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# The effect of emotional freedom technique and music applied to pregnant women who experienced prenatal loss on psychological growth, well-being, and cortisol level: A randomized controlled trial☆,☆☆

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ABSTRACT

*Introduction:* Research has shown that application of emotional freedom technique and music ensures psychological growth, increases well-being, and decreases cortisol level.
*Purpose:* In the study, it was aimed to determine the effect of EFT and music applied to pregnant women who had experienced prenatal loss on their psychological growth, well-being, and cortisol level.
*Methods:* The study was conducted as a randomized controlled trial in a city hospital in eastern Türkiye with 159 pregnant women, 53 of whom were in the EFT, 53 in the music group, and 53 in the control group. The study data were collected through Subjective Units of Disturbance Scale (SUDS), Subjective Units of Experience (SUE) Scale, Post Traumatic Growth Inventory (PTGI), and WHO-5 Well-Being Index, and saliva samples were taken for cortisol evaluation. EFT was applied to the women two times every other week; the women in the music group listened to music two times every other week. Throughout the week following the first intervention, the women continued the interventions at home.
*Results:* It was determined that EFT and music significantly decreased the participants' subjective anxiety and salivary cortisol median scores, the lowest anxiety was in the EFT group, and PTGI and WHO-5 Well-Being Index mean scores increased ($p < 0.005$). Further analyses showed that EFT was more effective in terms of increasing well-being than music ($p < 0.001$; $a > b > c$). It was determined that the anxiety levels and salivary cortisol median values of the control group were statistically significantly higher compared to the EFT and music groups ($p < 0.001$).
*Conclusion:* It was found that EFT and music applied to the women who had experienced prenatal loss decreased anxiety, ensured psychological growth, improved well-being, and decreased salivary cortisol level.

## Introduction

Prenatal loss leads to disappointment and sorrow in women, and as a result, women are afraid of re-experiencing such losses in their future pregnancies (Sutan et al., 2010; Yilmaz & Beji, 2013). About one out of four pregnancies result in miscarriage across the world, and 2.6 million babies are stillborn every year (Côté-Arsenault & Donato, 2011; Lawn et al., 2016; Obst et al., 2020). In Türkiye, 14 % of pregnancies are terminated due to reasons such as unintentional miscarriage, ectopic pregnancy, and stillbirth (Cavlin, 2019).

Women who experience prenatal loss can go through serious psychological problems such as depression, anxiety, and post-traumatic stress disorder (Collins et al., 2014; Cumming et al., 2007). Following pregnancy loss, many women can continue to experience symptoms such as avoidance, feeling as if they were living the same event, desperation, and guilt for a long time (Slobodin, 2014). In addition, behaviors such as focusing on pain that negatively affects their well-being are observed in women who experience pregnancy after the pregnancy loss (Lamb, 2002; Wallerstedt et al., 2003). In a study conducted on pregnant women, high levels of cortisol were determined in women who experienced high levels of anxiety throughout their pregnancy (Field et al., 2002). This situation increases the importance of the

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relationship between the anxiety level and cortisol level that occurs in women who experience pregnancy after the loss (Esel, 2003; Field et al., 2002). It was also observed that pregnancy losses could bring along positive outcomes in the time ahead (Krosch & Shakespeare-Finch, 2017; Winograd, 2017). Following traumatic experiences, an increase in skills to cope with stress, positive improvement in interpersonal relations, and an increase in the skill to think positively are observed in some individuals. This situation is defined as "post-traumatic growth or psychological growth" in the literature (Tedeschi & Calhoun, 2004).

It is quite important to investigate the emotional status of women after the loss of pregnancy and to use psychological approaches and effective coping methods in the management of this process. One of these methods, emotional freedom technique, is a method that is employed in eliminating the emotional blockages that occur in the bodily energy of individuals. EFT aims to reveal all potential points where a negative emotion that was experienced in the past and got stuck in a part of the body exists. In EFT, the emotions that affect the individual negatively are focused on, and through the simulations that are often created by tapping, energy flow is regulated, relieving the individual (Hartmann, 2016). When applied on pregnant women, it can contribute to decreasing post-traumatic stress disorder, decreasing cortisol level, increasing serotonin and endorphin release (Ghamsari & Lavasani, 2015; Irmak Vural & Aslan, 2018; Mardjan et al., 2018).

One of the methods that have been reported to have a positive effect on mood is music (Liu et al., 2016). It is used in order to meet individuals' physical, emotional, mental, social, and spiritual needs (de la Torre-Luque et al., 2017). Music has been used in various clinical populations and post-traumatic stress disorder as a therapeutic intervention in order to facilitate recovery (Patki et al., 2020; Shivamurthy & Anusha, 2016). It decreases cortisol levels and positively affects physiological parameters (Karamızrak, 2019), which in turn improves general health and welfare (Landis-Shack et al., 2017). In a study that investigated the effect of music on women who experienced prenatal loss, music application was found to relieve women (Aydın et al., 2019).

As all follow-up and care of the pregnant woman in the prenatal period are provided by midwives, the care provided by them to pregnant women plays a critical role for women to experience a comfortable and healthy pregnancy. Midwives should psychologically approach pregnant women who experienced prenatal loss in order to ensure their psychological growth, improve their general well-being, and decrease their stress levels. Considering all these factors, it is believed that EFT and music, which do not involve any intervention and are low-cost and easy to apply, will contribute to pregnant women who experienced a prenatal loss in terms of coping with previous loss trauma and thus feeling themselves better. In the literature review made, no study was encountered in which it was aimed to determine the effect of EFT and music application on psychological growth, well-being, and cortisol levels in pregnant women who experienced prenatal loss. Hence, the study is the first randomized controlled trial conducted in order to contribute to the literature.

### *Research hypotheses*

**H1**. EFT applied to pregnant women who experienced a prenatal loss increases their psychological growth level.

**H2**. Music applied to pregnant women who experienced a prenatal loss increases their psychological growth level.

**H3**. EFT applied to pregnant women who experienced a prenatal loss increases their well-being level.

**H4**. Music applied to pregnant women who experienced a prenatal loss increases their well-being level.

**H5**. EFT applied to pregnant women who experienced a prenatal loss decreases their cortisol level.

**H6**. Music applied to pregnant women who experienced a prenatal loss decreases their cortisol level.

## Materials and methods

### *Design and sample*

The study was designed as a randomized controlled trial in order to determine the effect of EFT and music application to pregnant women who experienced a prenatal loss on their psychological growth, well-being, and cortisol levels. The study population consisted of pregnant women with a prenatal loss history who presented to the obstetrics clinics of a city hospital in a province in eastern Türkiye. There are 6 obstetrics outpatient clinics and one pregnancy training classroom in the hospital. One midwife is assigned to the pregnancy training class which works in coordination with the outpatient clinics, and there is a physician and a midwife in each outpatient clinic. Pregnancy training class provides services between 08.00 and 16.00, and there are comfortable armchairs and chairs for the pregnant women. Routine care is provided to the pregnant women who apply to the pregnancy training class for prenatal and postnatal period, but no interventions related to EFT and music application are made. According to the city hospital records, 6768 pregnant women presented to the obstetrics clinics in 2019. The sample size was determined through a web based software. The sample size was calculated to be at least 53 for each group (53 in EFT group, 53 in music group, 53 in control group) with 5 % margin of error at two-way significance level, with 95 % confidence interval, and 80 % power of representing the population, with the assumption that the post traumatic growth index mean score of the group who experienced a prenatal loss, which was 51.22 (standard deviation: 20.13), would increase by 11 points following the intervention (Krosch & Shakespeare-Finch, 2017). Pregnant women who met the inclusion criteria and agreed to participate in the study were assigned to EFT, music, and control groups through simple randomization method according to the order of their presenting to the outpatient clinic.

All pregnant women whose anxiety level was 1 and above on SUDS, who were 18 years old and above, who did not have any infection, wound, or scar on tapping areas, who did not have a problem related to pregnancy and the baby (preeclampsia, diabetes, heart diseases, placenta previa, oligohydramnios, fetal anomaly, etc.) were included in the study sample. Those who had a communication problem (not speaking Turkish, having disorders related to hearing, speaking, and understanding skills, etc.), whose saliva was found to be contaminated, and who had a diagnosed psychological health problem were excluded from the study. Verbal declaration of the participants was taken regarding whether they were diagnosed with a psychiatric disorder. Pregnant women meeting the inclusion criteria were assigned to EFT (n = 62), music (n = 65), and control (n = 63) groups through simple randomization method according to their order of presenting to the outpatient clinic. 31 pregnant women were not included in the analysis process, as 2 pregnant women in EFT group were diagnosed with risky pregnancy, 3 women did not apply daily EFT homework procedure, and 4 women did not want to continue the study; saliva samples could not be taken from 2 women in the music group, 7 women wanted to discontinue the study, and 3 women did not apply the music listening procedure; 5 women included in the control group could not be accessed, 4 women wanted to leave, and the saliva sample of 1 pregnant woman could not be included in the analysis. The study was completed with 159 pregnant women, as 53 pregnant women in each group. In place of the lost pregnant women in the study, assignment of pregnant women to the groups through randomization was continued until the sample size required was reached. Sampling process carried out in accordance with CONSORT (Consolidated Standards of Reporting Trials-CONSORT) criteria is presented in Fig. 1.

