

Addressing Perceived Pain in Childbirth:
A Music Therapy Voicework Intervention Design

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ABSTRACT

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This study presents a six session music therapy intervention design for the use of vocalization during labor to reduce the perceived pain of un-medicated vaginal childbirth. Currently, only one childbirth education study is available on the use of vocalizing during childbirth, and with positive outcomes. While music therapy offers an established recorded music intervention for childbirth (music therapy-assisted childbirth), there is currently no evidence of a comparable vocal intervention in the music therapy literature, despite a growing body of evidence-based vocal interventions being used with other populations. In this study, a directed content analysis of 13 music therapy-assisted childbirth texts revealed that the main “problem” of childbirth is the pain associated with labor. Further analysis of these texts as well as 11 obstetrics texts identified numerous risk and protective factors and malleable mediators that may influence the perceived pain of the laboring woman in childbirth. Music therapy, sound healing, and voicework literature were reviewed to target vocal strategies which may positively influence the identified malleable mediators, thus potentially reducing a woman’s perceived pain during childbirth. These findings were combined with the researcher’s professional knowledge and personal experience to generate the first draft of an intervention program design for women and their birth partners where they would learn how to use vocalization during labor to reduce perceived pain. The proposed intervention design will need to be piloted and adapted based on participant feedback, and then clinically tested in order to verify its effectiveness.

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Chapter 1. Introduction

When I was pregnant with my daughter, I was not aware of the practice of music therapy-assisted childbirth (MTACB), but I assumed that I would use recorded music throughout my labor to help manage the experience of a natural childbirth. During my labor, however, I found myself turning inward to a more personal resource to manage the intense physical and emotional feelings that I was experiencing: vocalizing. Being a classically-trained singer and music therapist, the use of my voice felt natural and easy, and I began to wonder if other women also used their voices during labor.

A literature search revealed that while vocal interventions for childbirth exist outside of music therapy (Auneau, 2002; Pierce, 1998, 2001), music therapy literature does not appear to have an established vocal intervention for childbirth. It seems that the sole music therapy intervention used during this time is music therapy-assisted childbirth (MTACB), a recorded music intervention for laboring women (Browning, 2000, 2001; Clark, 1986; Clark, McCorkle, & Williams, 1981; DiCamillo, 1999; Fulton, 2005; McKinney, 1990; Stewart, 2009; Wei & Gao, 2011). The apparent omission of a vocal component in MTACB is interesting given evidence that live music-making and singing may prove even more beneficial in endorphin release and, thus, in pain management, than music listening (Kaskatis, MacDonald, & Barra, 2012). Additionally, women have reported using vocalization as an informal coping strategy during labor (Escott, Spiby, Slade, & Fraser, 2004). Thus, one could argue that a clearly articulated vocal intervention for childbirth could expand and strengthen the current music therapy services offered to women during the prenatal, labor, and postnatal periods.

Statement of Purpose

This study aimed to create a music therapy voicework intervention design that would introduce pregnant women to vocalizing as a potential pain management strategy for childbirth.

Research Question

The primary research question was: What is a music therapy voicework intervention design that pregnant women could use to address perceived pain in childbirth?

Delimitations

To fit within the scope of a master's thesis, only the first step and a half of Fraser and Galinsky's (2009, 2010) intervention design research method was completed. Although the initial literature review revealed that the use of voice in labor is influenced by cultural factors,

this study did not directly address this issue as it was not the primary focus. The practice of *chant prénatal* (a French, non-music-therapy vocal program for pregnant women) was not included for several reasons. First, it is used primarily in France and is not commonly practiced in North America. Second, it requires specific professional training that is not readily available in Canada. I also chose not to look at other aspects of the use of voice during pregnancy and labor, such as the influence of the mother's voice on mother-child bonding or attachment, as the current research is focused exclusively on the use of vocalizing as a potential pain management strategy during labor. Finally, as this intervention will involve the use of the voice as the main therapeutic agent and within the context of a relatively short-term therapeutic relationship with the music therapist, psychological factors influencing perceived pain identified in the research, such as unresolved previous trauma, attachment style, etc., were not addressed. While these are factors music therapy and vocalization are able to address – for instance, with vocal psychotherapy (Austin, 2008) – these issues are likely to require more in-depth or lengthy therapy, which falls outside of the scope of the proposed intervention, so they will not be considered.

Assumptions and Bias

I believe that each childbirth experience is unique, and that each woman experiences the physical and psychological demands of childbirth differently. Based partly on my own experience of vocalizing in childbirth, I think that the use of the voice in labor may be not only physically beneficial, but that it may offer the woman emotional and creative release as well as a sense of control over her experience. Based on my personal observations, I sense that vocalizing in labor is not always regarded as acceptable by a laboring woman's caregivers, particularly within hospital settings. Conversely, I believe that a woman should feel empowered to birth her children in the manner she feels is appropriate – whether that be in silence or with sound, for instance. A vocal program for childbirth may not be indicated for every woman, and it is up to each woman to decide what is appropriate for her.

I attempted to control the potential negative influence of my assumptions and bias by remaining open to all data, even when it contradicted my assumptions. I challenged myself to look at the data from all possible angles and perspectives. I employed techniques of iterative cycling and sought signs of data saturation, and looked for contraindications for vocalizing during pregnancy and labor. I reflected on my perspectives and bias by journaling and using memos throughout the research process. Finally, I tried to remain aware that my own

experience of vocalizing in pregnancy and childbirth is my own and separate from the overarching purpose of the study.

Operational Definitions

Childbirth. Childbirth refers to the first, second, and third stages of childbirth (early or latent labor, active labor and transition, and delivery of placenta).

Primiparous woman. This indicates a woman who has given birth once. A multiparous woman is defined as one who has given birth more than once.

Vocalization. Vocalization refers to any vocalized sound: vowels, words, melodies, primal sounds, voiced rhythms, voiced breath, etc.

Voicework. Voicework is defined as:

The use of the human voice within the therapeutic approach to achieve health and well-being, including improved vocal abilities, health and homeostasis, and human relationships. Voicework involves the use of breath and rhythm, primal human sounds of expression and communication building a dialogue between therapist and client/s and using rhythm, intonation, words, and fragments of sentences, and offering inter-subjective vocalization. (Baker & Uhlig, 2011, p. 32)

Intervention. An intervention is to “a purposeful change strategy, whether at the individual, family, group, organizational, community or societal or other level; a program or policy intended to produce change” (Fraser, Richman, Galinsky, & Day, 2009 p. 184).

Mediator. This refers to “a variable that intervenes between a cause and an effect and is thought to transmit a causal influence; a variable that serves as a causal link” (Fraser et al., 2009, p. 185).

Malleable mediators. Malleable mediators are the causal variables or “mediators identified as being responsive to intervention” (Fraser et al., 2009, p.185).

Risk factors. Risk factors refer to “individual and environmental conditions that increase the likelihood for negative outcomes in a particular population” (Fraser et al., 2009, p. 187).

Protective factors. These refer to “an asset or strength that acts to buffer the negative effects of a risk factor and increases the likelihood of experiencing a positive outcome” (Fraser et al., 2009, p.187).

Theory of change. This is “a graphic depiction of the causal chain of program activities intended to produce a positive intervention outcome” linked to the desired positive outcome

(Fraser et al., p. 188, 2009).

Chapter Summary

Chapter one outlined the significance and need for the present study. Chapter two, is a literature review which investigates strategies commonly employed by women to manage the demands of childbirth; the use of recorded music in childbirth; the use of voice in childbirth; and a brief overview of the role of voicework and sound healing in music therapy. Chapter three provides an overview of intervention design research methodology, as well as a detailed description of data collection and analysis procedures. Chapter four presents the problem and program theories, results which include a preliminary draft of the intervention manual that outlines a session-by-session program structure with goals, content, and elective activities. Chapter five discusses the study's limitations, findings, concerns and contraindications regarding the program, explanatory theory, and suggestions for future research.

Chapter 2. Literature Review

Managing the Demands of Childbirth

As Smith, Collins, Cyna, & Crowther (2006) write, “Labour presents a physiological and psychological challenge for women” (p. 2) often accompanied by conflicting emotions, from excitement to fear. As such, pregnant women have long employed different pharmacological and non-pharmacological treatments to manage these demands. Pharmacological treatments aim to relieve the physical pain that accompanies labor. Those considered effective in the relief of labor pain are epidural analgesia and inhaled analgesia, although these interventions may present significant physical side-effects (Jones, et al., 2012). As well, pharmacological treatments are not always readily available to women, depending on their birthing environment and the culture in which they give birth (Labrague, Rosales, Rosales, & Fiel, 2013).

Although there are contradictory findings with regard to the effectiveness of various alternative or complementary coping strategies (Jones et al., 2012), non-pharmacological strategies are considered an important aspect of prenatal education, even if the woman receives pharmacological treatments during labor. To manage pain, anxiety, and the potential emotional responses that accompany childbirth, Escott, Spiby, Slade, and Fraser (2004) found that women use “informal” strategies based on their past experiences of pain and anxiety, and “formal” strategies, which are typically taught in prenatal education. These researchers identified a range of effective and ineffective cognitive and behavioral informal strategies that women reported using to manage both past experiences of pain and anxiety and the pain and anxiety experienced during the birth of their first child. Effective informal strategies used during labor included talking with others, slow controlled breathing, support from caregivers, and vocalizing, for instance “making noises, humming and singing” (Escott et al., 2004, p.115). The researchers concluded that prenatal education programs could benefit from incorporating a wider range of strategies personalized to each woman when discussing pain and anxiety management in labor, based on each woman’s past use of informal strategies.

Just as a laboring woman’s informal strategies to manage pain are influenced by her past, it appears that her verbal and non-verbal expression of pain are influenced by her culture. Callister, Khalaf, Semenic, Kartchner, & Vehvilainen-Julkunen (2003) found that a woman’s vocal expression in labor is often defined by her culture – that is to say, if she uses her voice, how she uses her voice, and why. For instance, in some cultures, the use of voice is discouraged, while in

others, crying, screaming or the singing of specific chants may be considered as acceptable forms of expression.

