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Parents as nurturing resources: *A family integrated approach to music therapy for neonatal procedural support*

Alexandra Ullsten[1,2], Tarja Pölkki[3,4], Claire M. Ghetti[5]

[1]*Faculty of Medicine and Health, School of Health Sciences Örebro University, Örebro, Sweden*
[2]*Centre for Clinical Research, Region Värmland, Karlstad, Sweden*
[3]*Research Unit of Nursing Science and Health Management, Faculty of Medicine, University of Oulu, Oulu, Finland*
[4]*Oulu University Hospital, Medical Research Center, Oulu, Finland*
[5]*Grieg Academy Music Therapy Research Centre, The Grieg Academy – Dept. of Music, University of Bergen, Bergen, Norway*

Abstract

Family integrated music therapy approaches may contribute significantly to the prevention and management of pain and discomfort related to painful or distressing procedures, and the discipline of music therapy with infants requires sophistication in understanding how to best address this. In this perspective article, we advocate for the unique role parents may play in neonatal pain management, and for the importance of supporting and educating parents to actively engage in music therapy as procedural support. Infant-directed singing can be an apt medium for parents and infants to communicate in affective mutual relationship during painful procedures. Music therapists can collaborate with parents in a way that positions parents as experts and assures their empowerment in their roles. In doing so, music therapy both coordinates with, and extends the interdisciplinary team's initiatives to provide individualized, family integrated developmental care. Neonatal pain is an interdisciplinary field where music therapy has just started to build research studies. Theory development is essential in advancing music therapy research and practice. In our perspective paper, we present the theoretical underpinnings of a family integrated approach to music therapy as neonatal procedural support where parents are the primary (re)sources for nurturance and pain alleviation.

Keywords*: music therapy, parental infant-directed singing, family integrated care, procedural support, pain management*

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Introduction

The ubiquity of singing to infants, the existence of specific songs for different caregiving occasions across cultures, suggest that music serves a vital function in development. The act of singing has an important communicative function and is therefore a central part of the crucial interaction between parents and infants [1,2]. For the infant, the parents are, as Stern so accurately puts it, a "sound-light show" [3]. Singing with one's infant is a common activity among parents. However, in the hospital context and especially during painful procedures, parents might need instructions and support to implement this simple yet potent strategy [4]. A family integrated approach to neonatal music therapy may contribute in various ways to the worldwide interdisciplinary endeavour of involving and integrating parents in neonatal pain management.

Parents[1] are a valuable but often under-utilized resource in neonatal pain management. Parents' active contribution in infant pain management was largely overlooked until the last decade [5-9]. Parental presence enables a range of comforting parental interventions such as skin-to-skin contact, breastfeeding, rocking and soothing vocalisations; all of which are expressions of a parent's love for the infant [10]. In allied neonatal pain research fields within medicine and nursing, cutting-edge research about parent-delivered pain management such as skin-to-skin contact and breastfeeding, has presented robust findings that parents can be efficacious deliverers of pain relief [11,12]. When parents are present, the documentation of nursing pain assessment increases as well as the use of non-pharmacological pain-relieving methods, and parental presence reduces the infant's pain intensity and behavioral distress [13,14].

Research about music therapy as procedural support is scarce in all study populations [15,16]. The limited music therapy literature about pain and pain management mostly refers to music therapy with children or adolescents and not to infants and their families [e.g. 15,17-19]. Neonatal pain

PRODUCTION NOTES: Address correspondence to:
Alexandra Ullsten, E-mai alexandra.ullsten@regionvarmland.se |
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[1] In this article we refer to parents as the legal guardians and we include single parents, fathers, partners and other primary caregivers.

research is an interdisciplinary field where music therapy has just started to publish results [20]. Previous research about music and pain with hospitalized infants has mostly been infant-focused without involvement of the parents, investigating the infant's physiological and behavioral responses to recorded music undertaken by non-music therapists in the medical and nursing professions [21]. The recorded music in these studies is predominately researcher-selected, delivered without any involvement of a systematic therapeutic process and the musical characteristics are often poorly described, which make the research difficult to replicate [20]

