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Abstract

Motherhood can be characterised by psychological distress, negatively impacting familial relationships and mothers' well-being. A growing body of research supports the use of music listening for well-being. The present scoping review aimed to (1) consolidate evidence-based knowledge on the role of music listening for maternal well-being prenatally and during birth, and (2) examine the features of the music resources used in the published research. Following PRISMA guidelines for Scoping Reviews, a database search using three search terms (versions of music, listen* and prenatal or birth) resulted in analysing 55 articles. Thematic analysis identified the well-being benefits of music listening during pregnancy (three sub-themes: psychological well-being, attachment, and physiological well-being) and birth (three sub-themes: pain management, psychological well-being, and labour progression). During pregnancy, music listening significantly improves psychological well-being, fosters maternal-foetal attachment, and improves physiological well-being (e.g., sleep, blood pressure, heart rate). During labour, music listening significantly reduces labour duration and pain, accelerates labour progression, increases the likelihood of vaginal delivery. Details about the music were often missing; however, when provided, most studies implemented a single session lasting 15-30-minutes with experimenter-selected music. These findings have implications for using music listening as an accessible, non-pharmacological, evidence-based tool to support maternal well-being.

Keywords

Maternal perinatal well-being; everyday music listening; musical care; pregnancy; labour

How music listening can support antepartum and intrapartum maternal well-being: A scoping review

While first-time parents often experience excitement and joy, the transition to parenthood can be unexpectedly challenging and involve significant adjustments and a range of emotions (Centre of Perinatal Excellence [COPE], 2017). These challenges can be particularly overwhelming for mothers, with one in five Australian mothers experiencing perinatal anxiety and depression, resulting in significant annual costs of $877 million, relating to absenteeism, presenteeism, and reliance on healthcare services (PwC Consulting Australia, 2019). The perinatal period, spanning pregnancy and the year following birth, is marked by an increased prevalence of mental health disorders, which can profoundly impact both maternal and infant outcomes (Araji et al, 2020; COPE, 2017; Slomain et al, 2019). The challenges faced during this transition period can lead to various forms of psychological distress, adversely affecting maternal-infant bonding, familial relationships, infant development, as well as the functional well-being of mothers (Emmanuel & St John, 2010; Giallo et al., 2013; Law et al., 2018). Limited support from health services, financial barriers to paid services, and restricted accessibility for those residing in rural and remote areas further exacerbate mothers' risk of psychological distress (Andrade et al., 2014; Galbally et al., 2023; Lavender et al., 2016).

Effective resources play a pivotal role in assisting mothers during a time of significant emotional and physical changes (Lavender et al., 2016; Law et al., 2018). Tailored support groups and resources have been shown to enhance maternal agency, self-efficacy, and overall mental well-being (Lavender et al., 2016; Law et al., 2018; Sanfilippo et al., 2023). Resources that provide valuable information, coping strategies, and emotional support, help mothers to navigate the challenges that can arise from perinatal depression and anxiety. Ensuring resource accessibility, especially for mothers in rural and remote areas, can mitigate geographical barriers to maternal well-being (Galbally et al., 2023; Lavender et al., 2016). One resource to consider in supporting expectant and postpartum mothers to manage stress, anxiety, and depression, and promote mental well-being is music (Bauer et al., 2021; Cheung et al., 2023; Fancourt & Perkins, 2018; Sanfilippo et al., 2021).

Musical Care

Engaging with music is a non-pharmacological tool for enhancing health and well-being, offering mood regulation and stress management, among other benefits (Cheung et al.,

2023; Dingle et al., 2021; Fancourt & Perkins, 2018; Krause et al., 2018; Krause et al., 2023; Sanfilippo et al., 2021). Fancourt and Perkins (2018) define well-being as a multidimensional construct that encompasses both the absence of negative symptoms, such as depression, and the presence of positive psychological states, including emotional vitality, resilience, and life satisfaction. Music can promote health and manage disease symptoms through its physical and psychological benefits (Dingle et al., 2021; NCCIH, 2022). Though the processes through which the well-being effects of music engagement are achieved are not completely clear, Dingle et al.'s (2021) review found that the mechanisms of health outcomes related to pain, operation recovery, and patient satisfaction are reduced levels of distress and anxiety and increased relaxation. Music listening's effect on emotion regulation has also been cited as a mechanism for its impact on well-being (Dingle, et al., 2021).

"Musical care" encompasses music listening, music making, and music therapy and is defined in terms of natural and targeted musical care (Spiro & Sanfilippo, 2022). Natural music care involves the everyday, cultural practices which support the parent-infant relationship and nurture the infant's development and well-being. Targeted musical care employs evidence-based musical interventions and music therapy to enhance outcomes for parents and infants. When thinking about the perinatal period, musical care can focus on the parents' and infant's needs and well-being, as well as the parent–infant dyad, and entire family unit (Spiro & Sanfilippo, 2022). Despite the positive potential of musical care, the precise impact on health and well-being remains unclear (Dingle et al., 2021). It is important to examine the impact of engaging with music for well-being, considering both the psychological benefits and potential challenges; for example, maladaptive regulation strategies such as the use of music to ruminate (McFerran & Saarikallio, 2014; Saarikallio et al., 2015).

Music interventions have shown promise for pregnant and postpartum women with, or at risk of, mental illness, as they can support mother-child bonding, reduce maternal distress, including depression symptoms, and alleviate infants' chronic stress signs (Friedman et al., 2010; Rossen et al., 2016; Sun et al., 2024). Music listening has been reported to improve sleep quality and reduce sleep disturbances (Liu et al., 2016) and may potentially reduce stress, anxiety, and depression levels among expectant mothers (Sanfilippo et al., 2021). During childbirth, music listening offers non-pharmacological pain and anxiety relief, psychological support, and enhanced control for women in labour, emphasising the significance of personalised music choices (e.g., Ji et al., 2024; McCaffery et al., 2020). Despite the potential benefits of musical care, there is a need for further research to

understand the effectiveness, and nature of music listening on maternal well-being during the perinatal period (Konsam et al., 2023; McCaffery, et al., 2020).

Traditionally, research has focused on targeted musical care during the postnatal period, particularly on music therapy and infant outcomes in Neonatal Intensive Care Units (Haslbeck et al., 2020; Mohan et al., 2021; Poćwierz-Marciniak et al., 2024; Yue et al., 2021). Indeed, in the NICU setting, music therapy is beneficial for both the infant and caregivers, though studies do not often focus on parental outcomes (Roa & Ettenberger, 2018). While Sanfilippo et al. (2021) provided a broad overview on a variety of music interventions and practices for perinatal women, other recent reviews have been very targeted, such as focusing on music-based interventions for pain and anxiety during birth (Hunter et al., 2023) or on a single genre of music (e.g., classical; Konsam et al., 2023). Yet, musical interventions, such as music-making or music therapy, pose barriers to participation as they often require additional resources, specialised personnel (Davidson et al., 2014), and healthcare professionals' knowledge about their use and efficacy (Cheung et al., 2024). Thus, with the present review, we examined music listening specifically because it is a highly accessible component of musical care that is embedded in everyday life (Krause et al., 2015). Furthermore, the current review examines music listening during the antepartum and intrapartum periods, as opposed to being limited on music listening during labour and birth (McCaffery, et al., 2020). Crucially, it also provides detailed insights into specific types of music resources and the nature of their administration, potentially enhancing practical applications in maternal care given that McCaffery et al.'s (2020) discussion of the music resources was limited to the mode of music listening (i.e., whether headphones were used).

The Current Study

The current scoping review explores the role of music listening in enhancing maternal well-being throughout the prenatal and labour stages. Our scoping review had two aims. The first aim focuses on uncovering insights from published research on the impact of music listening on mothers' well-being during the antepartum and intrapartum periods. Therefore, research question (RQ) 1 asked, what does existing research indicate about the influence of music listening on maternal well-being within the antepartum and intrapartum periods?