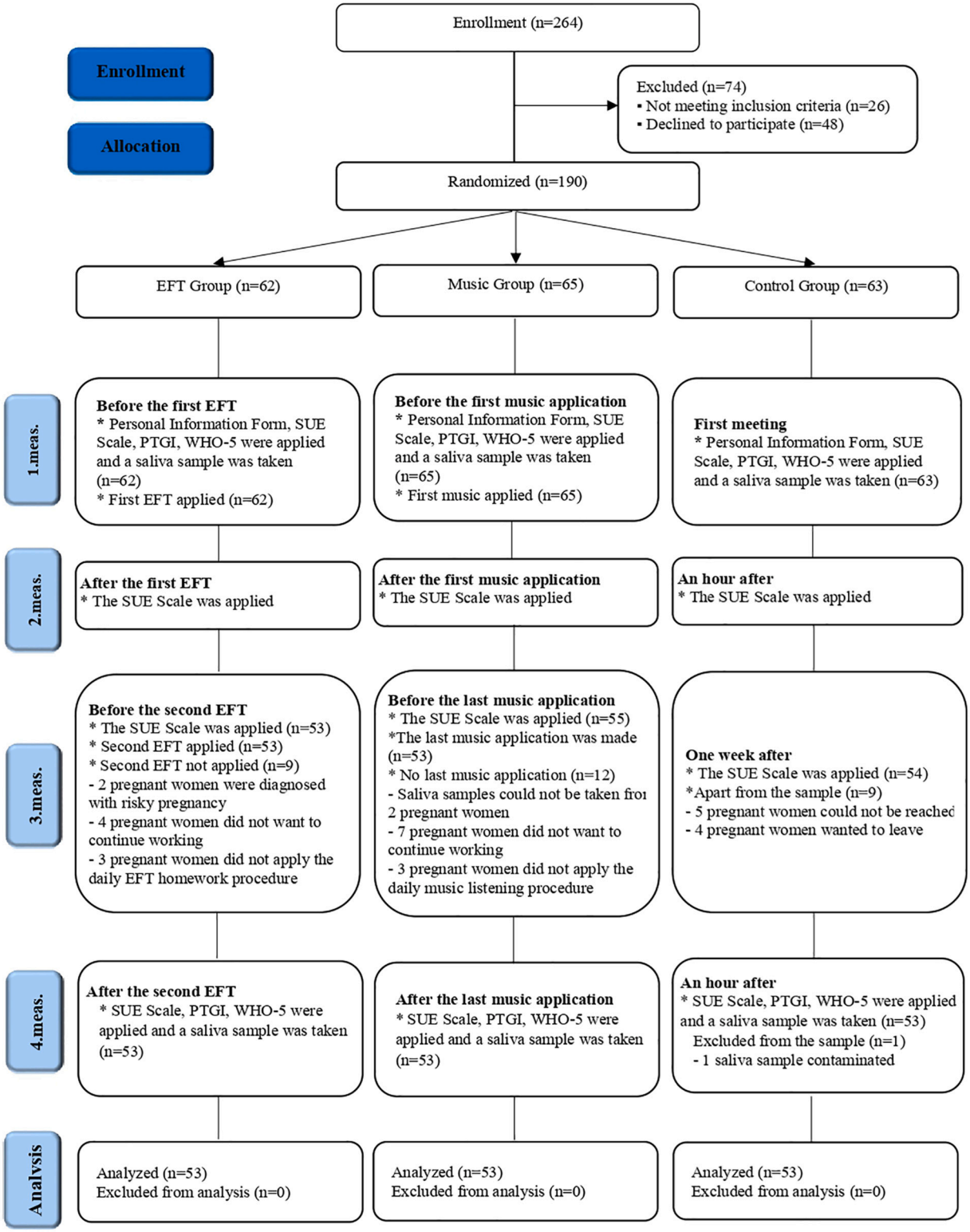


**Fig. 1.** CONSORT 2010 research application flowchart.

*Randomization*

The pregnant women were assigned to the groups by randomization. By using the Random Integer Generator method under the subheading of Numbers at random.org website, columns between 1 and 159 were created. By taking into account the numbers 1, 2, and 3, the pregnant women who experienced prenatal loss were randomly assigned to the numbers 1, 2, and 3. A draw was taken at the beginning of the study in order to determine which number corresponded to which group. As a result of the draw, number 1 was determined to be EFT group, number 2

music group, and number 3 control group (Random.Org).

*Data collection tools*

The study data were collected through Personal Information Form, Subjective Units of Disturbance Scale (SUDS), Subjective Units of Experience (SUE) Scale, Post-Traumatic Growth Inventory (PTGI), WHO-5 Well-Being Index, and cortisol level record form.

*Personal information form*

The form was created by the researcher in line with the literature review in order to determine identifying information of the pregnant women (age, economic status, family type, etc.) and their obstetric characteristics (number of pregnancies, presence of a living child, the week of pregnancy when the loss was experienced, etc.) (Farren et al., 2020; Körükcü & Kukulu, 2010; Krosch & Shakespeare-Finch, 2017).

*Subjective Units of Disturbance Scale (SUDS)*

Developed by Wolpe, SUDS is used in energy therapies in order to evaluate the individual's disturbance. The scale is scored between 0 and 10, and 0 indicates absence of anxiety, while 10 shows high anxiety level. As the score increases, so does anxiety (Wolpe, 1990).

*Subjective Units of Experience (SUE) Scale*

The scale was developed by Hartmann in order to determine emotional intensity of the individual at the beginning and end of EFT therapies. The scale is scored between −10 and +10. −10 indicates negative emotions, 0 shows absence of emotions, and + 10 demonstrates positive emotions (Hartmann, 2009, 2016).

*Post-Traumatic Growth Inventory (PTGI)*

The scale developed by Tedeschi and Calhoun in order to evaluate post-traumatic positive changes was adapted to Turkish by Kagan et al. The 21-item Likert type scale is scored between 0 and 5. The minimum score to be obtained is 0, while the maximum score is 105. A high score obtained shows that the individual has achieved a high level of growth in the post-traumatic period. The scale has three subdimensions. The subdimension of "perceived changes in self" is related with the items 5, 10, 11, 12, 13, 15, 17, 18, and 19, the subdimension of "a changed philosophy of life" is included in the items 1, 2, 3, 4, 7, and 14, and the subdimension of "a changed sense of relationships with others" is related with the items 6, 8, 9, 20, and 21. The scale's Cronbach's alpha reliability coefficient was determined as 0.92 (Kagan et al., 2012). In the current study, this value was found to be 0.87.

*WHO-5 Well-Being Index*

The index was developed by Ware in order to determine mental well-being and adapted to Turkish by Eser et al. The 5-item 6-point Likert type scale is scored between 0 (Never) and 5 (Always). The raw score is obtained by adding the scores given to the five items, and the score obtained is between 0 and 25. 0 represents the poorest quality of life possible, while 25 indicates the best quality of life possible. The Cronbach's alpha reliability coefficient of the scale was determined as 0.81 (Eser et al., 2019). In the present study, this value was found to be 0.83.

*Cortisol level record form*

The form was prepared by the researcher in order to record the salivary cortisol levels determined as a result of laboratory analyses.

*Data collection*

The study data were collected by using face-to-face method by the researcher at the pregnancy school located in the hospital on weekdays between October 2020 and April 2021. Firstly, SUDS was applied to the pregnant women in all groups, and those with anxiety level of 1 and above were invited to the study. No negative incidences were encountered throughout the research regarding the study groups and laboratory analyses. The application of data collection tools took 10–15 min for each participant.

The first meeting with the pregnant women was introductory meetings in which pregnant women were informed about the study. After the consents of the pregnant women were taken, Personal Information Form, SUE Scale, PTGI, and WHO-5 Well-Being Index were applied, and first measurement was performed by taking salivary samples.

*EFT group*

Following the first measurement, the first EFT which lasted for 30–40 min was applied to the pregnant women, which was followed by the application of SUE. Personal homework (releasing and positive EFT session protocol) was given to the pregnant women to apply by themselves two times a day (upon waking up in the morning and before going to bed at night) throughout the week following the first EFT application, and daily reminder was provided by the researcher through phone. In addition, the pregnant women were provided with EFT homework application guidelines prepared by the researcher and a homework follow-up chart where they could record their applications daily. One week after the first session, SUE scale was applied before the second session, and after that, the second EFT which lasted for 30–40 min was applied to the women by the researcher. Then, SUE, PTGI, and WHO-5 Well-Being Index were applied, and salivary samples were taken.

*Music group*

Following the first measurement, the first 30-minute music application was provided to the pregnant women by the researcher, which was immediately followed by the application of SUE scale. The music application was continued by the pregnant women at home once a day for 30 min throughout the week after the first application, and a reminder was made by the researcher over the phone. Also, a follow-up chart prepared by the researcher where they could record their applications daily was provided to the women. A week after the first music application, SUE scale was administered prior to the second session, which was followed by the last 30-minute music application by the researcher. Then, SUE, PTGI, and WHO-5 Well-Being Index were applied, and salivary samples were taken.

*Control group*

One hour after the first measurement, SUE scale was applied. One week after the first encounter, SUE was simultaneously applied to the experimental groups. One hour after the third measurement, SUE, PTGI, and WHO-5 Well-Being Index were applied, and salivary samples were taken.