Audioanalgesia: Recorded Music in Childbirth

One non-pharmacological pain-relief method used in childbirth is audioanalgesia, which is the use of sound/music for pain reduction. References to audioanalgesia in labor and delivery date as far back as a 1964 study by Burt & Korn (1964), which explored the impact of white noise on pain perception during childbirth. It was only in the 1980s that music therapists began investigating the impact of music therapy programs and techniques on the process of labor and delivery, often referred to as “music therapy-assisted childbirth,” or MTACB (Clark, 1986; Clark, McCorkle, & Williams, 1981; McKinney, 1990). Since then, music and music therapy interventions have been applied to other aspects of the childbirth experience including prenatal, labor, and postnatal care for women, as well as in the care of premature infants in the Neonatal Intensive Care Unit (NICU), all with positive results (Browning, 2000, 2001; Chang, Chen, & Huang, 2008; DiCamillo, 1999; Fowler, 2005; Haslbeck, 2012; Hatters et al, 2010; McKinney, 1990; Stewart, 2009; Whipple, 2000).

Two of the most recent models of MTACB contained in the literature were developed by DiCamillo (1999) and Browning (2000, 2001). Elements of their programs include (a) prenatal sessions for the woman, couple or family, which include assessment, identification of the woman’s preferred pre-recorded music, and assistance by the music therapist in the selection of the music to be used in labor; (b) the music therapist’s preparation of the chosen music recordings to be used in labor, organized according to the relaxing or motivating functions of the music; (c) instruction in breathing, imagery, and progressive muscle relaxation techniques for the woman to use while listening to the selected music in order to condition a relaxation response to the music; (d) the creation of a “womb song” or “birth song” which is a welcome song composed for the baby to be sung prenatally and after birth; (e) the presence of the music therapist at the birth to select and play the preferred music, adjust the volume of the music, and offer coaching or support to the laboring woman as per her request or based on the music therapist’s perception of her needs; (f) post-birth follow-up. While DiCamillo (1999) suggests that preparation begin in the second trimester (i.e., a 10-week plan), Browning (2000, 2001) suggests the third trimester.

Music therapy and nursing studies on the use of recorded music in labor have found music listening effective to reduce pain, fatigue, and duration of labor; to reduce the levels of

anxiety in women undergoing cesarean section; to reduce pain in women undergoing labor induction in early labor; to increase women's satisfaction with vaginal and cesarean section births; and to increase relaxation and the woman's sense of personal control during labor (Browning, 2000, 2001; Chang & Chen, 2005; Fulton, 2005; Labrague et al, 2013; Liu, Chang, & Chen, 2010; Phumdoung and Good, 2003; Wei & Gao, 2011). It is important to note that not all studies that claim to use MTACB involve certified music therapists. All of these studies report positive results; however, in contrast to the music therapy models mentioned above, the nursing studies that were reviewed focus almost entirely on the use of music, with limited prenatal preparation, minimal therapeutic labor support, and limited input from mothers regarding their musical preferences. As well, the treatments were often both introduced and administered during the labor itself, without prenatal training that is provided in the DiCamillo and Browning approaches.

Voice in Childbirth

As previously noted, the voice has also been identified as an informal strategy to manage the childbirth experience, and the use of voice during labor may depend on the woman's past and culture. Some obstetrics experts believe vocalizing should be permitted in labor, although there is potential for institutional resistance. Lowe (1996) summarizes this issue:

Vocalization also can be thought of as a behavior that may be an effective pain management strategy at some points during labor. Although parturients often are admonished to not make noise during labor, a more active approach to behavior during labor embraces the idea that giving voice to the sensations she is experiencing and the effort she is expending may assist a woman in coping at particularly difficult times during labor. Vocalizations may include groaning, moaning, or chanting repeated phrases. This is not the scream of a woman terrified by her pain and sensations but rather the sounds of a woman who is engaged in the work of her body and directing some of its intense energy outward through vocal expression. This may be a rather foreign and primitive experience for the parturient and for some care providers, but the sensitive nurse can help by giving "permission" to make noise and directing the laboring woman's efforts into low-pitched or guttural sounds. (p. 89)

Use of Voice in Music Therapy Childbirth Services

The literature indicates that the voice is being used in music therapy practices devoted to childbirth. For instance, Stewart (2009) found positive effects of the use of the voice for premature infants. The creation of “womb songs” (DiCamillo, 1999) or “birth songs” (Browning, 2014) have been used within MTACB practices. Here, an original song is created by the music therapist and parent(s) during the prenatal period, and are sung by the mother/family prenatally, upon birth, and in the postpartum period for the purposes of bonding and calming the baby (Frederico & Whitwell, 2001; Browning, 2014). As well, the literature demonstrates that some music therapists have discussed the role of voice in their music therapy practice with pregnant women. One such example is Frederico & Whitwell (2001), who write:

The greatest benefit to the babies in utero will be derived from live music. The mother’s voice is the first choice, as it is the most soothing and stimulating to her baby, followed by the father’s voice. In the future we need to focus more on the voice because it is the most musical instrument we possess... The voice, like the personality, develops patterns of sounding, limiting its expression. We need to free the voice of these constraints so that the body and the personality can express themselves fully and genuinely. Future mothers are introduced to toning and chanting. These styles of singing are good vehicles for the mother to express an extensive range of emotions from fear to joy and pain, besides helping her focus and relax. Toning is the extended breath and sound on one tone while chanting includes simple melodies contained within a small range of pitches with no meter. Instrumental improvisation during group sessions will provide a creative and supportive environment to both parents. At least half of the music to which babies are exposed to in the womb should be performed live. After the birth, the parents may welcome their baby by singing their special womb song. (p. 306)

There are studies on the use of singing for health and wellness, including the impact that group singing has on the perception of other kinds of pain, such as chronic pain (Kenny & Faunce, 2004; Gick, 2011). However, there does not appear to be an established *music therapy* vocal intervention for pain management during childbirth. Fulton (2005) attempted to evaluate the impact of the use of voice during labor but had to abandon her study as participants had difficulty with her chosen intervention of toning¹, which she defines as “a technique wherein an elongated vowel or hum is vocalized during each exhalation” (p. 16). This could have been due

to the fact that the participants were not previously instructed in this method, or the method's incompatibility with participants' cultures.

Toning

Pierce (1998, 2001), a childbirth educator in Great Britain, describes her incorporation of the practice of toning into her prenatal education classes and describes its effect on 22 women who used toning during their labors. She defines toning as “voicing the exhalation of breath on a single pitch, using a vowel sound or a hum” (Pierce, 1998, p. 41). Pierce draws on her personal experience of toning at the Institute for Music, Health and Education, as well as her experience as a certified prenatal educator. She describes her prenatal instruction in toning for labor as: (a) a description of some of the physiological and psychological elements of toning; (b) demonstration and practice of toning in class; (c) presentation of a video of a birth where the laboring woman vocalizes throughout; (d) assignment of home practice, which she calls “humwork” (Pierce, 1998, p. 41); (e) discussion in class. Data included a post-partum survey, contents of one participant's journal, and an informal interview with one participant. Three women in the sample did not attend her prenatal education course but were introduced to toning in other ways. One participant underwent a cesarean section and did not tone. Information pertaining to the cultural background of participants was not provided.

In spite of these limitations, however, the results were positive. Participants indicated that during labor toning helped them to: (a) manage pain; (b) focus attention and create useful imagery; (c) relax; (d) decrease anxiety. Some women felt they were able to direct their energies in ways useful to the labor process, which contributed to a sense of connectedness to nature and a sense of control. As well they found that toning aided in the release of emotions during their labor. Having practiced toning prenatally appeared to prove beneficial to some women's abilities to use toning effectively in labor.

Chant Prénatal

There is an approach originating in France called *psychophonie* and its prenatal counterpart called *chant prénatal* (Auneau, 2002). Currently this approach is practiced in France, Belgium, Spain, the United Kingdom, and Québec (Association pour la préparation affective à la naissance, n.d.). *Psychophonie* was developed in the mid-twentieth century by Marie-Louise Aucher, a classical singer who is now deceased. The premise underlying this approach is that not just the ear, but the body itself is a receptive instrument to the vibrations of sound. Aucher

believes that there is a correspondence between different notes and different points or zones of the body which are represented in Chinese medicine. According to her, placing the voice in these zones can help to establish a “vital harmony” in the body (Auneau, 2002, p.9).

Adapting *psychophonie* to the needs of pregnant women, Aucher and French midwife Chantal Verdiere created *chant prénatal*. A contemporary *chant prénatal* session lasts 90 minutes, has no instrumental accompaniment, and includes the following: (a) resonator warm-ups; (b) singing scales which correspond to different vertebra; (c) breath work; (d) vocal exercises; (e) singing and memorizing a selection of folk songs that the pregnant woman can practice at home (Auneau, 2002). Different body positions are explored, and certain sounds and registers are prescribed for use in labor. According to Auneau (2002), *chant prénatal* is also considered to have benefits for the developing fetus and for mother-child bonding, and the well-known French author and medical doctor Bernadette de Gasquet promotes the use of these sounds in labor as she feels the quality of these sounds allow the birth attendant to identify points of progress in the labor, such as the stage of labor.

Sound Healing and Voicework in Music Therapy

Toning as described above (Auneau, 2002; Pierce, 1998, 2011) appear to fall into the category of sound healing, as they use the voice to directly affect the body. Snow (2011), a music therapist, defines sound healing as “the application of sound vibrations directly into the body of an individual, to bring about a state of harmony and healing” (p. 3). She points out that another name for vocal sound healing is toning, which can also be self-administered, as is the case in Pierce’s practice of toning in childbirth. Interestingly, Snow cites a 1992 case study by Van Putten of “an individual who healed his own chest pain using sounds he himself made to resonate the part of the body that was in pain” (p. 14), commenting, “Imagine being able to alleviate a physical pain in one’s body by using one’s own voice, which is ‘free,’ instantly available at any time, and has no side effects” (p. 14). This concept strongly suggests possible benefits of vocalizing during childbirth and Snow predicts that sound healing will become more integrated into standard music therapy practices.

There is a well-established tradition of the use of voice as a therapeutic instrument in music therapy practice. However, it is only in recent years that a voicework model of music therapy has been published (Baker & Uhlig, 2011). This model is comprised of various vocal interventions and approaches practiced by international music therapists who use “the voice as a

unique tool for therapeutic change” (Baker & Uhlig, 2011, p. 333). They define voicework as: the use of the human voice within the therapeutic approach to achieve health and well-being, including improved vocal abilities, health and homeostasis, and human relationships. Voicework involves the use of breath and rhythm, primal human sounds of expression and communication building a dialogue between therapist and client/s and using rhythm, intonation, words, and fragments of sentences, and offering intersubjective vocalization. (Baker & Uhlig, 2011, p. 32)

The voicework approach comprises work with individuals across the lifespan: from neonates and children, to adults with and without injury and physical or mental pathologies, to older adults with dementia and in end of life care. According to Baker and Uhlig (2011), voicework interventions have addressed “physiological imbalance such as hyperaroused states, to decrease levels of agitation, manage thresholds for pain, and to improve breathing and respiratory function” (p. 334) and have been employed to promote the expression of emotions such as “frustration, aggression, and emotional pain” (p. 334). As well, the approach includes voicework with premature infants “as a means to establish a trusting and open therapeutic relationship” (p. 334) with adults in “processes stimulating self-growth, self-awareness, and identification of inner resources” (p. 334) and in “a client’s development of insight, expression of his or her inner world, and integration of the self” (p. 334).

