The Effect of Live Music as an Intervention on Antepartum Patients

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Abstract

This project examines the effect of playing live, violin music at the bedside of high-risk pregnant patients staying in the Perinatal Special Care Unit at Sharp Mary Birch Hospital for Women and Newborns. Before and after the music session, blood pressure, heart rate and mean arterial pressure were measured. Positive written feedback from each patient regarding their experience included themes of the music helping them to feel relaxed and connected with their baby. Patients also verbalized how the music was a memorable and special experience to have in the hospital.

Chapter 1

Introduction

In this project, Brooke Senne, a Bachelor of Science in nursing student desired to combine her interests of maternal-newborn health care and music. As an Arts for Healing volunteer violinist at Sharp Mary Birch Hospital for Women and Newborns, she has observed and been told by patients, families and staff about how her music has made a positive impact on the hospital environment in promoting relaxation, peace, and a warm presence. Because an unplanned hospital stay can be stressful for pregnant women staying in the Perinatal Special Care Unit (PSCU), this project serves to reaffirm that playing live music at the bedside can be an effective, noninvasive, non-pharmacological method to decrease or control physiological mechanisms which respond to stress (biophysical markers) as well as provide a memorable, relaxing experience for patients.

Background

Various factors contribute to a woman being hospitalized before a full-term pregnancy is completed. Upon hospitalization and identification of a medical diagnosis these women are often identified as "high risk" or having a "complicated pregnancy." A "high risk pregnancy" can be defined as one where the "mother, fetus, or neonate is at risk of morbidity or mortality before or after delivery" (Artal-Mittelmark, 201, para 1). According to the *National Institute of Child Health and Human Development (2012)*, about 6 to 8% of women are categorized as having a high-risk pregnancy. Some conditions of pregnancy possibly requiring hospitalization include preeclampsia and eclampsia, gestational diabetes, previous preterm birth, preterm labor, and multiple gestations (National Institute of Health, n.d.). The *Center for Disease Control and Prevention [CDC]* (n.d.), found that severe maternal morbidity (SMM) (including unexpected

pregnancy outcomes resulting in short or long-term effects on maternal health) affects approximately 50,000 women each year, with occurrences steadily increasing since 2014. Increasing rates of SMM are due in part to the changing health of the pregnant population. Technological advances, such as in vitro fertilization, have made it possible for women of advanced maternal age (AMA) to become pregnant. Studies have shown that women of AMA who have utilized assistive reproductive technologies have had pregnancies associated with increased incidences of fetal growth restriction and preterm deliveries (Harlev, 2018). In addition, the *American College for Obstetricians and Gynecologists* (2016) explains the increased incidence of obesity is also associated with poor infant outcomes of neural tube defects, macrosomia, and preterm birth. To prevent worsening of complications like these, management in the hospital includes activity restriction or bed rest.

Antepartum hospitalizations have varying time frames, ranging from days to weeks, to months. It has been estimated 1 million women with high risk pregnancy complications are placed on bed rest each year (Iams, 1998). Fox et al. (2009) defined "bed rest" as activity limited to 1-2 hours per day with bathroom privileges. As a consequence of spending up to 22 hours per day in their patient rooms, many women experience stress, anxiety, or psychological unrest out of fear for their baby as well as their own health. Women are separated from their family or loved ones, contributing to feelings of isolation and loneliness (Pozzo, Brusati, & Cetin, 2010). In a literature review conducted by Maloni (2011), (six studies examining standardized depression screening tools) found that depression symptoms were high in antepartum women on bed rest. According to a large study in the United States, "approximately 84% of women experienced some level of stress during their pregnancy, with 6% reporting high levels" (Woods, Melville, Guo, Fan & Gavin, 2010, p. 1). When compared to women with

uncomplicated pregnancies, high risk pregnant women have higher ratings of "high level"

anxiety and depression, as well as lower levels of spiritual well-being (Zadeh, Khajehei, Sharif,

& Hadzic, 2012; Kartal & Oskay, 2017; Dunn, Handley, & Shelton, 2007). Prenatal stress not

only impacts the mother, but it is also associated with negative infant outcomes at birth and

throughout development.

One of the most dominant findings is the effect of prenatal stress on infant size and

weight at birth. In women with uncomplicated pregnancies, stress has been associated with small

for gestational age (SGA) infants (Khashan et al., 2014). For women who experienced perinatal

stress due to natural disasters, perinatal stress was associated with smaller newborn head

circumferences, shorter newborn lengths, and low gestational age (Palmiero-Silva et al., 2018).

Other psychological disorders during pregnancy, such as depression, have also been associated

with preterm birth (PTB) and low birth weight (LBW) (Toan, Hanh Thuy, Meyrowitsch, &

Rasch, 2018). Tomita, Labis, and Burns (2015) discovered that among children who were born at

a LBW, 43.1% of mothers had depressive symptoms prior to pregnancy compared to 31.4% of

those having normal birth weight children.