**Fig. 2.** Saliva collection tube.



**Fig. 3.** Mouthpiece for submitting salivary sample.

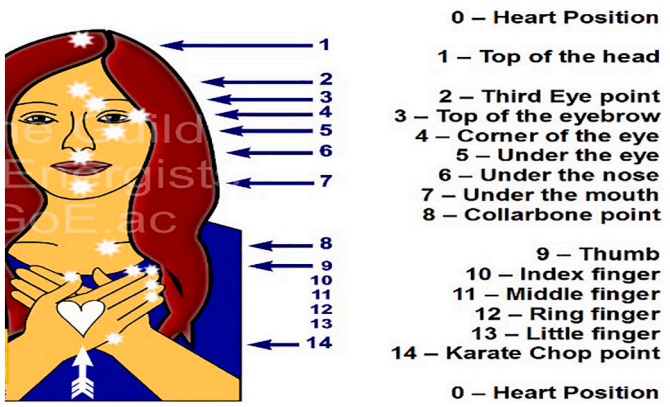


**Fig. 4.** Energy points (Hartmann, 2016).

*Obtaining salivary samples*

Salivary samples were collected into 1.5 mm saliva collection tubes (Eppendorf tubes) (Fig. 2) through hookah mouthpieces (Fig. 3). Before each saliva sampling, the pregnant women were informed about the procedure to be followed, and the procedure was told by the researcher by demonstrating. The tubes were prepared by the researcher according to a labeling system and given to the pregnant women. All groups were numbered according to their order in the study, and the tubes were coded as "A" for the first sample and "B" for the second sample (e.g., 1A: the first salivary sample of the first pregnant woman, 1B: the last salivary sample of the first pregnant woman).

The sampling time for all groups was similar, and in order to prevent the cortisol level from being affected by the circadian rhythm, the first salivary samples were collected between 09.00 and 13.00 a.m. Besides, in order to prevent the contamination of salivary cortisol values, the participants were told to stick to some rules such as terminating food intake at least 1.5 h before sample collection, stopping consuming caffeinated drinks in the last 2 h, not doing exhausting physical activities in the last hour, not consuming alcohol within the 24 h before sample collection, not brushing teeth in the last 2 h, and not having gingival bleeding (Bershadsky et al., 2014; Chen et al., 2017; Toda et al., 2004). The salivary samples collected were kept in a carrying case with ice cubes and taken to the laboratory by the researcher within 2 h. Salivary samples can be kept up to a week within the range of 2–8 °C and up to a year at -20 °C and below (DRG International, 2018; Kirschbaum & Hellhammer, 2000; Ozgocer, 2016). The lowest temperature of the freezer in the laboratory was −22 °C, so each salivary sample was kept at −22 °C in the laboratory until they were analyzed.

*Intervention*

*EFT group*

EFT application was performed by the researcher EKO, who had received training on the application (40 h) and had EFT Foundation and EFT Master certificates certified by International GoE. The application was performed in the most silent environment possible and in the position where the pregnant woman felt comfortable. After the pregnant women were informed about a brief history of EFT, its function, blockage points, and its application through written and visual materials, EFT application steps were demonstrated by the researcher by applying, and then application phase was initiated.

*EFT application steps.* The following steps include application steps of EFT (Hartmann, 2016):

1. *Taking heart chakra healing position:* While starting EFT, the pregnant woman is asked to take heart chakra healing position, close her eyes, and take three deep breaths in and out.
2. *Identifying the problem:* Then, the private problem or emotion to be worked on with EFT is determined together with the pregnant woman.
3. *Creating a reminder word cluster (emotion statement):* A short emotion statement that will help remember the problem in later stages of the application is created (e.g., I fear having a miscarriage/giving a stillbirth again). The emotion statement is repeated three times.
4. *Evaluation of the problem:* The pregnant woman is asked to identify the intensity of this emotion on SUE scale.
5. *Implementing tapping sequence:* While the pregnant woman is chanting the reminder word cluster, with the guidance of the researcher, she starts tapping the EFT acupuncture points (Fig. 4). The tappings are carried out by performing negative EFT in the first tour (e.g., "I fear having a miscarriage/giving a stillbirth again"), releasing in the second tour (e.g., "I release my fear of having a miscarriage/giving a stillbirth"), and positive EFT in the third tour (e.g., "In order to cleanse from this fear, I want health/healing for my pregnancy and baby").
6. *Re-evaluation:* After the tappings are completed, the pregnant woman is asked to return to heart chakra healing position, to inhale and exhale three deep breaths, and to drink some water. By performing an emotional evaluation again with SUE, EFT application is concluded.

*Music application procedure*

After the pregnant women were informed about the intervention, the music application was performed by the researcher in the most quiet environment possible and in the position where the pregnant woman felt the most comfortable. In the literature, it has been stated that listening to music for a long time would lead to unrest, and that therefore, it would be appropriate to listen to music between 15 and 40 min a day in order to achieve relaxation (Chang et al., 2008; Lee et al., 2005; Liu et al., 2016; Shin & Kim, 2011). Besides, it is seen that in studies conducted, the duration of listening to music is mostly limited to 30 min (Chang et al., 2015; Hosseini et al., 2013; Li & Dong, 2012; Liu et al., 2016; Ventura et al., 2012; Yang et al., 2009). Hence, listening to music in the present study was limited to 30 min. In the application, the CD recording created by taking expert opinion from faculty members of Fine Arts and Design Faculty was used. The CD recording included music at 60 dB that was flowing, relieving anxiety, making the listener feel empowered, and providing relaxation and joy (music and maqams chosen: Rast, Neva, Buselik, Huseyni, and Saba). The music was sent to the pregnant women who did not have a CD player via smart phone (WhatsApp, Bluetooth, etc.). In order to choose music in line with the musical preferences of the participants, more than one choice of music

was presented to the pregnant women. Attention was paid to issues such as the pregnant women having an empty bladder during music application, starting the application with pregnant women taking three deep breaths, repeating breath taking procedure upon loss of concentration, keeping the mobile phones off, and no intervention being performed in the process.

### *Analysis of saliva samples*

Salivary cortisol analyses were performed in a private laboratory by taking the study of Ozgocer, Ucar, et al. (2017) and Ozgocer, Yildiz, et al. (2017) as reference. Firstly, 96-well microplates (Nunc, Denmark) were covered with cortisol -BSA (bovine serum albumin) at +4 °C throughout the night, and blocked with 200 µl BSA (1 %) at 37 °C for 2 h. Saliva samples were thawed before being added to the microplates and centrifuged at 4000*g* for 10 min. Supernatant was diluted three times with test solution before being used in the test. Saliva samples and standards (0, 1, 5, 10, 20, 40, 100, 1000 ng/ml) were added to the wells in duplicates (40 µl) along with diluted rabbit anti-cortisol antibodies (40 µl). The plates were incubated at 37 °C for 45 min and washed with washing solution five times, and then, 100 µl biotinylated goat-anti-rabbit antibodies were added. This was followed by incubation at 37 °C for 30 min. After that, the plates were washed with washing solution five times. Then, streptavidin peroxidase (100 µl) was added, and the plates were incubated at +4 °C for 15 min, which were afterwards washed with washing solution five times. Then, 150 µl substrate solution (tetramethylbenzidine) was added. When it turned to blue, it was stopped with 50 µl sulfuric acid, and the plates were read by plate-reader spectrophotometer (Biotek, Synergy HT, USA). Calibration curves were created by using 4-parameter logistic regression curves (Gen5, Biotek, USA), and cortisol levels were measured by using this curve. Minimum detection limit was 1 ng/ml, and intra- and intertest variation coefficients were 13.6 % and 15.8 %, respectively (Ozgocer, Ucar, & Yildiz, 2017; Ozgocer, Yildiz, & Ucar, 2017).

### *Statistical analysis*

The statistical analyses of the data were performed with SPSS (Statistical Package for the Social Sciences) 25.0 software, and visualization of the data was done with R language software programming language. Descriptive statistics were presented as number, percentage, mean, and standard deviation. Intergroup comparison of the categorical variables was made with Chi-square test. The compliance of the parameters with normal distribution was checked with Kolmogorov-Smirnov test. In the intergroup comparison of the data with normal distribution, ANOVA test was used, while in intragroup comparisons, dependent groups *t*-test was employed. In the intergroup comparison of the data without normal distribution, Kruskal-Wallis test was used, and in the intragroup comparisons, Mann-Whitney *U* test was employed. In the multiple comparison made for determining the difference between the groups, Post-Hoc Tukey test was used, and in the comparison of the differences between the groups' measurements, repetitive measurements variance analysis and Wilcoxon Signed Ranks test was employed. Statistical significance level was accepted as $p < 0.05$.

