The Effects of Laughter Therapy, Music Listening and Diary Keeping Given to Pregnant Women on Mental Health and Maternal Attachment Levels in Postpartum Period*

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ABSTRACT

Aim: The aim of this study is to evaluate the effects of laughter therapy, listening to music, and diary keeping interventions during pregnancy on the mother's mental health and the level of maternal attachment in the postpartum period.

Material and Methods: This is a quasi-experimental study. The study consisted of 50 pregnant women, 25 in intervention, and 25 in control groups. Interventions consisted of listening to music, laughter therapy and diary keeping for six weeks. Data were collected with the Beck Depression Inventory, Edinburgh Postpartum Depression Scale, Brief Symptom Inventory, and Maternal Attachment Scale.

Results: It was determined that the change in mental health of women in the intervention group over time was significant ($p<0.05$). The group-time interaction of the change in mental health level of pregnant women with depression symptoms in the intervention group was significant ($p<0.05$). There was a statistically significant difference between the mental health post-test scores of the experimental and control groups ($p<0.05$). Group scores were similar in maternal attachment ($p>0.05$).

Conclusion: Laughter therapy, music listening, and diary keeping interventions applied to pregnant women made a difference in improving mental health in the postpartum period. Such procedures suggest an easy-to-use, non-invasive and cost-effective method.

Keywords: Antenatal care; depression; diary; laughter therapy; maternal attachment; music listening

Gebelere Verilen Kahkaha Terapisi, Müzik Dinleme ve Günlük Tutmanın Postpartum Dönem Ruh Sağlığı ve Maternal Bağlanma Düzeyine Etkisi

ÖZ

Amaç: Gebelikte uygulanan kahkaha terapisi, müzik dinleme ve günlük tutma müdahalelerinin, postpartum dönemde annenin ruh sağlığına ve maternal bağlanma düzeyine etkisini değerlendirmektir.

Gereç ve Yöntemler: Bu yarı deneysel bir çalışmadır. Çalışmaya 25'i müdahale ve 25'i kontrol grubunda olmak üzere 50 gebe katıldı. Müdahaleler altı hafta boyunca kahkaha terapisi, müzik dinleme ve günlük tutmaktan oluşmaktadır. Veriler Beck Depresyon Envanteri, Edinburg Doğum Sonrası Depresyon Ölçeği, Kısa Semptom Envanteri ve Maternal Bağlanma Ölçeği ile toplandı.

Bulgular: Müdahale grubundaki kadınların ruh sağlıklarında zaman içinde meydana gelen değişimin anlamlı olduğu belirlendi ($p<0,05$). Müdahale grubundaki depresyon belirtileri olan gebelerin ruh sağlığı düzeyindeki değişimin grup-zaman etkileşimi anlamlıydı ($p<0,05$). Deney ve kontrol gruplarının ruh sağlığı son test puanları arasında istatistiksel olarak anlamlı fark vardı ($p<0,05$). Anneye bağlanmada grup puanları benzerdi ($p>0,05$).

Sonuç: Gebelere uygulanan kahkaha terapisi, müzik dinleme ve günlük tutma müdahalelerinin doğum sonrası dönemde ruh sağlığının iyileştirilmesinde fark yarattığı görüldü. Bu tür müdahalelerin kullanımı kolay, invazif olmayan ve uygun maliyetli bir yöntem olarak önerilmektedir.

Anahtar Kelimeler: Doğum öncesi bakım; depresyon; günlük; kahkaha terapisi; maternal bağlanma; müzik dinleme.

INTRODUCTION

The perinatal period, an important stage in a woman's life, can be a difficult process in women with mental health problems (1). Approximately 10% of pregnant women and 13% of women in the postpartum period are exposed to mental health problems, especially depression (2). Undiagnosed depression during pregnancy is a leading risk factor for postpartum depression (3), and symptoms of depression appear soon after delivery or up to one year after delivery (4). Mental health problems that occur during the perinatal period affect the mother and the baby and other family members (5). Symptoms such as sadness, restlessness, anxiety, frequent crying, indecision, guilt and instability, sleep, energy and appetite changes are common in women affected by depression (2). Postpartum depression may negatively affect the maternal attachment and development of the baby (6, 7). Therefore, nurses should provide care to help prevent or alleviate mental problems.

