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# Effectiveness of Music Listening on Anxiety and Stress Levels of Primiparous Pregnant Women in the Third Trimester: A Randomized Controlled Trial

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## ABSTRACT

**Objectives:** This study aimed to evaluate the effect of music listening on the anxiety and stress levels of primiparous pregnant women in the third trimester.

**Methods:** The study was conducted between December 01, 2019, and August 31, 2020. In the study, 120 primiparous pregnant women in their third trimester were randomized into two groups at a 1:1 ratio. Participants in the music group were given standard prenatal education and a 10-day practice of listening to Turkish music for 20 min a day. Participants in the control group received standard prenatal training. The State and Trait Anxiety Inventory and pregnancy stress rating scale (PSRS) were applied twice to both groups, before and after the practice.

**Results:** The study included 60 (50.0%) pregnant women in the music group and 60 (50.0%) in the control group. A decrease in state anxiety scores was observed in both the music and control groups (34.5 [15.5] vs. 31.4±8.6, respectively; p<0.001 in the music group, 37.1±7.6 vs. 35.0±7.3, respectively; p<0.001 in the control group). On the other hand, while a decrease was observed in the music group's total PSRS score, no difference was found in the control group (61.9±28.2 vs. 45.0 [46.8], respectively; p=0.002 in the music group, 59.2±26.4 vs. 54.8±28.2, respectively; p=0.1115 in the control group).

**Conclusion:** Turkish classical music listening can be used safely in primiparous pregnant women to reduce anxiety and stress.

**Keywords:** Anxiety, emotional stress, music, pregnant women, primiparity, third trimester

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## INTRODUCTION

Pregnancy is a period in which emotional changes are experienced along with physiological changes.[1] Therefore, anxiety and stress during pregnancy can frequently develop. In the first trimester of pregnancy, the prevalence of anxiety and stress is 15.3%, in the second trimester is 23.6%.[2] The prevalence of anxiety and stress is highest in the third trimester compared to 25%.[3] Similarly, it is known that primiparous pregnant women have higher anxiety and stress levels than multiparous pregnant women because they experience pregnancy and childbirth for the 1st time.[4,5]

Music listening is also one of the non-pharmacological methods used during pregnancy.[6] Music listening is defined as using music to support and improve physical, mental, and spiritual well-being. It is found out that music listening relaxes the mother, increases the level of well-being, and improves sleep quality and quality of life when the studies in which music

listening is used in pregnant women are examined. Furthermore, it is reported that it reduces blood pressure, increases birth satisfaction, increases maternal-fetal attachment, and reduces maternal anxiety and stress in pregnant women with preeclampsia.[7-11]

Considering such studies in the literature, it is seen that interventions to increase the well-being of pregnant women in normal pregnancies where music listening is mainly applied to risky pregnancies are not studied adequately.[7-11] However, it is known that anxiety and stress rates are high even in pregnant women who are not at risk.[3-5] Since this rate reaches the highest level, especially in the third trimester, it is essential to implement midwifery interventions to support the well-being of the pregnant women and the baby in this period.[3] In this way, complications related to anxiety and stress in pregnant women can be prevented. Positive birth results can be achieved by improving the quality of life of the pregnant women and preparing her for birth with positive emotions. In addition, this study can contribute to a positive pregnancy experience within the scope of the Antenatal Care Recommendations on Antenatal Care for a Positive Pregnancy Experience Guide published by the World Health Organization in 2016; with the outputs, we targeted as a result of the music listening application.[12]

With anxiety and stress, the release of catecholamine and corticosteroid hormones in the body increases.[13] In pregnant women, the increase in these hormones can initiate labor by stimulating uterine contractions and may adversely affect delivery outcomes.[14] The positive effects of music can be used to reduce the anxiety and stress of babies. With natural serotonin and acetylcholine, music listening provides a feeling of relaxation, regulates blood pressure and respiratory rhythm, and calms the pregnant women by increasing the oxygenation of the brain.[15]

Pregnant women who are not in the risk group in our country are monitored in primary health care services, the necessary counseling and educational services are provided at this stage.[16] The use of different alternative methods such as listening to music during these follow-ups may create positive results such as increasing the diversity of care and pregnant participation. It was thought that our study would bring a different perspective to care services by conducting it in primary health services with healthy pregnant women.