**Table 1**
Comparison of the sociodemographic and obstetric characteristics of the pregnant women (n = 159).

| Characteristic | EFT group (n = 53) | | Music group (n = 53) | | Control group (n = 53) | | Test and p value |
|---|---|---|---|---|---|---|---|
| | n | % | n | % | n | % | |
| Age (years) | | | | | | | $x^2 = 8.070$ |
| 19–26 | 13 | 24.5 | 21 | 39.6 | 10 | 18.9 | p = 0.089 |
| 27–33 | 28 | 52.9 | 25 | 47.2 | 27 | 50.9 | |
| ≥34 | 12 | 22.6 | 7 | 13.2 | 16 | 30.2 | |
| Family type | | | | | | | $x^2 = 0.712$ |
| Nuclear family | 44 | 83.0 | 47 | 88.7 | 45 | 84.9 | p = 0.701 |
| Extended family | 9 | 17.0 | 6 | 11.3 | 8 | 15.1 | |
| Employment status | | | | | | | $x^2 = 4.470$ |
| Employed | 16 | 30.2 | 12 | 22.6 | 7 | 13.2 | p = 0.107 |
| Unemployed | 37 | 69.8 | 41 | 77.4 | 46 | 86.8 | |
| Income status | | | | | | | $x^2 = 9.286$ |
| Low | 14 | 26.4 | 7 | 13.2 | 16 | 30.2 | p = 0.054 |
| Medium | 30 | 56.6 | 37 | 69.8 | 35 | 66.0 | |
| High | 9 | 17.0 | 9 | 17.0 | 2 | 3.8 | |
| Number of pregnancies | | | | | | | $x^2 = 2.184$ |
| 2 | 12 | 22.6 | 14 | 26.4 | 9 | 17.0 | p = 0.702 |
| 3 | 16 | 30.2 | 17 | 32.1 | 15 | 28.3 | |
| ≥4 | 25 | 47.2 | 22 | 41.5 | 29 | 54.7 | |
| Existence of living children | | | | | | | $x^2 = 0.777$ |
| Yes | 39 | 73.6 | 37 | 69.8 | 41 | 77.4 | p = 0.678 |
| No | 14 | 26.4 | 16 | 30.2 | 12 | 22.6 | |
| Number of pregnancy loss | | | | | | | $x^2 = 6.902$ |
| 1 | 39 | 73.6 | 42 | 79.2 | 41 | 77.3 | p = 0.141 |
| 2 | 10 | 18.9 | 10 | 18.9 | 9 | 17.0 | |
| ≥3 | 4 | 7.5 | 1 | 1.9 | 3 | 5.7 | |
| Pregnancy planning status | | | | | | | $x^2 = 1.302$ |
| Planned | 36 | 67.9 | 41 | 77.4 | 37 | 69.8 | p = 0.522 |
| Unplanned | 17 | 32.1 | 12 | 22.6 | 16 | 30.2 | |
| Gestational week | | | | | | | $x^2 = 4.952$ |
| 1. Trimester | 11 | 20.8 | 13 | 24.5 | 12 | 22.6 | p = 0.292 |
| 2. Trimester | 21 | 39.6 | 11 | 20.8 | 14 | 26.5 | |
| 3. Trimester | 21 | 39.6 | 29 | 54.7 | 27 | 50.9 | |
| Lost week of pregnancy | | | | | | | $x^2 = 6.902$ |
| ≤12 week | 46 | 86.8 | 42 | 79.2 | 39 | 73.6 | p = 0.141 |
| 13–20 week | 2 | 3.8 | 1 | 1.9 | 6 | 11.3 | |
| ≥21 week | 5 | 9.4 | 10 | 18.9 | 8 | 15.1 | |

EFT: emotional freedom technique.
$x^2$: Chi-squared test.

**Table 2**
Comparison of SUE mean scores of the pregnant women in the measurements made.

| SUE scale | Groups | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | EFT group (n = 53) | | | | Music group (n = 53) | | | | Control group (n = 53) | | | |
| | 1st meas. | 2nd meas. | 3rd meas. | 4th meas. | 1st meas. | 2nd meas. | 3rd meas. | 4th meas. | 1st meas. | 2nd meas. | 3rd meas. | 4th meas. |
| SUE scale (mean ± SD) | −5.85 ± 1.72 | −1.26 ± 2.11 | −2.87 ± 1.77 | 1.91 ± 3.23 | −5.53 ± 1.82 | −2.13 ± 2.01 | −3.64 ± 1.76 | −1.09 ± 2.39 | −5.13 ± 2.04 | −4.87 ± 1.98 | −5.02 ± 1.91 | −5.75 ± 2.22 |
| Test[a] and p value | t = −19.998, **p < 0.001** | | t = −15.328, **p < 0.001** | | t = −20.361, **p < 0.001** | | t = −15.637, **p < 0.001** | | t = −1.493, p = 0.142 | | t = 4.021, **p < 0.001** | |
| Statistical model | | | | | | Test[b] value | | | | | | p value |
| Group | | | | | | F = 38.758 | | | | | | **<0.001** |
| Measurement | | | | | | F = 34.862 | | | | | | **<0.001** |
| Group × measurement | | | | | | F = 131.297 | | | | | | **<0.001** |

EFT: emotional freedom technique, SUE: Subjective Units of Experience.
*p<0.001 *p<0.05
[a] Paired-samples t-test.
[b] Repeated measures ANOVA.

*Ethical considerations*

Ethical approval to conduct the study was taken from Malatya Clinical Research Ethics Committee (Decision No: 2020/66) and necessary permission was obtained from Elazıg Provincial Health Directorate (Issue No: E.843). In addition, the study was registered at clinicaltrials.gov (ClinicalTrials.gov Identifier: NCT05344144). The participating pregnant women were informed in line with the Voluntary Informed Consent Form principles, and their written and verbal consents were taken. The pregnant women were told that they could leave the study at any time they wished.

## Results

In the study, the difference between each group in terms of sociodemographic and obstetric characteristics was determined to be statistically insignificant ($p > 0.05$) (Table 1).

It was seen that SUE scale scores of the pregnant women in the EFT and music groups statistically significantly increased, and that it significantly decreased in the control group. In addition, a statistically significant difference was found according to the groups and measurement times ($p < 0.001$; Table 2; Fig. 5).

It was found that the difference between PTGI total and subdimension mean scores, WHO-5 Well-Being Index mean score, and salivary cortisol median value in the first measurement was statistically insignificant ($p > 0.05$), but that the difference between the groups in the fourth measurement was significant in favor the EFT and music groups ($p < 0.05$ for PTGI "perceived changes in self" and "changed sense of relationships with others" subdimensions and salivary cortisol value; $p < 0.001$ for others). Besides, as a result of further analyses, it was determined that in the comparison made between the groups in the fourth measurement in terms of PTGI total and "perceived changes in self" and "changed sense of relationships with others" subdimensions, the mean score of the pregnant women in the EFT group was higher compared to the pregnant women in the control group ($a > c$). Regarding PTGI "a changed philosophy of life" subdimension, the mean score of the EFT group pregnant women was found to be higher in comparison to the mean scores of the music and control group women ($a > b, c$). A significant difference was found between the three groups in terms of WHO-5 Well-being Index ($a > b > c$). When the salivary cortisol median scores were compared, it was determined that the pregnant women in the control group had a higher median score compared to the EFT group and music group ($c > a, b$) (Table 3; Fig. 6).

It was also determined that after the intervention, PTGI and its subdimensions and WHO-5 Well-Being Index mean scores of the pregnant women in the EFT and music groups significantly increased ($p < 0.001$) for all; $p < 0.05$ for only PTGI "changed sense of relationships with others" subdimension, and that their cortisol levels significantly decreased (EFT group $p < 0.001$; music group $p < 0.05$), It was found that after the intervention, PTGI total, "a changed philosophy of life" and "changed sense of relationships with others" subdimensions and WHO-5 Well-Being Index mean scores of the pregnant women in the control group significantly decreased ($p < 0.05$ for PTGI total and "a changed philosophy of life" subdimension; $p < 0.001$ for others), and that their cortisol levels significantly increased ($p = 0.001$) (Fig. 6). In the measurements made, the difference between the first and fourth measurement cortisol levels median scores was found to be statistically significant ($p < 0.001$) (Table 3; Fig. 6).

## Discussion

The study was conducted in order to determine the effect of EFT and music applied to pregnant women who experienced prenatal loss on their psychological growth, well-being, and cortisol levels. It was determined that both EFT and music application were effective in increasing psychological growth and well-being and decreasing cortisol

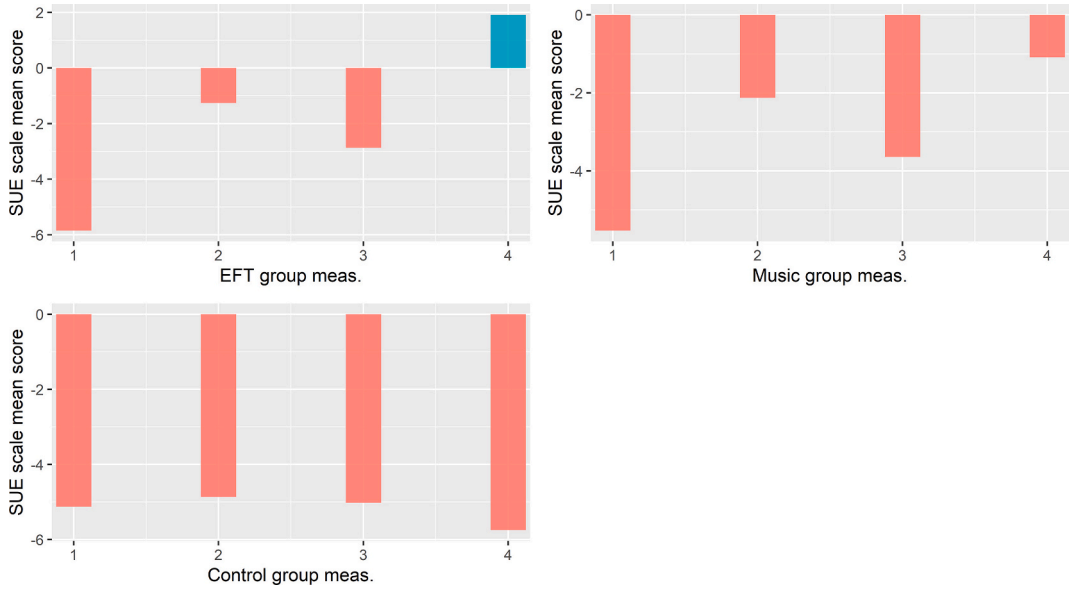


**Fig. 5.** Pregnant women's Subjective Units of Experience Scale mean scores.

**Table 3**
Intergroup and intragroup comparisons of the pregnant women's PTGI total and subdimension mean scores, WHO-5 Well-Being Index mean scores, and salivary cortisol levels in the first and fourth measurements.