The second aim concerned examining the features and application of the music used in the published research. As Cheung et al. (2024) highlight, a barrier to the use of music in perinatal care is knowledge and evidence about its efficacy. Focusing on the attributes of music resources allows for interpretation of findings, replication of studies and the ability to

make meaningful cross-study comparisons (Konsam et al., 2023; Robb et al., 2018). It is also essential for isolating the factors responsible for any observed changes to well-being (Robb et al., 2018). Thus, our second aim was guided by asking, What are the characteristics of the music resources that have been used in the research leading to the promotion of well-being (RQ2)?

Method

Study Design

Our scoping review was guided by Arksey and O'Malley's (2005) framework with Levac et al.'s (2010) improvements, consisting of: (1) identifying the research question, (2) identifying relevant studies, (3) study selection, (4) charting the data and (5) collating, summarising, and reporting the results. Reporting followed the Preferred Reporting Items of Systematic Reviews and Meta-Analyses Extension for Scoping Reviews (PRISMA-ScR) checklist (see Appendix A; Tricco et al., 2018).

Search Strategy

Three search terms (music, listening, perinatal) and variations were used[1]. Database searches included the Cumulative Index to Nursing and Allied Health Literature (CINAHL), Cochrane Library, EMCare (OVID), Medline (OVID), PsycArticles, PsycInfo, PubMed, SAGE Journals, Scopus, Web of Science, and Wiley online library. Searches in some databases were restricted to title, abstract, and keywords due to a high volume of ineligible studies (Arksey & O'Malley, 2005; Levac et al, 2010).

Study Selection

Quantitative and qualitative study designs were eligible if they focused on music listening during pregnancy or birth. Inclusion criteria included: peer-reviewed, empirical studies with primary data collection (including randomised, quasi-randomised, and one-armed trials, and qualitative research); published in English, dated between January 1, 2000 and April 11, 2024 (date the most recent search was executed); involving music listening; and

[1] Aiming to conduct a broad search, our search strategy was based on relevant keyword terms and synonyms. Terms were initially searched individually, and then they were combined: they included music AND listen* AND (antepartum OR "ante-partum" OR "ante partum" OR "intra partum" OR "intra-partum" OR intrapartum OR birth* OR pregnan* OR labour OR labor OR prenatal OR "pre-natal" OR "pre natal" OR "peri-natal" OR "peri natal" OR "perinatal" OR primigravida OR multiparous OR nulliparous). Appendix B includes an example of our database search procedure for two of the databases used.

with study participants who were pregnant (at any time during pregnancy through labour and birth). Exclusion criteria were: studies that only involved activities other than music listening (such as music therapy, group lessons, and singing); articles focused solely on fertility, contraception, neonatal, or childhood outcomes; and publications without primary data. The first author screened all study titles and abstracts before conducting full-text screening in consultation with the other authors. Each article underwent full review for inclusion based on the inclusion/exclusion criteria. Discrepancies were resolved via discussion amongst all authors with a bias towards inclusion.

Charting the Data

To address the research questions, the following publication details were extracted: author(s), title, year, country, study design, aim(s), sample size, outcome measures, findings, and music stimuli details (i.e., setting, type of music listened to, frequency, duration, listening device, and volume).

Collating, Summarising, and Reporting the Results

Descriptive frequencies have been used to summarise the nature of the studies included in the present review. In line with Mak and Thomas (2022; see also Levac, et al., 2010), the extracted data were subjected to Thematic Analysis (Braun & Clarke, 2013; 2019). Guided by our research questions (Mak & Thomas, 2022), one analysis was focused on examining the reported outcomes of the studies; a second analysis was directed at the musical and administration features. In both analyses, the first author coded the data and grouped similar initial codes. Next, the first and third author grouped codes to form analytical themes. A narrative analysis of each theme was conducted based on the study objectives (Braun & Clarke, 2013; 2019). The second author served as a critical friend (Sparkes & Smith, 2014), assisting the first and third authors in refining higher-order themes and sub-themes, challenging assumptions and highlighting alternative perspectives and interpretations. Lastly, the final themes were labelled and reported. The authors acknowledge that their experiences and prior knowledge were brought into the analytic process (Braun & Clarke, 2019). The first author is a psychologist, who has worked in a Hospital Neonatal Intensive Care Unit; the second author is a PhD researcher investigating perinatal mental health; and the third author is a music psychology researcher studying the influence of music engagement on well-being.

Results

In total, 1117 documents were identified (see Figure 1 for the PRISMA flow chart). After removing duplicate articles (n = 561), the remaining titles and abstracts (n = 556) were

reviewed and screened for inclusion. After reviewing abstracts, 146 articles were subjected to full-text review, resulting in the final data set of 55 articles included in the analysis.

As outlined in Table 1, Randomised Controlled Trials were the most common study design (n = 35), followed by quasi-experiments (n = 12), experiments (n = 3) and qualitative studies (n = 3). The studies were conducted in 22 different countries, with the majority undertaken in Turkey (n = 16). The thematic analysis identified two overarching themes, such that the reviewed studies pertained to outcomes of listening to music during pregnancy (n = 30) or during birth (n = 25) (detailed in Table 1).

Outcomes of Using Music During Pregnancy

The outcomes of music listening during pregnancy were categorised as belonging to three sub-themes: psychological well-being, attachment, and physiological well-being (RQ1).

Psychological Well-being

Twenty out of 31 studies examined the effect of music listening on perinatal anxiety and stress (see Table 1). Six studies investigated whether music listening is effective in reducing anxiety in full-term pregnant women during a Nonstress Test, a test aimed at monitoring foetal heart rate and movement (Erkun Dolker & Basar, 2019; Estrella-Juarez et al., 2023; Garcia Gonzalez et al., 2018; Kafali et al., 2011; Milona et al., 2020; Şimşek Küçükkelepçe & Timur Taşhan, 2018).

Six studies focused on the impact of music listening on maternal stress, including implications for birth outcomes and foetal development (Bauer et al., 2021). For example, Bauer et al. (2021) demonstrated that a 20-minute relaxation intervention involving music significantly reduced maternal stress levels. Notably, women in earlier stages of pregnancy reported higher rates of relaxation following the intervention compared to those in later stages, indicating a potential influence of gestational age on perceived stress (Bauer et al., 2021). Similarly, Wulff et al. (2021) found that music listening had an immediate positive effect on emotional state, leading to reduced stress levels and salivary cortisol during the prenatal period.

Furthermore, psychological well-being outcomes examined included happiness and depression. For instance, Hoorijani, et al. (2022) found that music listening increased pregnant women's happiness. However, these outcomes received less attention than stress and anxiety symptoms. Additionally, Fancourt and Perkins' (2018) exploration of the longitudinal impact of prenatal music listening found that music listening could serve as a valuable tool to mitigate the risk of postnatal depression, particularly among women experiencing low well-being. These findings underscores the potential of music as a simple

yet effective intervention to uplift mood and promote emotional well-being during pregnancy.

Attachment

Seven studies focused on the positive impact of music listening on maternal-foetal attachment and bonding (see Table 1). While distinct concepts, bonding and attachment are often used synonymously (Wittkowski et al., 2020). For the purposes of this review, the terms bonding and attachment are used interchangeably to describe the reciprocal relationship between mother and infant. Notably, the results underscored the efficacy of listening to lullabies in nurturing attachment within the mother-foetus dyad (Baltaci et al., 2022), particularly among women with a high-risk pregnancy (Baltaci & Baser, 2021). Additionally, Wulff et al. (2021) observed immediate increases in bonding following music listening sessions, attributed to elevated oxytocin levels. Wulff et al. (2021) also reported prolonged effects, finding a significant increase in perceived closeness to the unborn child from 30 weeks of pregnancy until birth.