There are various models, interventions, and techniques in the voicework approach. Loewy’s medical music therapy practice of tonal intervallic synthesis incorporates techniques such as singing specific intervals, chanting, toning, vowel sounds, breathing and instruments to treat a number of issues, including physical pain (Loewy, 2011). Similarly, Summers (2011; 2014) discusses the potential of the voice as a healing agent for pain in palliative care in her vocal hello space model. And finally, Oddy (2011) presents a music therapy workshop for the rediscovery of the singing voice designed for individuals who were told as children that they could not sing. While the music therapy voicework approach covers areas relevant to childbirth such as pain, breath management, and emotional expression, there does not appear to be an application of these models to childbirth.

Summary

It appears that both recorded music and vocalizing can be beneficial in childbirth; in fact, as has been discussed, vocalizing is one of the informal strategies women have reported using in

order to manage pain and anxiety in childbirth and it is encouraged in some obstetrics literature (Clark, et al., 2003; Escott, et al., 2004; Lowe, 1996). As well, there exists an established practice of the use of vocal interventions and techniques in music therapy, as represented by the voicework approach in music therapy (Baker & Uhlig, 2011). However, there appears to be no evidence in the music therapy research literature of an established vocal intervention for childbirth, nor does it appear that instruction on the use of voice in childbirth is taught in standard prenatal education courses. This is interesting due to evidence that live music-making and singing may prove even more beneficial in endorphin release and, thus, in pain management, than music listening (Kaskatis, MacDonald, & Barra, 2012).

Although a few vocal approaches to childbirth exist outside of the music therapy literature, these approaches do not appear to take into consideration the issue of cultural perceptions of the use of voice during labor, may be perceived as too prescriptive to some women, and are not easily accessible in North America. As well, they do not appear to require musical expertise or therapy training on the part of the facilitator, two elements regarded as important to the success of MTACB (Browning, 2001). With only one study on the effect of toning in labor, the use of voice in childbirth merits further development and inquiry.

Chapter 3. Methodology

Intervention Design Research

The chosen methodology for this study was intervention design research. According to Fraser et al. (2009), intervention refers to “a purposeful change strategy, whether at the individual, family, group, organizational, community, or societal or other level; a program or policy intended to produce change” (p. 184). This methodology allows the researcher to pinpoint and define a problem, and offer a targeted intervention which is likely to produce a positive outcome as it is “closely tied to theory and research” (Fraser et al., 2009, p. 31). It also enables the researcher to create an intervention prescription, or set of clearly defined steps and materials, which can be tested and refined to ensure that it addresses the problem adequately. The ultimate intention is that the resulting evidence-based intervention may be implemented consistently and appropriately to ensure the intended outcome in all cases.

According to Fraser et al. (2009), intervention design research follows a five-step model: “1. Specify the problem and develop a program theory; 2. Create and revise program materials; 3. Refine and confirm program components; 4. Assess effectiveness in a variety of settings and circumstances; 5. Disseminate findings and program materials” (p. 36). This study addresses step 1 and part of step 2 of their model.

The first part of step one (1.1) is to identify and define the problem (Fraser & Galinsky, 2010; Fraser et al., 2009). This includes describing the problem in terms of prevalence and incidence, and identifying risk and protective factors related to the problem. This may be achieved by searching the literature for these factors.

The second part of step one (1.2) is to develop a program theory. First, malleable mediators are identified and paired structured activities intended to produce a positive outcome, or action strategies (Fraser & Galinsky, 2010). In summary, a theory of change is presented, which is a graphic depiction of program activities linked to the desired positive outcome. Elements of intervention level, settings, and agents are also indicated.

Step two, *Create and revise program materials* involves drafting the intervention manual for the purposes of testing and revision, to ensure that the intervention delivers appropriate and positive outcomes. Only the first part of this step (2.1), “an overview of session-by-session content that explains session goals, essential content, and elective activities which may be used to reinforce core content” (Fraser & Galinsky, 2010, p. 463), is included in this study.

Data Collection

The data in this study consists solely of relevant literature and personal material (journal, memos during research process). Data consisted in: peer-reviewed literature, theses/dissertations, an unpublished book manuscript, statistical information, and published books. Key search terms included: *music therapy-assisted childbirth*; *music and childbirth*; *music therapy and childbirth*; *voice and childbirth*; *vocalizing and childbirth*; *singing and childbirth*. All literature was obtained in one of the following ways:

1. Databases available through the Concordia University CLUES library system (PsycInfo, Pubmed, RILM, etc.)
2. References from current publications
3. Personal reference
4. Federal and state agency resources (e.g., The National Institutes of Health) for current statistical information

Cut-off dates were established for peer-reviewed research literature. Music-therapy assisted childbirth literature had a cut-off date of 1990. No cut-off date was established for obstetrical texts, but articles published within the past 10-15 years were considered first, followed by a few oft-cited or otherwise noteworthy articles that were published over 15 years ago.

Data was collected throughout the research process. Materials were searched until data saturation was reached. Texts were researched and reviewed in the following order:

1. 12 peer-reviewed research articles and one unpublished book manuscript on the use of music therapy in vaginal childbirth were reviewed to identify the main problem of childbirth
2. 11 peer-reviewed obstetrical research articles were reviewed to further develop the problem theory
3. Statistical information on childbirth in the United States was reviewed to establish prevalence and incidence
4. Additional music therapy, voicework, and sound healing literature, and research journal entries/memos were reviewed to develop the program theory and identify potential contraindications of vocalization in pregnancy and childbirth

Data Analysis

Problem theory. Directed content analysis (Hsieh & Shannon, 2005) was used to analyze the texts. Texts were read on a case-by-case basis and information was extracted according to pre-determined coding themes (e.g., problem, theory cited, risk factors, and protective factors), using references and citations from the original texts. Results for each coding theme were compared across all cases, using one excel spread sheet per coding theme (e.g., one spread sheet recorded the risk factors cited in each article; another recorded the protective factors cited in each article, etc.). Color coding was used to rank and reorganize this data into subcategories. The final step was to create a summary of the results for the problem, risk and protective factors, and possible explanatory theories.

Program theory. The program theory was generated by identifying the malleable mediators among the identified risk and protective factors. Only those malleable mediators that may be positively influenced by the use of vocal music therapy intervention were selected. A theory of change was then generated to demonstrate how vocal interventions could possibly lead to less perceived pain in childbirth. Intervention objectives, resources needed (inputs), activities, benchmarks for success (outputs), proximal and distal outcomes were also specified. Sources for these specifications were the research data, including successful pre-existing music therapy programs, and professional and personal judgment.

Once appropriate music therapy, voicework, and sound healing literature was collected, vocal interventions were created, taking into consideration the possibility that this could be the participants' first experience of engaging in a structured vocal activity, and that they may have potentially complicated relationships with the use of their voices. Thus, an outline of a music therapy voicework intervention program for perceived pain in labor was created, based on my subjective understanding of the research material, and my own personal and professional experience, which also informed my consideration of the possible needs of potential participants.

Ethical Considerations

As this research was theoretical, there were no ethical concerns regarding human participants. However, several steps were taken to promote the validity and reliability of the research findings. Materials were searched until data saturation was reached, and as described previously, a research journal was kept for the purpose of procedural accountability as well as to monitor potential bias. Different theoretical schemes (i.e., theory triangulation) were considered

during data analysis, such as gate control theory and self-efficacy theory, among others. Trying to stay as close to the data sources as possible, references and supportive examples from the texts as well as color coding were used in order to provide a clear trail back to the data sources. The researcher immersed herself in the data, conducting the research over several months, reading and re-reading the texts, notes, and coding schemes multiple times. Breaks were taken in between analysis sessions to promote the researcher's clarity of perspective.

Possible contraindications for the various uses of voice during pregnancy and childbirth were considered. Only those vocal techniques and exercises that appeared to be the most psychologically and physically safe for pregnant women and their partners to use in consultation with a music therapist were selected.

Chapter 4. Results

Problem Theory (*Specify the Problem, Step 1.1*)

In summary, pain management was identified as the primary “problem” of childbirth. Excessive pain can adversely affect the fetus, slow the labor, and increase the need of medical intervention, among other important health implications. Labor pain is unique and distinct from other pains in quality, duration, and context. Furthermore, the experience of labor pain is subjective as it is the result of a complex interaction of multiple factors, including physiological/biological, cognitive/psychological, emotional, cultural, environmental (including sounds), support, medical, and educational/skill/training. Labor pain can be experienced on two primary levels: on a sensory (neurological) level and a processing level (one’s response or reaction to pain – emotional, etc.). Intervention may occur at either level. In particular Lowe (2002) notes, “interventions directed at psychosocial factors may dramatically decrease perceived [labor] pain” (p. S20).

Identification of the problem: pain in childbirth. The pain that often accompanies childbirth and the management of this pain was identified as the main “problem” of childbirth that existing music interventions address. Pain was cited as the focus of treatment in 10 of the 12 music therapy-assisted childbirth texts researched (N.B.: out of the 13 texts on music therapy-assisted childbirth for vaginal delivery, one was excluded from this analysis as it did not specify a problem). Other issues cited included anxiety (3/12); tension (3/12); fear and prolonged labor (2/12); stress (1/12); traumatic childbirth experiences (1/12); lack of coping skills (1/12); and maternal satisfaction with childbirth experience (1/12). See Appendix A for a summary table.