The aim of this study is to investigate the effect of listening to music on anxiety and stress levels in primiparous pregnant women in the third trimester.

## METHOD

This randomized controlled experimental study was conducted between December 01, 2019, and August 31, 2020, in a city in the west of Turkey. In this study, primiparous pregnant women in the third trimester who applied to the primary health care center were studied. Pregnant women aged 18 and over, speaking and writing Turkish, having no vision-hearing problems, having and using an internet-supported online site, primiparous, in the third trimester (28 weeks of gestation and above), and volunteering to participate in the study were included in the study. In addition, pregnant women who want to leave at any stage of the research, do not listen to music regularly, and have a chronic disease were excluded from the study.

In the study, a power analysis was used to determine the sample size. Power analysis was calculated by considering 80% power, 5% Type I error, and 50% effect size. According to the power analysis made according to a similar study in the literature, it was calculated that at least 51 people should be included in each group.[17] However, taking into account case losses, a total of 120 pregnant women, 60 (50.0%) in the application group, and 60 (50.0%) in the control group, were planned to be included in the study. The flow chart of participants in the study is shown in Figure 1.

Pregnant women were assigned to the experimental and control groups by randomization method to reduce the

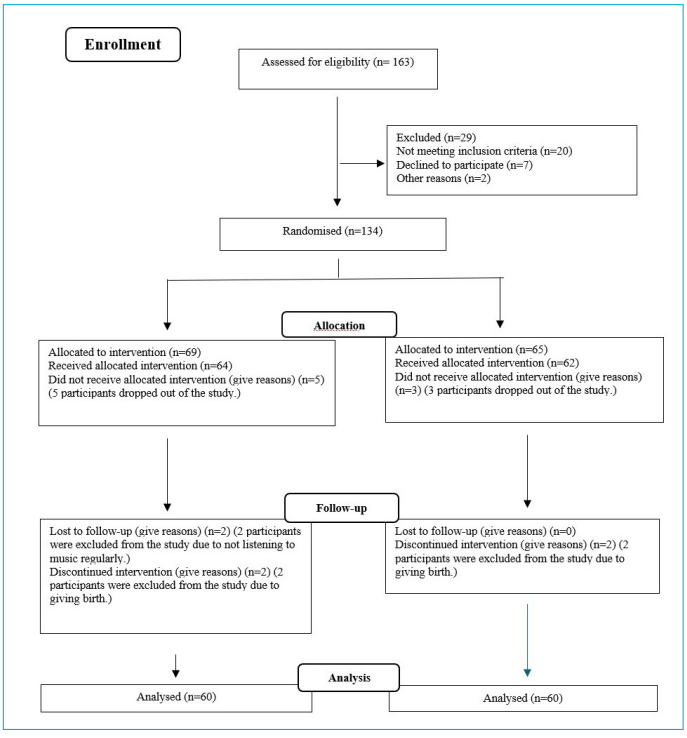


**Figure 1.** The flow chart of participants in the study.

selection bias and to control the variables that may have an effect on the outcome variables. For this purpose, participants were randomly randomized using the online program using the simple randomization method.[18] For randomization, a random number sequence was created according to the order of participation in the study. In the random number sequence designed, the numbers in the left column and the pregnant women in the music group and the numbers in the right column and the pregnant women in the control group were determined. At the beginning, pregnant women were asked to say a number between 1 and 120. Whichever group the reported number was in, the woman was included in that group. When a number that had been said before was told, he was asked to change the number until the appropriate number was determined. To ensure the reliability of the study, this study was also conducted by an unbiased person who was not in the randomization study. In this study, blinding could not be done because the responsible researchers carried out the intervention.