In investigating feelings among women with high risk pregnancies, fear was found to be

the most mentioned feeling (Wihelm et al., 2015). Wihelm et al. explains that being in a "high

risk" category creates a constant state of tension for women. The majority of women express a

sense of powerlessness and are overwhelmed by their lack of knowledge surrounding their

current state of pregnancy. A gap in current practice to address these concerns was demonstrated

by Pozzo, Brusati, and Cetin (2010), where it was found that 81% of hospitalized, high risk

pregnant women believed there was a deficiency of clarification regarding their admission,

diagnosis, and delivery plans. In addition, these women suggested that their feelings of

powerlessness, fear and loneliness should "require an additional relational and emotional presence from the prenatal care team" (Pozzo, Brusati, & Certain, 2010, p. 140). Because stress during pregnancy poses a threat to maternal and fetal well-being, holistic, simple, non-pharmacological practices are needed to alleviate stress for hospitalized, high risk pregnant women.

Chapter 2

Literature Review

Music as a therapeutic intervention in the hospital setting has become increasingly popular since the mid- 20th century with the rising interest in complementary therapies. Music is cost effective, easily accessible, and enjoyed as a universal pastime by many people. Because the hospital is a place where individuals of varying cultures and backgrounds are cared for, music has served as a transcendent, unifying means to connect with patients. Music's universal appeal has allowed for its incorporation into the activity options of many different units.

An Overview of Music during Pregnancy

In the population of pregnant women, music has shown to have a positive effect in managing pain, decreasing stress or anxiety, lowering cortisol levels, and increasing maternal-fetal well-being. Music is often a requested accommodation to ease psychological tension in patients during labor and delivery. Patients in the active phase of labor have yielded lower pain and anxiety scores after experiencing music therapy compared to patients who didn't experience this intervention (Gokyildiz Surucu, Ozturk, Avcibay Vurgec, Alan, & Akbas, 2018; John & Angeline, 2017; Karkal, Kharde, & Dhumale, 2017). After experiencing a music intervention, pregnant women were identified as having significantly lower psychological stress and state trait anxiety scores (John & Angeline, 2017; Oh et al., 2016). In a longitudinal study, it was found

that listening to music could be a protective factor during pregnancy as it was associated with increased levels of maternal well-being and decreased symptoms of depression in the postnatal period, three months after birth (Fancourt & Perkins, 2018). Physiological indicators of stress, such as the hormone cortisol, have been found to be lower in women who underwent cesarean sections while listening to music during the operation (Hepp et al., 2018).

Music has also shown to be effective in positively affecting the fetus in utero during routine antenatal testing. During cardiotocographic monitoring sessions, increased fetal activity (a strong indicator of fetal well-being) occurred during maternal listening to classical music as evidenced by increased fetal movement, increased variability with more frequent accelerations, and decreased uterine contractions (Gebuza, Dombrowska, Kaźmierczak, Gierszewska, & Mieczkowska, 2017). Similarly, during a nonstress test, there were significant increases in the frequency of fetal accelerations in women who experienced a music intervention compared to those who experienced routine care (Erkun Dolker & Basar, 2019; Oh et al., 2016).

High Risk Population Music Studies

Vital Sign Measurement. For women admitted to the hospital with high risk pregnancies, a review of past studies shows the effect of music on vital signs, stress, anxiety, depression, maternal well-being, and fetal activity. In randomized control trials (RCT), Cao et al. (2016) and Toker and Kömürcü (2016) found significant reductions in systolic and diastolic blood pressure (SBP and DBP) in post-music treatment measurements compared to pre-intervention values ($p<0.05$). In another RCT, Teckenberg-Jannson (2019) found a significant increase in the SD2 when measuring heart rate (HR) variability during the music session compared to the rest session ($p=0.027$). Although the women were not "high risk," Gonzalez et

al. (2017), found in a RCT that a statistically significant decrease in SBP, DBP, and HR was observed in pregnant women after receiving music stimulation.

 Psychological Measurement. The psychological impact of the music intervention was also observed during high risk hospitalization. Cao et al. (2016) utilized the Hamilton Anxiety Scale and the Hamilton Depression Rating Scale to discover that the scores dropped significantly ($p<0.05$) in both tests after music treatment, whereas the control group demonstrated no such change. In another RCT, Chang et al. (2015) found that women who listened to music during antenatal care yielded lower psychological stress scores during antenatal testing. Similarly, music interventions were shown to be significantly correlated ($p=0.02$) with reduced maternal anxiety in a systematic review/meta analysis investigating high risk pregnant women (Corbijn van Willenswaard et al., 2017). In a randomized single blind study, Bauer et al. (2010) found significant decreases in antepartum-related distress in high risk women using the researcher-developed Antepartum Bed Rest Emotional Impact Inventory tool. This tool measures multifaceted aspects of psychological health such as, "anxiety, loneliness, boredom, depression, stress, and loss of control" (Bauer et al., 2010, p. 525).

 Music has also contrived up feelings of increased satisfaction for hospitalized pregnant patients with complications. In a retrospective analysis of post feedback questionnaires, Corey, Fallek, and Benattar (2019) found ratings of high satisfaction amongst all respondents, positive relaxation, a sense of connection with their babies, and enthusiastic reception from providers and staff. A qualitative analysis included positive effects on the patients' mental, emotional, and physical states with themes of feeling soothed, relaxed, calm, and peaceful. (Corey, Fallek, & Benattar, 2019). Cao et al. (2017) also found higher quality of life scores in high risk patients who experienced a music intervention compared to those who did not.