Definition of the problem of pain in childbirth. The pain associated with childbirth has been described by women as “one of the most intense forms of pain that can be experienced” (Smith, et al., 2006, p. 2), and is widely recognized as a major concern among expectant mothers and caregivers alike (Caton, et al., 2002). While pain behaviors may vary depending on the woman’s ethnic and cultural group, there is no difference in self-reported pain perception across ethnic or cultural groups; all laboring women experience some degree of pain or discomfort (Lowe, 2002). However, while not all women experience the *same* degree of pain or discomfort during labor (Jones et al., 2012), it is “feared by most expectant mothers and fathers” and “enormous financial resources” are devoted to its reduction (Simkin, 2000, p. 254). For many birth partners, many of whom are men, “pain of the laboring woman [is] indicated as the worst

part of the birthing process for the partner” (Hanson-Abromeit & Gerweck, 2010, p. 25). In fact, anticipation and fear of the pain in childbirth is a significant reason many women request cesarean delivery in the absence of a medical indication for the procedure (Guszkowska, 2014), even despite the fact that the American College of Obstetricians and Gynecologists recently called for a reduction in elective cesarean sections and labor inductions prior to 39 weeks (Martin, Hamilton, Osterman, Curtain, & Mathews, 2012).

Close to four million births were reported in the United States in 2012: 98.6% were hospital births, and 35,184 home births; 32.8% were delivered by cesarean section (Martin et al., 2012). Of these births, 85.8% were attended by doctors, 7.6% by certified nurse-midwives, and 6% by doctors of osteopathy (Martin et al., 2012). In terms of pain management, of 27 states surveyed in 2008, 61% of women “who had singleton birth in a vaginal delivery” used epidural or spinal analgesia for pain management (Osterman & Martin, 2011).

Neuraxial anesthesia can be effective in managing physical sensation of pain, but carries medical risks, such as headache, maternal hypotension and fever, as well as potentially increasing the need for labor augmentation, medical intervention (such as instrumental delivery), and a prolonged labor (Jones, 2012; Kozhimannil, Johnson, Attanasio, Gjerdingen, & McGovern, 2013). While it appears that no North American national health institution has reported on the number of women who use non-medical pain relief during labor, a study by Kozhimannil et al. (2013) demonstrate that approximately 70% of a representative sampling of 1,382 U.S. women who gave birth in 2005 used non-medical pain relief; however, there are contradictory empirical findings with regard to the effectiveness of the various non-medical pain relief strategies in labor (Jones et al., 2012). In reality, however, management of labor pain involves using a number of different strategies. For some women, it may be all non-medical; for others solely medical; and for yet others, it may be a combination of the two (Kozhimannil et al., 2013; Lowe, 2002).

Excessive or extreme labor pain can adversely affect both the mother and fetus in a number of ways: it may increase oxygen demand; slow or stop the labor progress; cause harm to the fetus and fetal distress; and increase the need for medical intervention (Labrague, Rosales & Rosales, 2013; Rooks, 2012). While more pain does not necessarily mean less maternal satisfaction with birth (Lowe, 2002), extreme pain can diminish the pleasure of the event of the birth of a child

(Liu et al., 2010), and may cause post traumatic stress disorder in the mother after the birth (Rooks, 2012).

Labor pain is distinct from other forms of pain: it is not pathological in nature, but inherent to the birthing process itself and it is temporary (Browning, 2001; Lowe 2002; Rooks, 2012). According to the Chapman model of labor pain, it is a highly individualized, personal, and “private” pain experience (Lowe, 2002, p. S17), a result of a complex interaction of multiple factors, including physiological, emotional, cognitive, psychological, cultural/sociocultural, environmental, and experiential factors (Lowe, 1996). Labor pain is experienced on two primary levels: on a physiological and sensory (neurological) level and on a processing level (i.e., how one interprets, responds to, and reacts to pain – emotionally, psychologically, behaviorally, etc.).

Physiological pain in childbirth is caused by the central nervous, musculoskeletal and endocrine systems and it has various causes depending on the stage of labor; as well, pain is usually stronger in primiparous women (de la Brière, 2013; Lowe, 1996; Lowe, 2002). Other purely physiological factors that influence pain are the presentation of the baby, placental abruption, or other complications in the labor (de la Brière, 2013; Dick-Read, 1979). Included among other psychosocial factors that influence the labor pain experience are maternal anxiety, fear, sense of control, feelings of self-efficacy, coping skills, perception of emotional support, culture and ethnicity, environment, and perhaps previous life experiences among many others (Berentson-Shaw, Scott, & Jose, 2009; Browning, 2001; Lowe 2002; Rooks, 2012; Simkin, 2000).

Risk factors. Out of the 24 music therapy in childbirth and obstetrics texts analyzed, five were excluded as they did not clearly specify risk factors for pain in labor. From the remaining 19 texts, eight main coding categories were identified: physiological/biological (14/19); cognitive/psychological (12/19); emotional (10/19); cultural (3/19); environmental (3/19); music/sound (2/19); medical (2/19); and education/skill/training (2/19). There is some overlap between categories as many of these factors are interrelated; as well, some of the articles are by the same author. See Appendix B for a summary table of risk factors for pain in childbirth and Appendix C for examples of risk factors included in the categories.

Protective factors. One article out of 24 was excluded from analysis as it did not address protective factors. From the resulting 23 texts analyzed, nine coding categories were identified: cognitive/psychological (20/23); physiological/biological (17/23); emotional (16/23);

music/sound (14/23); preparation (13/23); environmental (10/23); support (non-music) (8/23); cultural (4/23); and spirituality/religion (3/23). Again, there is some overlap between categories as many of these factors are interrelated; as well, some of the articles are by the same author. See Appendix D for a summary table of protective factors for pain in childbirth, and Appendix E for examples of protective factors included in these categories.

Program Theory (*Create Program Theory, Step 1.2*)

Malleable mediators for pain in childbirth. The risk and protective factors identified as potential malleable mediators are as follows: preparation; active participation in labor; sense of control in labor (over fear, pain, environment, etc.); fear; expression/release of emotion; physical and psychological tension; concentration; relaxation; breathing; environmental sounds; familiarity of environment; music; hormones; vibrations; distraction; alternative sensory input; cognitive coping strategies; attitudes; and self-efficacy beliefs.

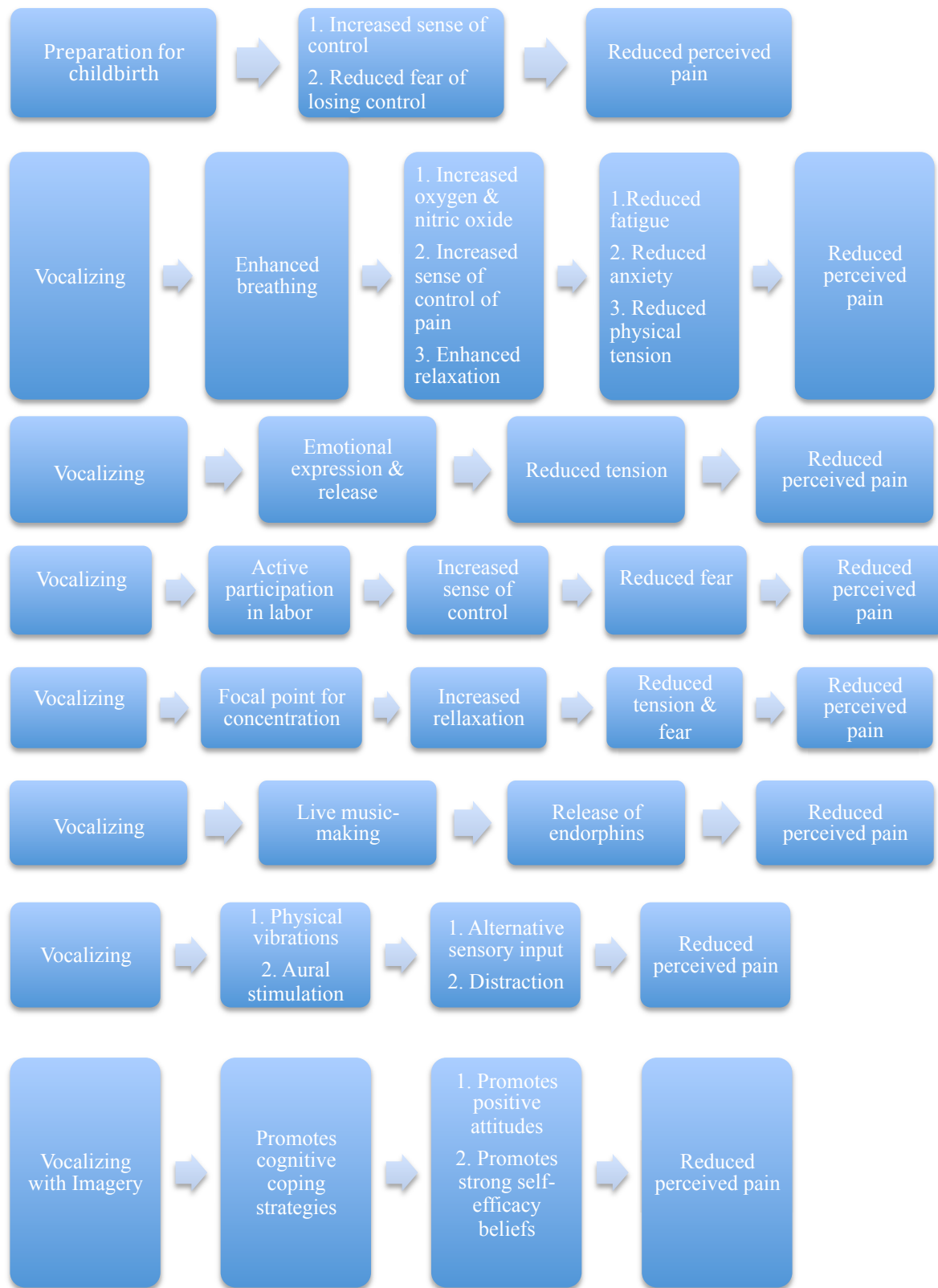
As preparation is a factor in pain management under which many of the other mediating factors may fall, the overall focus of the music therapy intervention program will be to help pregnant women and their birthing partners prepare for labor pain by exploring, learning, and practicing vocal techniques which may assist in the reduction of perceived labor pain. The exercises in this intervention may, in and of themselves, help to reduce labor pain by affecting a number of the risk and protective factors listed above. In particular, factors that could be linked to either established theory, practice, or research on the use of voice were included.