| | Measurements | EFT group (n = 53) | Music group (n = 53) | Control group (n = 53) | Test[a] and p value | | Significance[b] |
|---|---|---|---|---|---|---|---|
| | | Mean ± SD | Mean ± SD | Mean ± SD | | | |
| PTGI | Change in the self-perception | | | | | | |
| | 1.meas. | 26.70 ± 8.48 | 29.77 ± 8.83 | 28.66 ± 9.99 | F = 1.543 | p = 0.217 | |
| | 4.meas. | 34.08 ± 8.65[a] | 32.15 ± 8.40[b] | 28.34 ± 9.49[c] | F = 5.750 | **p = 0.004** | a > c |
| | Test[c] and p value | t = −11.560 **p < 0.001** | t = −7.886 **p < 0.001** | t = 1.066 p = 0.291 | | | |
| | Change in the philosophy of life | | | | | | |
| | 1.meas. | 11.89 ± 6.21 | 11.17 ± 6.84 | 10.38 ± 6.95 | F = 0.677 | p = 0.510 | |
| | 4. meas. | 16.00 ± 6.25[a] | 12.36 ± 6.70[b] | 9.91 ± 6.30[c] | F = 11.634 | **p < 0.001** | a > b, c |
| | Test[c] and p value | t = −10.210 **p < 0.001** | t = −5.647 **p < 0.001** | t = 2.099 **p = 0.041** | | | |
| | Change in the relationships with others | | | | | | |
| | 1.meas. | 6.26 ± 4.55 | 6.26 ± 5.41 | 6.45 ± 5.58 | F = 0.023 | p = 0.977 | |
| | 4.meas. | 8.26 ± 5.57[a] | 6.66 ± 5.30[b] | 5.53 ± 5.11[c] | F = 3.520 | **p = 0.032** | a > c |
| | Test[c] and p value | t = −5.075 **p < 0.001** | t = −2.073 **p = 0.043** | t = 3.941 **p < 0.001** | | | |
| | PTGI total | | | | | | |
| | 1.meas. | 44.85 ± 14.39 | 47.21 ± 17.75 | 45.49 ± 20.36 | F = 0.252 | p = 0.777 | |
| | 4.meas. | 58.34 ± 17.18[a] | 51.17 ± 16.95[b] | 43.77 ± 18.45[c] | F = 9.133 | **p < 0.001** | a > c |
| | Test[c] and p value | t = −10.519 **p < 0.001** | t = −8.061 **p < 0.001** | t = 3.624 **p = 0.001** | | | |
| (WHO-5) | 1.meas. | 11.42 ± 5.60 | 12.02 ± 5.66 | 11.62 ± 5.74 | F = 0.155 | p = 0.857 | |
| | 4.meas. | 17.70 ± 4.71[a] | 14.23 ± 5.37[b] | 10.43 ± 5.41[c] | F = 26.101 | **p < 0.001** | a > b > c |
| | Test[c] and p value | t = −13.092 **p < 0.001** | t = −9.568 **p < 0.001** | t = 5.742 **p < 0.001** | | | |

| | Measurements | EFT group (n = 53) | Music group (n = 53) | Control group (n = 53) | Test[d] and p value | | Significance[e] |
|---|---|---|---|---|---|---|---|
| | | Median (min-max) | Median (min-max) | Median (min-max) | | | |
| Cortisol level | 1.meas. | 23.80 (0.00–312.04) | 17.93 (0.00–243.08) | 18.01 (0.00–542.01) | KW = 2.150 | p = 0.341 | |
| | 4.meas. | 19.17[a] (0.00–155.76) | 13.18[b] (0.00–287.12) | 26.55[c] (0.00–608.17) | KW = 9.793 | **p = 0.007** | c > a, b |
| | Test[f] and p value | Z = −3.693 **p < 0.001** | Z = −3.431 **p = 0.001** | Z = -3.459 **p = 0.001** | | | |
| | 1. and 4. meas. difference between | −3.95[a] (−229.80–138.56) | −3.30[b] (−98.67–242.48) | 5.05[c] (−116.56–467.80) | KW = 32.109 | **p < 0.001** | c > a, b |

EFT: emotional freedom technique, PTGI: The Posttraumatic Growth Inventory, WHO-5: World Health Organization Well-Being Index.
*p<0.05
[a] One-way ANOVA.
[b] Post-hoc Tukey test.
[c] Paired-samples t-test.
[d] Kruskal Wallis test.
[e] Mann-Whitney U test.
[f] Wilcoxon Signed Ranks test.

level. The sociodemographic characteristics of the three groups included in the study were similar. This factor promotes our confidence in believing that the findings obtained after the intervention resulted from the interventions rather than from the obstetric characteristics of the pregnant women.

In the study, SUE scale, which is used in energy therapies such as EFT, was used in order to evaluate the anxiety levels experienced due to previous prenatal loss in the pregnant women in the music and control groups as well. The findings obtained showed that the anxiety levels of the pregnant women who were applied EFT and music decreased after the intervention. In studies in which the effect of EFT on pre-surgery anxiety and postpartum psychological disorders was investigated, EFT was found to have decreased anxiety (Cici & Ozkan, 2022; Guducu, 2021). In a study in the literature conducted in order to determine the effect of EFT on postoperative pain and anxiety in patients who underwent total knee arthroplasty, it was reported that EFT application increased mean scores on SUE and decreased anxiety levels of the patients (Tanrıver, 2023). Similarly, in another study conducted in order to identify the effect of EFT applied in early pregnancy period on nausea and vomiting severity and anxiety, EFT application was found to have increased SUE mean scores (Santur, 2022). In the study conducted by Vural and Aslan in order to determine the effectiveness of EFT application in reducing fear of birth, it was found that anxiety decreased when measured with a scale specific to EFT after the application (Irmak Vural & Aslan, 2019). These findings show that EFT application is effective in reducing anxiety by increasing SUE mean score. The reason for this is that individuals are made to focus on their anxiety while applying EFT, and that individuals are tapped during the application and continuous interaction is maintained (Cici & Ozkan, 2022). As per EFT application procedures, the individual applies tapping on acupuncture spots while at the same time reciting aloud the emotion statement (e.g., "I am afraid of having a miscarriage/giving a stillbirth"). As emotions change during tappings, emotion statement can also change. Sometimes, in order to clarify these emotions, questions such as "what happened?" and "how did it happen?" are asked to the individual, and thus, by helping the individual to find the emotional statement that involves the real emotion, a continuous interaction is maintained (Craig, 2004; Hartmann, 2009, 2016). No study was encountered in the literature in which SUE scale was used in order to evaluate anxiety level following music based interventions. In addition to SUE scale, SUDS is used in order to assess the effectiveness of energy therapies such as EFT. In this context, in a study conducted in the literature in order to determine the effect of EFT and music applied before lumbar disc hernia surgery on anxiety and vital signs, it was reported that music was effective in reducing anxiety level measured with SUDS (Cici & Ozkan, 2022). In addition, in meta-analysis studies conducted in order to identify the effect of music based interventions on anxiety level in pregnant women through other scales, the result that music therapy was effective in reducing stress and anxiety is in parallel with our study (Corbijn van Willenswaard et al., 2017; Lin et al., 2019). As a result of the present study, it was determined that there was an increase in SUE scale mean scores in the second and fourth measurements, and that a decrease of one point was observed in the mean score in the third measurement (Table 2). While this increase in the second and fourth measurements shows the effectiveness of the interventions, the decrease in the third measurement may have resulted from the time elapsing following the first interventions. In fact, in the literature review made, similar results were obtained in repetitive measurements as in our study (Guney & Ucar, 2021; Santur, 2022). In a study conducted in order to identify the effect of emotional freedom technique applied in early pregnancy period on nausea and vomiting severity and anxiety, it was determined that SUE scale mean score was higher in the 2nd and 4th measurements, while this value decreased in the 3rd measurement (Santur, 2022). In another study conducted in order to determine the effect of post C-section massage intervention on pain and anxiety, pain and anxiety scores were found to be lower in the 2nd and 4th measurements, and that this

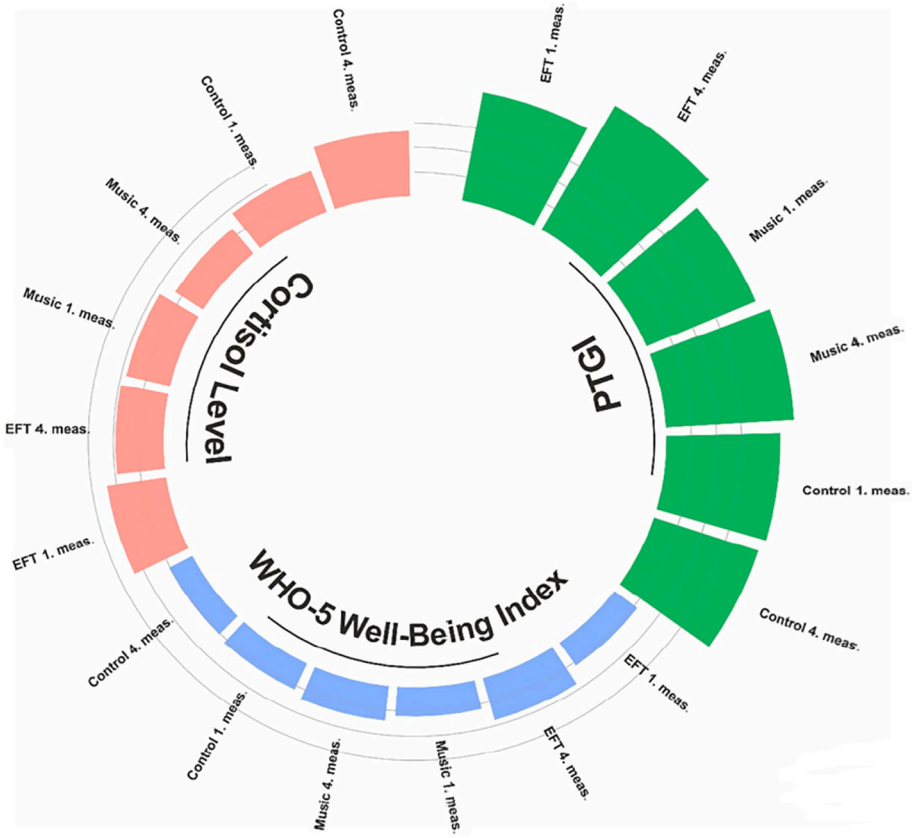


**Fig. 6.** The pregnant women's PTGI mean scores, WHO-5 Well-Being Index mean scores, and salivary cortisol measurement median values.

core increased in the 3rd measurement (Guney & Ucar, 2021). These results support our study finding. In the intragroup measurements made for the pregnant women in the control group, anxiety level was determined to increase over time. Prenatal loss history can lead to mental problems in pregnancy. When these problems are not solved, emotional pressures continue to increase and anxiety may develop (Sis Celik & Atasever, 2020). In a study conducted on adolescent pregnant women, the increase determined in the anxiety levels of those who did not receive psychological support confirms our findings (Ediz, 2020).

