

## Differential effects therapy of Javanese-traditional (*Karawitan instrumental*) music and classical music in the first stage and second stage of childbirth

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### ABSTRACT

**Background:** Labor pain may induce maternal anxiety, interfere with uterine contractions, and prolong the birthing process. Music therapy is a non-pharmacological intervention known to mitigate both labor pain and anxiety.

**Objective:** This study aimed to compare the effects of Javanese-traditional (*Karawitan instrumental*) and classical music therapies on anxiety, labor pain, and the duration of the first and second stages of labor.

**Methods:** A randomized controlled trial was conducted involving 201 mothers undergoing normal labor at primary healthcare centers. Participants were assigned into three groups: Javanese-traditional music (*Karawitan instrumental*), classical music, and a control group practicing deep breathing. Interventions lasted 40 minutes. Anxiety was measured using the Spielberger State-Trait Anxiety Inventory, pain intensity with a visual analog scale, and labor duration through partograph analysis. Statistical tests included paired t-test, Wilcoxon signed-rank, Kruskal-Wallis, one-way ANOVA, and Mann-Whitney U tests

**Results:** Both music interventions significantly reduced anxiety and pain within groups ( $p\text{-value} < 0.001$ ). No significant difference in pain reduction was found between the two music groups during the first active phase ( $p\text{-value} = 0.108$ ). Similarly, anxiety scores did not differ significantly between the music groups post-intervention ( $p\text{-value} = 0.956$ ), though classical music showed a slightly greater reduction. Regarding labor duration, Javanese-traditional music was associated with a shorter first stage, while classical music significantly reduced the duration of the second stage ( $p\text{-value} = 0.000$  and  $p\text{-value} = 0.035$ , respectively).

**Conclusions:** Javanese-traditional (*Karawitan instrumental*) and classical music therapies are both effective in reducing maternal anxiety and labor pain while supporting labor progress. Javanese-traditional (*Karawitan instrumental*) music demonstrated greater effectiveness during the first stage, whereas classical music offered benefits in anxiety reduction and second-stage labor duration.

**KEYWORD:** classical music; childbirth; labor pain; therapy; karawitan instrumental

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## INTRODUCTION

Pregnancy and childbirth are important events and a normal physiological process in a woman's life (1)(2). Five essential factors influence the labor and birth process, known as 5-P, namely passenger (fetus and placenta), passageway, power, position, and psychological response (3). Most 90% of childbirth is accompanied by pain (4)(5). The normal birth process can cause pain and increased stress, so the pain must be overcome. Pain during childbirth, which is one of the causes of stress. The pain felt by the mother in labor during the first active phase of labor is a physiological process caused by cervical dilation, uterine muscle hypoxia during contractions, and nerve compression in the cervix. This pain causes emotional and physical tension that triggers stress which has an impact on uncoordinated uterine contractions and prolongs the duration of labor (6). Fear of pain is one of the most common problems found during childbirth, especially in primiparas (7). Fear of facing childbirth is closely related to increased anxiety in mothers giving birth (8). Physiologically and anxiety can increase the release of stress hormones such as adrenaline and cortisol which can inhibit uterine contractions, prolong the duration of labor and worsen the perception of pain. Mothers with high levels of anxiety tend to have a more intense perception of pain even though they have been given epidural analgesia (9). Pietrzak et al reported the incidence of pain in 500 mothers giving birth, 2.5% experienced

mild pain, 25.5% with moderate pain, 72% with severe pain (with 5.2% of mothers experiencing unbearable pain or very severe pain) (10). World Health Organization shows that around 40% of cesarean deliveries are performed because of the frightening experience of giving birth and pain. Mothers who experience excessive anxiety and stress during labor will experience difficulties in the delivery process and it will also be detrimental to the baby to be born and can even cause fetal distress so that the baby's Apgar score will be low (11).

The method to reduce pain and anxiety in mothers giving birth using non-pharmacological methods had beneficial effects (6) and one of the non-pharmacological methods used to minimize pain is distraction auditory. Auditory distraction to reduce pain is done with music therapy (12). Music therapy reduces stress using a psychological approach (13). Music has been shown to reduce anxiety and depression, relieve pain, and lower heart rate. Nonpharmacological methods were developed to reduce pain in women without increasing risks to the fetus or mother or affecting the progress of labor (3). The intervention of music in maternal psychology is to reduce levels of anxiety, symptoms of depression, and stress. Music therapy is effective in reducing the pain (13), anxiety, and disgust. Music therapy reduces stress using a psychological approach. Music has been shown to reduce anxiety and depression, relieve pain, and lower heart rate. Music that has a tempo of 60 beats per minute

helps mothers to relax and control their anxiety because that beats is similar with the rhythm which can enhances the release of beta-endorphins, which block the releasing pain signals form nerve cells (14). The type of music used for therapy is soft and regular music, including classical music, instrumental, jazz, *dangdut*, and *keroncong*. The Javanese-traditional is a genre of *keroncong* music which is mostly sung in campursari form and is generally enjoyed as entertainment.