It is emphasized that during pregnancy is critical to support women's mental health during their perinatal period (3). Interventions performed during the gestational period provide early intervention opportunities to protect the mental health of pregnant women, postpartum mental health problems, and mother-infant interaction (8). Most women do not prefer pharmacological interventions due to their side effects, the thought that pharmaceuticals will harm their baby or harmful substances will pass to the baby through breast milk (4). Therefore, non-pharmacological interventions involving mind-body interaction without side effects may be more lucrative (9). Among them, laughter therapy is a type of cognitive-behavioral therapy that improves the health of physical, psychological, and social relationships (10). Laughter is an emotional response that affects an individual's personal and social life. Laughter creates a balance of chemicals and hormones in the body (11). Endorphin hormone secreted from mental and physical relaxation with laughter effectively reduces stress (12). Previous studies have reported that it reduces depression (13, 14), improves psychological and physiological status (15), decreases cortisol levels (16), and improves sleep quality (14, 17).

Based on various research findings, it can be assumed that music can be an effective treatment modality in women's mental health during the perinatal period. The literature states that nurses can utilize music as a nursing intervention to create a healing environment and improve health (18). Many studies have demonstrated that listening to music can change mood during pregnancy. It decreases anxiety and depression in pregnant women (19, 20). It provides better sleep quality to pregnant women with sleep disorders (21). Studies involving music therapy show that incorporating personal preferences during music therapy is a key factor for its success (21, 22). The choice of music positively affects an individual's heart rate, respiratory rate, blood pressure, and fetal heart flow (23). However, meta-analyses evaluating the effectiveness of interventions in the antenatal period for mental health are not based on strong evidence. While there are promising results for many types of interventions, these results do not appear to contain sufficient evidence to make a recommendation (24). Therefore, there is a need to evaluate the impact of these interventions when used together. In this context, laughter therapy along with music can be a successful strategy for improving anxiety, depression, and mood. Thus, the synergy created by laughter therapy and listening to music can benefit the mental health of the mother and mother-baby attachment in the postpartum period. Assuming that being aware of these emotions (25) will increase the effectiveness of these non-pharmacological methods, diary-keeping can also be adopted as a strategy.

This study aimed to evaluate the effects of laughter therapy, music listening, and diary-keeping interventions during pregnancy on the mother's mental health and the level of maternal attachment in the postpartum period. Based on the results of the meta-analysis, the effect of the interventions in this study was investigated when they were applied together, not separately.

MATERIAL AND METHODS

Study design

This study is prospective, non-randomized and two-arm (parallel). Only the posttest was applied to the control group.

Study setting

The study was conducted in two separate family health centers (FHC), where pregnant women were registered. These FHCs are in a disadvantageous region where access to socioeconomic and quality healthcare services is difficult. A pregnant woman is followed up at least four times during the entire pregnancy.

Participants

The intervention group consists of pregnant women in the second trimester who were registered with two FHCs. However, the women with the following constituted the study inclusion criteria: Pregnant women over the age of 18, those with pregnancy between 16-24 weeks of gestation, and those with literacy in Turkish. Participants with a psychiatric disorder (through self-reporting), the existence of chronic disease for laughter therapy (heart diseases, hypertension, hemorrhoids, urinary incontinence, and epilepsy, *etc.*), and pregnancy with infertility treatment were excluded from the study (26). The women in the experimental group were included in the study during pregnancy; however, when the post-test was performed, these women had three-month-old babies. Therefore, the control group consisted of mothers with three-month babies and settled in the same region. The control group's post-test data were collected within the same time interval as those of the intervention group between May and August 2018.

Recruitment and blinding

Firstly, a list of registered women with a pregnancy between 16-24 weeks of gestation was obtained. The

participants were included in the intervention group via face-to-face interviews based on the inclusion and exclusion criteria. Informed written consent was obtained from each participant, and the interventions were performed in this group. After the determination of participants, the intervention stage started within 24 and above gestational weeks. The control group consisted of mothers receiving standard antenatal care during the prenatal period, delivering, and having a three-month-old baby. The control group was formed, while the post-test was applied to the experimental group.

