which she feels relaxed. Then she should cross the legs and allow the arms and hands to rest. Inhale and exhale exercise.
2	The participant takes deeper and more regular breaths through inhaling and exhaling through the nose and mouth with eyes closed.
3	Being aware of her breathing, the participant repeats a word that makes her relaxed in every exhalation.
4	In this position, the participant releases her muscles from the tips of her toes and continues it towards the upper body muscles until all muscles reach full expansion. Inhale and exhale exercise.
5	The participant should maintain this position for 20 minutes. Inhale and exhale exercise.
6	After finishing the relaxation technique, the participant stays in this position for a few minutes. Inhale and exhale exercise.
7	For more effect, the participant can listen to a relaxation music through headphones. Inhale and exhale exercise.
8	The participants scan their body for any obvious areas of tension that they can relax a little more. Inhale through the nose and exhale through the mouth or stomach.

Data Analysis

The collected data were summarized using descriptive statistics, such as frequency, percentage, mean and standard deviation. Moreover, the analysis of covariance (ANCOVA)

was used to determine the effectiveness of Benson relation response on anxiety (ANCOVA is employed to identify differences between the means of two or more independent groups while accounting for scale covariates. A covariate, may affect the dependent variable and thus requires control). Also, the paired difference t-test and Chi-square test were used to measure the difference between the mean of two groups. Prior to ANCOVA, the assumptions of this test were first checked using Levene's and Box's M tests. The data were analyzed using SPSS software, version 26. The significance level was set at $P<0.05$.