The previous research to determine the effectiveness of music in reducing pain and anxiety scores (15). Music intervention can reduce anxiety scores and have an impact on the mother's physiological conditions related to anxiety such as heart rate, systolic and diastolic blood pressure during labor (16). The intervention of music on the mother's physiological condition is to reduce pain intensity, systolic and diastolic blood pressure, and heart rate (17). Classical Turkish music can reduce the pain and anxiety of patients (18). There is a significant relationship between anxiety levels and pain perception scores in primiparous mothers during the first-stage of labor, indicating that reducing anxiety levels can reduce maternal pain perception and mothers who were given relaxation music therapy during labor experienced a significant reduction in anxiety, pain, and stress. Karawitan instrumental music as Javanese-gamelan music is a type of music has soft tones and regular rhythm with variation of 60-90 beats per minute. The

characteristic of Karawitan instrumental can be used as therapeutic music to reduce anxiety, sensations of pain, and several effects that have a significant psychological impact. Javanese traditional music can reduce anxiety during labor and pain in primiparous mothers during the first active phase (19). Another study also find that Javanese-gamelan music can be used as therapeutic music for patients experiencing pain due to the birth process (1). The number of births in Yogyakarta City in 2020 is known to be 1290 births in inpatient level I health service providers (20) and so far the intervention carried out to reduce pain is relaxation techniques as a non-pharmacological action for mothers giving birth.

The novelty of this research lies in the utilization of Javanese-traditional music (Karawitan instrumental) as a culturally rooted, non-pharmacological intervention during labor. This study also presents a direct and systematic comparison between karawitan instrumental and classical music across three key variables: labor pain, maternal anxiety, and the duration of labor in both the first active phase and the second stage. Furthermore, the integration of local cultural elements into the intrapartum intervention highlights the potential for practical implementation within primary health-care settings as a culturally sensitive and evidence-based approach. In this research, used the Violin Concerto in D Major, RV 224-II Largo by Antonio Vivaldi as a classical music and the Javanese-traditional

music used is Karawitan instrumental song entitled *Onang-onang* by NN. The research aimed to determine the difference in the effect of Javanese-traditional music therapy and classical music on the active phase of the first and second-stage of labor.

## MATERIALS AND METHODS

This study was carried out at Tegalrejo Public Health-care, Jetis Public Health-care, and primary health-care facilities in Yogyakarta City. This study was carried out during August 1<sup>st</sup> until November 2022.

### Research instrument

The research carried out was a randomized control trial type of experimental research. The accessible population is all women giving birth normally in the delivery room of primary health-care facilities in the city of Yogyakarta and its surroundings with eligibility criteria. The inclusion criteria were in the first-stage of the active-phase (cervical dilation 4 to <7 cm) while the exclusion criteria were mothers with hearing impairment and/or using anesthesia during labor. Sampling was carried out using purposive sampling based on primary health-care facilities that receive births and implement normal childbirth care. The sample size is calculated using the mean difference hypothesis test formula (21)(22).

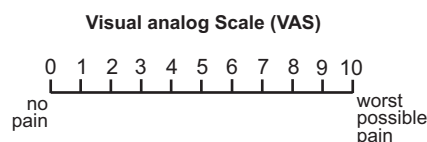
$$n = \frac{2\sigma^2 [Z_{1-\alpha} + Z_{1-\beta}]^2}{[\mu_1 - \mu_2]^2}$$

With  $\sigma = 8.99$ ;  $Z_{1-\alpha} = 1.96$ ;  $Z_{1-\beta} = 0.84$ ;  $\mu_1 - \mu_2 = 15$ .

A minimum sample of 67 per group was obtained so that the total sample for 2 treatment groups (Javanese-traditional and classical music intervention) and 1 control group (deep breathing exercise intervention) was 201 people. The Javanese-traditional music has a tempo of 60 beats per minute, by the statement of experts and researchers that the most recommended music is music with 60 beats per minute which has a relaxing effect (14). The classical music used is the Violin Concerto in D Major, RV 224-II Largo by Antonio Vivaldi. The Javanese-traditional music used is the Karawitan instrumental song entitled *Onang-onang* by NN. The music selection was the result of consultation with music experts (Lecturers Karawitan Department, Indonesian Art Institute Surakarta). The reason for choosing this song is to balance classical music which is played with several musical instruments. It doesn't use any type of Javanese-*Langgam* because the number of instruments played in Javanese-*Langgam* is less than that of *karawitan* and it can't keep up with classical music.

The instrument to measure anxiety in mothers giving birth using a scale The Spielberger State and Trait Anxiety Inventory (STAI). In STAI Form Y-1 of the 20 items, 10 items contain statements regarding anxiety (favorable) and 10 items do not contain statements about anxiety (unfavorable) (23). The anxiety grouping is divided into two, namely the low category if the score is  $\leq 40$  and the high category if the score is  $> 40$  (23). An instrument for measuring pain intensity

using the Visual Analog Scale (VAS) (24) has been illustrated in Figure 1. Instrumen self-efficacy is an important instrument for VAS. The VAS scale reading uses millimeters (mm) with the following range of meanings: a) 0- <10 mm = no pain; b)  $\geq 10$ -30 mm = mild pain; c)  $\geq 30$ -70 mm = moderate pain; d)  $\geq 70$ -90 mm = severe pain and e)  $\geq 90$ -100 mm = very severe pain (24). The assessment method is that the patient is asked to make a mark on the line according to the intensity of pain felt by the patient after receiving an explanation from the health worker. The measurement results are then recorded on an observation sheet.