A personal information form, State and Trait Anxiety Inventory (STAI I-II) and pregnancy stress rating scale (PSRS) were administered to all pregnant women before and after the intervention.

### Personal information form

This form consists of questions about pregnant women's socio-demographic and obstetric characteristics.

### STAI I-II

The inventory was developed by Spielberger et al., and a validity and reliability study was conducted in Turkish by Öner and Le Compte.[19] There are 40 questions in total, 20 questions questioning the feelings of individuals about the situation they live in and 20 questions about the perception and interpretation of general conditions. The range of scores to be taken from the inventory is 0–80. In the evaluation of the inventory, 0–19 points are interpreted as no anxiety, 20–39 points are interpreted as mild anxiety, 40–59 points are interpreted as moderate anxiety, 60–79 points are interpreted as severe anxiety, and 80 points are interpreted as severe anxiety.

### PSRS

The Turkish validity and reliability of the scale, which was developed by Chen, was done by Akin and Erbil.[20] The scale consists of 36 five-point Likert-type items comprising 5 sub-scales used to define pregnancy-related stress factors. The range of scores to be taken from the scale is 0–144. An increase in the score obtained from the scale is interpreted as an increase in stress.

### Interventions

### Music Intervention

In this study, pregnant women listened to instrumental classical Turkish music in Neva Maqam. Turkish music was preferred in the study because it is a part of the same culture. The sample group was selected only from a city in the west of Turkey to avoid cultural differences. It was also preferred because it gives people a sense of relief, reduces sadness, removes negative thoughts, and gives people feelings of courage, strength, joy, and calmness. According to literature and the consultancy received from Turkish Music Research and Promotion Group (TUMATA), this music is especially effective on anxiety and stress.[21,22] In the study, the consultancy was received from the TUMATA regarding the type, time, and application of the music used. According to information obtained about the mentioned aspects, pregnant women were requested to listen to music any time from at least 20 min daily for 10 days, from sunrise to afternoon. While listening to the music, pregnant women were asked to be a comfortable sitting position in a quiet, dim place. At the same time, pregnant women were asked loudspeaker to adjust the volume of the sound to a level that he could hear comfortably. The pregnant women were told to focus on their music and let go of their current thoughts. A written instruction was given to the pregnant women about the points that they should pay attention to while listening to music.

### Training

In this study, training was given to the participants in the control group by the researcher. The training was carried out live with a maximum of 10 participants on a group basis in different sessions through the internet. The training was carried out through an internet-based platform as the due to COVID-19 pandemic. The training took 40 min. In the training, issues related to anxiety and stress during pregnancy, which are routinely included in the prenatal pregnancy education program, were explained. It also included topics such as training, fear of childbirth, positive thinking, relaxation and breathing techniques, and endorphin massage.

### Procedure

Initially, this study was planned to be conducted face-to-face with pregnant women who applied to the primary healthcare center. However, with the start of the COVID-19 pandemic during the study, the study was carried out using online systems with internet access. In this study, music and control groups were formed from the participants, and they were studied for 10 days in two groups. The group

that received music listening was called the music group, and the other group was called the control group. Participants were informed that they were in a music or control group. To ensure the reliability of the study, this study was also conducted by an unbiased person who was not in the randomization study. In this study, blinding could not be done because the responsible researchers carried out the intervention. The procedure applied to both groups is presented below.

**Music Group**

Before the start of the research, written and oral information was provided by the researcher and online consent was obtained from pregnant women who volunteered to participate in the study and were included in the music group. For 10 days, the study was carried out with the pregnant women included in the music group. Pregnant women filled in the Personal Information Form, STAI I-II, and PSRS online on the 1st day of the study. After filling out the questionnaire forms, the researcher trained the pregnant women. After the training, pregnant women were asked to listen to the given music for 20 min without using headphones that they were adjusting the music volume to a level where they could comfortably hear through the loudspeaker. They were told to be in a comfortable sitting position in a quiet, dim place while listening to the music. They were focus on music while listening to it and let go of his current thoughts. In addition, written instructions were given regarding these details. Pregnant women were asked to listen to the music given to them every day for 20 min at the recommended time. Pregnant women were contacted through message every day and checked whether they listened to the music. On the 10th day, after listening to the music, the participants filled in the STAI I-II and PSRS again at the end of the study. Furthermore, the pregnant women who filled out the forms were informed that the study was completed.