The efficacy of music listening on attachment may be related to music selection: Baltaci et al. (2022) found researcher-selected lullabies were more effective in increasing attachment than participant-selected lullabies. It is also important to acknowledge that Chang et al.'s (2015) two-week intervention revealed no statistically significant differences in maternal-foetal attachment post-test scores between a control group and a music listening group. Nonetheless, Chang et al. (2015) suggested avenues for further exploration, such as investigating varying the duration of music listening or types of music interventions, to ascertain their impact on maternal-foetal attachment.

Physiological well-being

Twelve studies examined the impact of music listening on physiological well-being during pregnancy, specifically focusing on pain, sleep, blood pressure, and heart rate (see Table 1). While music was not effective in reducing pain during first-trimester surgical abortion (Guerrero et al., 2009) or second-trimester genetic amniocentesis (Hanprasertpong et al., 2016), it had a significant positive impact on pregnant women's quality of sleep (Liu et al., 2016; Sanll et al., 2022). Moreover, music listening was deemed a safe method to alleviate physiological symptoms experienced by women admitted to hospital for monitored bed rest due to having high-risk pregnancies and pre-hypertension (Brun et al., 2011; Sundar et al., 2015, Yeager, 2019).

Outcomes of Using Music During Birth

Three sub-themes concerned the reported outcomes of music listening during birth

(including labour and caesareans): pain management, psychological well-being, and labour progression (RQ1).

Pain Management

Seventeen out of the 25 studies investigated the pivotal role of music listening in effectively managing pain throughout the childbirth process (see Table 1). Fourteen reported statistically significant results indicating that music reduced pain during the early stages of labour (e.g., Gokyildiz Surucu et al., 2018; Liu et al., 2010; Paoin et al, 2023), or all stages of labour (e.g., Simavli et al., 2014). Using the Visual Analogue Scale for Pain (VAS), numerous studies indicated the effectiveness of music in reducing pain in music listening groups relative to control groups (Amanak, 2020; Buglione, 2020; Dehcheshmeh & Rafiei, 2015; Hosseini et al., 2013; Perkovic et al., 2021; Phumdoung and Good, 2003; Terzi, 2022). Furthermore, Phumdoung et al. (2014) found that combining music listening with specific body positions significantly mitigated labour pain and distress compared to oxytocin augmentation. Browning's (2000) qualitative study emphasised the role of music in distracting women from pain during childbirth, suggesting its effectiveness as a preparatory aid. Notably, Gönenç and Dikmen (2018) highlighted the affordability and effectiveness of music listening, both exclusively and in combination with dancing, as an intervention that actively engages women and their partners during labour.

However, the efficacy of music listening supporting well-being during labour may depend on the phase. For instance, Liu et al. (2010) found no significant differences between music listening and control groups during the active phase of labour. Additionally, Anğin et al. (2020) reported that music did not significantly influence pain levels from the end of active labour until the completion of episiotomy repair. Regarding caesareans, preoperative music was found to reduce pain in women undergoing elective caesarean delivery (Li & Dong, 2012), although perioperative music listening was not associated with postoperative acute pain scores (Kakde et al., 2023). Kakde et al.'s (2023) RCT offers further evidence of the complex nature of the impact of music listening on pain as pain catastrophising was significantly reduced, as was anxiety, even though there was no significant finding concerning acute pain (and the study did not collect data on persistent pain).

Psychological Well-being

Twelve studies investigated the impact of music listening on anxiety levels during childbirth (see Table 1). Seven of these studies focused on vaginal delivery and five examined caesarean delivery. Liu et al. (2010) found that the use of music supported labouring women as it significantly reduced anxiety, particularly in the early phase of labour.

Drzymalski et al. (2020) found that experimenter-chosen classical music (Mozart) reduced anxiety before caesarean delivery; however, participant-selected music did not have the same preoperative anxiety-reducing effect. Horasanli and Demirbas (2022) found that women who listened to Sufi music (a traditional Turkish genre) during a caesarean section reported lower levels of anxiety because the music acted as a distraction.

Furthermore, music listening during childbirth yielded additional psychological benefits, including relaxation, managing stress, and alleviating fears associated with childbirth (Anğın et al., 2020; Chuang et al., 2012; Gönenç & Dikmen, 2018; Kushnir et al., 2012; Pasternak et al., 2019; Perković et al., 2021; Ying et al., 2001). For instance, Angin (2020) found that Turkish pop music significantly lowered stress levels compared to classical music and no music. Kushnir et al. (2012) reported that women listening to music before a caesarean section experienced increased positive emotions, decreased negative emotions, and perceived the surgery as less threatening relative to women who birthed without music. Additionally, music listeners exhibited reduced systolic blood pressure, increased diastolic blood pressure, and a higher respiratory rate, indicative of decreased anxiety and stress (Kushnir et al., 2012).

Labour Progression

Four studies investigated the impact of music listening on labour progression (see Table 1). Garcia Gonzalez et al. (2018) found that nulliparous pregnant women (i.e., women who have not previously given birth) who listened to music experienced a significant reduction in the first stage of labour compared to those who did not listen to music. Additionally, women in the music intervention group were less likely to undergo caesarean sections and had a higher rate of non-medicated spontaneous births compared to those not exposed to music (Garcia Gonzalez et al., 2018). Similarly, Pasternak et al. (2019) found that choosing to listen to music during the latent phase of labour improved the likelihood of first-time mothers having a vaginal delivery, irrespective of stress levels. Given Pasternak et al.'s (2019) study was not designed as a blinded RCT, additional work is needed to understand the mechanisms underpinning music's role in promoting spontaneous vaginal birth.

Music listening can also assist with labour progression: the music listening intervention group in Hosseini et al. (2013) exhibited a significant improvement in labour progression one and two hours after the music intervention compared to the control group. Likewise, Phumdoung et al. (2014) found that combining relaxing music with specific body positions significantly reduced the duration of active labour compared to a group that received oxytocin alone.

Examining the Music Listening Resources

Two themes were identified regarding the music resources involved in the reviewed studies (detailed in Table 2). Addressing RQ2, these themes encompassed the administration of music (with six sub-themes: setting, music selection, duration, frequency, listening device, and volume) and musical features (with three sub-themes: style, tempo, and presence of lyrics).

Musical Administration

Musical administration refers to how music was chosen and utilised in the context of the reviewed studies. Interestingly, the majority of the studies did not speak to the qualifications of the people involved in selecting and/or administering the music components: only one study referred to the involvement of a credentialed music therapist (Browning, 2000) and only four studies mentioned consulting with musicology experts (Baltacı & Baser 2021; Baltacı et al., 2023; 2024; Şimşek Küçükkelepçe et al., 2018). We employed Howlin and Rooney's (2020) categorisation to define the individual(s) responsible for selecting the music and to characterise the duration, frequency, and volume of the music used.

During pregnancy, the setting where participants listened to music was predominantly in a hospital (58%), followed by at home (29%), or a combination of both (10%). Music selection varied, with options including experimenter-chosen (61%), participant-chosen from an unlimited range (3%), or a limited range of choices (19%). Some studies featured three-arm trials with multiple groups and a control group to compare experimenter-chosen and participant-chosen music (10%), while 6% did not report how the music was selected. The duration of music listening sessions varied, with the majority (45%) lasting 15.01-30.00 minutes. Most studies involved a single listening session (39%), followed by 9 to 21 sessions (23%). Music was predominantly listened to through headphones (48%), with 61% of studies not reporting the volume, 16% playing music between 60-70dB, and 22% allowing participants to control the volume.