**Figure 1. Visual Analog Scale (24).**

Length of labor in the active phase I is the time required during the first-stage of the active phase by the mother giving birth until the start of the second-stage in minutes. The duration of the second-stage of labor is the time required to complete the second-stage in minutes. Measurement of the duration of the first-stage of the active phase and phase II are carried out by calculating the duration in minutes based on the notes on the parto-graph sheet.

## RESULTS AND DISCUSSION

### RESULTS

Results of data analysis in two treatment groups (receiving Javanese-

traditional music and classical music intervention) and one control group (deep breathing exercise intervention). Each group consisted of 67 mothers giving birth. Total research subjects were 201 women giving birth who had received intervention and gone through the first and second-stages of labor normally. There are three analysis: univariate, data normality test, and bivariate analysis.

### Univariate Analysis

#### *Respondent Characteristics*

**Table 1** presents that in three groups: control, Javanese-traditional music, and classical music groups, the age distribution almost same. The majority of mothers giving birth were in 20-35 years old; in control group (89.55%), Javanese-traditional music (88.06%), and classical music (92.54%). Furthermore, the majority of mothers in control and intervention group had a history of multiparity, in control (56.7%), Javanese-traditional music (62.69%), and classical music (70.15%).

**Table 2** shows that the distribution of respondents based on age and parity. The mean age and mean parity for three groups almost same. The mean age for control group (27.84 years old), Javanese-traditional or *Karawitan* instrumental music (27.88 years old), and classical music (25.54 years old). The mean parity in control group (1.72 time), Javanese-traditional music (1.87 time), and classical music (1.85 time).

**Table 3** presents descriptive statistics on maternal anxiety and pain intensity before

**Table 1. Respondents' distribution based on age and parity characteristics of each group**

| Variable        | Group      |                                                  |                 | Total       |
|-----------------|------------|--------------------------------------------------|-----------------|-------------|
|                 | Control    | Javanese-traditional<br>(Karawitan instrumental) | Classical music |             |
| Maternal age    |            |                                                  |                 |             |
| <20 years old   | 2 (2.99)   | 1 (1.49)                                         | 1 (1.49)        | 4 (1.99)    |
| 20-35 years old | 60 (89.55) | 59 (88.06)                                       | 62 (92.54)      | 181 (90.05) |
| >35 years old   | 5 (7.46)   | 7 (10.45)                                        | 4 (5.97)        | 16 (7.96)   |
|                 | 67 (100)   | 67 (100)                                         | 67 (100)        | 201 (100)   |
| Parity          |            |                                                  |                 |             |
| Primipara       | 29 (43.28) | 25 (37.31)                                       | 20 (29.85)      | 74 (36.82)  |
| Multipara       | 38 (56.72) | 42 (62.69)                                       | 47 (70.15)      | 127 (63.18) |
|                 | 67 (100)   | 67 (100)                                         | 67 (100)        | 201 (100)   |

**Table 2. Distribution of respondents based on age and parity on a numerical scale**

| Group                                   | Variable        | N  | Mean  | SD    | Min ± max |
|-----------------------------------------|-----------------|----|-------|-------|-----------|
| Control                                 | Age (years old) | 67 | 27.84 | 4.965 | 18 ± 42   |
|                                         | Parity (time)   | 67 | 1.72  | 0.755 | 1 ± 4     |
| Javanese-traditional music intervention | Age (years old) | 67 | 27.88 | 5.333 | 17 ± 40   |
|                                         | Parity (time)   | 67 | 1.87  | 0.886 | 1 ± 4     |
| Classical music intervention            | Age (years old) | 67 | 25.54 | 4.377 | 18 ± 39   |
|                                         | Parity (time)   | 67 | 1.85  | 0.68  | 1 ± 3     |

and after intervention across the control, Javanese-traditional music, and classical music groups. In the control group, the mean anxiety score decreased slightly from  $37.30 \pm 12.77$  to  $34.42 \pm 14.48$ , and pain intensity dropped from  $7.15 \pm 2.38$  to  $4.63 \pm 2.13$ . The Javanese-traditional music group showed a more notable reduction in anxiety, from  $43.58 \pm 9.73$  to  $31.57 \pm 9.91$ , and pain scores decreased from  $7.79 \pm 1.72$  to  $5.42 \pm 8.29$ . Similarly, the classical music group experienced a decline in anxiety scores from  $45.81 \pm 9.41$  to  $34.33 \pm 8.36$ , and in pain intensity from  $7.01 \pm 2.15$  to  $5.27 \pm 2.06$ . These pain intensity scores were measured

using the Visual Analog Scale (VAS), which ranges from 0 (no pain) to 10 (worst possible pain). Based on this scale, the pre-test scores across all groups reflect moderate to severe pain, while post-test scores indicate a shift toward mild to moderate pain. These findings suggest that all groups experienced improvements following the intervention, with greater reductions in anxiety and pain observed among participants who received music therapy.