Action strategy. The overall action strategy that will address the above factors includes the supported exploration, learning, practicing, and ultimate use (in labor) of various vocalizing techniques with and without imagery to potentially reduce perceived pain. Vocal activities include vocalizing on hums, vowel and expressive sounds, and chanting, with or without imagery. These vocal activities are rooted in basic diaphragmatic breathing techniques. Therefore, preparatory activities include exploring, learning, and practicing breathing techniques, and using and/or generating cognitive coping devices such as visual, aural, or kinesthetic imagery, and coping words and phrases (including positive affirmations, images, etc.). Because research on MTACB (Browning, 2001; DiCamillo, 1999) and toning in childbirth (Pierce, 1998, 2001) indicate that practicing the techniques incorporated here increases the likelihood of a positive outcome, personal reflection in the form of journaling and home practice will be strongly encouraged. Assessment and support (emotional processing) in the form of several

individual sessions is included as a safeguard for the participants as well as to provide opportunities for their personal growth and development.

Theory of change. As the pain in childbirth is a result of a complex interaction of multiple factors, including physiological, emotional, cognitive, psychological, cultural/sociocultural, environmental, and experiential factors (Lowe, 1996), the theory of change generated from this research can be represented by multiple relationships between the variables as seen in the graphic representations of Figure 1, below.

Figure 1. Theory of change



See Appendix F for examples of how theory, research, and practice support the relationship between vocalizing and these mediating factors.

Elements of the logic model. Below are certain elements of the logic model: intervention level, settings, agents. Cost for implementing such a program was not included and may be addressed in future research. This program is not meant to replace traditional childbirth education courses.

Intervention level. It was determined that this intervention program should be targeted at primiparous or multiparous women and their birthing partners (i.e., father of fetus, life partner, designated “coach,” etc.) who have had or are taking part in prenatal education. It is suggested that participants would begin sessions late in their second trimester of pregnancy or early in their third trimester of pregnancy. The basic program would be aimed at women with uncomplicated pregnancies who are anticipating having an un-medicated vaginal childbirth. It could, of course, be adapted to pregnant women with other needs (teenage mothers, mothers with psychiatric conditions, etc.) or who are on bed rest, either at home or in an obstetrics unit, but these adaptations are not presented in this paper. It would also have to be individualized to some degree to take into account each woman’s history, culture, and needs. The intervention would be offered in six sessions: three individual sessions and three group workshop sessions, all facilitated by a music therapist.

Settings. This intervention program is to be delivered in a combination of private and group formats. In-person private sessions could take place at the music therapist’s office or in participants’ homes. Group sessions could be held in a hospital or birthing center, in a private office, or in a community center centrally located for the participants. In the future, this program could also be adapted to the needs of staff and patients on an obstetrics unit in hospital (see Hanson-Abromeit & Gerweck, 2010).

Agents. This intervention program would be implemented by a certified music therapist (e.g., MTA, MT-BC). Recommended additional training could include MTACB, the Bonny Method of Guided Imagery and Music, and doula and/or prenatal educator training.

Program objectives. The overall goal of the program is to teach women and their birthing partners vocalization techniques that they may use during labor in order to help manage labor pain. As such, women and their partners must first explore their voices and then learn to use the voice effectively as a tool for pain management. Thus, the first objective of the program

is the exploration of the voice, to initiate the pregnant woman and/or the couple to a comfortable and confident use of their voices together and individually. Allowing a woman/couple to become comfortable with vocalizing could prevent some potentially unbeneficial effects of singing for those who are anxious to sing or vocalize in front of others (Gick, 2011). It is thought that if the women and couples are comfortable with vocalizing and learn how to vocalize effectively, this will increase the chances that they will both practice the techniques at home and eventually use them in labor, thus increasing the chance that vocalizing will be an effective tool in their labor pain management. Relaxation and grounding are an integral parts of this process, allowing the couple to be open to producing sound and to facilitate relaxed sound. The second objective is to help instill deep breathing techniques to support both the physical demands of labor and healthy, resonant, vibratory vocal sound. The third objective is to identify the woman's potential coping strategies in the form of images, words, and phrases. The fourth objective is to learn to use vocalization techniques as a tool to manage labor pain. This objective incorporates and builds on the previous ones. Included here will be concepts such as practicing relaxation and vocalization exercises; exploring the different resonant qualities of the voice; vocalizing for and with the birthing partner; vocalizing with instruments; learning to give voice to the pain with relaxed and expressive sound; using visual, aural, and kinesthetic imagery; and promoting positive emotions/coping thoughts through vocalized images, chants, and mantras.

Resources needed (“inputs”). The following resources are required for the implementation of this intervention program: a soundproofed space large enough to accommodate 12-14 people; comfortable mats, bolster supports, blocks, chairs, and fitness/stability/pilates balls to facilitate relaxation and comfortable seated/semi-reclined positions for the pregnant woman and partners; journaling materials including paper, pens, art supplies; a recording/playback device; ice; water and cups; and a variety of instruments of quality which are appropriate for relaxation induction, drone and other accompaniment. Examples of such instruments are a tom drum or djembe, a crystal or Tibetan bowl, piano, guitar, a drone instrument such as a *sruiti* box or a drone recording (Nakkach & Carpenter, 2012).

Benchmarks of success (“outputs”). If this program were to be tested, a self-reported and empirically demonstrated reduction in perceived pain during labor would be desirable. As well, self-reported positive labor experience and positive experience in working with the voice overall would be desired.

Proximal outcomes. In the short term, women could potentially experience a variety of beneficial outcomes from participation in this intervention program. During labor, vocalizing could help them reduce the intensity of perceived pain by positively affecting a majority of the factors mentioned above that influence the experience of pain for each person. Improved breathing, increased breath control, and relaxation techniques could help them cope with the demands of pregnancy. Engaging in the workshop together could also promote partner bonding, and the group setting could foster new relationships/support networks between participating couples.

Distal outcomes. In the long term, parents who use their voices comfortably could also be more apt to sing to their baby, thus promoting the parent-child bonding process for both term and premature infants, and promote infant and parent health. Participants could also use these vocal strategies to cope with other events in their lives. Participants could experience other benefits from learning to vocalize, such as personal development, or improved expressive or communication skills. Finally, it could also prevent potential post-traumatic stress, by helping the woman manage her pain instead of being traumatized by it.

Program Materials (Step 2.1)

As manuals may vary in their prescriptive detail (Fraser et al., 2009), a basic outline of this intervention is presented here.

1. PRIVATE SESSION 1 (1 hour) - Assessment

Objectives:

1. Establish therapeutic alliance
2. Collect pertinent client background information
3. Recommend areas of focus for program
4. Make referrals if appropriate

(See Appendix G for a sample assessment form.)

2. GROUP SESSION 1 (2 hours)

Objectives:

1. Relax and ground participants
2. Introduce vocal experiences

3. Model a home practice structure
4. Introduce breathing techniques
5. Learn to vocalize comfortably on vowels
6. Increase comfort with singing voice and knowledge of lullabies

PART 1.1 (45 min)

A. Welcome/Check-in

B. Overview of seated/reclined positions for the Relax-Sound-Ground experience (i.e., resting against partner, supported with bolsters, seated on chair, etc., and overview of safe ways to get in and out of these positions)

C. Relax-Sound-Ground

- A relaxation induction followed by free and/or guided breathing and vocalization, and then grounding
- Also serves as a model for home practice
- When used as home practice, each Relax-Sound-Ground experience should be followed by journaling personal observations, reactions, images, and responses to the experience

D. Journaling and discussion/processing

E. Break/snack

PART 2.1: RESOURCE DEVELOPMENT (45 min)

A. Discussion

1. How to practice these techniques at home using the Relax-Sound-Ground structure
2. Principles of sounding during birth: making comfortable resonant sound for labor (woman and partner) including
 - a. Relaxing jaw, mouth, throat/larynx, body
 - b. Diaphragmatic breathing with full exhalations
 - c. Helpful and unhelpful vocal sounds in labor (i.e., how to distinguish “in control” sounds from “out of control” sounds)
3. Partner role in sounding for birth

B. Exercises: Diaphragmatic and Rhythmic Breathing Exploration

1. Discuss benefits of diaphragmatic breathing

2. Diaphragmatic breathing instruction and practice
3. Rhythmic breathing instruction and practice

C. Break/snack

PART 3.1: RESOURCE DEVELOPMENT AND CLOSING (30 min)

A. Exercises: Humming and vocalized vowels in resonant spaces of the body (each exercise is followed by discussion in dyads and/or journaling)

1. Explore humming and vocalized vowels in resonant spaces of the body such as the chest, the abdomen, the pelvis, etc. (e.g., exercise to resonate each chakra region with different vowel sounds and pitches – see “Goldman’s System,” in Goldman, 2002 – or other experiences); explore different vowels and sounds and pitches that work for each individual
2. Explore vocalizing for and with your partner

B. Discussion and/or journaling

C. Closing: Sing a lullaby/“song of kin” (Loewy, 2011) together

3. GROUP SESSION 2 (2 hours)

Objectives:

1. Relax and ground participants
2. Explore different vocal experiences
3. Model a home practice structure
4. Explore drone and instrument-supported vocalizing
5. Develop and practice vocalizing coping words/phrases
6. Increase comfort with singing voice and knowledge of lullabies

PART 1.2 (45 min)

A. Welcome/Check-in

B. Relax-Sound-Ground

- Can repeat basic structure, exploring rhythmic instead of diaphragmatic breathing, and/or incorporate any of the vocal sound experiences that were covered in the previous session or ones that will be introduced in this session

C. Journaling and discussion/processing

D. Break/snack

PART 2.2: RESOURCE DEVELOPMENT (45 min)

A. Discussion

1. Review of basic principles of making sound for labor

B. Exercises (each exercise is followed by journaling or discussion in dyads)

1. Explore vocal drone/instrument-supported vocalizing
2. Explore vocalizing with guided imagery of relaxing, releasing, and opening (e.g., images of flowers opening, other images generated by participants, etc.)

C. Break/snack

PART 3.2: RESOURCE DEVELOPMENT AND CLOSING (30 min)

A. Explore vocalizing with coping words or phrases

1. Women explore what thoughts/words they have used to cope with pain or difficulty before; what they might find helpful
2. Explore vocalizing on these words or phrases

B. Discussion and/or journaling

C. Closing: Sing a lullaby/"song of kin" together

4. GROUP SESSION 3 (2 hours)

Objectives:

1. Relax and ground participants
2. Model a home practice structure
3. Explore vocalizing for pain expression
4. Review of use of voice throughout stages of labor
5. Increase comfort with singing voice and knowledge of lullabies

PART 1.3 (45 min)

A. Welcome/Check-in

- Same as session 2

B. Relax-Sound-Ground

- Can repeat basic structure, exploring rhythmic instead of diaphragmatic breathing, and/or incorporate any of the sound experiences that were covered in the previous session or ones that will be introduced in this session

C. Journaling and discussion/processing

D. Break/snack

PART 2.3: RESOURCE DEVELOPMENT (45 min)

A. Exercise

1. Explore vocalizing for pain expression
 - a. Application of the various vocal techniques learned with one or more pain simulation exercises (i.e., ice cube on wrist, held squat, etc.)
 - b. Both the women and their partners experience this exercise

B. Discussion/share findings/journaling

C. Break/snack

PART 3.3: RESOURCE DEVELOPMENT AND CLOSING (30 min)

A. Review:

- a. Principles of sounding in labor (summary of material covered in workshop)
- b. Use of voice for different stages of labor

B. Questions

C. Sing a lullaby/song of kin together

D. Workshop closing (ritual of instructor's choice – i.e., each participant shares one thing that they learned from the workshop; group toning experience; etc.)