During birth, most music listening occurred in a hospital setting (84%), with some at home (4%) or both at home and the hospital (8%). Experimenter selection of the music was prevalent (44%), and most studies involved a single listening session (64%), lasting over an hour (32%). Details regarding the listening device and volume were less frequently reported: 24% did not specify the device used and 88% did not report the volume. However, when reported, headphones were commonly used (60%), and music was typically played at 60-70dB (8%).

Musical Features

The second theme encompasses the characteristics of the music resources utilised in the reviewed studies, focusing on style, tempo, and the presence of lyrics.

Style. During pregnancy, classical music predominately used when chosen by the experimenter (*n* = 3), self-selected from a limited range (*n* = 7), self-selected from an unlimited range (*n* = 2), or selector was not reported (*n* = 2). Similarly, during childbirth, the prevailing style of music participants listened to was classical, irrespective of whether it was chosen by the experimenter (*n* = 4), self-selected from a limited range (*n* = 4), or self-selected from an unlimited range (*n* = 1).

Out of the 55 studies, the style of the musical pieces was frequently characterised by using a genre label, including pop (*n* = 7), jazz (*n* = 4), rock (*n* = 4), and easy listening (*n* = 2). Additionally, seven studies incorporated lullabies, while others described the music style as soft, soothing, and relaxing. In some cases (e.g., Phumdoung & Good, 2003; Phumdoung et al., 2014), it was challenging to categorise the music chosen by participants into specific style categories due to the lack of information.

A notable trend across studies was the implementation of culturally appropriate music, often reflecting the country of origin. For instance, studies conducted in Turkey utilised various forms of Turkish music, while those in Taiwan incorporated selected Taiwanese songs. Furthermore, music from Indonesia and Germany was tailored to their respective cultural contexts. As a counter example, however, Iranian studies exhibited a less culturally focused approach.

Tempo. Explicit reporting of tempo, indicated by reporting beats per minute (BPM), was limited to eight out of the 55 studies. These studies identified tempos ranging from 58 to 90BPM, with some studies selecting 60-75BPM to mirror the human heart rate (e.g., Brun et al., 2011; Estrella-Juarez et al., 2023). Descriptive terms were also used to characterise tempo, such as "slow rhythm" and "low to medium tone" (Horasanli & Demirbas, 2022, p. 3). Reported recommendations included choosing music without extreme changes in dynamics, favouring soft and relaxing compositions (Simavli et al., 2014).

Presence of Lyrics. The majority of studies (82%) did not specify whether the music contained lyrics. Detailed descriptions were rare: some explicitly mentioned using “non vocal” instrumental music (e.g., Shams et al, 2021), "light vocals" (e.g., Ventura et al., 2012), and only a few studies mentioned specific aspects of vocal content, such as soothing female voices or composer-written songs tailored for pregnancy (Chuang et al., 2012). Some studies (e.g., Yeager, 2019) incorporated verbal instructions or guided imagery alongside music to induce a calm state. Nwebube et al. (2017) provided the greatest detail, stating that the

composer-written songs were specifically composed for pregnancy (these songs used phrases aimed at inducing a calm state and applied repetition of musical phrases aimed to further enhance the effect).

Discussion

Building upon prior research indicating the positive impact of music listening on physiological health and overall well-being (Dingle et al., 2021; Fancourt & Perkins, 2018; Krause et al., 2018; Krause et al., 2023; Sanfilippo et al., 2021), the present scoping review underscores the effectiveness of music listening as a form of natural musical care to support maternal well-being prenatally and during birth (RQ1). In particular, the benefits experienced during pregnancy pertain to psychological well-being, attachment, and physiological well-being. Taken together, the findings overwhelmingly confirm the use of music listening to alleviate stress and anxiety, though additionally music listening nurtures maternal-foetal attachment and improves physiological symptoms. Well-being benefits experienced during birth include pain management, psychological well-being, and labour progression: music listening during labour is associated with shortened first-stage labour, increased rates of vaginal deliveries, and accelerated labour progression. Notably, all 52 quantitative studies reviewed demonstrated statistically significant findings concerning a range of well-being outcomes[2], underscoring the therapeutic potential of music listening during the perinatal period to positively impact maternal well-being.

There is alignment with these findings and previous, broader considerations of music listening and well-being. For instance, the focus of studies on pain reduction and findings concerning a reduction in anxiety and stress are consistent with Dingle et al.'s (2021) review which highlighted decreased physiological arousal as an important mechanism for such effects. Indeed, music listening is widely recognised as a tool used to regulate mood (Schafer et al., 2013) especially in everyday life (Krause, et al., 2023). Music listening can serve as a distraction, contributing to an increased sense of control (McCaffery et al., 2020).

The present review adds evidence that music listening supports general physiological well-being through improved sleep and regulation of heart rate and blood pressure. Additional benefits were found for women facing high-risk pregnancies, such as those admitted to the hospital with pre-hypertension (Brun et al., 2011; Sundar et al., 2015), and in

[2]Noting that not all analyses were significant in three of the 52 quantitative studies. For instance, while Chang et al. (2015) found no statistically significant results concerning perceived stress and maternal-foetal attachment; their research found significant reductions in psychosocial stress levels, particularly in domains such as baby care, changes in family relationships, and maternal role identification (Chang et al., 2015).

enhancing labour outcomes. Findings as to reduced perceived pain during labour (Gokyildiz Surucu et al., 2018; Li & Dong, 2012; Liu et al., 2010; Simavli et al., 2014) and potentially reducing the need for caesarean sections (Garcia Gonzalez et al., 2018; Phumdoung et al., 2014) advance our understanding of mechanisms by which music listening promotes well-being regarding pain and surgery specifically. Hunter et al.'s (2023) review found that the effects of music interventions on pain alleviation lessened as labour progressed. It will be beneficial for additional research and reviews to further examine potential differences in efficacy by pain level and context.

The second research aim considered the characteristics of music resources employed in the research demonstrating well-being improvements (RQ2). It is important to stress that there was substantial variability in the extent of detail provided concerning the music resources used. In many instances, minimal information about the actual music used was provided. This lack of detail poses challenges for reproducing and applying the findings (as do the vague descriptions of the music – e.g., "soft and relaxing"). From what was reported, a single music listening session, typically with music chosen by the experimenter, was common. Although self-selected music is associated with positive listening outcomes (e.g., Krause, et al., 2015), music out of someone's control can still result in positive well-being benefits (Groarke, et al., 2020; Krause & Davidson, 2021). Indeed, choice with regard to music listening is a continuum (Krause, et al., 2014), such that actively including music during a birth (even if someone else selects the music) is, for example, is still affording the mother agency and control which may partially underpin benefits experienced from music listening. The musical selections varied widely in terms of style, reflecting the diversity not only in geographical study locations but also who selects the music and varied listening contexts.

Clinical Implications

As this review demonstrates, the benefits of incorporating music listening into the antepartum and intrapartum periods are multifaceted. Listening to music allows mothers to derive benefits from an activity they may already engage in regularly (given that music listening is a readily accessible activity, already integrated into many people's everyday lives – Krause et al., 2015). Indeed, expectant and new mothers can derive well-being benefits from their existing everyday listening preferences and practices, without the need for targeted interventions. Considering that benefits often emerged from short sessions (15-30 minutes), music listening offers a very accessible form of natural musical care which can be easily

integrated into mothers' daily routines. Moreover, the variety of music styles used in the research resulting in significant improvements to well-being highlights flexibility in that people can use their preferred music. Thus, listening to music may be a simple yet powerful way for mothers to self-regulate their emotions as well as enhance their self-efficacy and well-being during the perinatal period.