**Control Group**

After written and oral information was given by the researcher to the pregnant women in the control group who volunteered to participate in the study, online consent was obtained before starting the study. Pregnant women filled in the Personal Information Form, STAI I-II, and PSRS online on the 1st day of the study. After filled out the questionnaire forms, the researcher trained the pregnant women. On the 10th day, the participants filled in the STAI I-II and PSRS again at the end of the study. Furthermore, the pregnant women who filled out the forms were informed that the study was completed.

Data analysis was performed using the Statistical Package for the Social Sciences (version 24.0). The normality of the data was analyzed with the Shapiro–Wilk test. Descriptive statistical methods such as frequency, percentage, mean, median, standard deviation, and interquartile range were used. In accordance with parametric methods, the "Independent Sample-t" test was used to compare the measurement values of two independent groups and the "Paired Sample-t" test method was used to compare the measurement values of two dependent groups. In accordance with non-parametric methods, Kruskal–Wallis H, Mann–Whitney U, and Wilcoxon were used for data analysis. Moreover, Pearson Chi-square test was used for categorical variables. In the study, $p<0.05$ value was considered statistically significant.

## RESULTS

A total of 120 pregnant women were included in the study, comprising 60 (50.0%) pregnant women in the music group and 60 (50.0%) pregnant women in the control group. Distribution of socio-demographic and obstetric characteristics of pregnant women regarding the groups is summarized in Table 1.

In this study, the state anxiety inventory score was found to be 31.4±8.6 in the music group and 35.0±7.3 in the control group (p=0.014). The trait anxiety inventory score was found to be 39.4±9.6 in the music group and 40.6±8.2 in the control group (p=0.451). The STAI I-II score of pregnant women regarding the groups are summarized in Table 2.

PSRS total score was 45.0 [46.8] in the music group and 54.8±28.2 in the control group (p=0.297). PSRS score regarding the groups are summarized in Table 3.

## DISCUSSION

It is known that birth is approach in the third trimester of pregnancy and anxiety and stress increase, especially in primiparous pregnant women due to the effect of this condition.[4] In this study, it was determined that the pregnant women in the music and control groups had mild state anxiety and moderate trait anxiety levels according to their pre-test scores. When studies evaluating the anxiety of pregnant women are examined, it is seen that the level of state and trait anxiety is in the range of mild to moderate.[4,5,10,23,24] According to the findings in this study and the literature, although it is predicted that the anxiety level will be higher in primiparous pregnant women in the third trimester, it was found that the anxiety level in pregnant women is in the light-medium.

**Table 1.** Distribution of socio-demographic and obstetric characteristics of pregnant women regarding the groups

| | Music group (n=60) | Control group (n=60) | p |
|---|---|---|---|
| Age (years) | 27.0±3.7 | 27.7±3.7 | 0.269* |
| Age groups | | | |
| 18–23 years | 11 (18.3) | 6 (10.0) | 0.417† |
| 24–30 years | 38 (63.4) | 41 (68.3) | |
| 31–37 years | 11 (18.3) | 13 (21.7) | |
| Level of education | | | |
| High school and below | 15 (25.0) | 17 (28.3) | 0.280† |
| University and above | 45 (75.0) | 43 (71.7) | |
| Working status | | | |
| Not working | 30 (50.0) | 24 (40.0) | 0.271† |
| Working | 30 (50.0) | 36 (60.0) | |
| Level of income | | | |
| Income is less than expenses | 43 (71.7) | 46 (76.6) | 0.657† |
| Income exceeds expenses | 17 (28.3) | 14 (23.4) | |
| Chronic disease | | | |
| No | 53 (88.3) | 54 (90.0) | 0.769† |
| Yes | 7 (11.7) | 6 (10.0) | |
| Gestational age | | | |
| 28–32 weeks | 47 (78.3) | 45 (75.0) | 0.829† |
| 33–37 weeks | 13 (21.7) | 15 (25.0) | |
| The planned state of pregnancy | | | |
| Not planned | 9 (15.0) | 8 (13.3) | 0.793† |
| Planned | 51 (85.0) | 52 (86.7) | |