In the study, it was found that the psychological growth levels of the pregnant women who were applied EFT and music increased. No study in which the effect of EFT applied to pregnant women on psychological growth was encountered in the literature. However, the main point in EFT is to change various thought patterns, and it is aimed to ensure a positive emotional transformation by eliminating negative emotions through emotional awareness, and at the end of the application, the individuals feels as if s/he has never experienced the problem (Altuntas & Duzguner, 2020). In a study conducted in order to determine the effect of EFT on the individual, social, and spiritual change in women, it was found that women experienced a positive change in terms of their relations with others, their perspectives of life, and recognizing their emotions after the EFT application (Altuntas & Duzguner, 2020). EFT was also reported to be effective in coping with critical and stress-based crises encountered in pregnancy (Ghamsari & Lavasani, 2015). Similarly, music contributes to psychological growth by creating positive changes in human behavior (Cetin et al., 2017; Karamızrak, 2019; Mastnak, 2016; Ocebe et al., 2019). In studies conducted on pregnant women, it was reported that music application neutralized negative feelings and changed the mood positively, thus leading to psychological growth (Cetin et al., 2017; Sidorenko, 2000). In evidence-based applications, it was also shown that music contributed to emotional regulation in a wide range involving prenatal and perinatal care (Mastnak, 2016).

In a study conducted in order to determine the effect of music therapy on fatigue and anxiety levels in hemodialysis patients, Rast and Ussak maqams were found to reduce anxiety (Gulcek & Aylaz, 2022). Hicaz and Rast maqams of Turkish classical music were found to reduce anxiety in patients hospitalized in palliative care service (Duzgun & Karadakovan, 2021). Hicaz, Huseyni, and Neva maqams were also found to decrease anxiety in cancer patients (Gokalp & Ekinci, 2020). In a study on the effects of musical therapy on mental status in schizophrenia patients in which patients listened to music in Buselik maqam, musical therapy was found to be significantly effective on mental status (Findiklioglu et al., 2020). Buselik, Buzurk, Huseyni, Saba, Neva, and Rast maqams were found to reduce preoperative anxiety (Cici & Ozkan, 2022). In the present study, psychological growth level decreased in the pregnant women in the control group over time. In the literature, it has been stated that the pregnant women who received antenatal training and consulting services perceived their pregnancy positively, and that they were not negatively affected by the physiological burden and psychological changes brought about by pregnancy (Arslan et al., 2019). As a result, it is believed that women who do not receive professional support in pregnancy may have difficulty in adapting to the physiological and psychological changes seen in pregnancy and may experience psychological problems.

In the study, it was found that well-being levels of the pregnant women who were applied EFT and music increased, with more significance in the pregnant women who received EFT application. No study in which the effect of EFT on well-being in pregnancy was encountered, but in studies conducted on different groups including patients with tension-type headache and anxiety disorder, EFT was found to have increased quality of life, which is an indicator of well-being (Bougea et al., 2013; Lataima et al., 2020). In studies including music applications, similar results to our findings were found, and it was emphasized that listening to music in pregnancy had relaxing and mood-improving effects (García González et al., 2018; Liu et al., 2016; Nwebube et al., 2017). In the present study, well-being levels of the pregnant women in the control group were determined to decrease over time. Depression and anxiety symptoms negatively affect the woman's well-being (Dogru et al., 2018). It is thought that as pregnant women who experienced prenatal loss frequently experience negative emotions such as anxiety and depression, their well-being levels decrease.

It is known that anxiety increases maternal cortisol level in pregnancy (Baibazarova et al., 2013). In the present study, it was found that the cortisol levels of the pregnant women who were applied EFT and music decreased. Manually stimulating acupuncture spots with EFT regulates cortisol, which is the principal stress hormone (Lane, 2009). Mardjan et al. and Yuniarti et al. also found that EFT applied to pregnant women decreased cortisol levels (Mardjan et al., 2018; Yuniarti et al., 2016). In parallel with our finding, Wulff et al. and Ventura et al. determined in their studies on pregnant women that music decreased cortisol values (Ventura et al., 2012; Wulff et al., 2021). In the control group in our study, the median salivary cortisol values of the pregnant women increased over time. Having experienced a loss in previous pregnancies means being in the risky pregnancy category, and it is known that high-risk pregnancies increase stress levels in women (Aydemir & Hazar, 2014; Elkin, 2015). Our finding is similar to the finding obtained in the study conducted by Mardjan et al., and the cortisol levels of the women in the control group were found to have increased in the posttest (Mardjan et al., 2018). In addition, it is thought that the increase in the stress levels of the pregnant women in the control group of our study sample could be associated with the fear of experiencing a loss again as pregnancy progressed. The results we obtained in our study show the effectiveness of EFT and music applied to pregnant women who experienced a prenatal loss in the increase in the pregnant women's psychological growth and well-being and decrease in their anxiety and cortisol levels, and the findings are in parallel with the literature.

## Limitations of the study

The study has certain limitations. Firstly, although homogenous distribution of the sample to the groups increases internal validity, as the study was conducted with pregnant women who had a prenatal loss history and applied to only one hospital, the results cannot be generalized to all pregnant women. However, the results can be used to compare them with other study results. Another limitation is that the effect of EFT and music application on the continuity of pregnancy and delivery outcomes was not evaluated. On the other hand, the absence of similar previous studies is the strength of our study. In addition, the present study presents solid evidence on the effectiveness of EFT and music application in increasing psychological growth and well-being and decreasing cortisol level in pregnant women with a prenatal loss history.

## Conclusion and recommendations

The present study shows the applicability and acceptability of EFT and music in increasing psychological growth and well-being and decreasing cortisol levels in pregnant women with a prenatal loss history. It can be recommended that different studies with different groups that will aim to increase psychological growth and well-being and decrease cortisol levels should be conducted. In addition, midwives are recommended to receive training on EFT and include EFT and music applications in their midwifery care in order for pregnant women with a prenatal loss history to experience a healthier pregnancy process.

## Declaration of competing interest

The authors declare no conflict of interests.

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## References

Altuntas, S., & Duzguner, S. (2020). A qualitative research on individual, social and spiritual changes in women supported with emotional freedom technique. *Journal of the Faculty of Divinity of Ankara University, 61*(2), 453–492. https://doi.org/10.33227/auifd.781006

Arslan, S., Gulsen, O., Coskun, A. M., & Temiz, F. (2019). Women's perception of pregnancy and the affecting factors. *Journal of Health Science and Profession, 6*(1), 179–192. https://doi.org/10.17681/hsp.432333

Aydemir, H., & Hazar, H. U. (2014). Low risk, risk, and high risk pregnancies and the role of midwives. *Gumushane University Journal of Health Sciences, 3*(2), 815–833.

Aydın, R., Guven, D. Y., & Karahan, N. (2019). Let you listen: The effect of music therapy on coping with stress in high risk pregnancies. *Necmettin Erbakan University Faculty of Health Sciences Journal, 2*(1), 19–24.

Baibazarova, E., van de Beek, C., Cohen-Kettenis, P. T., Buitelaar, J., Shelton, K. H., & van Goozen, S. H. (2013). Influence of prenatal maternal stress, maternal plasma cortisol and cortisol in the amniotic fluid on birth outcomes and child temperament at 3 months. *Psychoneuroendocrinology, 38*(6), 907–915. https://doi.org/10.1016/j.psyneuen.2012.09.015

Bershadsky, S., Trumpfheller, L., Kimble, H. B., Pipaloff, D., & Yim, I. S. (2014). The effect of prenatal Hatha yoga on affect, cortisol and depressive symptoms. *Complementary Therapies in Clinical Practice, 20*(2), 106–113. https://doi.org/10.1016/j.ctcp.2014.01.002

Bougea, A. M., Spandideas, N., Alexopoulos, E. C., Thomaides, T., Chrousos, G. P., & Darviri, C. (2013). Effect of the emotional freedom technique on perceived stress, quality of life, and cortisol salivary levels in tension-type headache sufferers: A randomized controlled trial. *Explore (New York, N.Y.), 9*(2), 91–99. https://doi.org/10.1016/j.explore.2012.12.005

Cavlin, A. (2019). *Türkiye Demographic and Health Survey 2018. (978-975-491-492-4).* Ankara, Türkiye: Hacettepe University Institute of Population Studies (Retrieved from file:///C:/Users/atilim%20bilgisayar/Desktop/Downloads/TDHS2018_mainReport.pdf).