Health professionals can also draw on these findings to assist expectant and new mothers in using music listening to support their well-being. Music listening offers a practical, non-pharmacological strategy to support prenatal care and childbirth. Moreover, when music listening involves partners and family members, it can holistically support maternal and family well-being (Gönenç & Dikmen, 2018), especially when broader cultural and structural contexts are considered (Ettenberger, 2017). In recognising the challenges faced by women in rural and remote areas in accessing perinatal care (Galbally, et al., 2023), music listening resources can play a crucial role in promoting maternal well-being given they can be easily accessed online. Such resources could include culturally diverse playlists and guided relaxation, catering to the varied needs of mothers in different cultural contexts.

Limitations and Future Research Directions

The present scoping review, while informative, has several limitations. Firstly, most of the included studies focused primarily on low-risk pregnancies, such that additional research and review is necessary to consider the potential impact of music listening in higher-risk pregnancy scenarios and postnatally. Additionally, future research could investigate how music listening impacts the maternal-foetal relationship, potentially enhancing bonding and attachment, contributing to a more comprehensive understanding of music's role in supporting individual and family well-being, and children's developmental outcomes.

Secondly, the inadequate reporting of music resources presents a challenge for reproducibility and practical application of evidence-based music listening strategies. However, as Cheung et al. (2024) noted there is a high demand for evidence-based guidance on music use in perinatal care, so enhanced clarity in reporting should increase its use by healthcare professionals. Therefore, in line with Robb et al.'s (2018) recommendations, future research should adopt a standardised approach to reporting music resources. In addition to clearly articulating the type of music activity under investigation (Dingle, et al., 2021), it is important to prioritise detailed information about the music involved (including specific music styles and features) as well as characteristics of its administration (such as the devices, settings, and involvement of any healthcare professionals, including credentialed music therapists). Enhanced reporting transparency will facilitate the refinement and

standardisation of music interventions aimed at promoting maternal well-being. To this end, explicit consideration of participants' previous experiences with, and perceived importance of, music could also advance our understanding of the nuances concerning the efficacy of music listening for maternal well-being.

While the present review encompasses evidence from 22 countries, further (ideally multi-country) research is needed to understand the benefits of focused music listening within specific cultural and linguistically diverse contexts, which will help tailor dedicated musical care practices and specific, culturally appropriate interventions to meet the diverse needs of expectant mothers and promote positive birth experiences. Moreover, future research should explore how musical care via music listening can be used to support expectant mothers in rural and remote locations, considering factors such as music preferences and device accessibility. For example, while Hunter et al. (2023) characterised headphones as particularly useful in relieving mothers' anxiety and pain during caesareans, the use of speakers could be a suitable way to involve a partner or other support people. Thus, attention to the possible differences in efficacy by device (e.g., headphones versus speakers) is warranted (as both device and selection method impact music listening experiences - Krause, et al., 2014).

Future studies can build upon our findings to refine research methodologies and widen the scope to include other musical care activities (including those that are therapist-led), enabling comprehensive comparisons. Such research could investigate the prolonged impact of music listening on maternal well-being during pregnancy as well as throughout the postnatal period. Conclusions from the present study should also be considered within the context of the limitations of using the PRISMA extension for scoping reviews and methodology (Arksey & O'Malley, 2005: Levac et al., 2010; Tricco et al., 2018). To further enhance our understanding of the intricate connection between the daily stressors experienced by mothers, music listening practices, and their well-being, employing additional primary data collection methods, such as diary and experience sampling methods, could provide longitudinal insights into music listening practices and outcomes, including motivations and well-being effects. Research tracking music listening from conception through the postpartum period could offer valuable insights into prenatal music listening programs aimed at enhancing maternal-foetal bonding and parental well-being.

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Table 1.

Summary of the Studies Included in the Scoping Review ($N = 55$)

Author	Year	Country	Research design	Condition assignment	Sample Size	Theme	Music Resource	Setting	Music Choice	Duration	Frequency	Listening Device	Volume
Drzymalski et al.	2020	USA	RCTa	Random, online tool	150	Birth (Caesarean): PsychWB	Pandora Station Broadcast (G1) & Mozart's Classical music (G2)	Hospital	G1 - SCU, G2 - EC	Entire procedure and additional time	One session	iPod with speaker	Medium, adjustable (to participant preference)
Horasanli & Demirbas	2022	Turkey	RCTa	Random, coin flip	4	Birth (Caesarean): PsychWB	Sufi music, 60 - 72 bpm	Hospital	EC	Entire procedure and additional time	One session	Earpiece	Not reported
Kushnir et al.	2012	Israel	RCTb	Random, preprepared sealed envelopes	60	Birth (Caesarean): PsychWB	Light popular music, light classical music, and Israeli tunes	Hospital	SCL	30.01-1hr	One session	Discman, earphones G1, Headphones MP3 player, G2, Headphones own phone	Not reported
Terzi	2022	Turkey	RCTa	By arrival order to the clinic	92	Birth (Caesarean): Pain	Classical Turkish music in the Acemashiran maqam (G1), and the music of their own choice (G2)	Hospital	G1 - EC G2 -SCU	Entire procedure and additional time	One session	Apple device, Bluetooth speaker during operation,	Not reported
Kakde et al.	2023	Singapore	RCTa	Random, 1:1 allocation via computer sequence	108	Birth (Caesarean): PsychWB, Pain	Apple Music	Hospital	SCU	Entire procedure and additional time	One session	Earphones in recovery	Not reported
Li & Dong	2012	China	RCTb	Random, computer-generated number table	60	Birth (Caesarean): PsychWB, Pain	Chinese classical music	Hospital	SCL	15.01-30.00	One session	Not reported	Not Reported
Gönenç & Dikmen	2018	Turkey	RCTa	Random, block method by computer program	93	Birth (Labour): PsychWB	Pop music, slow pop, Turkish folk music, mystic (religious music)	Hospital	SCU	15.01-30.00	One session	Headphones	Not reported

Ar-Rayyan et al.	2023	Indonesia	Quasi-experiment	Not specified	36	Birth (Labour): PsychWB, Pain	G1 to 3 binaural beats, G4 preferred genre	Not reported	SCU & EC	15:01 – 30.00min	14 sessions	Not reported	Not reported
Paoin et al.	2023	Thailand	RCTa	Random, preprepared sealed envelopes	300	Birth (Labour): Pain	*"Musical Journey through Pregnancy"* playlist	Hospital	EC	30:01-1hour	Once	Headphones	Not reported
Buglione et al.	2020	Italy	RCTa	Random, 1:1 allocation via online tool	30	Birth (Labour): Pain	Not reported – selected songs at their discretion	Hospital	SCL	Entire procedure	One session	Speaker	Not reported
Browning	2000	Canada	Qualitative	N/A	11	Birth (Labour): Pain	Classical relaxation music, Contemporary music for relaxation, Classical relaxing rocking music, Contemporary vocal music, lullabies and soothing music	Home, & Hospital	SCU	>1hr	Greater than three, but the final number not reported	Not reported	Not reported
Dehcheshmeh & Rafiei	2015	Iran	RCTa	Random, by maternity ward supervisor	90	Birth (Labour): Pain	Piano or waves sound	Hospital	EC	15.01-30.01	One session	Headphones	Not reported
Phumdoung & Good	2003	Thailand	RCTa	Random, by computer program	110	Birth (Labour): Pain	Soft Western music without lyrics and Jazz, slow beat 60-80 bpm	Hospital	SCL	>1hr	One session	Tape recorder, headphones	Not reported
Amanak	2020	Turkey	RCTa	Random, online tool	30	Birth (Labour): PsychWB, Pain	Turkish Instrumental Ney music, Segah modal rhythm	Hospital	EC	>1hr (3x30mins)	3 listens in one session	CD player, earphones, or speaker	Not reported
Liu et al.	2010	Taiwan	RCTa	Random (technique not specified)	60	Birth (Labour): PsychWB, Pain	Classical, light, popular, crystal children's or Chinese religious music	Hospital	SCL	>1hr (2x30mins during two stages of labour)	2 listens in one session	Participant chose headphones or no headphones	Not reported