Handouts for sessions include:

1. Resource review sheets including:
 - a. Relax-Sound-Ground practice structure
 - b. Principles of sounding in labor
 - c. Breathing techniques
 - d. Vocalization exercises review

- e. Use of voice for different stages of labor
 - f. List of lullabies (including lyrics)
 - g. Logs to record participant's helpful imagery, coping thoughts, affirmations, and exercises discovered in the workshop
2. Principles of lullaby singing for after birth (see MacKinlay & Baker, 2005)
 3. How to create a birth/womb/welcome song for the baby

5. PRIVATE SESSION 2 (1 hour)

(post-workshop follow-up)

1. Address specific questions, concerns of client(s)
2. Adapt techniques to needs of client(s)
3. Make referrals if necessary
4. Create a birth/womb/welcome song or chant, or discuss post-natal singing – if so desired by client(s)

6. PRIVATE SESSION 4 (1 hour)

(postpartum follow-up)

1. Process labor experience
2. Make referrals if necessary
3. Termination

Chapter 5. Discussion

This chapter will discuss the limitations of this study, important considerations regarding this program, contraindications, and propose an explanatory theory. Future directions for research will be presented.

Limitations

As only the first step and a half of intervention design research methodology was conducted to fit within the scope of a master's thesis, the research is theoretical and the program was not evaluated. Although I have given community voice workshops, have worked with voice in my professional practice, and was myself a pregnant woman who vocalized extensively during labor, I have not worked directly with this population as a music therapist.

Important Considerations

Locus of control and active participation in labor. Vocalizing is a conscious physical and mental action that requires intentional breathing, concentration, sounding, imagination, and muscular control (Goldman, 2002; Hemsley, 1998). When vocalizing in labor, the laboring woman is actively making sounds with the intention to express herself, release her pain, and is, thus, more physically, mentally, and perhaps emotionally implicated in the labor process. As such, the woman may feel a greater sense of control over her body, the birth, and her pain management by actively making sound and audibly expressing her pain experience. In this sense, she would not be passively receiving pain control in the form of massage or medication, for instance, but actively participating in it, adjusting her sounds to suit her ever-changing needs. As Lowe (1996) writes, “in the case of pain, the [care] provider must realize that labor pain belongs to the woman experiencing it, and management of the pain also belongs to her” (p. 87). Vocalizing offers the laboring woman the possibility of direct control of a pain management strategy, as she can control how much, how often, and with what intensity she makes sound.

Music therapy approach to vocalizing in labor and current practice. It appears that other approaches to the use of voice for pregnancy and labor fit within the sound healing and music therapy traditions. As Snow (2011) observed, music therapists' expertise in both music and therapy could be advantageous in the practice of sound healing, in particular when working with the emotional component of this practice, a similar sentiment expressed by Browning (2001) and demonstrated by DiCamillo (1999) with regard to MTACB. As in Oddy's (2011) work, a music therapy approach to the use of voice in labor and delivery may prove beneficial in

helping women who want to vocalize but who may be hesitant. A music therapist would have the necessary skills to help a woman both access her voice and process her relationship to her voice. A music therapist's training may also equip her or him to adapt such a program to meet the needs of pregnant women who fall outside of the "norm": high risk pregnancies; mothers with physical or mental disabilities; mothers who have psychiatric needs. Finally, a music therapist would be able to provide additional support to women who, for example, experience the unexpected loss of a baby in late pregnancy or during/immediately after labor, or who require further assistance in processing their labor experience if it was traumatic in any way. For instance, according to one study on memory of labor pain, women who watched a videotape of their labor found that hearing the sounds they made during labor caused them to re-experience their pain (McKay & Barrows, 1992). The therapeutic alliance created in in this program could be a powerful resource available to the woman in such instances.

How does this program align with music therapy theory? There are many different theoretical stances in which this work is situated, including voicework, Embodied voicework, medical music therapy, and resource-oriented music therapy. The voicework approach to music therapy is perhaps the most relevant, as the intervention itself is, at its most basic, one involving the breath and voice. Within this approach, this intervention aligns particularly well with Sokolov's (2009) Embodied Voicework, among others.

As well, because the use of voice, breath, and imagination in this intervention are intended to affect the physical and psychosocial event of childbirth, it appears to fit well within the boundaries of medical music therapy (see Hanson-Abromeit, 2010). Although I do acknowledge that there are health implications for both mother and child during pregnancy and childbirth, and I am grateful that we have services to help those in need of medical intervention, I do not view childbirth itself through the lens of illness, but rather through the lens of wellness, as a natural life event. I feel it is a highly individual experience in which each woman has the right to birth her baby as she needs to, and for which each woman possesses the necessary strength and wisdom to bring life into the world, albeit with medical assistance if necessary. As such Rolvsjord's (2012) resource-oriented approach to music therapy seems to be particularly relevant to this intervention. It aims to: (a) nurture the strengths, resources, and potentials of individuals; (b) take a collaborative approach with participants; (c) view the individual within their context; and (d) use music (in this case, voice) as a primary resource.

Workshop, support group, or therapy? In Young's (2009) discussion of her "Singing and Wellness" workshops for persons affected by cancer, she clearly articulates guidelines for those wishing to implement similar programs. In doing so, she makes a good argument for having a competent music therapist in the role of facilitator for singing groups where the participants are vulnerable or "at risk." She makes a clear distinction between a support group and a therapy group and stresses that the facilitator must be clear about which pertains to his or her group. This intervention has attempted to be a mix of both – offering a workshop setting with some space for discussion and self-processing through journaling, buttressed by individual sessions where any significant issues that may arise can be addressed either through consultation with or referral by a music therapist.

Stage of labor and kind of labor. While vocalizing throughout labor offers benefits to mother and baby in terms of promoting good breathing, it is possible that this intervention may be most helpful in reducing pain in the stages of labor before transition as they focus on physical relaxation and relaxed sound. As transition is likely to be very painful and intense, the techniques may be harder to implement, but perhaps even more valuable in order to help the woman to maintain a sense of calm and control, and to provide her with an expressive outlet for such an intense experience. When more energy is required, as during the pushing phase, sounds in the higher registers and more rhythmic vocalizing could be beneficial. It should be noted that the program was not designed for women who receive pharmaceutical intervention or cesarian section, although it could be beneficial in these instances.

Role of birth partner. This program includes birth partners for several reasons. First, a study by Lewicka, Sulima, Wisiewska, Stec, & Wdowiak (2014) found that roughly a third of fathers who participated in their study felt that music therapy could potentially reduce labor pain of women. Second, they also determined that "there is a need for education of men on various aspects of the course of physiological childbirth" (p. 36), which this intervention could potentially address. Third, Pierce (1998, 2001) found that several of her study participants' partners vocalized (toned) with the laboring woman during pregnancy and labor. Some of the women commented how in some instances, the low pitch and vibrations of her male partner's vocal sounds were helpful, and in other instances, their partner was able to coach the laboring woman to make her sound more effective. One father suggested that he had a moving, perhaps even transcendent experience from sounding with his partner during her labor. Fourth, according

to Hanson-Abromeit & Gerweck (2010) the inclusion of birth partners, fathers in particular, is central to Family-Centered Maternity Care, an approach that takes into account the specific needs and desires of all parties: the mother, the father/partner, and the fetus/infant. They also suggest that prenatal education be available to men “in a variety of formats [and] offer multiple support strategies” (p. 25). Finally, it can be argued that parents who are comfortable using their voice may be more apt to sing to their babies, which offers potential benefits for both the full-term and particularly for the premature infant (Haslbeck, 2012). Taking this program as a couple could potentially increase the comfort level both parents have with regard to their voices overall.

Optimal time to implement the program. This intervention suggests that participants would begin sessions in their second trimester of pregnancy or early in their third trimester of pregnancy (around weeks 20-28) for several reasons. First, while Pierce (1998, 2001) does not indicate at what point in pregnancy her toning instruction took place, DiCamillo (1999) suggests that MTACB sessions should ideally begin in the second trimester to allow more practice time for the mother. Second, as the baby’s auditory system is developed around weeks 18-20 (Nakkach & Carpenter, 2012; Frederico & Whitwell, 2001), it would be optimal for the baby to begin benefitting from the mother’s or birth couple’s vocalization as early as possible. Third, a general theme taken from the data analysis revealed that benefits of music therapy-assisted childbirth and toning during labor increased with home practice time. One could argue that starting as early as possible in pregnancy would give the mother and couple the maximum possible amount of time to practice and reflect on techniques in this intervention. Fourth, based on the time frames for most prenatal education classes that I am aware of, as well as from personal experience and anecdotal evidence (conversations with other pregnant women, etc.), it seems that both parents begin to feel a stronger connection with the unborn child and start thinking more seriously about the birth event during the late second/early third trimesters. Thus, this appears to be an optimal moment for parents to benefit from the potentially enhanced bonding experience that singing to or vocalizing for one’s baby could bring.

As for the best time for women to learn new techniques, DiCamillo (1999) notes that “learning readiness peaks during the second trimester of pregnancy” (p. 35). In terms of physical comfort for women, the second trimester is when most cases of “morning sickness” abate, making singing more comfortable. Finally, breathing can become difficult for the pregnant woman in the third trimester as the expanded uterus infringes upon the lungs (Hanson-Abromeit

& Gerweck, 2010), so the second trimester may be the best or most comfortable time to introduce breath work.

Special needs and culture. While the program could theoretically be used with women of all ages, this program was not conceived of in terms of addressing a pregnant teen's specific needs, which Hanson-Abromeit & Gerweck (2010) discuss in detail. Likewise, some women and couples may have other pregnancy-related issues such as hypertension or preeclampsia, medical bedrest, or other issues such as a history of mental health disorders or concerns, etc. And as I discussed in the literature review, the use of voice, particularly during labor, is a culturally-sensitive and personal issue. Thus, this intervention program would have to be tailored to suit each woman and/or couple in the context of their cultures.