It was unlikely to blind the intervention and control groups in the study. Even so, the blinding of the statistics and editing process of the report was achieved. The groups were encoded as 'A' and 'B' without specifying the intervention and control groups regarding the post-test scores. The statistician performed the analysis of the data without revealing the group name. After analysis of the statistical data and completion of the research report, the coding created for the study and control groups was explained. Biases related to the statistics and the report were controlled through blinding.

Ethical considerations
Ethical approval (October 25, 2017/1785) from the university's ethical committee and institutional permission (February 28, 2018/94723667) were obtained prior to the research.

Sample size
The Gpower 3.1.9.2. program was used to determine the number of participants in both groups. The sample size was found as 25 for each group by accepting the effect size to be wide (0.82), the alpha value (0.05), and the power (0.80).

Interventions
Interventions such as music listening, laughter therapy, and diary keeping were carried out for each woman in the intervention group. When faced with a problem, people typically do not engage in just one relaxation activity but instead try combined solutions. Therefore, this study used a combined approach as an intervention.

Music Listening
Before the intervention, the participants were asked two questions about whether they liked music, and if any, the type(s) of music they preferred. Based on the information obtained, 52% of pregnant women in the intervention group stated they liked pop music, 24% all kinds of music, 12% Turkish folk music, 4% arabesque, 4% foreign music, and 4% hymns. Participants listened to the types of music that they liked. In the meeting room in FHC, two professional artists performed music recitals with a guitar and saz (qopuz) for pregnant women. In addition to listening to music, women voluntarily recited songs whenever they wished. The performance was carried out as three sessions, once every 15 days, and each session took 40 minutes. According to the checklist for reporting music-based interventions developed by Robb et al. in 2011 (27) (Supplementary file 1), this musical recital was reported.

Laughter Therapy
Laughter therapy is a technique leading to mood changes, where laughter exercises combined with childish exercises are converted into real laughter by inhaling proper breath without any reason (26). Before the study process, the researcher had attended the "Laughter Yoga" course on August 27, 2017, and graduated with a certificate. The process was performed entirely under the supervision of this researcher. The researcher carried out the intervention as a total of three sessions every 15 days, and each session lasted 30 minutes. The procedures performed during a laughter therapy session are tabulated below:
1. Clapping: Hand clapping is performed using the 1-2, 1-2-3, Ho-Ho and Ha-Ha-Ha rhythms.
2. Deep breathing
3. Playing games: Dancing, singing, and playing childlike playfulness enabled the participant to laugh unconditionally and increase their energy levels.
4. Laughter exercises: Laughter exercises are the mainstay of the session and help reduce inhibition and shyness, converting laughter into unconditional laughter (e.g., milkshake laughter, lion laughter, cell phone laughter, argument laughter, greeting laughter, or hug laughter). The therapy session is ended by saying relaxation sentences (26).

Diary Keeping
In addition to music listening and laughter therapy, the pregnant women were asked to keep a diary and write down their emotions about their health status, pregnancy, and baby. In this step, a notebook including such questions as "How do you feel about your health? How do you feel about your pregnancy? How do you feel about your baby?" was given to each woman. Then, every 15 days during the group therapy sessions, each participant had the opportunity to explain their feelings or answer the questions so that pregnant women could express their feelings. This intervention was chosen because of the important contribution of awareness-based applications in stress management (28). Thus, pregnant women were offered an opportunity to reveal and share their feelings and concerns.

General Management
A six-session antenatal care program included both music listening and laughter therapy and was designed for those in the study group as a session every week. The program was carried out by arranging a music session for one week and a laughter therapy session over the following week. Also, the notes uttered by pregnant women were discussed at the week laughter listening sessions were performed.

Measures
The data were collected through BDI, EPDS, BSI, and MAS to evaluate mental health status comprehensively (Supplemental file 2). All participants responded to the questionnaire prepared for the study. The questionnaire includes 23 questions related to socio-demographic, obstetrics, delivery, and newborn features (5,29,30).
The Beck Depression Inventory (BDI) is a 21-item self-reporting scale consisting of emotional, cognitive, somatic, and motivational components to measure the level and severity changes of depressive symptoms (31).

The validity and reliability assessment of the Turkish version of BDI was performed. Cronbach's alpha value is 0.80 and 0.74 by halving method (32). In this study, the Cronbach's alpha value was found to be 0.858.