In addition to positive effects on the mother, music in the hospital setting also has been associated with increased fetal well-being, as demonstrated during antenatal nonstress testing. High risk patients receiving a music intervention experienced increased fetal movements and greater fetal heart rate accelerations than those who received routine care while on bed rest (Toker & Kömürcü, 2016).

Duration of the Music Intervention. In the current literature, there is a lack of consistency regarding the proper duration of music intervention sessions for hospitalized women (Corbijn van Willenswaard et al., 2017). Single, one time music sessions lasting approximately 30-60 minutes have been utilized due to convenience and increased reception by recruited patients. (Corey, Fallek, & Benattar, 2019; Bauer et al., 2010). Corbijn van Willenswaard et al. (2017) noted the possible limitation of shorter music sessions and that longer listening sessions should be explored to allow for greater possible effect on participants. Thus, studies utilized music interventions of varying time frames such as 30-60 minutes, 1-2 times per day for 4 weeks and also 30 minutes per day for 7 days (Cao et al. 2017; Toker & Kömürcü, 2016). Some researchers have chosen to allow for music therapists to determine the length of time of the music session based on patient preference and need, which ranged from 1-3 days (Corey, Fallek, & Benattar, 2019).

Delivery Method of Music Intervention. Music therapy delivered at the bedside of high-risk pregnant patients is a common finding in many studies. This method was utilized most commonly in the various consulting studies due to the educational background and expertise of the therapist to use the best practice of patient engagement for desired changes (Bauer et al., 2010; Corey, Fallek, & Benattar, 2019; Teckenberg-Jannson, 2019). Another music intervention in the form of categorical music listening is commonly utilized in studies through the form of a

speaker, such as an MP3 player and headphones/earpiece (Cao et al. 2017; Toker & Kömürcü, 2016).

Types of Music Used. Music selection is an important factor when considering maternal stress because different women have varying preferences regarding favorite or preferred music (Corbijn van Willenswaard et al., 2017). A woman's music preference may impact the effectiveness of the intervention and what is perceived as most relaxing; therefore, selective music therapy has been used to address this concern. A licensed music therapist session is unique and different than only listening to music. Music therapy utilizes various instruments and improvisation to ensure integrative involvement is patient centered and non triggering. In the consulted literature, therapists used multiple modalities of instruments such as guitar, voice, ocean drum, harp, and lyre (Bauer et al., 2010; Corey, Fallek, & Benattar, 2019; Teckenberg-Jannson, 2019). The selection of the music is based on patient preference and consisted of lullabies, therapist improvisation, a music focused relaxation intervention, or non-vocal music (Bauer et al., 2010; Corey, Fallek, & Benattar, 2019; Teckenberg-Jannson, 2019). In other music interventions, classical music was the broad category most commonly used, with Toker and Kömürcü (2016) using Turkish classical music specifically suited for the area and population in their study. Cao et al. (2017) used four popular classical symphonies as well as folk music for their intervention.

Other Possible Interventions

In a study exploring various integrative therapies, it was found that after experiencing acupuncture, guided imagery, Healing Touch, massage therapy, and reflexology, hospitalized high risk pregnant women showed a significant lowering of post-test pain and anxiety scores (Schlegel, Whalen, & Williamsen, 2016). Although physical activity is typically limited to bed

rest, high risk pregnant women reported significant decreases in anxiety and stress levels after participating in yoga sessions while inpatient (Dangel, Demtchouk, Prigo, & Kelly, 2020; Gallagher, Kring, & Whitley, 2020).

Medications are commonly used to control high blood pressure and treat psychological conditions for high risk pregnant women. However, these medications come with side effects that have the potential to adversely affect the growing fetus. In a population-based study, it was found that antidepressant use during pregnancy was associated with a 20% increase in low birth weight infants and preterm birth rates when compared to women who used no antidepressants (Cantarutti, Merlino, Monzani, Giaquinto, & Corrao, 2016). Bernard et al. (2019) found that among women who took anxiolytic and antidepressant medications before the 16th week of pregnancy, there was a three-fold increase in the incidence of preeclampsia ($p=.001$). Music stimulation can be used in addition to medications and may even reduce the need for pharmacological therapy in antepartum hospital units. It is "simple, noninvasive and inexpensive" and does not impose harmful effects on the mother or baby (Gonzalez et al., 2017, p. 66).

Guiding Question

Based on the consulted literature, it is consistently found that music is an effective intervention to positively impact psychological and physiological indicators of well-being in pregnant women and their babies. It is comparable and equally as effective as other methods aimed at increasing relaxation and alleviating distress during antepartum hospitalizations. Thus, the following research question has been formulated to guide this evidence-based practice project: In hospital antepartum units, does playing live music change a woman's post intervention biophysical markers in comparison to pre intervention values?

Chapter 3

Methods

Study Design

The study follows a mixed methods design, combining both quantitative and qualitative data collection methods. A single, experimental group experienced the music intervention.