There is good reason to involve parents in the care of their hospitalized infants, including the likelihood of beneficial outcomes for parents themselves. For example, many parents experience significant stress, depression and potential traumatization in association with the rigors of neonatal intensive care unit (NICU) hospitalization [22]. When parents are educated about and invited to actively engage in the care of their infant as a part of family-centered care initiatives in the NICU, they report less anxiety and depression and demonstrate improved caregiving abilities [23]. Individualized educational programs in various formats and subsequent participation in care can increase parental confidence and facilitate attainment of parental role, while also leading to a more collaborative relation between parents and nursing staff [24]. Given adequate counselling and supportive structures, parents can become successfully integrated partners in neonatal pain management [9]. By constructively engaging in the amelioration of their infant's pain, parents develop confidence in their caregiving capabilities [25] and can experience an increased awareness of the significance of their unique parental role [9]. When parents are recognized as experts on their infants including recognizing and sensitively responding to infant signals of pain and discomfort, they can be empowered in a long-lasting caregiving role that supports pre-cursors to healthy attachment [25].

Empowering parents in providing comfort care for their infants, including during painful procedures, has important implications for infant development beyond the consideration of the infant-parent relation. Given the detrimental consequences of poor pain management in infancy with adverse long-term effects of repeated procedural pain-related stress in the NICU, research explaining how parents can manage infant pain is important to informing healthy infant development. Repeated and untreated procedural pain in neonates as well as exposure to pharmacological analgesia have been associated with negative consequences later in life such as cognitive deficits, impaired brain development, compromised neurodevelopment and programming of stress systems, later pain sensitivity and chronic pain [26-35]. More knowledge is therefore needed to advance the use of parent-delivered interventions in procedural support, interventions including parental voice and musical presence. Family integrated music therapy may contribute by offering active methods to engage parents in infant pain management.

Aims

In this perspective article, we advocate for the unique role parents play in the prevention and management of pain and discomfort in infants related to painful or distressing procedures[2], and for the importance of supporting and educating parents to actively engage in music therapy as procedural support in neonatal care. We discuss the power balance within the music therapist-parent relation that influences a balanced collaboration. In our perspective paper, we also explore challenges that manifest when involving parents in neonatal music therapy as procedural support. We conclude with future directions on the topic of parents as primary (re)sources in neonatal music therapy for nurture and pain alleviation.

Pain in infancy, a complex phenomenon

The purpose of pain is to alert our body to danger and protect it from physical or psychological harm. Preventing and alleviating pain in hospitalized infants is as complex as pain itself. When an infant is born prematurely or with a critical illness, pain often accompanies life-saving efforts and numerous painful procedures are sometimes unavoidable. Research shows that infants cared for in the NICU experience on average between 7 and 17 painful procedures per day in addition to multiple puncture attempts, and a majority of infants do not receive adequate pain management during procedures [36-38].

Due to physical and cognitive immaturity, infants have obviously limited capacity to modulate the experience and suffering of the pain and have no concept of coping strategies, attributing meaning to the pain or realizing there will be an end to the pain [39]. Infants' limited ability to moderate their pain places great responsibility on parents and other caregivers to accurately assess pain and determine when an infant is suffering. For decades, the prevailing belief was that infants have no memories of painful experiences, no present perception or localisation of pain, and no capacity for interpreting pain in a manner similar to that of adults [40]. Today, we know that infants, including premature born infants, feel, experience and have a sensory memory of pain and that they are more vulnerable to the negative effects of pain than older children and adults [41-43]. In the short term, repeated, cumulative and inadequately treated procedural pain in addition to separation from the parent, might harm the infant physically and psychologically including increasing

[2] A note on terminology is warranted here. What we discuss in this article is also relevant for procedures that are noxious and/or sensorily aversive for the infant and the caregiver.

the risk for abnormally heightened sensitivity to pain [44]. In the long term, the new family's attachment process and mental health for generations to come are also put at risk [45].