*Independent Sample-t test; †Pearson Chi-square test.

**Table 2.** The STAI I-II score of pregnant women regarding the groups

| STAI I-II | Music group (n=60) | Control group (n=60) | p |
|---|---|---|---|
| State anxiety | | | |
| Pre-test | 34.5 [15.5] | 37.1±7.6 | 0.520* |
| Post-test | 31.4±8.6 | 35.0±7.3 | 0.014† |
| p | <0.001‡ | <0.001§ | |
| Trait anxiety | | | |
| Pre-test | 45.2±10.1 | 43.2±7.9 | 0.225† |
| Post-test | 39.4±9.6 | 40.6±8.2 | 0.451† |
| p | 0.013§ | 0.003§ | |

STAI: Stait trait anxiety inventory.

Data are presented as median [IQR] and mean±standard deviation.

*Mann–Whitney U-test; †Independent Sample-t test; ‡Wilcoxon test; §Paired sample-t test.

In this study, it was found that music listening applied to primiparous pregnant women in the third trimester significantly reduced the anxiety levels of pregnant women compared to the last test and control groups. According to this result, it was found that listening to music in primiparous pregnant women in the third trimester positively reduced the anxiety level. Similar studies have also reported that music listening reduces the anxiety level of pregnant women.[10,11,23] According to the data obtained in this study, efficacy of music listening is a positive result that can be used in practice to reduce anxiety in primiparous pregnant women in the third trimester.

In the study, the anxiety level of the pregnant women in the control group decreased significantly in the post-test. In the third trimester, the primary source of anxiety in primiparous pregnant women is the obscurity about childbirth. It has been thought that the training provided

**Table 3.** PSRS score regarding the groups

| PSRS subscales | Music Group (n=60) | Control Group (n=60) | p |
|---|---|---|---|
| Pregnancy, search for a safe process | | | |
| Pre-test | 21.1±8.0 | 20.7±8.6 | 0.825* |
| Post-test | 17.5 [15.0] | 19.0±8.4 | 0.248† |
| p | 0.002‡ | 0.064§ | |
| Baby care and changing family relations | | | |
| Pre-test | 12.0 [10.5] | 14.0 [10.0] | 0.994† |
| Post-test | 8.0 [14.8] | 10.0 [12.8] | 0.367† |
| p | 0.011‡ | 0.058‡ | |
| Motherhood role | | | |
| Pre-test | 11.5 [10.8] | 11.8±6.7 | 0.629† |
| Post-test | 7.5 [13.8] | 11.4±6.9 | 0.343† |
| p | 0.010‡ | 0.550§ | |
| Quest for social support | | | |
| Pre-test | 1.0 [4.8] | 1.0 [5.0] | 0.998† |
| Post-test | 1.0 [4.8] | 1.0 [5.0] | 0.710† |
| p | 0.605‡ | 0.275‡ | |
| Physical appearance and function | | | |
| Pre-test | 10.0 [10.8] | 8.5 [8.0] | 0.301† |
| Post-test | 9.0 [9.8] | 9.0 [7.8] | 0.693† |
| p | 0.037‡ | 0.993‡ | |
| Total PSRS | | | |
| Pre-test | 61.9±28.2 | 59.2±26.4 | 0.580* |
| Post-test | 45.0 [46.8] | 54.8±28.2 | 0.297† |
| p | 0.002‡ | 0.115§ | |

PSRS: Pregnancy stress rating scale.