Breath, voice, and emotion. Publications and my personal observations indicate that the breath and the voice are closely tied to emotions and individuals' intimate, vulnerable inner world (Austin, 2008; Azoulay & Loewy, 2009). Bradt (2009) notes:

We control the awareness and expression of our feelings partly by our breath. When trying to repress our emotions, we tend to breathe more shallowly. When we are trying to suppress anger or extreme sadness, we close off our throats... this unconscious manipulation of our emotions has at times important defense functions. It is imperative to understand that by attempting to regulate (and therefore, often deepen) patients' breathing... we may be opening an emotional gateway (p. 16).

Although Bradt is speaking specifically about breath entrainment techniques, I think it is safe to apply her logic to other breath work or vocal interventions. Likewise, one's past and present relationship with their voice, and even feelings one may have toward changes to the texture and quality of the voice that can occur during pregnancy (due to hormones, changes to the physical body, etc.), are all potential issues for clients. Thus, the music therapist should work with the breath and voice with sensitivity and respect, and be alert to issues that may arise. As Young (2009) writes, a facilitator of such a group "needs to clearly inform participants at the beginning of the first group that they might have unexpected emotional reactions, and that these reactions are normal" (p. 21). It is quite possible that the proposed intervention would need even more space to devote to these issues.

The reluctant singer. Another issue relevant to the proposed program is what to do with the tentative, reluctant, or resistant singer/sounder. Austin (2008) observes that resistance is

normal in treatment contexts that use voice. Relaxation is paired with vocalization throughout the program to address this issue. In addition to serving as a protective factor for labor pain and helping to achieve the kind of sound that will be beneficial to this process, relaxation can also help persons to release defenses and self-judgment, and prepare them to open their mouths and let sound come out. Finally, the potential for resistance necessitates the presence of a music therapist, as he or she has skills to work with this issue.

Parent/partner-infant bonding and other potential benefits. As previously mentioned, the literature demonstrates that singing to one's baby may have a number of beneficial effects on both caregiver and infant, including promoting the bonding process and functioning as a coping skill for new mothers. While this was not a primary objective of this intervention, it is certainly a secondary benefit that may take place. This parent-baby bonding process can start when the baby is in utero and can continue in the post-natal period. Music therapy interventions that may promote this process are the creation of "womb songs" (DiCamillo, 1999) or "birth songs" (Browning, 2014), and becoming familiar and comfortable with lullabies as is addressed this intervention, among other ways. "Womb songs" or "birth songs" may also be created in the individual sessions offered in this intervention. Initiating a mother/couple to vocalizing and singing could make them more comfortable with their voices, and thus, make them more likely to spontaneously engage in infant-directed singing. It may also promote bonding between the couple as they share their voices with each other, and sing to their baby together.

Aside from reducing perceived pain in labor, there may be other benefits to an established vocal program for childbirth, for instance, meaningful involvement of the partner during labor; increased satisfaction with birth; increased sense of control during birth; reduced fear; shorter labor, etc.

Contraindications

Altered states of consciousness. Goldman (2002) writes that "sound is safe and gentle and works with the natural resonance of the individual" (p.114). However, relaxation, vocalizing, and chanting may induce altered states of consciousness. For instance, Nakkach & Carpenter (2012) write that 21 minutes of microtonal chanting induces relaxation states in the brain. Although labor itself may induce an altered state of consciousness (England & Horowitz, 1998; Pierce, 1998), vocalizing for extended practice periods is not recommended in this program, as it may be contraindicated for certain individuals to self-induce an altered state of consciousness

outside of the labor experience (i.e., individuals with a psychotic disorder). Therefore, when working with these elements, it is recommended that participants engage in short periods of vocalizing and/or relaxation (no more than 15-20 minutes), followed by sufficient grounding afterward, in order to return to a “normal” state of consciousness. These techniques are addressed in the Relax-Sound-Ground experience that start each group session in the program.

Physiology of pregnancy. As previously mentioned, the music therapist must be sensitive to the physical changes in the mother during pregnancy which could make vocalizing difficult, such as morning sickness and difficulty breathing. In addition, it is often contraindicated for pregnant women in their second and third trimesters to lie on their back, engage in deep twisting movements, and engage in breath techniques such as the yogic “fire breath” and breath retention. In general, it would be advisable that participants speak with their doctors/midwives before participating in this program.

How Voicework May Affect Labor Pain: Relevant Theory

While there is not space here to devote to a discussion of each of theory – in fact, this would be more appropriate once the intervention is validated – some are worth noting. It seems that music therapy could intervene on both the sensory and processing levels of pain. Vocalization may affect how pain is physically sensed by offering a sensory stimulus to compete with the pain sensation (gate control theory); and the emotional release and relaxation afforded by producing expressive and relaxed sound may help reduce physical tension and fear that can result in or augment perceived pain (fear-tension-pain theory).

As well, this intervention may work on a processing level by focusing on cognitive coping strategies and by potentially addressing psychological or emotional issues that may increase pain perception (self-efficacy and fear-avoidance theories). Furthermore, conditioned relaxation responses to vocalizing could help promote helpful responses to pain in labor.

It would be interesting to consider vocalizing in labor from the perspective of self-hypnosis, which women sometimes employ in childbirth. As was already observed, vocalizing can induce deep relaxation, as does hypnosis. Could women be potentially hypnotizing themselves with their own breath and sound?

Future Directions for Research

Once the proposed intervention has been refined and tested, implications for future research may also be refined. For instance, if the program is successful, it may be interesting to

adapt the intervention to educate childbirth care providers (doctors, nurses, midwives, doulas); to other obstetric procedures; to medical interventions during birth (cesarian section, administration of epidural, internal examinations, postpartum surgical sutures, etc.); and to various cultures.

In the meantime, other areas of research may be addressed. This could include investigating the use of vocal psychotherapy techniques to address psychological factors that influence perceived pain of childbirth. According to results from this study, these include fear of childbirth, unresolved trauma, unresolved developmental issues, and conflictual feelings toward childbirth.

Conclusion

I am certain that woman are not only intuitively using their voices during labor, but that they are also being guided to do so by some doulas, midwives, nurses, doctors, childbirth educators, and music therapists. In fact, the intervention itself is indebted to techniques and ideas that I have learned in my own personal and professional experiences. However, this study offers a first attempt at organizing what may be common practice into a testable and replicable intervention program with intervention activities that are supported by current theory and research to reduce a woman's perceived pain during labor. This draft must be implemented a number of times and adjusted in accordance with participant feedback and emerging research findings. If vocalizing is found to be effective in reducing perceived pain in childbirth, it could offer an important pain-management strategy to birthing mothers particularly in situations where pharmaceutical pain-management strategies for labor are not indicated or available. Although this draft has not yet been validated in clinical trials, this research offers an argument for the important role of vocalization during labor.

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Footnotes

¹ For a better understanding of the origins and history of toning, please refer to Laurel Elizabeth Keyes' 1973 book *Toning: The Creative Power of the Voice*. Keyes was a pioneer in the use of toning in North America and since then, music therapists and others have explored this practice in a variety of ways.

Appendix A Summary of Problem of Childbirth (Table 1)

Table 1: Identification of main “problem” in childbirth across data sources

Data source	Problem(s) cited
Browning, 2000	Pain
Browning, 2001	Pain
Browning, 2014	Pain Fear Anxiety
Callister et al., 1990	Pain Anxiety
DiCamillo, 1999	Pain Anxiety
Federico & Whitwell, 2001	Stress Tension
Labrague et al., 2013	Pain
Liu et al., 2010	Pain
McKinney, 1990	Pain Tension Prolonged labor Satisfaction with childbirth experience
Phumdoung et al., 2003	Pain Traumatic childbirth experience Fear
Pierce, 1998	Non-specified
Pierce, 2001	Pain Lack of coping skills Tension (physical and emotional)
Wei & Gao, 2011	Pain Prolonged labor

Appendix B Summary of Risk Factors for Pain in Childbirth (Table 2)

Table 2: Risk factor categories across data sources

Data source	Risk factor categories cited
Adams et al., 2012	Physiological/biological Cognitive/psychological Cultural
Berentson-Shaw et al., 2009	Cognitive/psychological
Browning, 2000	Emotional Physiological/biological Cognitive/psychological
Browning, 2001	Non-specified
Browning, 2014	Emotional Physiological/biological Cognitive/psychological
Callister et al., 1990	Emotional Physiological/biological Cognitive/psychological Cultural
Costa-Martins et al., 2014	Emotional
Curzik & Jokic-Begic, 2011	Cognitive/psychological
de la Brière	Physiological/biological Cognitive/psychological Medical
DiCamillo, 1999	Emotional Physiological/biological Environmental
Federico & Whitwell, 2001	Non-specified
Ip, 2009	Non-specified
Jones et al., 2012	Physiological/biological Medical
Labrague et al., 2013	Emotional Physiological/biological Environmental Music/sound
Liu et al., 2010	Physiological/biological
Lowe, 1996	Emotional Physiological/biological Cognitive/psychological Cultural Environmental Education/skill/training
McKinney, 1990	Emotional Cognitive/psychological
Melender, 2002	Physiological/biological

	Cognitive/psychological Education/skill/training
Phumdoung et al., 2003	Emotional
Pierce, 1998	Non-specified
Pierce, 2001	Physiological/biological Music/sound
Rooks, 2012	Emotional Physiological/biological Cognitive/psychological
Simkin, 2000	Physiological/biological Cognitive/psychological
Wei & Gao, 2011	Non-specified

Appendix C Examples of Risk Factors for Labor Pain/Fear

Each of these following risk factors were all related to an experience of strong labor strong labor pain and, if indicated, fear of childbirth.