**Table 4** shows that the mean of length of labor for the first stage for control group 553.51 minutes, length of labor for Javanese-traditional music group 374.18 minutes, and

**Table 3. Distribution of mean, standard deviation, minimum and maximum of the anxiety and pain intensity**

| Group                      | Variable       | Pre-test |       |        |           | Post-test |       |        |           |
|----------------------------|----------------|----------|-------|--------|-----------|-----------|-------|--------|-----------|
|                            |                | N        | Mean  | SD     | Min ± max | N         | Mean  | SD     | Min ± max |
| Control                    | Anxiety        | 67       | 37.3  | 12.774 | 20±76     | 67        | 34.42 | 14.481 | 20±79     |
|                            | Pain intensity | 67       | 7.15  | 2.376  | 1±10      | 67        | 4.63  | 2.131  | 1±10      |
| Javanese-traditional music | Anxiety        | 67       | 43.58 | 9.731  | 26±72     | 67        | 31.57 | 9.909  | 20±71     |
|                            | Pain intensity | 67       | 7.79  | 1.719  | 4±10      | 67        | 5.42  | 8.287  | 1±70      |
| Classical music            | Anxiety        | 67       | 45.81 | 9.405  | 25±68     | 67        | 34.33 | 8.356  | 21±66     |
|                            | Pain intensity | 67       | 7.01  | 2.15   | 2±10      | 67        | 5.27  | 2.064  | 1±10      |

**Table 4. Distribution of the mean value, standard deviation, minimum and maximum values of the length of labor for the first-stage of the active phase and the second-stage**

| Group                                   | Variable                             | N  | Mean          | SD      | Min ± max |
|-----------------------------------------|--------------------------------------|----|---------------|---------|-----------|
| Control                                 | Length of labor for the first stage  | 67 | 553.51        | 271.388 | 180±1320  |
|                                         | Length of labor for the second stage | 67 | 31.75         | 22.011  | 5±150     |
| Javanese-traditional music intervention | Length of labor for the first stage  | 67 | <b>374.18</b> | 195.085 | 120±1080  |
|                                         | Length of labor for the second stage | 67 | 36.01         | 27.72   | 5±180     |
| Classical music intervention            | Length of labor for the first stage  | 67 | 607.52        | 355.834 | 52±1680   |
|                                         | Length of labor for the second stage | 67 | <b>25.96</b>  | 16.035  | 3±61      |

607.52 minutes for classical music intervention.

The comparison of the duration of labor which had the shortest mean duration in stage I (active phase), was in the Javanese-traditional music intervention group (Mean = 374.18 minutes; SD = 195.09; range = 120-1080 minutes). The shortest mean duration in stage II was the classical music intervention group (Mean = 25.96 minutes; SD = 16.04; range = 3-61 minutes).

#### Data Normality Test Results

Data normality analysis was carried out based on the Kolmogorov-Smirnov test.

Distribution of normality test results for anxiety and pain intensity variables divided based on pre-test and post-test. **Table 5** presents the results of Kolmogorov-Smirnov normality test, which indicated that most of the data were not normally distributed (p-value < 0.05).

However, the anxiety variable in the classical music intervention group met the assumption of normality, with pre-test and post-test p-value of 0.200 and 0.079, respectively. Accordingly, this variable was analyzed using a paired t-test.

**Table 5. Distribution of normality test results for anxiety and pain intensity variables**

| Group                        | Variable       | Pre-test |            | Post-test |               |
|------------------------------|----------------|----------|------------|-----------|---------------|
|                              |                | N        | p-value    | N         | p-value       |
| Control                      | Anxiety        | 67       | 0          | 67        | 0             |
|                              | Pain intensity | 67       | 0          | 67        | 0             |
| Javanese-traditional music   | Anxiety        | 67       | 0.036      | 67        | 0.004         |
|                              | Pain intensity | 67       | 0          | 67        | 0             |
| Classical music intervention | Anxiety        | 67       | <b>0.2</b> | 67        | <b>0.079*</b> |
|                              | Pain intensity | 67       | 0.012      | 67        | 0.001         |

\* Kolmogorov-Smirnov test

**Table 6. Distribution of normality test results for duration of labor in the first active and second-stage**

| Group                                   | Variable                             | N  | p-value |
|-----------------------------------------|--------------------------------------|----|---------|
| Control                                 | Length of labor for the first stage  | 67 | 0.02    |
|                                         | Length of labor for the second stage | 67 | 0.002   |
| Javanese-traditional music intervention | Length of labor for the first stage  | 67 | 0       |
|                                         | Length of labor for the second stage | 67 | 0.006   |
| Classical music intervention            | Length of labor for the first stage  | 67 | 0.001   |
|                                         | Length of labor for the second stage | 67 | 0       |