Developed by Cox, Holden and Sagovsky (1987)(33), the Edinburg Postpartum Depression Scale (EPDS) was designed with the aim of screening to determine the risks of depression in pregnancy and postpartum periods. The internal consistency coefficient of this scale was 0.79, and the two-half reliability was 0.80 (34). In this study, the Cronbach's alpha value was found to be 0.836.

The 53-item Brief Symptom Inventory (BSI) (35) has three global indexes: discomfort severity, total symptom, and discomfort symptom indexes. The increase obtained from these index scores demonstrates individuals' negative experiences regarding their mental health status. The validity-reliability study was carried out for Turkish society. The Cronbach Alpha internal consistency coefficients for the scale are between 0.96 and 0.95 (36). In this study, the Cronbach's alpha value was found to be 0.962.

Mary E. Muller developed the Maternal Attachment Scale (MAS) in 1994 (37) to measure the attachment for maternal affection. The validity and reliability study of the Turkish version of MAS was also conducted. The Cronbach Alpha reliability coefficient of the scale was found to be 0.93 (38). As the score from the scale increases, the level of maternal attachment is so high. In this study, the Cronbach's alpha value was found to be 0.710.

Statistical Analysis

After the study, the data pooled were analyzed using the computer software of SPSS 22.0, Open Meta[Analyst], and JAPS 09.0 statistical analysis packages. Similarity analyses of the study and control groups were performed with chi-square (the Pearson and Yates correction). The post-test scores of BDI, EPDS, BSI, and MAS in the intervention and control groups were compared through the t test in independent groups, and Cohen's d and confidence interval (CI) were utilized to assess effect size. Four measurement results of the intervention group were compared with those of variance analysis through repeated measurements, and the partial eta square and CI were used to evaluate the effect size. Two-way variance analysis for repeated measures was used to assess the group/time interactions of the changes in terms of the group's mental health scores with and without depression symptoms in the intervention group at the four time-points.

RESULTS

Of the 64 pregnant women registered in FHCs within the second trimester of pregnancy, 25 constituted the study group. The control group was also composed of 25 mothers who met the following criteria: receiving standard prenatal care and having a three-month-old baby (Figure 1). The pregnant women in the experimental and control groups were similar in terms of age, education, monthly income, family structure, social security, age of the spouse, and educational status. In addition, the groups had similar characteristics in terms of decision making in their marriage, the duration of marriage, having marital problems, experiencing stressful events in life, being exposed to violence, being pregnant, number of pregnancies, type of delivery, time and duration of breastfeeding, and health problems (p>0.05).

The decrease seen in women's BDI scores with pregnancy in the intervention group was found not to be significant at the four time-points (p>0.05). However, a significant decrease was determined in the EPDS score. The average scores of the first (6.2±4.4), second (5.4±4.2), and final evaluations (5.2±3.9) of pregnant women were found to be similar, and these scores were lower than those from the pre-test (8.3±3.7) (p<0.05). The power level (96%) resulting from the score changes was quite high, and the effect size was also large ($\eta2=0.227$) (Table 1). The change in the mean scores of pregnant women in the study group for the three global indexes of BSI over time is significant (p<0.05). Upon considering the effect sizes, the effect sizes of changes in discomfort severity index ($\eta2=0.191$), total symptom index ($\eta2=0.170$), and discomfort symptom index ($\eta2=0.244$) are observed to be large.

While 52% of pregnant women had mild-to-moderate depression symptoms in the intervention group, 48% showed no symptoms before the interventions. When the interaction effect was evaluated according to the two-way variance analysis in repeated measurements, the time/group interaction was significant, and BDI scores were detected to be lower among those experiencing depression than those without depression four time-points (p<0.05). However, in light of EPDS and BSI scores, it was observed that the significant change developing over time was similar among those both with and without depression symptoms (Table 2).

It was found that there was a statistically significant difference between BDI and EPDS post-test scores of the intervention and control groups, and the score in the intervention group was significantly lower than that of the controls (8.12±6.07, 20±3.98, 12.96±9.42 and 9.24±6.07, respectively) (p<0.05). However, the effect size was determined not to be significant. Similarly, when the global indexes of BSI were assessed, the averages of the discomfort severity index (0.36±0.30), total symptom index (14.64±10.08), and discomfort symptom index (1.22±0.26) were observed to be lower in the intervention group than those of the controls (p<0.05) (Table 3).