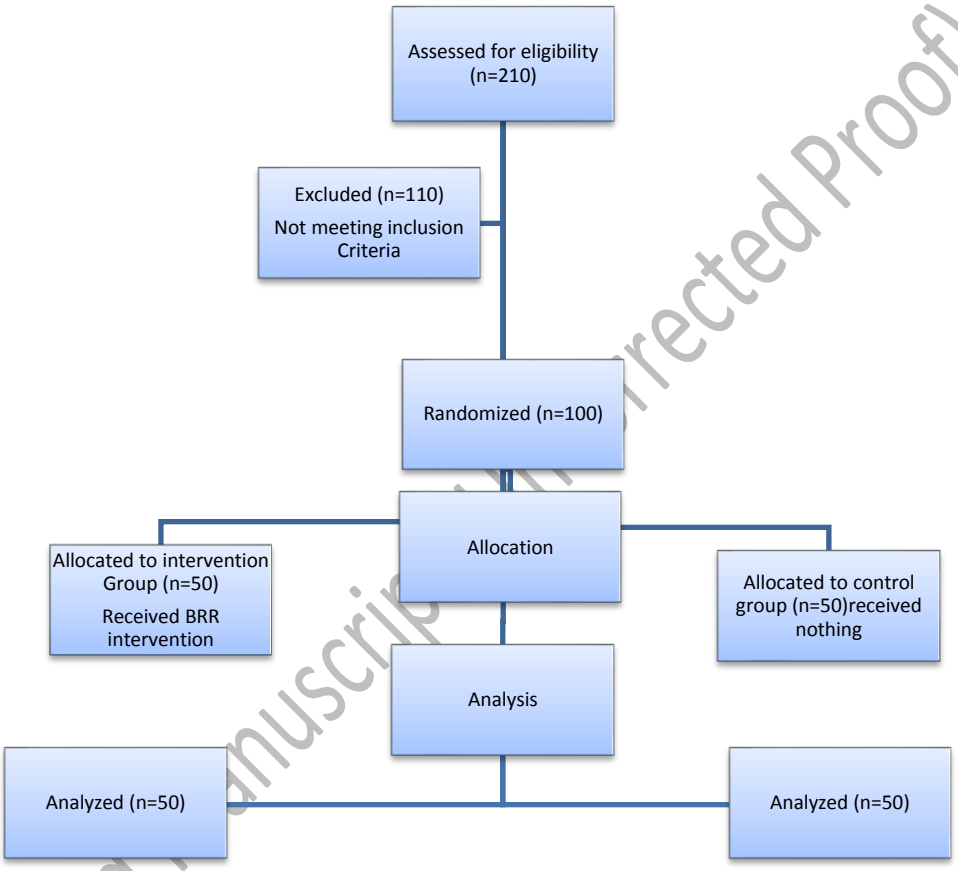

Diagram 1. The CONSORT Flow Diagram of the study process

3. Results

Table 2 shows the participants' demographic characteristics. It should be noted that in all cases, the first child was diagnosed with autism. As can be seen, there was no significant difference between the two groups in terms of the demographic variables:

Table2. Comparison of demographic characteristics in the intervention and control groups

Variable		**M±SD**		**P-value**
		Control	Intervention	
Child's age (Y)		10.08±1.91	11.02±1.06	Independent t-test P=0.32
Mother's age		41.02±2.08	42.01±1.49	Independent t-test P=0.52
	Categories	**Frequency (%)**		
Number of Children	one	41(82%)	43(86%)	Chi square
	Two	9(18%)	7(14%)	P=0.49
Education	Diploma	24 (48%)	20 (40%)	Chi square
	Undergraduate	17 (34%)	19 (38%)	P = 0.51
	Postgraduate	9 (18%)	11 (22%)	
Occupation	Housewife	38 (76%)	37 (74%)	Chi square
	Employed	12 (24%)	13 (26%)	P = 0.89

Table 3 shows the descriptive statistics for anxiety levels in the two groups before and after the intervention:

Table 3. The descriptive statistics for anxiety levels in the two groups of mothers

Groups	Pretest M±SD	Posttest M±SD	Paired difference t-test
Control	32.14± 4.57	33.04 ±4.41	t = 1.1; P = 0.19
Intervention	31.26± 4.58	25.38± 6.01	t = 4.8; P ≤ 0.001
Paired difference t-test	t = 0.41; P = 0.63	t = 5.73; P ≤ 0.001	

As table 3 shows, there is no statistically significant difference between the two groups in terms of the mean anxiety scores before the intervention (p-value =0.63). However, there was a significant difference between the mean anxiety scores of the two groups after the intervention (p-value≤0.001). Furthermore, a statistically significant difference was observed between the mean anxiety scores before and after the intervention in the intervention group (p-value≤0.001). ANCOVA was run to detect the effectiveness of Benson's relaxation response and to control the effects of covariates (Table 4).

Table 4. ANCOVA test results comparing the mean anxiety scores in the two groups of mothers

Indicators Variables	SS	df	MS	F	Sig.	η^2
Pre-test	270.37	1.00	270.37	10.69	0.001	0.10
Group	1334.50	1.00	1334.50	52.76	0.001	0.35
Error	2453.33	97.00	25.29			
Total	4190.59	99.00				

SS: sum of squares; df: degrees of freedom; Ms: mean squares; F: F value; $\eta^{2:}$ Eta squared

As can be seen in the table 4, after eliminating the covariate effect and considering the (F-value= 10.69), there was a significant difference between the adjusted mean anxiety scores of the participants in terms of their group membership (control or intervention) in the post-intervention stage (p<0.001). These data imply that the Benson relaxation response had a significant effect on the anxiety levels of the participants in the intervention group compared to the control group.