Cetin, F. C., Ali, T., & Merih, Y. D. (2017). The effects of Turkish music on pregnancy and newborn. *Zeynep Kamil Medical Journal, 48*(3), 124–130. https://doi.org/10.16948/zktipb.283033

Chang, H. C., Yu, C. H., Chen, S. Y., & Chen, C. H. (2015). The effects of music listening on psychosocial stress and maternal-fetal attachment during pregnancy. *Complementary Therapies in Medicine, 23*(4), 509–515. https://doi.org/10.1016/j.ctim.2015.05.002

Chang, M. Y., Chen, C. H., & Huang, K. F. (2008). Effects of music therapy on psychological health of women during pregnancy. *Journal of Clinical Nursing, 17*(19), 2580–2587. https://doi.org/10.1111/j.1365-2702.2007.02064.x

Chen, P. J., Yang, L., Chou, C. C., Li, C. C., Chang, Y. C., & Liaw, J. J. (2017). Effects of prenatal yoga on women's stress and immune function across pregnancy: A randomized controlled trial. *Complementary Therapies in Medicine, 31*, 109–117. https://doi.org/10.1016/j.ctim.2017.03.003

Cici, R., & Ozkan, M. (2022). Effects on anxiety and vital signs of the emotional freedom technique and music before surgery for lumbar disc hernia. *Alternative Therapies in Health and Medicine, 28*(5), 20–27.

Collins, C., Riggs, D., & Due, C. (2014). The impact of pregnancy loss on women's adult relationships. *Grief Matters: The Australian Journal of Grief and Bereavement, 17*, 44–50.

Corbijn van Willenswaard, K., Lynn, F., McNeill, J., McQueen, K., Dennis, C. L., Lobel, M., & Alderdice, F. (2017). Music interventions to reduce stress and anxiety in pregnancy: A systematic review and meta-analysis. *BMC Psychiatry, 17*(1), 271. https://doi.org/10.1186/s12888-017-1432-x

Côté-Arsenault, D., & Donato, K. (2011). Emotional cushioning in pregnancy after perinatal loss. *Journal of Reproductive and Infant Psychology, 29*(1), 81–92. https://doi.org/10.1080/02646838.2010.513115

Craig, G. (2004). Emotional liberation techniques handbook. http://www.eftiletanis.com/EFT_Manual_Turkish_eftiletanis.com.pdf.

Cumming, G. P., Klein, S., Bolsover, D., Lee, A. J., Alexander, D. A., Maclean, M., & Jurgens, J. D. (2007). The emotional burden of miscarriage for women and their partners: Trajectories of anxiety and depression over 13 months. *An International Journal of Obstetrics and Gynaecology, 114*(9), 1138–1145. https://doi.org/10.1111/j.1471-0528.2007.01452.x

Dogru, H. Y., Ozsoy, F., Dogru, S., Karaman, T., Sahin, A., Özsoy, A. Z., Cakmak, B., & Süren, M. (2018). Catastrophizing, depression and anxiety during pregnancy: Relation between lumbopelvic pain and physical/social functioning. *Journal of Rational-Emotive & Cognitive-Behavior Therapy, 36*(2), 119–136. https://doi.org/10.1007/s10942-017-0277-z

DRG International, I. (2018). Salivary cortisol ELISA. Retrieved 09.09.2020 from www.drg-international.com.

Duzgun, G., & Karadakovan, A. (2021). Effect of music on pain in cancer patients in palliative care service: A randomized controlled study. *OMEGA - Journal of Death and Dying.* , Article 302228211059891. https://doi.org/10.1177/00302228211059891

Ediz, C. (2020). *The effect of BPS psychoeducation given to pregnant adolescents on anxiety, depression and perceived social support.* Inonu University (PhD Thesis, unpublished thesis).

Elkin, N. (2015). Ways of coping with stress affecting factors of pregnant women. *Mersin University Journal of Health Sciences, 8*(1), 22–31.

Esel, E. (2003). Neurobiology of generalized anxiety disorder. *Bulletin of Clinical Psychopharmacology, 13*(2), 78–87.

Eser, E., Cevik, C., Baydur, H., Günes, S., Esgin, T. A., Oztekin, Ç. S., Eker, E., Gümüssoy, U., Eser, G. B., & Ozyurt, B. (2019). Reliability and validity of the Turkish version of the WHO-5, in adults and older adults for its use in primary care settings. *Primary Health Care Research & Development, 20*, Article e100. https://doi.org/10.1017/s1463423619000343

Farren, J., Jalmbrant, M., Falconieri, N., Mitchell-Jones, N., Bobdiwala, S., Al-Memar, M., Tapp, S., Van Calster, B., Wynants, L., Timmerman, D., & Bourne, T. (2020). Posttraumatic stress, anxiety and depression following miscarriage and ectopic pregnancy: A multicenter, prospective, cohort study. *American Journal of Obstetrics and Gynecology, 222*(4). https://doi.org/10.1016/j.ajog.2019.10.102, 367.e361–367.e322.

Field, T., Diego, M., Hernandez-Reif, M., Salman, F., Schanberg, S., Kuhn, C., Yando, R., & Bendell, D. (2002). Prenatal anger effects on the fetus and neonate. *Journal of Obstetrics and Gynaecology, 22*(3), 260–266. https://doi.org/10.1080/01443610220130526

Findiklioglu, S., Dogan, S., Ozbek, H., & Gidis, V. (2020). The effects of music therapy on mood in patients with schizophrenia. *The Journal of International Art and Art Education, 3*(4), 61–70.

García González, J., Ventura Miranda, M. I., Requena Mullor, M., Parron Carreño, T., & Alarcón Rodriguez, R. (2018). Effects of prenatal music stimulation on state/trait anxiety in full-term pregnancy and its influence on childbirth: A randomized controlled trial. *The Journal of Maternal-Fetal & Neonatal Medicine, 31*(8), 1058–1065. https://doi.org/10.1080/14767058.2017.1306511

Ghamsari, M., & Lavasani, M. (2015). Effectiveness of emotion freedom technique on pregnant women's perceived stress and resilience. *Journal of Educational Sociology, 6*(2), 118–122. https://doi.org/10.7813/jes.2015/6-2/26

Gokalp, K., & Ekinci, M. (2020). Effect of music therapy on anxiety and sleep quality of geriatrıc haematological oncology patients. *Turkish Journal of Geriatrics, 23*(4), 546–554. https://doi.org/10.31086/tjgeri.2020.193

Guducu, N. (2021). *The effect of emotional freedom techniques (EFT) on postpartum depression.* Istanbul University (PhD Thesis, unpublished thesis).

Gulcek, E., & Aylaz, R. (2022). The effect of music therapy on fatigue and anxiety levels in hemodialysis patients. *Euroasia Journal of Mathematics, Engineering, Natural & Medical Sciences, 9*(22), 113–123. https://doi.org/10.5281/zenodo.6949100

Guney, E., & Ucar, T. (2021). Effects of deep tissue massage on pain and comfort after cesarean: A randomized controlled trial. *Complementary Therapies in Clinical Practice, 43*, 101320. https://doi.org/10.1016/j.ctcp.2021.101320

Hartmann, S. (2009). *Events psychology: How to understand yourself and other people.* DragonRising Publishing.

Hartmann, S. (2016). *Energy EFT* (1 ed.). Pegasus Publications (E. Duru, Trans.).

Hosseini, S. E., Bagheri, M., & Honarparvaran, N. (2013). Investigating the effect of music on labor pain and progress in the active stage of first labor. *European Review for Medical and Pharmacological Sciences, 17*(11), 1479–1487.

Irmak Vural, P., & Aslan, E. (2018). Emotional freedom technique (EFT) scope and practice areas. *Life Skills Journal of Psychology, 2*(3), 11–25. https://doi.org/10.31461/ybpd.383026

Irmak Vural, P., & Aslan, E. (2019). Emotional freedom techniques and breathing awareness to reduce childbirth fear: A randomized controlled study. *Complementary Therapies in Clinical Practice, 35*, 224–231. https://doi.org/10.1016/j.ctcp.2019.02.011

Kagan, M., Gülec, M., Boysan, M., & Cavus, H. (2012). Hierarchical factor structure of the Turkish version of the posttraumatic growth inventory in a normal population. *TAF Preventive Medicine Bulletin, 11*(5), 617–624. https://doi.org/10.5455/pmb.1323620200

Karamızrak, N. (2019). Music therapy in cardiovascular diseases. *Koşuyolu Heart Journal, 22*(2), 120–125. https://doi.org/10.5578/khj.68486

Kirschbaum, C., & Hellhammer, D. H. (2000). Salivary cortisol. In G. Fink (Ed.), *Vol. 3. Encyclopedia of stress* (pp. 379–383). Academic Press.

Körükcü, Ö., & Kukulu, K. (2010). The perinatal loss and parental reflection. *Dicle Medical Journal, 37*(4), 429–433.

Krosch, D. J., & Shakespeare-Finch, J. (2017). Grief, traumatic stress, and posttraumatic growth in women who have experienced pregnancy loss. *Psychological Trauma, 9*(4), 425–433. https://doi.org/10.1037/tra0000183

Lamb, E. H. (2002). The impact of previous perinatal loss on subsequent pregnancy and parenting. *The Journal of Perinatal Education, 11*(2), 33–40. https://doi.org/10.1624/105812402x88696

Landis-Shack, N., Heinz, A. J., & Bonn-Miller, M. O. (2017). Music therapy for posttraumatic stress in adults: A theoretical review. *Psychomusicology, 27*(4), 334–342. https://doi.org/10.1037/pmu0000192

Lane, J. (2009). The neurochemistry of counterconditioning: Acupressure desensitization in psychotherapy. *Energy Psychology: Theory, Research, and Treatment, 1*(1), 31–44.