Data are presented as median [IQR] and mean±standard deviation.

*Independent Sample-t test; †Mann–Whitney U-test; ‡Wilcoxon test; §Paired sample-t test.

in this study helps pregnant women to have information about childbirth and therefore reduces anxiety effectively. In studies where prenatal education was given to pregnant women, it was reported that education reduced the level of anxiety.[25,26] It is thought that the education given in this study is effective in reducing the anxiety level due to informing pregnant women about childbirth.

It is reported that the stress level increases in pregnant women in the third trimester.[27] According to the results of this study, it was determined that primiparous pregnant women in the third trimester experienced a slight level of pregnancy stress. It was found out that the mean scores obtained in other studies in the literature using the same measurement tool were similar to the results of this study.[7,20,28] Some studies have reported that music listening reduces pregnancy stress.[7,8,17] In this study, it was determined that the music played to the pregnant women in the application group significantly reduced their stress levels compared to the pre-test. However, it was determined that there was no significant decrease when compared with the control group. On the other hand, in two systematic reviews and one study on music listening, it was concluded that music was limitedly effective in reducing stress.[15,29,30] With this study, it is seen that this information is compatible. Music listening was not effective at the desired level in this study to reduce stress. The reason for this may be the type of music, the duration or environmental factors that may affect the practice, as well as the hormones released during pregnancy and physiological changes.

Music listening was not found to be effective for stress in the sub-dimension of seeking social support. Music listening was insufficient on the stress related to the seeking social support experienced by pregnant women. The reason for this is that pregnant women are thought to experience more social isolation with the threat of COVID-19 disease in the pandemic.

Our study was conducted during the pandemic, which may affect the anxiety and stress of pregnant women. It is reported that the pandemic increases anxiety and stress during pregnancy.[31-33] In the study of Zilver friends, it was emphasized that the proportion of pregnant women experiencing stress due to the pandemic is especially high and it is important to carry out studies to reduce this stress.[34] In our study, it was found that the anxiety level in pregnant women was significantly reduced by listening to music. However, listening to music is only limited effective in reducing the stress level of pregnant women. These results we have reached suggest that our study may also be related to its implementation, especially during a crisis period such as a pandemic.

Pregnant women listening to music in different environments, listening to music at a certain time interval, and using a single type of music to pregnant women are among the limitations of the study. The results obtained in this study include the results of pregnant women who applied to the place where the study was conducted. These results cannot be generalized to all pregnant women. The accuracy of the research results is based on the self-declaration of pregnant women.

## CONCLUSION

In this study, it was found that music listening practice had a positive effect on reducing the level of anxiety in pregnant women but had a limited impact on reducing the stress level. Music listening can be used safely in pregnant women to reduce anxiety and stress due to its low cost, easy application, and no side effects. In future studies, it is recommended to examine the impact of music listening, especially on stress levels. It can be recommended that researchers conduct studies in the future on the effectiveness of music listening, which pregnant women in different cultures and with music suitable for the culture different music.

### Disclosures

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**Peer-review:** Externally peer-reviewed.

**Conflicts of Interest:** The authors declare that they have no conflicts of interest.

**Ethics Committee Approval:** The study was approved by the Non-Interventional Clinical Research Ethics Committee of a Kutahya Health Sciences University (Approval date: December 01, 2019, and Approval number: 41997688-402.03.01-E.7757). All procedures in this research were carried out in accordance with the ethical standards set out in the Declaration of Helsinki of 1964 and comparable ethical standards. Written and oral informed consent was obtained from all participants included in the study.

**Authorship Contributions:** Concept – E.E., N.Ç.; Design – E.E., N.Ç.; Supervision – N.Ç.; Materials – E.E., N.Ç.; Data collection and/or processing – E.E.; Analysis and/or interpretation – E.E., N.Ç.; Literature search – E.E.; Writing – E.E., N.Ç.; Critical review – N.Ç.

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