Setting and Participants

The study took place at Sharp Mary Birch Hospital for Women and Newborns (SMBHWN) in their 36 bed, Perinatal Special Care Unit (PSCU). After receiving Investigational Review Board (IRB) approval from both SMBHWN and Point Loma Nazarene University, patients were recruited by the primary investigator (PI).

Eligibility and Recruitment

The only requirements to participate in the study included admission to the PSCU, being at least 18 years of age, and having the ability to read and write in English. All patients staying on the unit were visited by the PI to evaluate the possibility of participation in the project. The PI introduced herself to each patient, provided an informational flyer about the project (see Appendix A), gave brief explanation of what the music experience would be like, and shared what information would be collected. Once patients agreed to participate, they were added to the roster and assigned a participant number.

Description of the Intervention

The PI is an experienced violinist, classically trained with over 13 years of experience. She has been a volunteer in Sharp Hospital's Arts for Healing Program since 2015 and has an established relationship with PSCU staff. Because of her experience, songs from the genre of classical music were utilized in the study. The PI played selected songs on the violin, live at the

bedside for each patient in a single session lasting approximately 10 minutes. Repertoire was

chosen from Suzuki Violin School, Volume 2, and included the following: Chorus from Judas

Maccabbaeus (G.F. Handel), Musette, Gavotte II (J.S. Bach), Long, Long Ago (T.H. Bayly),

Waltz, Op. 39, No. 15 (J. Brahms), Bourree from Sonata in F major (G.F. Handel), and Minuet in

G (L. van Beethoven). All songs were chosen by the PI due to the steadiness of tempo and

rhythm as well as being melodic, peaceful, and calming in nature. Similar to Cao et al. (2018),

music was played at a low volume and at a tempo between 60-100 beats per minute to mimic the

rate of the human heart.

Sample Strategy

The sample strategy was a goal of 15 participants. This number was preferred in order to

collect a manageable amount of data to analyze.

Sample Size

A total of 14 patients hospitalized between November 2019 and February 2020

participated in the project.

Outcome Measures

Vital sign measurements (blood pressure [BP], heart rate [HR], mean arterial pressure

[MAP]) were taken by the PI before and after the music intervention to evaluate for a numerical

change in values. Participants were provided with an anonymous nine item, post session

"Antepartum Demographic Form" (see Appendix B) developed by the PI to be brief and non-

burdensome after experiencing a relaxation intervention. The questionnaire gathered information

regarding the patient's age, gestational age, length of hospital stay, music genres and

preferences, and whether they used music during past or current pregnancies. The last question

was an open qualitative question asking for words or phrases they would use to describe their experience. A GE Healthcare, Corometrics 250cx Series Maternal/Fetal Monitor (present at each bedside in the PSCU) was used to obtain vital sign measurements.

Data Collection

After a verbal introduction, explanation, and agreement to participate in the project, participants were asked to make themselves comfortable before the music session. To eliminate any factor possibly affecting the data, patients were asked to use the restroom if needed and sit relaxed in a semi-fowler's position with legs uncrossed. The PI also temporarily removed intermittent pneumatic compression stockings during the session (with nurse approval). Each patient then had their pre-intervention vital sign measurements taken by the PI. Using paper and pencil tools, the PI investigator wrote down findings on a printed data collection spreadsheet. The PI played selected repertoire on the violin for approximately 10 minutes and took vital sign measurements once again. The patient was given the Antepartum Demographic Form to fill out which took approximately 5 minutes. The PI collected the form and input data into excel on a password protected PSCU computer. Physical data sheets were safely discarded by the PI in a locked, shred bin on the unit.

Data Analysis

SPSS statistical software (version 26) was used for the data analysis. All data analysis was completed by the PI. The Antepartum Demographic Form was summarized using descriptive statistics such as frequencies, percentages, and means. The words and phrases written by participants for the qualitative question were analyzed to look for trends. Similar words/phrases were then categorized and summarized in the results. To test for the significance

between pre- and post- intervention vital signs, paired t tests were conducted. The accepted level of significance for all analysis was $p<0.05$.

Ethics

IRB approval was given by SMBHWN (IRB #1910808) and Point Loma Nazarene University (IRB #17782), allowing this project to be conducted (see Appendix C). Participants acknowledged their willingness to participate in the study with verbal agreement given to the PI.

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Chapter 4

Results

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In total, 14 participants were involved in this study. As seen in Table 1, the most common age range of participants was 25-29 years and 30-34 years. The mean gestational age was approximately 201 days (about 29 weeks) with a range between 135-238 days (about 19-34 weeks). The average amount of days each patient had spent in the hospital was about 10 days. 57.1% of women answered they had experienced live music being played for them in the past, while 42.9% of women answered they had not. R&B/Soul was found to be the most favorited type of music among participants (see Table 2). Other favorite music types (in order of popularity) were pop, hip hop/rap, rock, jazz, and country (all three tied), and lastly, classical. Patients rated meditative/nature sounds as the type of music they felt was most relaxing. Other music types found to be relaxing (in order of popularity) were instrumental, classical, and lastly, smooth jazz (see Table 3). 64.3% of patients stated they had used music to relax them during their current pregnancy. 28.6% answered they had used music to relax them in past pregnancies, 35.7% had not, and 35.7% answered this was their first pregnancy. Half of the women who responded that they were experiencing their first pregnancy had not previously used music.