**Table 7. Differences in anxiety scores between control group and Javanese-traditional music before-after being given intervention using Wilcoxon Sign Ranks Test**

| Group                                   | Category                    | Frequency | Sum of ranks |          | P-value |
|-----------------------------------------|-----------------------------|-----------|--------------|----------|---------|
|                                         |                             |           | Negative     | Positive |         |
| Control                                 | Post-test anxiety <pre-test | 43        |              |          |         |
|                                         | Post-test anxiety >pre-test | 18        | 33.08        | 26.03    | 0.001   |
|                                         | Post-test anxiety =pre-test | 6         |              |          |         |
| Javanese-traditional music intervention | Post-test anxiety <pre-test | 60        |              |          |         |
|                                         | Post-test anxiety >pre-test | 5         | 34.28        | 17.7     | 0       |
|                                         | Post-test anxiety =pre-test | 2         |              |          |         |

### Bivariate Analysis

**Table 7** shows results of the Wilcoxon Test that the control group showed 43 respondents experienced a decrease in anxiety, 18 experienced an increase, and 6 did not experience a change. The negative sum of ranks value (33.08) was slightly larger

than the positive (26.03), with a p-value of 0.001, indicating that standard procedures in primary health care facilities have a significant effect on reducing anxiety, although limited. Meanwhile, in the traditional Javanese music intervention group, anxiety decreased in 60 respondents, only 5

experienced an increase, and 2 remained the same. The negative sum of ranks value (34.28) was greater than the positive (17.70), with a p-value of 0.000, indicating that the traditional Javanese music intervention was very effective and consistent in reducing anxiety levels.

**Table 8** presents the results of the paired t-test in the classical music group. The mean anxiety score decreased from 45.70 (SD± 9.543) in the pre-test to 34.40 (SD± 8.367) in the post-test. The test results showed a statistically significant difference with a p-value of 0.000 ( $t = 11.299$ ; 95% CI= 9.097-13.500). These findings indicate that

classical music intervention is effective in significantly reducing anxiety in mothers in labor.

**Table 9** shows that The Kruskal–Wallis test revealed no statistically significant difference in post-intervention labor pain scores among the control, Javanese-traditional music, and classical music groups (p-value = 0.108; 95% CI = 0.050-0.129). Although descriptively the classical music group showed the greatest reduction in pain intensity ( $\Delta = 20.97$ ), followed by the Javanese-traditional music group ( $\Delta = 17.33$ ), and the control group ( $\Delta = 3.64$ ), these differences were not statistically significant.

**Table 8. Differences anxiety scores in classical music intervention group**

| Variable | Pre-test |      |       | Post-test |      |       | p-value | 95% CI       | t      |
|----------|----------|------|-------|-----------|------|-------|---------|--------------|--------|
|          | N        | Mean | SD    | N         | Mean | SD    |         |              |        |
| Anxiety  | 67       | 45.7 | 9.543 | 67        | 34.4 | 8.367 | 0       | 9.097-13.500 | 11.299 |

**Table 9. Differences in labor pain scores for the control group, Javanese-traditional music, and classical music before and after being given intervention using Kruskal-Wallis Test**

| Variable       | Group                             | Pre-test |        |    | Post-test |       |    | Mean Rank ( $\Delta$ ) | p-value | 95% CI      |
|----------------|-----------------------------------|----------|--------|----|-----------|-------|----|------------------------|---------|-------------|
|                |                                   | N        | Mean   | df | N         | Mean  | df |                        |         |             |
| Pain intensity | Control                           | 67       | 98.66  | 2  | 67        | 95.02 | 2  | 3.64                   | 0.108   | 0.050-0.129 |
|                | Javanese-traditional intervention | 67       | 112.2  | 2  | 67        | 94.87 | 2  | 17.33                  |         |             |
|                | Classical music intervention      | 67       | 113.11 | 2  | 67        | 92.14 | 2  | 20.97                  |         |             |

**Table 10** presents the result of the independent t-test that there was no significant difference between the mean decrease in anxiety in the traditional Javanese music intervention group (Mean =

$11.85 \pm 9.95$ ) and classical music (Mean =  $11.94 \pm 8.66$ ). The mean difference between groups was only  $-0.09$  points (SD = 1.61), with a t-value =  $-0.056$  and p-value = 0.956. The 95% confidence interval for the mean

difference ranged from -3.277 to 3.097, which includes the value of zero, confirming that the difference was not statistically significant

**Table 11** shows the results of the Mann-Whitney U test comparing post-intervention labor pain scores between the Javanese-traditional (*Karawitan* instrumental) music group and the classical music group. The analysis revealed a statistically significant difference between the two groups ( $U = 1076.000$ ,  $p\text{-value} = 0.000$ ), with the classical music group showing a lower mean rank (53.81) compared to the Javanese-traditional music group (81.19). This indicates that

participants exposed to classical music experienced significantly lower labor pain intensity than those who received the traditional music intervention.