When the difference between both groups was examined, the distribution and averages of the post-test MAS scores of the intervention and control groups seemed to be very similar (102.36±2.13 and 102.52±2.85, respectively).
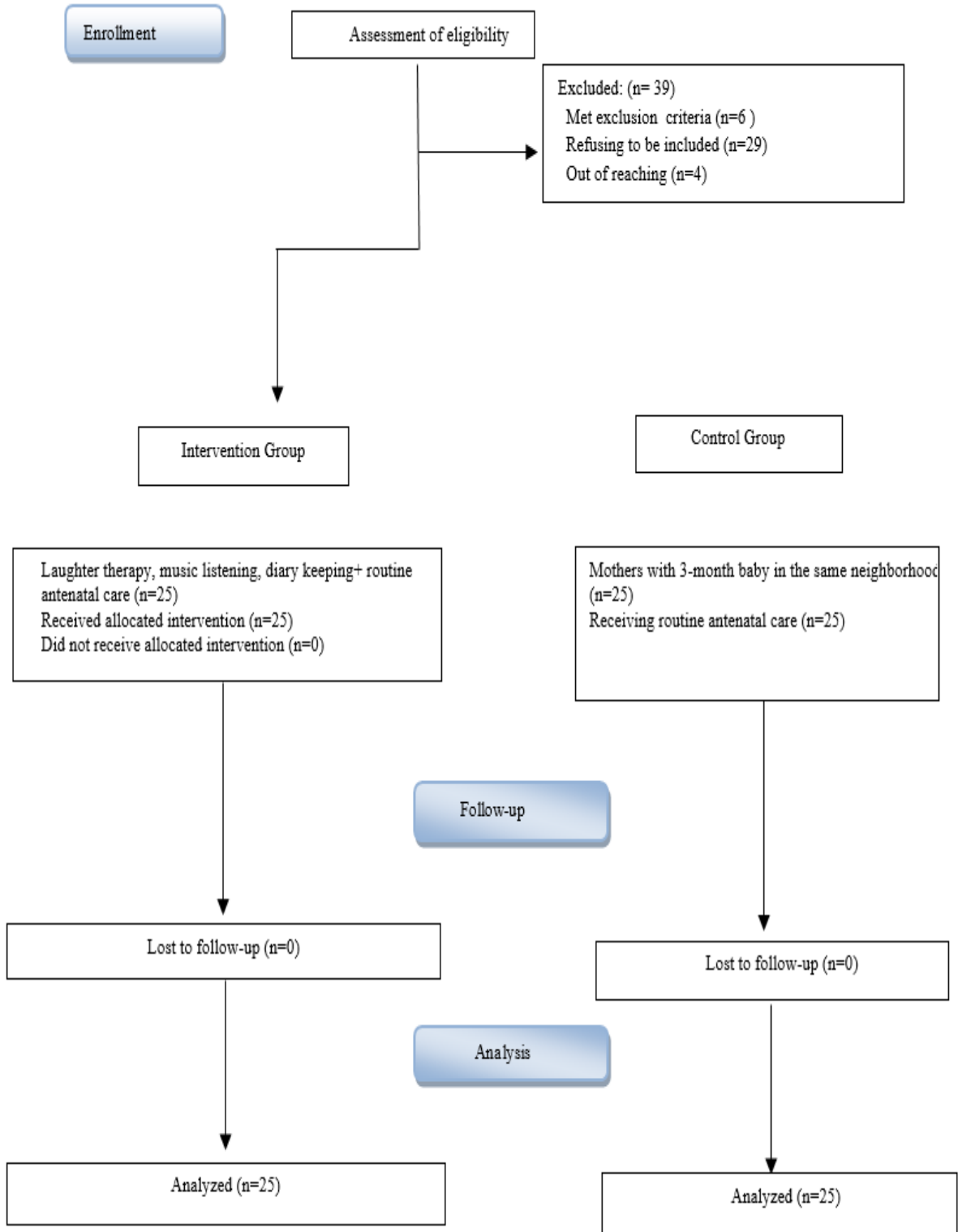
Figure 1. The Consolidated Standard of Reporting Trials (CONSORT) flow diagram

Table 1. The distribution of mean BDI, EPDS, and BSI scores of pregnant women according to time