Lataima, N. S., Kurniawati, N. D., & Astuti, P. (2020). Manfaat emotional freedom technique (EFT) bagi pasien dengan gangguan kecemasan. *Jurnal Penelitian Kesehatan Suara Forikes (Journal of Health Research Forikes Voice), 11*(2), 129–132. https://doi.org/10.33846/sf11204

Lawn, J. E., Blencowe, H., Waiswa, P., Amouzou, A., Mathers, C., Hogan, D., Flenady, V., Frøen, J. F., Qureshi, Z. U., Calderwood, C., Shiekh, S., Jassir, F. B., You, D., McClure, E. M., Mathai, M., & Cousens, S. (2016). Stillbirths: Rates, risk factors, and acceleration towards 2030. *Lancet, 387*(10018), 587–603. https://doi.org/10.1016/s0140-6736(15)00837-5

Lee, O. K., Chung, Y. F., Chan, M. F., & Chan, W. M. (2005). Music and its effect on the physiological responses and anxiety levels of patients receiving mechanical ventilation: A pilot study. *Journal of Clinical Nursing, 14*(5), 609–620. https://doi.org/10.1111/j.1365-2702.2004.01103.x

Li, Y., & Dong, Y. (2012). Preoperative music intervention for patients undergoing cesarean delivery. *International Journal of Gynecology & Obstetrics, 119*(1), 81–83. https://doi.org/10.1016/j.ijgo.2012.05.017

Lin, C. J., Chang, Y. C., Chang, Y. H., Hsiao, Y. H., Lin, H. H., Liu, S. J., Chao, C. A., Wang, H., & Yeh, T. L. (2019). Music ınterventions for anxiety in pregnant women: A systematic review and meta-analysis of randomized controlled trials. *Journal of Clinical Medicine, 8*(11). https://doi.org/10.3390/jcm8111884

Liu, Y. H., Lee, C. S., Yu, C. H., & Chen, C. H. (2016). Effects of music listening on stress, anxiety, and sleep quality for sleep-disturbed pregnant women. *Women & Health, 56*(3), 296–311. https://doi.org/10.1080/03630242.2015.1088116

Mardjan, M., Prabandari, Y., Hakimi, M., & Marchira, C. (2018). Emotional freedom techniques for reducing anxiety and cortisol level in pregnant adolescent primiparous. *Unnes Journal of Public Health, 7*, 1–6. https://doi.org/10.15294/ujph.v7i1.19212

Mastnak, W. (2016). Perinatal music therapy and antenatal music classes: Principles, mechanisms, and benefits. *The Journal of Perinatal Education, 25*(3), 184–192. https://doi.org/10.1891/1058-1243.25.3.184

Nwebube, C., Glover, V., & Stewart, L. (2017). Prenatal listening to songs composed for pregnancy and symptoms of anxiety and depression: A pilot study. *BMC Complementary Medicine and Therapies, 17*(1), 256. https://doi.org/10.1186/s12906-017-1759-3

Obst, K. L., Due, C., Oxlad, M., & Middleton, P. (2020). Men's grief following pregnancy loss and neonatal loss: A systematic review and emerging theoretical model. *BMC Pregnancy and Childbirth, 20*(1), 11. https://doi.org/10.1186/s12884-019-2677-9

Ocebe, D. K., Kolcu, M., & Uzun, K. (2019). Music therapy and elderly health. *University of Health Sciences Journal of Nursing, 1*(2), 112–115.

Ozgocer, T. (2016). *Menstrual cycle, cortisol awakening response and autonomic nervous system activity*. Inönü University (PhD Thesis, unpublished thesis).

Ozgocer, T., Ucar, C., & Yildiz, S. (2017). Cortisol awakening response is blunted and pain perception is increased during menses in cyclic women. *Psychoneuroendocrinology, 77*, 158–164. https://doi.org/10.1016/j.psyneuen.2016.12.011

Ozgocer, T., Yildiz, S., & Ucar, C. (2017). Development and validation of an enzyme-linked immunosorbent assay for detection of cortisol in human saliva. *Journal of Immunoassay & Immunochemistry, 38*(2), 147–164. https://doi.org/10.1080/15321819.2016.1230130

Patki, S., Patil, R., & Kulkarni, S. (2020). The effect of music therapy on the level of blood cortisol in pregnant women conceived by ın vitro fertilization (ıvf) technology. *Acta Scientific Women's Health, 2*, 02–07. https://doi.org/10.31080/ASWH.2020.02.0097

Random.Org. Random Integer Generator. Retrieved 04.04.2020 from https://www.random.org/integers/?num=162&min=1&max=2&col=10&.

Santur, S. G. (2022). *The effect of emotional freedom technique applied in early pregnancy on nausea-vomiting severity and anxiety*. Inönü University (Master's Thesis, unpublished thesis).

Shin, H. S., & Kim, J. H. (2011). Music therapy on anxiety, stress and maternal-fetal attachment in pregnant women during transvaginal ultrasound. *Asian Nursing Research, 5*(1), 19–27. https://doi.org/10.1016/s1976-1317(11)60010-8

Shivamurthy, G., & Anusha, G. (2016). Effect of music therapy on serum cortisol in primigravida in active labour. *IOSR Journal of Dental and Medical Sciences, 15*(4), 91–94. https://doi.org/10.9790/0853-1504039194

Sidorenko, V. N. (2000). Clinical application of medical resonance therapy music in high-risk pregnancies. *Integrative Psychological and Behavioral Science, 35*(3), 199–207. https://doi.org/10.1007/bf02688780

Sis Celik, A., & Atasever, İ. (2020). Determination of the level of perceived stress and affecting factors in pregnant women. *Journal of Anatolia Nursing and Health Sciences, 23*(2), 267–276. https://doi.org/10.17049/ataunihem.622304

Slobodin, O. (2014). The aborted time: A temporal view on the trauma of pregnancy loss. *Journal of Depression and Anxiety, 03*(04), 1–7. https://doi.org/10.4172/2167-1044.1000163

Sutan, R., Amin, R. M., Ariffin, K. B., Teng, T. Z., Kamal, M. F., & Rusli, R. Z. (2010). Psychosocial impact of mothers with perinatal loss and its contributing factors: An insight. *Journal of Zhejiang University. Science. B, 11*(3), 209–217. https://doi.org/10.1631/jzus.B0900245

Tanrıver, P. (2023). *Effect of emotional freedom technique on postoperative pain and anxiety in patients undergoing total KNEE replacement*. Ataturk University (Master's Thesis, unpublished thesis).

Tedeschi, R. G., & Calhoun, L. G. (2004). Posttraumatic growth: Conceptual foundations and empirical evidence. *Psychological Inquiry, 15*(1), 1–18. https://doi.org/10.1207/s15327965pli1501_01

Toda, M., Morimoto, K., Nagasawa, S., & Kitamura, K. (2004). Effect of snack eating on sensitive salivary stress markers cortisol and chromogranin A. *Environmental Health and Preventive Medicine, 9*(1), 27–29. https://doi.org/10.1265/ehpm.9.27

de la Torre-Luque, A., Caparros-Gonzalez, R. A., Bastard, T., Vico, F. J., & Buela-Casal, G. (2017). Acute stress recovery through listening to Melomics relaxing music: A randomized controlled trial. *Nordic Journal of Music Therapy, 26*(2), 124–141. https://doi.org/10.1080/08098131.2015.1131186

Ventura, T., Gomes, M. C., & Carreira, T. (2012). Cortisol and anxiety response to a relaxing intervention on pregnant women awaiting amniocentesis. *Psychoneuroendocrinology, 37*(1), 148–156. https://doi.org/10.1016/j.psyneuen.2011.05.016

Wallerstedt, C., Lilley, M., & Baldwin, K. (2003). Interconceptional counseling after perinatal and infant loss. *Journal of Obstetric, Gynecologic & Neonatal Nursing, 32*(4), 533–542. https://doi.org/10.1177/0884217503255264

Winograd, M. (2017). *Understanding the predictors of posttraumatic growth among those with a history of a reproductive trauma*. Seton Hall University.

Wolpe, J. (1990). *The practice of behavior therapy*. Pergamon Press.

Wulff, V., Hepp, P., Wolf, O. T., Balan, P., Hagenbeck, C., Fehm, T., & Schaal, N. K. (2021). The effects of a music and singing intervention during pregnancy on maternal well-being and mother-infant bonding: A randomised, controlled study. *Archives of Gynecology and Obstetrics, 303*(1), 69–83. https://doi.org/10.1007/s00404-020-05727-8

Yang, M., Li, L., Zhu, H., Alexander, I. M., Liu, S., Zhou, W., & Ren, X. (2009). Music therapy to relieve anxiety in pregnant women on bedrest: A randomized, controlled trial. *MCN: The American Journal of Maternal/Child Nursing, 34*(5), 316–323. https://doi.org/10.1097/01.Nmc.0000360425.52228.95

Yilmaz, S. D., & Beji, N. K. (2013). Effects of perinatal loss on current pregnancy in Türkiye. *Midwifery, 29*(11), 1272–1277. https://doi.org/10.1016/j.midw.2012.11.015

Yuniarti, Y., Suwondo, A., Runjati, R., Maharani, S. I., Ofiwijayanti, H., & Anastasia, S. (2016). *Influence of spiritual therapy emotional freedom technique (SEFT) on cortisol levels and immunoglobulin e (study of anxiety in pregnant women in independent practice midwives semarang)*. Nakhon Pathom: ASEAN/Asian Academic Society International Conference Proceeding Series.