The mean average pre-intervention SBP was 105 and the DBP was 62. The average pre-intervention HR was 84 and the average pre-intervention MAP was 78. The mean average post intervention SBP was 103 and the DBP was 62. The average post intervention HR was 87 and the average post-intervention MAP was 77. The t value for SBP was positive (t= 1.058), indicating that SBP was higher pre-intervention than post-intervention. The t value for MAP was also positive (t= .321) indicating that MAP was higher pre-intervention than post-intervention. SBP, DBP, HR, and MAP for both pre- and post-intervention values were not found to be statistically significant (see Table 4).

Table 1.

Demographic information: age, gestational age, number of days of current hospitalization, live music experienced in past, music used to relax in past pregnancies, music used to relax in current pregnancy

Age	Percentage of Participants
18-24	21.4%
25-29	28.6%
30-34	28.6%
35-39	7.1%
40-44	14.3%
45+	0%

Gestational Age	Range
	19-34 weeks

Number of Days of Current Hospitalization	Mean
	10 days

Live Music Experienced in the Past	Percentage of Participants
Yes	57.1%
No	42.9%

Music Used to Relax in Past Pregnancies	Percentage of Participants
Yes	28.6%
No	35.7%
This is my first pregnancy	35.7%

Music Used to Relax in Current Pregnancies	Percentage of Participants
Yes	64.3%
No	35.7%

Table 2. *Favorite Types of Music Graph*

Favorite Types of Music

Type	Value
Rock	3
R&B/Soul	7
Pop	6
Jazz	4
Hip Hop/Rap	5
Country	4
Classical	2
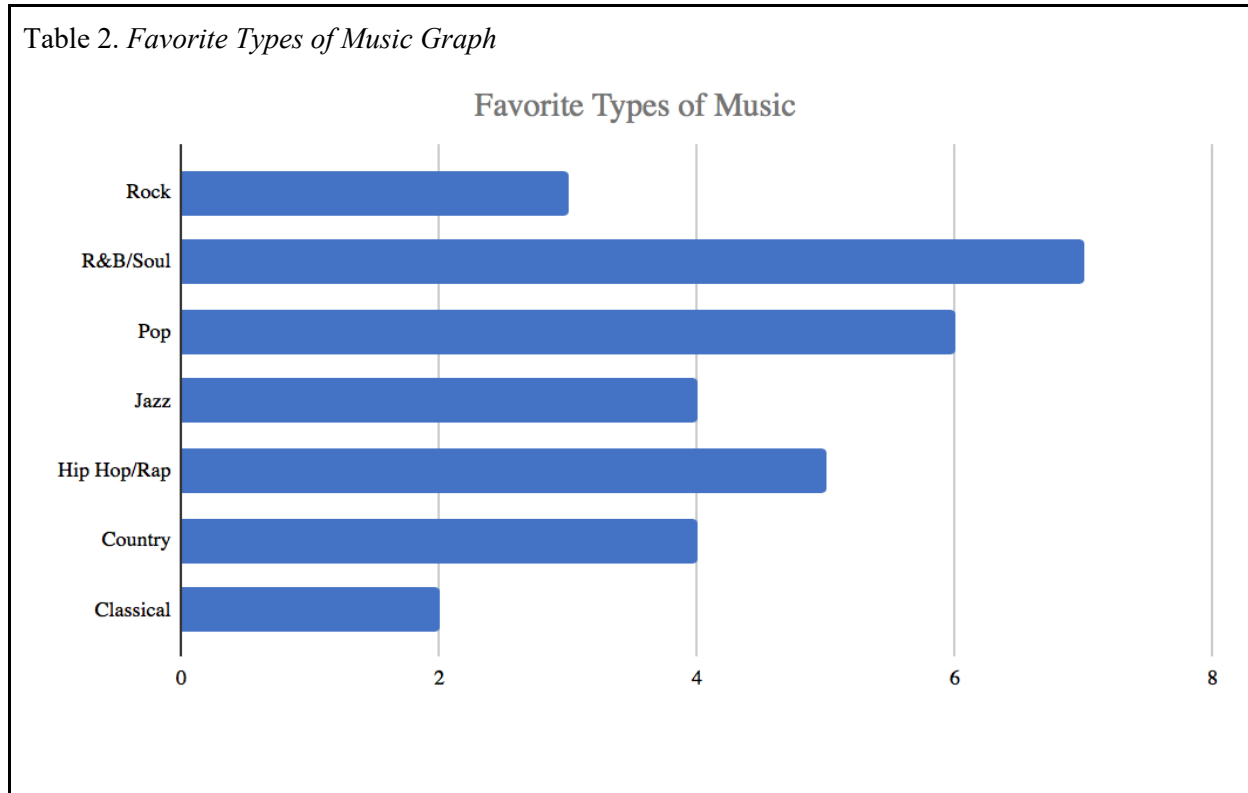
Table 3. *Music that Relaxes Graph*