Infant pain must be understood within the interactive process involving both the infant and the parents, who in their turn are influenced by the context of the extended family, community and culture [41, 46]. Understanding infant pain in a dyadic context means considering two specific behavioral reciprocal control systems, the attachment system and the caregiving system. Attachment theory, the joint work of John Bowlby and Mary Ainsworth [47-50], is a framework within which the infant learns how to regulate negative affects during stressful situations where a secure attachment becomes a protective factor for the infant and her/his parents through life. The infant's attachment behavior is especially activated by pain, fatigue and frightening events including separation from the parent. The goal of the caregiving system is to increase the proximity between parent and infant to protect the infant. Positive parent-infant interactions have been demonstrated to employ a buffering effect on the connection between early neonatal pain exposure in preterm infants and subsequent cognitive functioning and mental health outcomes [51].

Infants learn about pain through their families, and culture shapes the pain experience and pain expressions of the family [46]. Pain is a process of dynamic interactions between infants and parents, where the pain experience of the infant is influenced by sensory and affective qualities. The expression of pain does not only reflect internal experience and processes, but is also influenced by social reinforcement by the parent and by macro-social factors, such as the culture of the family and the healthcare system [52]. The parent's own pain experiences and cognitive pain schemas will influence her/his autonomic nervous system physiology, her/his pain assessment and her/his management of the infant's pain, which in turn influences the infant's pain regulation and reactivity [51]. Therefore, pain is not just an issue for the infant but for the whole family, society and generations to come.

Family-centered and family integrated care

The ongoing global paradigm shift to family-centered care (FCC) has come a long way in welcoming and including parents in the everyday care of their infant [53]. Yet, in neonatal pain management there are still contextual and organizational impediments that restrict consistent parental participation [54]. From the parent's perspective, confusion and frustration surround their role in their infant's pain management [9].

FCC is a philosophy of care that is guided by a set of core principles recognizing the importance of the family in the care and well-being of a hospitalized person [55]. As medical advances for hospitalized infants improved across the second half of the 20th century, care of hospitalized neonates became more medicalized and parents became increasingly distanced from their infants [56]. Engaging parents as primary care providers in more modern neonatal settings was first described by Levin in the 1979 "Humane Neonatal Care Initiative" in Estonia [57]. In the 1990s, NICUs in the U.S. began adopting principles of FCC [55]. Research-supported principles of family- and patient-centered care specific to the neonatal intensive care context include: 1) free and unrestricted access to the NICU 24 hours/day for parents; 2) psychological support to parents, including but not limited to educational and developmental support; 3) consistent assessment and treatment of pain; 4) supportive NICU environment that minimizes noxious sensory stimuli while assuring presence of parent voice; 5) developmentally-appropriate postural support; 6) skin-to-skin contact with parents; 7) support for breastfeeding; and 8) promotion of good sleep quality [58]. These principles may inform larger-scale aspects such as the design of the NICU itself, or individual service provisions such as parent-to-parent support structures and telehealth initiatives [55,56]. Safeguarding parental engagement in care and decision-making are cornerstones of FCC in neonatal settings, which combined help better prepare parents for transitioning home after hospitalization [55].

The family integrated care (FIC) model of neonatal care builds upon principles of FCC but takes the concept of parental involvement further by establishing parents as primary caregivers, and positioning families as the center of care [56,59]. Parents receive educational, structural and psychological supports that help them successfully assume their parenting and primary caregiving roles in the NICU context [56]. Families collaborate with all levels of interdisciplinary staff to develop and implement the FIC model, and parents function as integral members of the care team [56,59]. Specific models of FIC have been developed to assure consistent and systematic implementation, and to enable verification of effects through replicable research [56]. In answer to Franck and O'Brien's [56] call to use common language, we consider music therapy as making a unique contribution to family integrated care, where the nurturing resources of parents are acknowledged and form a base for supporting their primary caregiving role.