Measurements	Antenatal		Postnatal		Test and p values	Effect Size (Partial Eta Square)	Power
	T1 x̄±sd	T2 x̄±sd	T3 x̄±sd	T4 x̄±sd			
Beck Depression Inventory	11.88±7.19	9.72±6.73	8.60±5.62	8.12±6.02	F=1.934 p=0.154	0.074 (0.001-0.304)	0.43
Edinburg Postpartum Depression Scale	8.36±3.78	6.28±4.41	5.44±4.25	5.20±3.99	F=7.868 **p<0.001**	0.246 (0.016-0.479)	0.96
Brief Symptom Inventory (Discomfort severity index)	0.68±0.35	0.53±0.31	0.34±0.23	0.36±0.30	F=5.682 **p=0.005**	0.191 (0.001-0.430)	0.90
Brief Symptom Inventory (Total symptom index)	23.12±9.45	20.52±10.30	14.76±9.08	14.64±10.08	F=4.940 **p=0.009**	0.170 (0.002-0.411)	0.85
Brief Symptom Inventory (Discomfort symptom index)	1.56±0.38	1.33±0.32	1.18±0.19	1.22±0.26	F=7.763 **p=0.001**	0.244 (0.015-0.477)	0.97

Table 2. The changes in mental health levels of pregnant women as to according to depression symptoms exhibited at pre-intervention period in terms of time

Measurements	Antenatal		Postnatal		Group	Group*Time	Time
	T1 $\bar{x}\pm sd$	T2 $\bar{x}\pm sd$	T3 $\bar{x}\pm sd$	T4 $\bar{x}\pm sd$			
Beck Depression Inventory							
No depression symptom	6.00±2.40	6.55±6.03	8.27±5.40	6.09±4.52	F=117.818	F=5.482	F=2.654
Mild-to-moderate depression	16.50±6.23	12.21±6.35	8.86±5.98	9.71±6.70	**p<0.001**	**p=0.003**	p=0.055
Edinburg Postpartum Depression Scale							
No depression symptom	6.64±4.15	5.18±3.62	5.09±5.08	3.45±2.84	F=83.789	F=1.318	F=7.547
Mild-to-moderate depression	9.71±2.94	7.14±4.89	5.71±3.64	6.57±4.30	**p<0.001**	p=0.278	**p<0.001**
Brief Symptom Inventory (Discomfort severity index)							
No depression symptom	0.48±0.29	0.38±0.24	0.20±0.20	0.17±0.15	F=150.03	F=0.402	F=12.734
Mild-to-moderate depression	0.84±0.32	0.64±0.31	0.45±0.19	0.52±0.30	**p<0.001**	p=0.638	**p<0.001**
Brief Symptom Inventory (Total symptom index)							
No depression symptom	18.72±9.54	16.09±8.65	9.27±8.24	8.09±6.72	F=170.36	F=0.517	F=11.652
Mild-to-moderate depression	26.57±8.12	24.00±10.43	19.07±7.39	19.78±9.38	**p<0.001**	p=0.578	**p<0.001**
Brief Symptom Inventory (Discomfort symptom index)							
No depression symptom	1.41±0.40	1.21±0.15	1.10±0.19	1.10±0.19	F=1285.08	F=0.241	F=10.607
Mild-to-moderate depression	1.68±0.34	1.42±0.39	1.25±0.16	1.32±0.27	**p<0.001**	p=0.778	**p<0.001**

Table 3. According to time, the distribution of mean beck depression inventory, edinburg postpartum depression scale, and brief symptom inventory scores of women in the study and control groups.

Scales	Study Group $\bar{x}\pm sd$	Control Group $\bar{x}\pm sd$	Test and p Values	Size Effect Cohen d (%95 CI)
Beck Depression Inventory	8.12±6.07	12.96±9.42	t=2.163 **p=0.036**	0.591 (0.024-1.157)
Edinburg Postpartum Depression Scale	5.20±3.98	9.24±6.07	t=2.778 **p=0.008**	0.761 (0.192-1.314)
Brief Symptom Inventory (Discomfort severity index)	0.36±0.30	0.70±0.58	t=2.576 **p=0.014**	0.726 (0.149-1.295)
Brief Symptom Inventory (Total symptom index)	14.64±10.08	21.64±13.06	t=2.121 **p=0.039**	0.617 (0.047-1.182)
Brief Symptom Inventory (Discomfort symptom index)	1.22±0.26	1.47±0.55	t=2.076 **p=0.045**	0.561 (-0.007-1.124)

DISCUSSION

This quasi-experimental study is one of the first studies to examine the effects of laughter therapy, listening to music, and diary-keeping interventions applied to pregnant women on postpartum mental health of the mother and maternal attachment. The results of this study partially support our hypotheses. However, while these interventions changed mental health in general, they did not affect maternal attachment.