**Table 12** presents the effect of the intervention on the duration of the first and second stages of labor that were tested using One-way ANOVA. In the first stage, the group listening to traditional Javanese (*Karawitan* instrumental) music experienced the shortest average labor time (71.66 minutes) compared to the control group (113.36 minutes) and classical music (117.98 minutes). All groups showed statistically significant differences ( $p\text{-value} = 0.000$ ). For

**Table 10. Differences in mean anxiety scores in the Javanese-traditional and classical music**

| Group                        | Mean  | SD    | Different Mean | Different SD | t      | Lower  | Upper | p-value |
|------------------------------|-------|-------|----------------|--------------|--------|--------|-------|---------|
| Javanese-traditional music   | 11.85 | 9.949 | -0.09          | 1.611        | -0.056 | -3.277 | 3.097 | 0.956   |
| Classical music intervention | 11.94 | 8.657 |                |              |        |        |       |         |

**Table 11. Differences in mean labor pain scores in the Javanese-traditional (*Karawitan* instrumental) and classical music**

| Group                        | Mean Rank | n  | p-value |
|------------------------------|-----------|----|---------|
| Javanese-traditional music   | 81.19     | 67 | 0       |
| Classical music intervention | 53.81     | 67 |         |

**Table 12. Effect of intervention on the length of time in stage I and stage II**

| Variable                             | Group                        | N  | Mean         | df | P-value | 95% CI      |
|--------------------------------------|------------------------------|----|--------------|----|---------|-------------|
| Length of labor for the first-stage  | Control                      | 67 | 113.36       | 2  | 0       | 0.000-0.015 |
|                                      | Javanese-traditional music   | 67 | <b>71.66</b> | 2  |         |             |
|                                      | Classical music intervention | 67 | 117.98       | 2  |         |             |
| Length of labor for the second-stage | Control                      | 67 | 105.73       | 2  | 0.035   | 0.000-0.032 |
|                                      | Javanese-traditional music   | 67 | 110.99       | 2  |         |             |
|                                      | Classical music intervention | 67 | <b>86.28</b> | 2  |         |             |

the second stage, the shortest average time was found in the classical music group (86.28 minutes), followed by the control group (105.73 minutes) and traditional Javanese music (110.99 minutes). Statistical tests showed significant differences between groups ( $p$ -value = 0.035).

## DISCUSSION

### Respondent Characteristics

The results of the study based on **Table 1** and **Table 2** showed that almost all mothers in labor were in the 20-35 years old. Likewise with parity characteristics, the majority of mothers who give birth are multiparous. The results of the research show that mothers who give birth have a healthy reproductive age and the mother's reproductive system is in optimal condition to go through pregnancy and childbirth. Ages 20-35 years are a healthy reproductive age group who are physically ready to face pregnancy and childbirth. Most of the mothers who gave birth were multiparous. Multiparous means a mother who has given birth to a child at least once before. Anatomically, multiparous mothers with a history of normal labor at birth have the opportunity to undergo a normal labor process again.

### The effect of Javanese-traditional (*Karawitan* instrumental) music and classical music therapy on labor pain

This study found that both Javanese-traditional (*Karawitan* instrumental) and classical music interventions contributed to

reductions in labor pain during the first-stage active phase. However, based on **Table 9**, the difference between the two music groups was not statistically significant ( $p$ -value = 0.108), suggesting that while music therapy is beneficial; neither genre demonstrated clear superiority in pain relief. The results of this study strengthen the results of previous study which stated that music therapy has proven to be significantly effective in reducing pain intensity in the first stage of labor (1). These findings also align with a 2025 meta-analysis by Vaid et al. which reported that music therapy significantly reduced pain intensity during the active phase of labor, although the overall evidence quality was moderate to low due to heterogeneity across studies (7). Music can divert attention (auditory distraction) from painful stimuli, thereby reducing sympathetic nervous system activity and increasing relaxation. Music also stimulates the release of endorphins, endogenous opioids that function as the body's natural analgesics, thereby increasing the pain threshold and reducing the transmission of pain impulses to the brain (6).

Music can positively influence maternal physiology during labor by activating the primary auditory cortex, which in turn stimulates the limbic system, brainstem, hypothalamus, and cerebral cortex. Given the close anatomical and functional connection between the auditory cortex and the pain center within the cerebral cortex, music may facilitate endorphin release, enhance oxygenation of organs and tissues, and

reduce pain sensitivity (25). Both types of music chosen for use in this study have a slow tempo with beats between 60-80 BPM and the previous study proved that therapy with slow tempo music can help stabilize the mother's heart rate and breathing, create physiological conditions that support uterine muscle relaxation and accelerate cervical dilation in labor (7).

Classical music has previously been widely studied for its calming benefits for those who listen to it, but not everyone feels that this genre of music is suitable, so in this study, traditional karawitan music was chosen as music that is considered to be more familiar and culturally appropriate for mothers giving birth in Yogyakarta. Classical music has been associated with a calming effect and listening to classical music has been recognized as an effective non-pharmacological method for supporting emotional regulation. The effects of relaxing classical music on the body and brain (26). Meanwhile, culturally familiar music such as Javanese-traditional Karawitan may enhance emotional resonance and psychological comfort, especially in populations with strong cultural ties to the musical form. This is supported by Liu et al., who found that music therapy combined with prenatal training significantly reduced labor pain and improved delivery outcomes in parturients (27).