Simavli et al.	2014	Turkey	RCTa	Random, by computer program	156	Birth (Labour, NST): PsychWB, Pain	Classical music, Turkish art music, Turkish folk music, Turkish classical music and popular music Second stage labour music changed to more rhythmic to support pushing.	Hospital	SCL	>1hr, entire labour	One session	Headphones	Volume changed after the second stage of labour
Gokyildiz Surucu et al.	2018	Turkey	RCTa	Random, coin flip	50	Birth (Labour): PsychWB, Pain	Acemasiran mode music	Hospital	EC	>1hr	One session	Earphones	Not reported
Hosseini et al.	2013	Iran	Experiment	Random (technique not specified)	30	Birth (Labour): Pain, LP	“Barane Eshgh” (Love Rain) composed by Manouchehr Cheshmazar	Hospital	EC	>1hr	One session	Headphones	Not reported
Anğın et al.	2020	Turkey	RCTb	Random (technique not specified)	90	Birth (Labour): PsychWB, Pain	G1: Classical music, G2: Turkish pop music, G3: control (noise-reducing headphones, but no music). 90min CDs	Hospital	EC	Entire procedure, to the end of episiotomy	One session	Headphones	60-70dB
Pasternak et al.	2019	Israel	Quasi-experiment	Patient choice	119	Birth (Labour): PsychWB, LP	G1: Rhythmic G2: classical music.	Hospital	EC	>1hr	One session	Speakers in the delivery room	Not reported
Ying et al.	2001	Hong Kong	Qualitative	N/A	18	Birth (Labour):PsychWB	Not reported	Hospital	Not reported	Not reported	Not reported	Not reported	Not reported
Chuang et al.	2012	Taiwan	Experiment	Random, by recruitment month (even/odd)	129	Birth (Labour): PsychWB	Relaxation audiobook produced by the John Tung Foundation used a female voice with a soft musical background.	Hospital	EC	5.01-15.00	22+ session	MP3 player with earphones	Not reported
Phumdoung et al.	2014	Thailand	Quasi-experiment	Not random, dependent on physician’s order for oxytocin	88	Birth (Labour): Pain, LP	Soft soothing relaxing Instrumental music, 2 albums one tempo 58-	Hospital	EC	>1hr	One session	Not reported	Not reported

							70bpm, other tempo 66-72bpm						
Perković et al.	2021	Bosnia and Herzegovina	RCTa	Random (technique not specified)	198	Birth (Labour): PsychWB, Pain	Classical music of participants' choice	Home	SCL	5.01-15.00	22+ sessions	Not reported	Not reported
Garcia Gonzalez et al.	2018	Spain	RCTa	Random, online tool	409	Birth (Labour): LP Pregnancy (NST): PsychWB, PhysioWB	Instrumental music - “Musical Journey through Pregnancy” by Gabriel F. Federico, 60-75bpm	Hospital, Home, Hospital	EC	30.01min - 1hr	16 sessions	CD player, no headphones	65–70 dB, under participant control
Erkun Dolker & Basar	2019	Turkey	Quasi-experiment	Not random, sequential sampling method	100	Pregancy (NST): PsychWB	Turkish classical music, Turkish folk music, or classical music	Hospital	SCL	15.01-30.00	One session	MP3 player, earphones	Participant control
Djohan et al.	2020	Indonesia	Quasi-experiment	Non random	60	Pregnancy: PsychWB, Attachment	Gendhing Gamelan, Javanese traditional music piece in slendro sanga scale	Health Centre	EC	5.01-15.00	One session	Wireless headset	Medium volume (to be "heard" but not too loud)
Baltacı et al.	2022	Turkey	RCTa	Random, by computer program	120	Pregnancy: PsychWB, Attachment	G1 - Lullabies, G2 – self-selected music from selected records	Home	G1 - EC, G2-SCL	15.01-30.00	14 sessions	Headphones	Participant control
Araki et al.	2010	Japan	Quasi-experiment	Random (technique not specified)	43	Pregnancy: PhysioWB	Mozart's Sonata for Two Pianos in D Major, K. 448.	Hospital	EC	5mins or less	One session	CD Player, headphones	65dB, adjustable
Asmaria et al.	2023	Indonesia	Quasi-experiment	Not random	34	Pregnancy: PhysioWB, Pain	Classical with yoga	Health Centre	SCL	30:01-1 hour	8 sessions	Not reported	Not reported
Meepon et al.	2024	Thailand	RCTa	Random, 1:1 allocation via computer program	50	Pregnancy - PsychWB	Beethoven’s Piano Concerto No. 5, Movement II	Hospital	EC	5minutes or less	Once	Headphones, MP3	Not reported

Okyay and Uçar	2023	Turkey	RCTa	Random, by simple method involving order of presenting	159	Pregnancy - PsychWB	Relaxing music and maqams chosen: Rast, Neva, Buselik, Huseyni, and Saba	Hospital then home	EC	15:01 – 30.00min	7-8 sessions	CD recording	60dB
Chang et al.	2015	Taiwan	RCTa	Random (technique not specified)	296	Pregnancy: PsychWB, Attachment	Crystal music, nature sounds, classical music, lullabies, and symphonic music; the tempo of the music selections was selected to mimic the human heart rate (60-80bpm)	Home	SCU	15.01-30.00 min	14 sessions	Speaker or earphones	Not reported
Şimşek Küçükkelepçe & Timur Taşhan	2018	Turkey	Quasi-experiement	Not random	96	Pregnancy (NST): PhysioWB	Classical music, Turkish art music, Turkish folk music, Rehavi Makam music, Kurdish music, and hymns	Hospital	SCL	15.01-30.00	One session	MP3 player, headphones	Participant control
Kafali et al.	2011	Turkey	RCTb	Random, by random number table	201	Pregnancy (NST): PsychWB	Classical music, Turkish art music, Turkish folk music (60-72bpm)	Hospital	SCL	Entire procedure NST	One session	Tape recorder (cassette or CD)	Participant control
Ventura et al.	2012	Portugal	Experiment	Random, by random number table	157	Pregnancy (Amniocentesis) PsychWB	Light vocals, light instrumental, classical music, or vocal jazz (CD)	Hospital	SCL	15.01-30.00	One session	Loud Speakers or headphones	Participant control, 45-60dB
Nwebube et al.	2017	England	RCTb	Random, using bock design and prepared sealed envelopes	36	Pregnancy: PsychWB	Composer Jennie Muskett wrote specific songs “for use during pregnancy” aimed at inducing a calm state	Home	EC	15.01-30.00	22+ sessions	MP3 files	Not reported
Baltaci & Baser	2021	Turkey	RCTa	Random, computer-generated number table	76	Pregnancy: PsychWB, Attachment	Turkish lullabies (CD called “Our Lullabies” by Kaya and Igus)	Hospital	EC	15.01-30.00	2 sessions	Not recorded	Participant control