Physiological/Biological Risk Factors

- Muscular tension
- Unstable/un-paced breathing
- Hormones
- Stage and duration of labor
- Maternal fatigue
- Physical mechanisms of childbirth
- Maternal physiological features (such as age, weight and parity)
- Fetal physiological features (including presentation, size, position and speed/intensity of descent)

Cognitive/Psychological Risk Factors

- Birth mother having an external locus of control with regard to her pain
- Lack/loss of focus
- Negative attitudes/thoughts
- Conscious awareness of pain
- Previously unresolved psychological trauma (previous unresolved)
- Weak self-efficacy beliefs
- Poor motivation
- Sense of dissatisfaction with pain management

Emotional Risk Factors

- Maternal feelings of fear
- Anxiety
- Negative emotional responses to pain
- Emotional tension
- History of insecure attachment

Cultural Risk Factors

- Mother's personal history, ethnicity, and attitudes in mother's culture toward birth

- Communication between mother and caregivers/culture in which birth takes place
- Sociocultural factors such low maternal educational level
- Poor maternal support network (for fear of childbirth)

Environmental Risk Factors

- An unfamiliar birth environment
- Unpleasant sounds in birth environment
- Poor caregiver support
- Hospital birth

Music and Sound Risk Factors

- Maternal production of high-pitched sounds
- Hearing high-pitched music
- Mechanical sounds

Medical Risk Factors

- Use of some medications (labor induction medications, etc.), which may increase experienced pain

Education/Skill/Training Risk Factors

- Low maternal educational level
- Too much information about childbirth
- A lack of information about childbirth

Appendix D Summary of Protective Factors for Pain in Childbirth (Table 3)

Table 3: Protective factor categories across data sources

Data source	Protective factors categories cited
Adams et al., 2012	Non-specified
Berentson-Shaw et. al, 2009	Cognitive/psychological Physiological/biological Emotional Preparation
Browning, 2000	Cognitive/psychological Physiological/biological Music/sound Support (non-music)
Browning, 2001	Cognitive/psychological Physiological/biological Music/sound Environmental
Browning, 2014	Cognitive/psychological Physiological/biological Emotional Music/sound Preparation Environmental
Callister et al., 1990	Cognitive/psychological Physiological/biological Emotional Music/sound Preparation Environmental Support (non-music) Cultural Spirituality/religion
Costa-Martins et al., 2014	Cognitive/psychological Emotional
Curzik & Jokic-Begic, 2011	Cognitive/psychological Preparation Support (non-music)
de la Brière	Support (non-music)
DiCamillo, 1999	Cognitive/psychological Physiological/biological Emotional Music/sound Preparation Environmental Support (non-music)
Federico & Whitwell, 2001	Cognitive/psychological

	Physiological/biological Emotional Music/sound Environment
Ip, 2009	Cognitive/psychological Physiological/biological Emotional Preparation
Jones et al., 2012	Physiological/biological Preparation Environmental Support (non-music)
Labrague et al., 2013	Cognitive/psychological Physiological/biological Emotional Music/sound
Liu et al., 2010	Cognitive/psychological Physiological/biological Emotional Music/sound Preparation
Lowe, 1996	Cognitive/psychological Physiological/biological Emotional Music/sound Preparation Environmental Support (non-music)
McKinney, 1990	Cognitive/psychological Physiological/biological Emotional Music/sound Preparation Cultural
Melender, 2002	Cognitive/psychological Physiological/biological Emotional Preparation Environment Cultural
Phumdoung et al., 2003	Cognitive/psychological Physiological/biological Emotional Music/sound Environmental
Pierce, 1998	Cognitive/psychological

	Physiological/biological Emotional Preparation Music/sound Spirituality/religion
Pierce, 2001	Cognitive/psychological Physiological/biological Emotional Music/sound Environmental Spirituality/religion
Rooks, 2012	Cognitive/psychological Emotional Environmental Support (non-music)
Simkin, 2000	Cognitive/psychological Cultural
Wei & Gao, 2011	Music/sound Preparation

Appendix E Examples of Protective Factors for Labor Pain/Fear

The following protective factors were all related to an experience of lower or successfully managed labor pain and, if indicated, fear of childbirth.

Cognitive/Psychological Protective Factors

- Birth mother having an internal locus of control (i.e., sense of control over labor and pain)
- Concentration
- Positive distractions from pain sensation
- Positive attitudes and coping thoughts
- Use of cognitive coping strategies
- Motivation
- Previous pain experiences
- Strong self-efficacy beliefs
- Self-confidence
- Resilience
- Realistic goals and expectations for labor and birth

Physiological/Biological Protective Factors

- Physical relaxation
- Proper breathing
- Presence of certain hormones (i.e., endorphins, etc.)
- Multiparity
- Upright/lateral birth position
- Spontaneous labor
- Active participation in labor
- High pain tolerance
- Changing states of consciousness that accompanies labor

Emotional Protective Factors

- Positive emotions/feelings/moods
- Affirmation and validation of birthing mother
- Expression/release of emotions and feelings
- Sense of mastery over labor experience

- Desire to have a baby
- Reduced anxiety
- Centeredness
- Control over emotions
- History of secure attachment in the mother

Music and Sound Protective Factors

- Physical sensation of sound vibration through singing
- Specific musical characteristics (i.e., slow tempo, etc.)
- Musical genre (recorded music)
- Mother's control over music selection, volume, and sound equipment
- Anxiolytic music (i.e., music that has been shown to be anxiety-reducing)
- Certain rhythms
- Use of voice
- Guided imagery and music
- Presence of the music therapist in labor
- Adjustment of music to woman's needs in labor

Preparation Protective Factors

- Participation in music therapy prenatal sessions
- Use of music/music therapy during labor
- Childbirth education preparation (i.e., learned breathing, relaxation, and pain coping techniques; and addressing fear of childbirth)
- Home practice of coping techniques
- Individualized pain management plan
- Conditioned relaxation responses.

Environmental Protective Factors

- Presence of quality, trusted, familiar support people and caregivers during labor
- Continuous care
- Pleasant/familiar sounds
- Positive support behaviors for mother (i.e., facilitate her expression of pain, etc.)

Support (Non-Music) Protective Factors

- Alternative strategies such as baths, massage, biofeedback, and hypnosis
- Pharmacological interventions, such as epidural (with woman's input)
- Birthing positions
- A woman's accessing and use of professional services (to reduce fear of childbirth)

Cultural Protective Factors

- Culturally-appropriate care
- Woman's ability to express and communicate pain
- Strong social network (for fear of childbirth)
- Support

Spirituality/Religion Protective Factors

- Connecting with spiritual energies or nature through vocalization
- Religious or spiritual beliefs that justify the labor pain

Appendix F Theory and Research to Support Vocalizing for Pain

This appendix summarizes some theory supporting the potential benefits of vocalizing on pain for some of the areas addressed by this intervention.

Breath Control

- Quality, pace, and stability of breath as well as supported breath are important to perceived labor pain (Browning, 2001; DiCamillo, 1999; Federico & Whitwell, 2001; Jones et al. 2012; Liu et al., 2010; Pierce, 2001)
- Making a sustained vocal sound in sounding, toning, chanting, and singing requires abdominal/diaphragmatic breathing, and long, controlled inhalations and exhalations (Gaynor, 1999; Goldman, 2002; Hemsley, 1998; Nakkach & Carpenter, 2012)
- A review of research on singing, health, and well being revealed that singing interventions show benefits for breathing (Gick, 2011)
- Vocal interventions are being used in a variety of health-related issues (Azoulay & Loewy, 2009)
- Montello (2009) states “the best way to synchronize and harmonize breath rhythms is through singing, particularly simple songs or chants” (p.69)

Physical Tension, Relaxation, and Fatigue

- Physical tension and fatigue may increase pain perception, and relaxation protects against physical tension; singing and vocalizing reduces physical tension and promotes relaxation (MacKinlay & Baker, 2005; Young, 2009)
- Sound, deep breathing, and vocalizing elongated vowels activates the parasympathetic nervous system, which promotes the “relaxation response” (Gaynor, 1999; Goldman, 2002; Nakkach & Carpenter, 2012)
- Rhythmic breathing (i.e., the inhalation and exhalation become gradually deeper and longer) can also activate the relaxation response (Azoulay & Loewy, 2009)
- Considerably more than nasal breathing alone, humming substantially increases nasal nitric oxide, a naturally-occurring substance which participates in the parasympathetic nervous system (as well as increasing blood flow, boosts immune system, protects against stress and boosts energy/stamina) (Nakkach & Carpenter, 2012)

- Music and sound increases alpha brainwave activity, which is linked to mental and physical relaxation states (Gaynor, 1999)

Focus/Concentration/Centering

- According to Young (2009), “chanting, which involves the use of sustained repeated vowel sounds, is an ancient art form practiced by various cultures to promote internal awareness and increased concentration” (p. 16)
- Nakkach & Carpenter (2012) cite research by music therapist Kate Richards Geller about individuals who “sing through strong emotional states for one’s own self (rather than an audience)... show dramatic improvement in their ability... to concentrate and learn new skills” among other benefits (p. 46)
- Vocalizing in the form of toning and chant in yogic traditions requires and helps to facilitate “dharana, or single-pointed attention” (Nakkach & Carpenter, 2012)

Emotional Tension

- Practitioners of toning and sound healing maintain that these vocal practices aid in the release of emotions (Gaynor, 1999; Goldman, 2002; Nakkach & Carpenter, 2012)
- Summers (2014) cites several studies indicating that singing helps with the expression of emotions
- Gick (2011) cites a study that found members of a community choir composed of marginalized people reported “emotional release from tension, increased energy, and positive mood” (p. 191), among other benefits.
- Gick (2011) cites a study that demonstrated that women with eating disorders expressed a sense of emotional release after participation in a singing intervention

Physical Sensation of Vibration

- Research indicates that sound vibrations have the potential to affect the body on a cellular level, offering potentially healing effects to body tissues (Gaynor, 1999; Goldman, 2002)
- Some participants in Pierce’s (1998, 2001) study reported benefits from the physical sensation of their own or other’s voices during labor

Appendix G Client Assessment Outline

Client Contact Information

- Mother and partner name, contact information

Personal History

- Ages (mother and partner)
- Expected delivery date
- Parity (if multiparous, inquire about previous birth experiences)
- Progress of pregnancy so far
- Feelings about having a child (mother and partner)
- Complications (high blood pressure, etc.)
- Medical conditions (allergies, asthma, history of mental illness, trauma, etc.)

Birth Preparation

- Birth plans (location, pain management plan, etc.)
- Prenatal preparation: childbirth education/yoga/acupuncture, etc.
- Particular concerns about labor (mother and partner)

Other

- Reason for taking workshop (mother and partner)
- Previous experiences with pain or discomfort and how they coped
- Child's name/gender if known

Music (Mother and Partner)

- Music experience
- Singing experience
- Attitude toward vocalizing
- Music preferences
- Familiarity with children's songs, lullabies
- Favorite lullabies and "songs of kin" (Loewy, 2011)

Participant questions/concerns

Music therapist's recommendations of areas of focus in the program

Referrals (if appropriate)