On the other hand, the presence of someone who provides support is very useful because it will make a person feel more comfortable. In order to enhance labor

services and give mothers better assistance, companion support should be promoted in health policy. Companion care during the birthing process is crucial for boosting maternal comfort and satisfaction (28). Pain intensity is a description of how severe the pain is felt by an individual. Music listening has a significant role to play for women in childbirth (29). Upright position and music can shorten the duration of labor and lower labor pain (30). Pain during labor is something physiological that occurs due to changes in the birth canal during the first stage, especially during contractions. Pain impulses during the first stage of labor are transmitted through the T11-12 spinal nerve segments and lower thoracic accessory nerves and upper lumbar sympathetic nerves. This pain starts from the lower abdomen and spreads to the lumbar region of the back and down to the thighs (3). Although the present study did not find a statistically significant difference between the two music types, the descriptive trends suggest that cultural familiarity may play a role in enhancing the effectiveness of music therapy. This echoes the conclusions of Santiv  ez-Acosta et al. who emphasized the importance of tailoring music interventions to the sociocultural context of the patient to optimize therapeutic outcomes (6). Another study also reported that listening to a preferred music genre has a significant positive effect on pain resilience, regardless of the specific type of genre (31). The significant reduction in pain scores observed in the classical group suggests the pain felt by

the mother in labor during the first stage can be transferred or distracted. A decrease in the VAS score indicates that the pain felt by the mother in labor during the first stage can be transferred or distracted. This is in accordance with the theory that music stimulates the release of endorphins. Endorphins have a relaxing effect on the body and also act as an ejector for the feeling of relaxation and calm that arises (32). Music therapy is a way to distract or divert the client's attention to other things and thereby reduce awareness of pain and even increase tolerance to pain. Distraction efforts are included as part of non-pharmacological methods. Non-pharmacological methods were developed to reduce pain in women without increasing the risk to the fetus, to the mother, or affecting the progress of labor (5). Music therapy reduces pain and anxiety during childbirth (3). This is in accordance with research by An et al which using music therapy during labor decreased labor pain and improved the childbirth experience (33). Mothers who listen music during labor have lower levels of anxiety, the duration of contractions is longer and labor progresses more quickly than those who don't listen to music (1).

### **The effect of Javanese-traditional (*Karawitan* instrumental) and classical music therapy on maternal anxiety**

The results of the analysis showed in **Table 7** that both music interventions, Javanese-traditional (*Karawitan* instrumental) and classical music, were significant-

ly more effective than the control group in reducing anxiety levels in mothers in labor. The Javanese-traditional music group showed a dominance of respondents who experienced a decrease in anxiety, with a consistent pattern of decrease (p-value = 0.000). On the other hand, based on **Table 8** the classical music group showed a quantitatively greater decrease in anxiety ( $\Delta$  mean = -11.299; p-value = 0.000), indicating a high statistical effect strength. Meanwhile, the control group showed a significant but more limited decrease in anxiety both in terms of the number and consistency of respondents (p-value = 0.001).

These findings are supported that sound interventions including classical and culturally familiar music consistently reduce physiological stress markers such as cortisol levels and heart rate variability, regardless of musical origin. This supports the notion that the therapeutic efficacy of music may be more closely tied to its structural and emotional properties than to its cultural classification alone (34). Music therapy significantly reduces anxiety during labor, particularly when using slow-tempo music that aligns with physiological rhythms (6). Additionally, Lin et al found that music interventions during labor significantly decreased anxiety scores and physiological indicators such as heart rate and blood pressure, reinforcing the role of tempo-regulated music in autonomic modulation (16). Music therapy is widely recognized for its influence on the autonomic nervous system, reducing sympathetic

activity while enhancing parasympathetic tone which fosters physiological relaxation and emotional regulation. Slow and steady-tempo music consistently reduced anxiety levels across multiple studies, particularly when the music was instrumental, culturally familiar, and emotionally calming (35). Javanese musical idioms, when composed with therapeutic intent, can evoke calmness and reduce emotional tension in pregnant women, suggesting cultural familiarity may enhance the anxiolytic effect (36).

The research results in line with Suryani et al, the group that was given Javanese-traditional music intervention experienced a decrease in anxiety of 8.58 compared to the group that was not given the intervention (19). Music intervention can reduce anxiety scores (16). Javanese *gamelan* music can be used as therapeutic music to reduce anxiety, sensations of pain, and several effects that have a significant psychological impact. Javanese-*gamelan* can be used as therapeutic music for patients experiencing pain due to the birth process. Javanese-traditional music can reduce anxiety during labor and pain in primiparous mothers in the first-stage of the active phase (19). During labor, music functions to reduce disturbances, increase positive responses, and act as a stimulus for relaxation.