Music that Relaxes

Type	Value
Other	0
Smooth Jazz	4
Meditative/Nature Sounds	10
Instrumental	7
Classical	6

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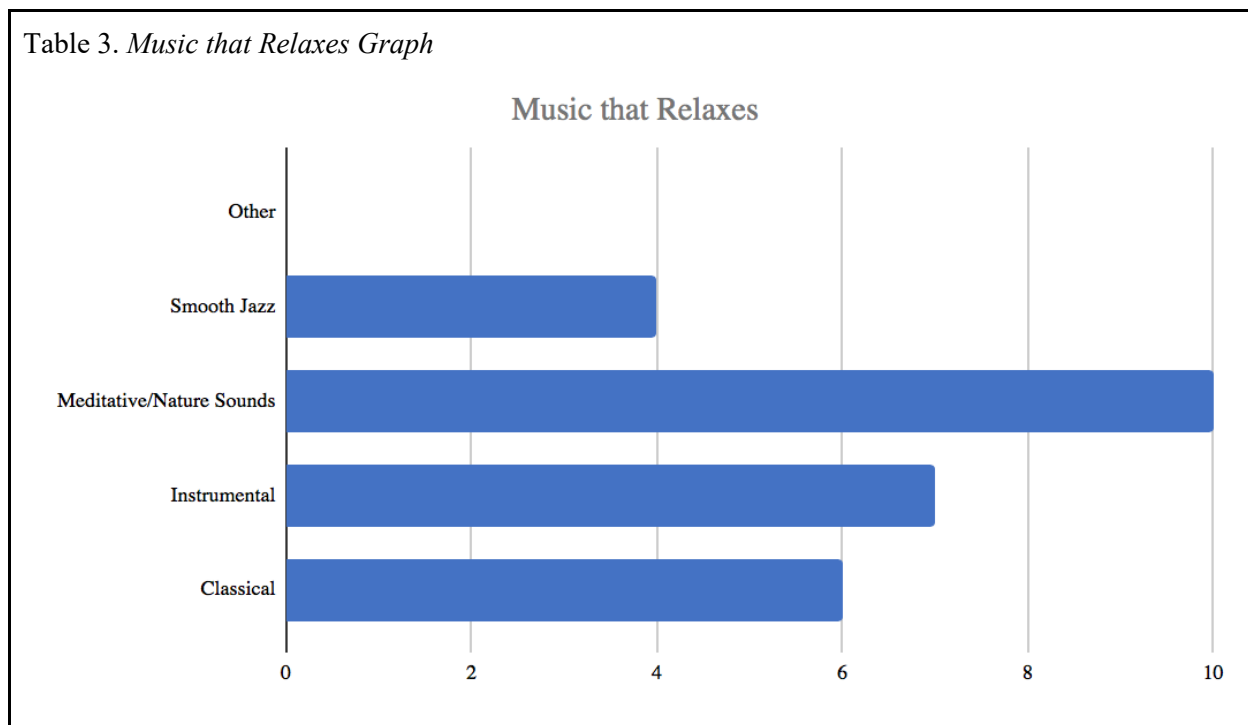
Table 4. *Paired Samples T Test of Biophysical Measurements*

Paired Samples Test

| | | Paired Differences | | | | | | | |
| | | Mean | Std. Deviation | Std. Error Mean | 95% Confidence Interval of the Difference | | t | df | Sig. (2–tailed) |
					Lower	Upper			
Pair 1	Pre Systolic BP – Post Systolic BP	1.357	4.798	1.282	−1.413	4.127	1.058	13	.309
Pair 2	Pre Diastolic BP – Post Diastolic BP	−.357	4.651	1.243	−3.043	2.328	−.287	13	.778
Pair 3	Pre HR – Post HR	−2.643	8.967	2.396	−7.820	2.534	−1.103	13	.290
Pair 4	Pre MAP – Post MAP	.357	4.162	1.112	−2.046	2.760	.321	13	.753

Analysis of the last qualitative question resulted in the grouping of similar, repeated phrases into the three categories which related to relaxation, feeling connectedness with their baby, and how the experience contributed to a memorable, hospital stay.

Relaxation

The words "relaxing" or "relaxed" were used by 11 out of 14 participants. The most similar phrases included, "relaxing," "my mind and body relax," "emotional, calming, nice distraction," "relaxed and happy," "it was really nice and relaxing and peaceful, it made me calm and happy," and "relaxed feeling, calming vibe." These phrases reflected those present in the qualitative analysis conducted by Corey, Fallek, and, Benattar (2019), who noted that participants stated they found the music session *relaxing, soothing, calming, and peaceful.*

Connectedness with Baby

Phrases used by participants to describe a feeling of connection with their baby included, "Thank you for this amazing experience for me and my baby," "it made my baby happy," "baby kept moving and that was a very good sign," and "baby seems calm while playing music." These phrases reflect a healthy sense of maternal fetal attachment, which according to Young (2013, p.

13) includes "connecting with fetal movement" and "noticing habits or rhythms that the fetus might exhibit through their movements.