Resource-oriented music therapy

Parents of critically ill infants each have their own rich personal and social histories that impact how they respond to the stressors related to hospitalization, and how they engage with their infants. While some of these factors make adjustment more difficult, others may be seen as resources that can promote resilience. A resource orientation to working with parents of hospitalized infants is consistent with FIC and draws inspiration from resource-oriented approaches to music therapy. Rolvsjord [60] describes resource-oriented

music therapy within mental health care, characterized by: 1) focus on activating strengths and resources, 2) recognition of the interplay between the individual and society in determining health, 3) power balance within the therapist-client relation that facilitates balanced collaboration, and 4) nuanced understanding of music as a resource for health.

The client is considered an expert on her or his own life situation and needs, and the therapist helps collaborate with the client to promote health. Clients draw upon their resources during the course of this collaboration, which enables therapeutic change. Thus, the mechanism of change does not occur via an intervention provided by an expert therapist, but instead evolves from a client's experiences of mastery and strengthening of resources during the supportive and collaborative endeavor [61]. Resource-oriented music therapy becomes particularly relevant in the neonatal context, where staff must seek to assure that power is transferred to parents, in order to support mastery in their primary caregiving role. When parents engage in infant pain management, a resource-oriented approach can help highlight the intra- and interpersonal factors that interact to influence the parent-infant dyad's pain experience and pain expressions [c.f. 46,51].

Music therapy as procedural support

When individuals undergo painful or anxiety-provoking medical procedures they benefit from receiving various forms of support. While nursing and other hospital staff routinely provide informal supportive elements to improve comfort and decrease anxiety and pain during the course of a procedure, particular professionals, such as music therapists and Child Life Specialists, provide a range of systematic and considered approaches to support patients and families during procedures. Ghetti [15] provides an initial definition of the concept of music therapy as procedural support, in which the music therapist draws upon aspects of music and the therapeutic relationship to support healthy coping and reduce distress during procedures. Beer and Lee [62] offer an expanded definition that specifies the interactive nature of the music, the presence of a board-certified music therapist (relevant in a U.S. context), and the use of music tailored to patient need. Loewy [16] highlights the need for the patient to experience control during the procedure, and emphasizes the critical importance of maintaining trust between patient and staff that can extend to future procedures. Further, Loewy [16] cautions that parents, are not always able to cope well enough with their own anxieties and aversions to adequately support their children during procedures. Procedural support within family integrated neonatal care aims to empower parents in their caregiving roles even during painful or distressing procedures, to the extent possible for the parent. In this context, the staff (including music therapist) partners with parents to enable maximum comfort for both infants and parents, and to assure that parents can actively use their comforting abilities to support their child.

Ullsten [20] presents a Nordic NICU MT pain management strategy, which is a family integrated biopsychosocial and resource-oriented theoretical and practical model. With this strategy, Ullsten adapts Ghetti's [15] working model of music therapy as procedural support, to illustrate the theoretical underpinnings of a model in which parents assume primary caregiving roles during the provision of procedural support via parent-delivered interventions including parental infant-directed lullaby singing. The Nordic contexts are particularly well-poised for consistent family involvement in music therapy. In the Nordic countries, comprehensive inclusion of and collaboration with parents is considered best practice. Progressive family politics in the Nordic countries help assure generous parental leave schemes, gender equality in childcare, and the presence of modern NICUs that are built to welcome the whole family including siblings 24 hours/day. The combination of these factors means that the Nordic context offers particularly favorable conditions for further developing neonatal music therapy into a family integrated approach for procedural support.