Laughter therapy, listening to music, and diary-keeping improved mental health over time in the intervention group. Similarly, there was a significant difference in mental health between the intervention and control groups. These results are consistent with some studies in the literature. For example, music-based laughter therapy reduces depression and stress in patients with gynecological cancer (10). Listening to music during pregnancy reduces postpartum depression symptoms and increases the feeling of well-being (3). In addition, it has been reported that the application of laughter therapy for eight weeks can improve depression and anxiety levels among retired women (39). Laughter therapy reduces depression in older people residing in nursing homes (40). Furthermore, in a study involving laughter therapy, comedy movies, and reading group, the authors reported that the cortisol level of the laughter therapy group decreased significantly (16). Lin et al. (2018) showed that music interventions applied during pregnancy significantly reduced anxiety (4). In the present study, comparisons were also performed by analyzing the effect of time and group interaction to determine the

effectiveness of the interventions. Pregnant women with depression symptoms benefited more from the interventions than those without depression symptoms. By balancing the sympathetic and parasympathetic system with laughter, the effect of the endorphin hormone secreted as a result of mental and physical relaxation reduced the symptoms of (11, 12) anxiety, tension, and depression (12, 41). Therefore, a concomitant of music and laughter therapy may be important for complementing each other in terms of both physiological and psychological effects of these interventions. At the same time, owing to the prevalence of depression during pregnancy and the postpartum period (42) and women's preference to use complementary therapies instead of drugs (43), these practices can be integrated into standard care by nurses. It should be considered that these practices would also make important contributions toward nursing practice by helping nurses to spend more time with the pregnant woman understanding her, and building trust in the relationship.

In addition to music and laughter, diary-keeping about themselves and their pregnancy, expressing their feelings in group sharing, and realizing that other women also experience the same emotions may be important for pregnant women in protecting and improving mental health. It can be said that women became aware of the emotions they experienced and applied the methods they learned when they experienced negative emotions.

In the present study, mental health was evaluated with a Brief Symptom Inventory that evaluated conditions such as sleep problems, fatigue, paranoid thoughts, and depression and anxiety. Laughter therapy, listening to music, and diary-keeping reduced the number of symptoms and the level of discomfort related to the symptoms experienced. During pregnancy, impaired sleep quality is one of the most common complaints that can lead to adverse maternal and fetal consequences (44). It has been reported that listening to music during pregnancy enhances sleep quality (21,44), and improves sleep quality in patients on hemodialysis who receive laughter therapy (17). These findings elucidate the healing effects of laughter therapy, listening to music, and diary keeping for many mental health indicators.

Multiple interventions in the present study showed no effect on maternal attachment. It was observed that maternal attachment was at a good level regardless of the interventions applied. Similar to the current study's findings, it has been reported that listening to music and singing does not affect maternal-fetal attachment (45). On the other hand, an increase in mother-infant attachment has been reported after 40 minutes of music therapy applied to mothers in the postpartum period for eight days (46).

In our study, the addition of time series to the quasi-experimental design has increased the study's power, and blinding was obtained in terms of statistician and reporting. The fact that all participants completed the study, and the interventions were fully performed are robust features of the study for the reliability of the effects. No adverse effects were observed to arise from the interventions during the study. The internal validity of the study is weaker as randomization was not performed. However, the controls had similar socio-demographic and reproductive health characteristics to those of the study group and were settled in the same region.

CONCLUSION

In the present study, it was demonstrated that laughter therapy, music listening, and diary-keeping interventions applied to pregnant women made a difference in improving mental health but had a moderate-to-severe effect. However, the same effect was not achieved against the controls despite the difference. The absence of a negative impact on women's health and observing improvements in mental health after the interventions indicates that these interventions are viable for pregnant women in routine prenatal care programs.

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