Memorable Experience During Hospital Stay

Though the literature has shown that antepartum hospitalizations can cause anxiety and stress for women, unexpected, positive experiences, like music at the bedside, can help create unique memories that women will remember when they reflect on their pregnancy (Corey, Fallek, & Benattar, 2019). This was evident when participants stated the following about the music session: "A really nice experience," "It was beautiful and awesome," "emotional, nice distraction," "special, unique, beautiful, fun," "different, memorable," "music made me feel very comfortable, overall very much enjoyed the music," "overall great experience," "love, hope, family," and "powerful, moving, enjoyable." Four participants expressed gratitude for the experience saying phrases such as, "thank you," and "appreciative." One patient was welcoming of more music sessions in the future stating, "Would love to have again sometime."

Discussion

Demographic survey data offered valuable information about the music preferences of patients. Though classical music was the only genre used in this study, as Corbijn van Willenswaard et al. (2017) noted, it is important to consider patient preference. Incorporating this element could cause greater effectiveness of the overall music experience. Although few patients selected classical music as their favorite type, more patients rated classical as the type that relaxes them. This indicates that live, classical music can still be welcomed by patients and effective at encouraging relaxation. The most favored music that relaxed patients was the meditative/nature sounds category. It is possible for a licensed music therapist to meet these preferences as they often incorporate sounds of nature into the patient experience through an

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ocean drum or rain stick. Corey, Fallek, and Benattar (2019) noted a patient stated these

instruments made it seem as if they were in the real environment and not at the hospital. 35.7%

of women had not used music to relax them during past pregnancies and half of the women who

answered that they were experiencing their first pregnancy had not yet used music for relaxation.

The live music intervention they experienced may influence them to think differently about using

music as a relaxation tool during pregnancy. In addition, the use of a music genre not commonly

listened to by participants can encourage women to explore new interests during their

hospitalization.

A statistically significant change in biophysical markers did not occur after the music

intervention. Though the t observed value indicated that there was a decrease in SBP and MAP

after the music intervention, this finding was not significant. The music intervention only lasted

approximately 10 minutes, which can serve as a possible explanation for seeing little change in

biophysical values. Although the music intervention did not seem to have a physiological effect

on maternal vital signs, many participants during the session verbalized their baby started

moving in response to the music. Observations made of participants rubbing their belly, closing

their eyes, and smiling were signs of maternal bonding with their baby. Because fetal activity

and movement is an indicator of fetal well-being, this is often an encouraging sign to high risk

antepartum patients.

The participants' written responses served as the strongest indicator of what impact the

music session had. Qualitative data analysis revealed all favorable responses from patients about

their experience. Statements about the music bringing about feelings of relaxation, happiness,

and peace can naturally combat feelings of anxiety or stress during hospitalization. Bedrest is a

limiting and often uncomfortable situation for many antepartum patients. Patients stating that the

music made them feel very comfortable is encouraging. Because not every delivery hospital has

music services offered for lengthened antepartum stays, the patient's feedback about the

experience being unique, different, and special can influence hospitals to develop or expand

music intervention opportunities. In addition to patients writing they would love to have live

music at the bedside again, many patients also verbally inquired into how often violin is offered

on the unit and how wonderful it is this service is offered.

Limitations

The small sample size was a limitation of this study because it did not serve as a reliable

source for testing for significance of biophysical data. The PI was responsible for all collection

and analysis of the data. This contributed to a limited ability to recruit more patients at more

frequent times. Because of the multiple instruments and items used in the study, it would have

been more efficient to have a co-investigator present to assist in data collection and recording.

During the music session, the PI observed uncontrollable factors that could have influenced the

results or change in post intervention biophysical markers. Uncontrollable factors included

hanging of intravenous fluids and medications and a nurse entering the patient's room and setting

them up for fetal monitoring. Consulting with the nurse about the timing of interventions before

beginning the session could have aided in avoiding interruptions. This study included one group

who experienced the intervention of music. However, two different groups would allow for a

greater and more thorough comparison of demographic survey data and its significance. Using

one group in this study limited the amount of statistical tests that could be conducted and

analyzed. The music experience was spoken of favorably, reflecting a positive impact on each

participant's psychological health. Thus, using a reliable, standardized scale measuring stress,

anxiety, or satisfaction would have allowed for a more rigorous assessment of objective data to use in data analysis.

Recommendations for Clinical Practice

Future studies investigating the effect of live music at the bedside of antepartum patients is recommended. Longer music sessions (such as 30 minutes or 1 hour) for a longer period of time could possibly have a greater physiological impact on antepartum patients. Corbijn van Willenswaard et al. (2017) noted there was a lack of consistency about the duration of the music intervention sessions in current literature. Short sessions may have limited benefits and longer antenatal music listening sessions should be explored.