Music therapy during childbirth were reduced postpartum anxiety and pain (13). Music therapy reduced anxiety significantly more than control conditions at post-intervention (37) and had a positive effect to

improve mother's quality of life (38). Emotional freedom technology therapy has been proven to reduce mental health (39). Health strategic programs are necessary to improve the maternal health in Indonesia (40). Music therapy was effective in reducing pain for women who gave birth naturally (33)(41). Music give the satisfaction with pain relief, sense of control in labour (42).

### **The effect of Javanese-traditional (*Karawitan* instrumental) and classical music therapy on the length of labor in the first-stage**

Based on the **Table 12**, the findings revealed that the shortest mean duration was observed in the group of mothers who received Karawitan instrumental music (mean = 71.66 minutes). These results suggest that *Karawitan* instrumental-based interventions may facilitate more efficient cervical dilation and uterine activity during the initial stage of labor. This finding aligns with previous studies that have demonstrated the efficacy of music therapy in shortening the first stage of labor. Riyanti and Wahyuni reported that music therapy significantly reduced the duration of the active phase among laboring women in community health centers (43). The underlying mechanism is believed to involve neurophysiological responses, where music influences the limbic system and hypothalamus, thereby reducing stress hormone levels such as cortisol and promoting uterine relaxation (14). The Javanese-traditional music can be used as

therapeutic music for patients experiencing pain due to the birth process. Javanese-traditional music can reduce anxiety during labor and pain in primiparous mothers during the first active phase (19). Music therapy reduces labor pain and improves self-esteem (29), psychological health of women during pregnancy, reducing anxiety (6) and pain felt by the mother during labor (44).

Suryani et al. further supported these results by showing that exposure to Javanese-instrumental music shortened labor duration through mechanisms such as rhythmic entrainment, parasympathetic nervous system activation, and emotional regulation (19). Similarly, Lin et al. found that music interventions during labor decreased physiological indicators of stress such as elevated heart rate and blood pressure which are known to impact uterine contractility and labor progression (16). The psychological dimensions of childbirth, particularly fear and anxiety, can trigger a stress response that elevates catecholamine levels, resulting in vasoconstriction of uterine vessels, and reduced effectiveness of uterine contractions (45).

### **The effect of Javanese-traditional (*Karawitan* instrumental) and classical music on the duration of the phase II**

The results of this study presented in **Table 12** demonstrate that mothers who listened to music during labor, particularly classical music, experienced a significantly shorter duration in the second stage of labor

compared to those in the control and traditional karawitan groups ( $p\text{-value} = 0.035$ ). This finding aligns with the work of Ji et al., who emphasized that music positively influences the limbic system and hypothalamus, thereby reducing catecholamine levels and enhancing emotional stability, which may indirectly improve muscular coordination during the expulsive phase (14). Scientifically, music stimulates the parasympathetic nervous system, leading to a decrease in stress hormones (such as cortisol and adrenaline) while increasing endorphins and oxytocin, which are critical for smooth uterine contractility and maternal comfort during labor (35)(46). This neuro-hormonal shift facilitates better synchronization of pushing efforts and reduced maternal fatigue, key factors in second-stage efficiency.

Moreover, Indahwati et al., concluded that music directly affects the central nervous system, enhancing the regulation of uterine muscle contractions and reducing the mother's pain perception. These physiological responses are particularly significant during the expulsive phase, where voluntary effort must align with uterine action to achieve timely delivery (47). In contrast, while karawitan was more effective in shortening the first stage of labor, it may offer a more soothing rather than stimulatory effect, which could explain its relatively longer second-stage duration. The structured rhythm and melodic predictability of classical music may provide a more energizing stimulus for

maternal focus and breath control, consistent with findings by Vaid et al. who observed enhanced maternal endurance and shortened second-stage labor among participants exposed to dynamic classical compositions (7).

Research in Türkiye, the average duration of the active phase in nulliparas is 5.75 hours and 3.5 hours in multiparas (48). Based on the test results presented in **Table 12**, it can be seen that average length of the second-stage in the classical music intervention group was shorter, namely 86.28 with a  $p\text{-value} = 0.035$ . This value shows the influence of the intervention on the length of the second stage of labor. The results of this study are in accordance with research by Gokyildiz et al which proves that mothers who listen to music during labor have lower levels of anxiety; duration of contractions is longer and labor progresses more quickly than those who do not listen to music (2).

## CONCLUSION AND RECOMMENDATIONS

These findings indicate that both traditional Javanese and classical music effective to reduced the pain and maternal anxiety during labor. There is a difference in the effect of therapy of Javanese-traditional and classical music on labor pain during the first active phase. The average reduction in maternal anxiety was greater for birthing mothers who received Javanese-traditional music therapy than for birthing mothers who received classical music therapy. Javanese-traditional (karawitan instrumental) music

intervention had an effect on the length of labor in the active phase of the first-stage with an average of 71.66 minutes. Classical music intervention had an effect on the length of the second-stage of labor with an average of 86.28 minutes. It is recommended that Javanese-traditional (karawitan instrumental) music therapy be considered as a non-pharmacological intervention during the first-stage of labor to help reduce maternal anxiety and labor pain and also to shorten the duration, while classical music may be more beneficial in shortening the second-stage of labor.

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