Yuksekol & Baser	2020	Turkey	RCTa	Random, online tool	60	Pregnancy: PsychWB, PhysioWB	Buselik makam songs and acemaşiran makam songs	Hospital	EC	15.01-30.00	2 sessions	Headphones	Not reported
Milona et al.	2020	Greece	Quasi-experiment	Not specified	80	Pregnancy (NST): PsychWB	Music track 'Kung Fu' Piano: Cello Ascends', a cover of the Piano Guys band.	Hospital	EC	5min or less	One session	Audio device with headphones	Not reported
Shams et al.	2021	Iran	Quasi-experiment	Not random	30	Pregnancy: PsychWB, Attachment	Relaxing, nonvocal music from an album by Arnd Stein	Hospital	EC	30.01-1hr	12 sessions	Delivered in a group setting	Not reported
Hanprasertpong et al.	2016	Thailand	RCTa	Random, using computer program and sealed envelopes	332	Pregnancy: PsychWB, PhysioWB	Thai classical music composed by King Bhumipol	Hospital	EC	Entire procedure	One session	Earphones	Not reported
Guerreroa et al.	2009/12	USA	RCTa	Random, sequential sequence and sealed envelopes	101	Pregnancy (Abortion): PsychWB, PhysioWB	Rock, Pop, Hip-hop, Rap, Classical, Jazz, Spanish, Alternative, Easy Listening and Reggae.	Hospital	SCL	Entire procedure	One session	iPod nano via headphones	Participant control
Brun et al.	2011	Canada	Quasi-experiment	Random (technique not specified)	11	Pregnancy: PhysioWB	Easy Listening (mostly harmonius melodies), 70-90bpm	Hospital	EC	15.01-30.00	One session	Portable CD player, headphones	Not reported
Sanlı et al.	2022	Turkey	RCTa	Random, by computer program	70	Pregnancy: PhysioWB	Musical pieces composed in Uşşak mode, Traditional Turkish Music (Sufi Music), performed by the TÜMATA (Turkish Music Research and Promotion Group)	Home	EC	15.01-30.00	14 sessions	mp3 player	60-70dB

Liu et al.	2016	Taiwan	RCTb	Random (technique not specified, but labelled as systematic)	121	Pregnancy: PsychWB, PhysioWB	Symphonic music (selected Taiwan songs performed by a symphony orchestra and Western classical music, nature sounds, lullabies), or Chinese children's rhymes and songs performed primarily by the glass armonica/Crystal Music. Tempo, 60–80bpm. Or participants chose self-selected music.	Home	SCL OR SCU	15.01-30.00	14 sessions	CD player	Not reported
Bauer et al.	2021	Germany	Quasi-experiment	Alternately assigned	38	Pregnancy: PsychWB	“Find Your Inner Peace”, Rostar	Hospital	EC	5.01-15.00	One session	Headphones	Not reported
Wulff et al.	2021	Germany	RCTa	Random (technique not specified)	172	Pregnancy: PsychWB, Attachment	Classical, calm music without lyrics (CD), and women also free to choose music they found relaxing	1 group in the Hospital, then home	EC	First session 15.01-30.00, then at home 5.01-15.00	22+ sessions	Music group with up to 3 other women -- G1: relaxation through passive listening, G2: singing, G3: control	Not reported
Fancourt & Perkins	2018	UK	Longitudianal (prospective cohort)	N/A	395	Pregnancy: PsychWB	Jazz, pop, rock, classical, Folk and R&B	Not reported	Not reported	Varied (categorised as ‘rarely; a couple of times a week; every day <1hour; every day 1–2hours; every day 3–5hours; every day 5+hrs)		Not reported	Not reported

Hoorijani et al.	2023	Iran	RCTb	Random, by simple method	30	Pregnancy: PsychWB	Relaxing music by Kitaro, the Japanese composer and musician	Home	EC	30.01-1hr	22+ sessions	Not reported	Not reported
Sundar et al.	2015	India	RCTa	Random, sequential sequence based on registration numbers	52	Pregnancy: PhysioWB	Instrumental music	Hospital	EC	5.01-15.00	3 sessions	Not reported	Not reported
Arabin & Jahn	2013	Germany	Cross-sectional	N/A	500	Pregnancy: Attachment	“Classical”, “pop/rock”, “play songs or lullabies” and “various”	Home	Not reported	Varied (categorised as daily, regularly 'at least weekly, occasionally/not regularly, or never)		Not reported	Not reported
Estrella-Juarez et al.	2023	Spain	RCTa	Random, online tool	343	Pregnancy (NST): PsychWB	Musical Journey through Pregnancy by Gabriel F. Federico, instrumental, slow rhythm (60 to 75 bpm, tempo mimics a human pitch between low and moderate, and a harmonious, smooth, and fluid melody with tonal qualities including string instruments or specially synthesised music)	Hospital	EC	30.01-1hr	multi listens within 1 session	iPod, wireless headphones	Not reported
Baltacı et al.	2024	Turkey	RCTa	Random, by computer program and order of clinic admission	126	Pregnancy: PsychWB	G1 Lullaby, (60-70bpm) G2 Mixed music (Nature sounds, classical western music, Turkish music (Acemaşiran mode)	Home	Group 1- EC Group 2 - SCL Group	15.01-30.00	14 sessions	Phone, headphones	Participant controlled
Yeager	2019	USA	Qualitative	N/A	12	Pregnancy(High risk): PhysioWB	Music adapted from The River (DeMaria 2003), guided imagery, visual imagery	Medical Centre	EC	15.01-30.00	3 sessions (1 of each intervention)	CD	Not reported

Note. RCTa = Randomised Controlled Trial, explicitly labelled as such in the publication; RCTb = Randomised Controlled Trial, as judged as meeting the core definition (i.e., an intervention involving a control group and random assignment) but not the CONSORT (2010) reporting guidelines; G1 = Group 1; G2 = Group 2; SCU = self-chosen music from unlimited range; SCL = self-chosen music from limited range; EC = experimenter chose; NST = Nonstress Test; PhysioWB = Physiological Well-being; PsychWB = Psychological Well-being; bpm = beats per minute; min = minutes; dB = decibels.