For future studies, it is beneficial to have an experimental and control group to allow for a greater comparison of those who experience a music intervention and those who receive standard care. In addition to vital signs (which can have fluctuations throughout pregnancy) other physiological indicators of stress, such as cortisol levels can also be assessed. Because participants verbalized and commented about the movement of their babies during the music session, investigations into the effect of live music during fetal monitoring would be beneficial. Live music can serve as an additional intervention option for nurses in their care management to maintain a relaxed environment for high risk patients in the stressful hospital environment. Music can also bridge the gap when nurses seek to utilize other advanced interventions. For instance, (when deemed appropriate) before moving on to medication, a nurse will be encouraged to utilize a non-pharmacological intervention with the patient. Music stimulation can be one of these first-line options. Delivery hospitals who do not have an arts-based program should consider developing one and incorporating it into the activity options for antepartum patients with lengthy hospital stays. Hospitals with established arts programs should expand their

programs by hiring more music therapists and recruiting experienced volunteer musicians (who play various instruments) to visit patients more often during their hospitalization.

Based on the high receptivity from patients and general feasibility of incorporating more music at the bedside, it is clear that live music is a plausible and welcomed intervention for high risk pregnant patients. Participants and even providers expressed great interest in the continuation of services. Fine art-based therapies, such as live music, can provide effective support as a tailored intervention through nurturing interactions and a multisensory sensory experience. Live music incorporates a relational aspect of human connection in a place that can seem clinical and foreign to patients.

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Appendix A

TEMPLATE: Flyer						
NUMBER	DATE	AUTHOR	APPROVED BY	AUDIENCE	USE	PAGE
HRP-572	10/1/2017	Center For Research	Institutional Official	Investigators or designees	Required: X Elective:	Page 1 of 1

SHARP
Human Research Protection Program

Sharp Mary Birch Hospital for Women and Newborns PSCU Patients are Invited to Participate in a Project

The Effect of Live Music as an Intervention on Antepartum Patients

Why is the project being done?
- To find out what effect live music has on a patient's biophysical markers of blood pressure (BP), heart rate (HR), and mean arterial pressure (MAP)

What will happen if I decide to participate in the project?
You will:
- Have your BP, HR, and MAP taken with a vital signs machine

- Have live, violin classical music played for you at your bedside

- Complete a brief demographic survey

How long will I be participating in the project?
- Your participation is expected to last about 20 minutes for one time only

Who can be in the project?
- Patients must be able to read and speak English

For more information, contact:
- Brooke Senne, Principal Investigator at bksenne2020@pointloma.edu
Or
- Joanna Hunt, Co-Investigator at (858) 939-4183 or Joanna.Hunt@sharp.com
Or
- Office of Sharp HealthCare, Human Research Protection Program at (858) 939-7161

MUSIC FOR ANTEPARTUM PATIENTS

Appendix B

Study ID #____

Antepartum Patient Demographic Survey

Instructions: Please circle the letter or fill in the blank with your answers. All information will be kept confidential and will remain anonymous. Thank you.

1. What is your age in years?

      a. 18-24
      b. 25-29
      c. 30-34
      d. 35-39
      e. 40-44
      f. 45+

2. What is your baby's gestational age? _____

3. How many days have you been in the hospital? _____

4. Have you experienced live music being played for you in the past?

      a. Yes   b. No

5. What is your favorite type of music?

      a. Country
      b. Rock
      c. Pop
      d. R&B/Soul
      e. Hip Hop/Rap
      f. Jazz
      g. Classical
      h. Other_____

6. What kind of music relaxes you?

      a. Classical
      b. Instrumental
      c. Meditative/Nature Sounds
      d. Smooth Jazz
      e. Other_____

7. Did you use music to relax you with past pregnancies?

      a. Yes   b. No   c. This is my first pregnancy

Study ID #_____

8. Have you used music to relax you in this current pregnancy?

     a. Yes   b. No

9. When finished listening to the music, please write any words or phrases you would use to describe your experience. Thank you.

Appendix C

SHARP
Center for Research

Full Accreditation

1910808
Senne
11/13/2019

Institutional Review Board
7930 Frost Street, Suite 300
San Diego, CA 92123
Phone 858-939-7195 / Fax 858-939-5067
http://sharpnet/irb/ / www.sharp.com/research
Email: research@sharp.com

October 21, 2019

Brooke Senne,
3003 Health Center Drive
San Diego, CA 92123

RE: IRB # 1910808 / Live Music Antepartum / Investigator-Initiated
The Effect of Live Music as an Intervention on Antepartum Patients

The IRB has determined this research is not subject to regulation under 45 CFR part 46. Therefore, IRB oversight is not required and this study is not subject to periodic review requirements. Other Federal, State, or local laws and/or regulations may apply (i.e., HIPAA).

- HRP-500 EBP Brooke Senne dated 09Oct2019
- EBP Grid dated 09Oct2019
- HRP-572-Flyer-Brooke Senne dated 21Oct2019
- Antepartum Patient Demographic Form FINAL dated 09Oct2019
- HRP-581 - Antepartum Demographic Survey Data Collection Sheet dated 09Oct2019
- HRP-581 - Biophysical Markers Data Collection Sheet dated 09Oct2019

This determination applies to only to the following:

Site(s):
Sharp Mary Birch Hospital for Women & Newborns

Research Team:
Joanna Hunt RNC, BSN, Co-Investigator
Brooke Senne, Principal Investigator

Please include IRB reference number "1910808 Senne" in all future correspondence to the IRB regarding this study.