4. Discussion

This study investigated the effect of Benson relaxation method on the anxiety of mothers of children with autism. The findings indicated that after eliminating the covariate effect, there was a significant difference between the adjusted mean anxiety scores of the participants in terms of their group membership (control or intervention) in the post-intervention stage, implying that Benson relaxation response has led to a significant difference in the anxiety of mothers of children with autism before and after the intervention. Some studies have also shown the beneficial effects of BRM on different groups of healthy people (Mohammadi and Parandin, 2019). Moreover, Gika et al. (2012) reported that a six-week relaxation program was effective in reducing the level of stress experienced by the mothers of children with autism. In addition, Ibrahim et al. (2019) examined the effectiveness of Benson relaxation method on anxiety of adult patients. The results showed that the participants in the intervention group had significantly lower levels of anxiety compared to those in the control group. In their systematic review of randomized controlled trials, Abu Maloh et al. (2021) assessed the effectiveness of Benson relaxation responses on the anxiety and depression of patients under hemodialysis. The findings showed a statistically significant decrease in the patients' anxiety scores of all five included studies.

Pardede and Tarigan (2020) studied the effectiveness of Benson relaxation technique on the anxiety levels of mothers in the pre-cesarean section stage. The results showed that Benson relaxation response is effective in reducing the anxiety induced by cesarean section (Pardede and Tarigan, 2020). Herbert Benson and his colleagues observed that immediately after the onset of relaxation, slow waves of alpha appeared in the curves measuring brain activity, which increased in proportion and number as the state of relaxation progressed. For most people in the society, the appearance of alpha waves is associated with arousing feelings of happiness and well-being. Benson believed that relaxation method also reduces tension in muscles and increases the muscular relaxation (Darmawati et al., 2021). In addition to arousing feelings of happiness, fun, and excitement, and promotion of self-confidence, it can also suppress the release of cortisol, epinephrine, and norepinephrine hormones, which are strong vasoconstrictors in blood vessels (Sutrisno, 2023). Suppression of these hormones

can cause dilation of blood vessels, leading to decreased vascular resistance and pressure (Price and Wilson, 2012).

Benson relaxation response intervention can block sympathetic nerve activation, which can reduce oxygen consumption in the body. It also relaxes the muscles and thus creates a feeling of relaxation and comfort. Relaxation reduces anxiety and increases the stability of the autonomic nervous system by increasing the hypothalamus nucleus that controls the activity of the parasympathetic nervous system (Anisah and Maliya, 2021).

Given the adverse effects of anxiety on all body systems and many side effects of anti-anxiety drugs including drug resistance and the reduction of the effect of these drugs after a short period, as well as the high rate of autism in Iran (Mohammadi et al. 2019), Benson relaxation response can be used as an easy, inexpensive and non-invasive method to reduce anxiety and stress, reduce the frequency of using anti-anxiety and sedative drugs, reduce stress, and depression levels and improve the satisfaction of mothers of children with autism. Benson relaxation response is simple and does not require specialized personnel, and trained psychotherapists can use it to take a step towards calming clients and increasing their satisfaction. In this study, to reduce the possibility of communication between the participants in the two groups, the intervention sessions were carried out on days when the participants in the control group did not visit the center.

5. Conclusion

The findings of the present study showed that Benson relaxation response helps the mothers of children with autism to decrease their anxiety levels. Generally, it can be argued that Benson relaxation response can be instructed in the form of a self-learning and self-help program. These relaxation exercises can be used by healthcare providers, including psychologists and family counselors and psychiatric nurses in autism centers as an effective, accessible, and inexpensive approach to maintaining mental health and psychological well-being of the mothers of these children. Community health administrators and mental health managers can apply and implement BRM as a useful and therapeutic approach for mothers of children with autism in therapeutic centers.

Ethical Consideration

Complying with ethical guidelines

The protocol of this study was approved by Qazvin University of Medical Sciences (https://ethics.research.ac.ir/IndexEn.php) with code: **IR.QUMS.REC.1402.399**. To comply with the ethical principles of voluntary participation, written informed consent was obtained from all the participants. The subjects were also reassured of the confidentiality of their information.

Authors contribution

Conducting research, data gathering and analysis: Jalilvandi A; Supervisor, Study design, and data analysis: Sheikhi MR; Advisor, Conceptualization of the study and drafting the initial version of the manuscript: Khodabakhshi-Koolaee A; Final approval: All the authors.

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