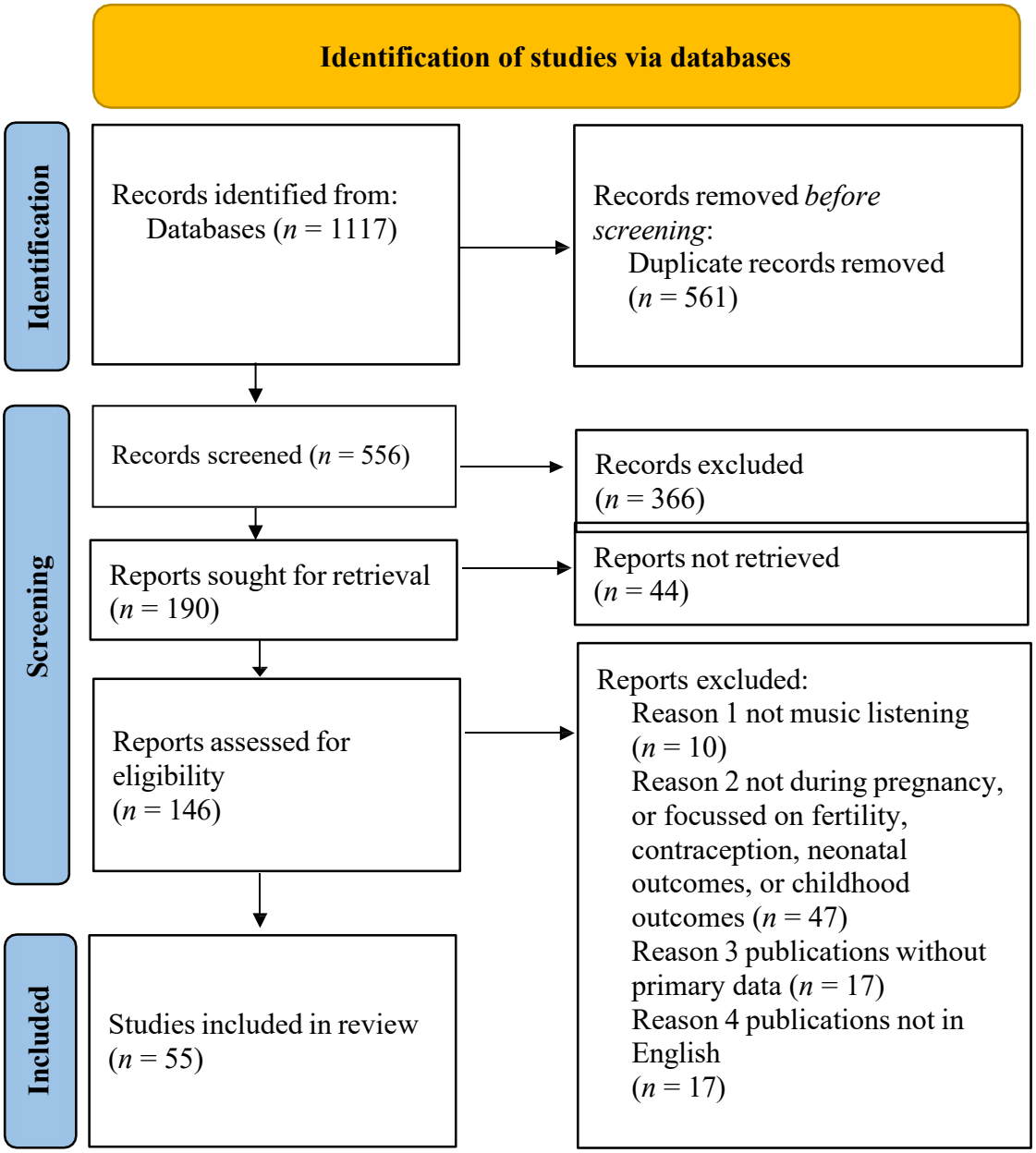
Table 2

Results of the Music Administration Analysis

Administration feature	Number of studies		
	Pregnancy	Birth	Total
Music choice			
Participant chosen from unlimited range (SCU)	1	3	4
Participant chosen from limited range (SCL)	6	8	14
Experimenter chosen (EC)	19	11	30
Multiple groups, mix of EC, SCU and SCL	3	2	5
Not reported	2	1	3
Duration			
5.00 min or less	3	0	3
5.01-15.00 min	4	2	6
15.01-30.00 min	14	4	18
30.01 min – 1 hour	5	3	8
>1hr	0	8	8
Entire procedure	3	3	6
Entire procedure and additional time before or after procedure	0	4	4
Not reported	2	1	3
Frequency			
Multiple listens within one session	1	3	4
1 session	12	16	28
2-8 sessions	6	0	6
9-21 sessions	7	2	9
22+ sessions	3	2	5
Not Reported	2	2	4
Volume			
45-70 dB	5	2	7
Participant had control	7	1	7
Not reported	19	22	1

Figure 1

PRISMA Flow Chart



Reproduced from Page, M. J. et al., (2021). The PRISMA 2020 statement: An updated guideline for reporting systematic review. *BMJ (Online)*, *372*, n71–n71. https://doi.org/10.1136/bmj.n71

Appendix A

Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) Checklist

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
TITLE			
Title	1	Identify the report as a scoping review.	0
ABSTRACT			
Structured summary	2	Provide a structured summary that includes (as applicable): background, objectives, eligibility criteria, sources of evidence, charting methods, results, and conclusions that relate to the review questions and objectives.	1
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known. Explain why the review questions/objectives lend themselves to a scoping review approach.	3-4
Objectives	4	Provide an explicit statement of the questions and objectives being addressed with reference to their key elements (e.g., population or participants, concepts, and context) or other relevant key elements used to conceptualize the review questions and/or objectives.	4
METHODS			
Protocol and registration	5	Indicate whether a review protocol exists; state if and where it can be accessed (e.g., a Web address); and if available, provide registration information, including the registration number.	N/A
Eligibility criteria	6	Specify characteristics of the sources of evidence used as eligibility criteria (e.g., years considered, language, and publication status), and provide a rationale.	5
Information sources	7	Describe all information sources in the search (e.g., databases with dates of coverage and contact with authors to identify additional sources), as well as the date the most recent search was executed.	5
Search	8	Present the full electronic search strategy for at least 1 database, including any limits used, such that it could be repeated.	5, Appendix
Selection of sources of evidence	9	State the process for selecting sources of evidence (i.e., screening and eligibility) included in the scoping review.	5
Data charting process	10	Describe the methods of charting data from the included sources of evidence (e.g., calibrated forms or forms that have been tested by the team before their use, and whether data charting was done independently or in duplicate) and any processes for obtaining and confirming data from investigators.	6

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
Data items	11	List and define all variables for which data were sought and any assumptions and simplifications made.	6
Critical appraisal of individual sources of evidence	12	If done, provide a rationale for conducting a critical appraisal of included sources of evidence; describe the methods used and how this information was used in any data synthesis (if appropriate).	N/A
Synthesis of results	13	Describe the methods of handling and summarizing the data that were charted.	6
RESULTS			
Selection of sources of evidence	14	Give numbers of sources of evidence screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally using a flow diagram.	6-12, Figure 1
Characteristics of sources of evidence	15	For each source of evidence, present characteristics for which data were charted and provide the citations.	6-12
Critical appraisal within sources of evidence	16	If done, present data on critical appraisal of included sources of evidence (see item 12).	6-12
Results of individual sources of evidence	17	For each included source of evidence, present the relevant data that were charted that relate to the review questions and objectives.	6-12
Synthesis of results	18	Summarize and/or present the charting results as they relate to the review questions and objectives.	6-12
DISCUSSION			
Summary of evidence	19	Summarize the main results (including an overview of concepts, themes, and types of evidence available), link to the review questions and objectives, and consider the relevance to key groups.	12-14
Limitations	20	Discuss the limitations of the scoping review process.	15-16
Conclusions	21	Provide a general interpretation of the results with respect to the review questions and objectives, as well as potential implications and/or next steps.	16
FUNDING			
Funding	22	Describe sources of funding for the included sources of evidence, as well as sources of funding for the scoping review. Describe the role of the funders of the scoping review.	N/A

PRISMA-ScR = Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews.

From: Tricco et al. (2018). PRISMA extension for scoping reviews (PRISMA-ScR): Checklist and explanation. *Annals of Internal Medicine,169*(7), 467-473. https://doi.org/10.7326/M18-0850

Appendix B

Database Search Procedure

Key concepts

Descriptor 1 = music
Descriptor 2 = listen*
Descriptor 3 = pregnant

Search term	Music	Listen	pregnant
Cinahl AB music AND AB listen* AND AB (antepartum OR "ante-partum" OR "ante partum" OR "intra partum" OR "intra-partum" OR intrapartum OR birth* OR pregnan* OR labour OR labor OR prenatal OR "pre-natal" OR "pre natal" OR "peri-natal" OR "peri natal" OR "perinatal" OR primigravida OR multipar* OR nullipar* OR primipara OR parturient	Music Keyword Abstract	Listen* Keyword Abstract	antepartum OR "ante-partum" OR "ante partum" OR "intra partum" OR "intra-partum" OR intrapartum OR birth* OR pregnan* OR labour OR labor OR prenatal OR "pre-natal" OR "pre natal" OR "peri-natal" OR "peri natal" OR "perinatal" OR primigravida OR multipar* OR nullipar* OR primipara OR parturient) keyword - abstract
Sage	music	Listen*	antepartum OR "ante-partum" OR "ante partum" OR "intra partum" OR "intra-partum" OR intrapartum OR birth* OR pregnan* OR labour OR labor OR prenatal OR "pre-natal" OR "pre natal" OR "peri-natal" OR "peri natal" OR "perinatal" OR primigravida OR multipar* OR nullipar* OR primipara OR parturient