The significance of the parent's voice

The mother's voice, and later on, the father's/partner's, is among the most multisensory (visual, auditory, motor, and tactile) experience of the parent-infant dyadic relationship [63]. The first voice the fetus hears and ascribes significance to is the mother's voice and the music of her prosody [64]. The mother's behaviors, the way she moves and acts, also become familiar to the foetus and are reflected in the mother's voice. The musical qualities of the mother's voice (pitch, volume, timbre and rhythm) are salient in the perinatal experience of speech, enculturation and attachment [65]. In the womb, the fetus grows familiar with the interior sounds of the mother, continuously enriched by the multimodal sensory environment; the steady rhythm of the mother's heart and breathing, the flow of her bloodstream and her prosody [64,66,67]. From about three months before birth, the fetus can hear a variety of sounds from the extrauterine world. This enables the developing foetus to share and acquire preferences for the family's music, culture, voices and language [66,68]. Full-term newborns may recognize a musical melody and the voices of significant others at birth, which requires some level of awareness while still in the womb [3].

After birth, infants manifest an intense interest in the parents' affective content in the prosody of their speech and try to synchronize their expressions with those of the parent [69]. Still, infant-directed singing is considerably more effective than infant-directed speech in lowering infants' elevated arousal levels and ameliorating distress [2]. Live lullaby-singing is a repetitive emotion communication tool for parents in regulating the infant's state and arousal levels [1,70-

74]. The soothing, comforting and emotion regulating properties of a lullaby are well-known cross-culturally and historically [1,2,75]. The power of a parent's live lullaby is therefore something to consider in painful procedures such as venipunctures and intramuscular injections. Live parental infant-directed singing may augment the parent's focus on the infant in the moment, enhancing the parent's emotional availability and responsiveness in the painful context and decrease stress, which have been confirmed in previous research in non-painful contexts [71,76].

The voice of the parent in neonatal pain literature

Within the interdisciplinary research field of neonatal pain there is a surprisingly small number of research studies that address the voice of parents and their musical presence during procedural support. In pain studies that investigate non-pharmacological pain alleviating approaches, the nature of parents' vocal and musical engagement with their infants is not systematically reported. For example, in studies by Johnston et al 2009 [77] and Johnston et al 2012 [78], parents' voices and their vocalizations are viewed as an ineffective distraction technique. In the aforementioned studies, parental singing was however not differentiated from "babytalk", reciting of nursery rhymes or reading a story [78], resulting in vague findings for the singing condition presuming that there is no need to either encourage nor inhibit the mother from singing to her baby [77].

In contrast to these findings, Jahromi et al [79] established the efficacy of parents' multimodal, soothing vocalization behavior. The study was a naturalistic observation of mother-infant mutual regulatory interactions including specific soothing behaviors mothers used, and the effectiveness of these behaviors for relieving distress in older infants during immunization. Holding/rocking and vocalizing combined were significantly related to reductions in infant crying at all levels of distress, even when the infant was highly distressed [79]. Vocalizations in this study involved any vocalizations the mother made directed at the child, including talking, singing, "shushing," and unrecognizable vocal sounds. Holding/rocking and vocalizing behaviors were only effective if they occurred together [79].

The results by Jahromi et al [79] might be viewed in relation to research showing that infant-directed speech is less effective in ameliorating distress than infant-directed singing. For example, in the above-mentioned studies [77-79] the researchers did not report if the parents' vocalizations involved verbal reassurance during the painful procedures. Reassurance is defined as "procedure-related comments that are directed toward the child with the intent of reassuring the child about his/her condition, or the course of the procedure" [80 p. 53]. A reassuring tone of voice while the infant is stressed or in pain, does not communicate a shared affect of the painful experience and subsequently the infant becomes more distressed. The pain alleviating effect of live parental infant-directed singing during painful procedures in infants where the singing is not blended with infant-directed speech, has not yet been researched.

Affect-attuned pain management

Infants are feeling and communicating beings, responsive to affective and social communication [3,81]. Early affective and social interactions are particularly important in psychological development, and the primary social object mediating infant's approach with the external environment is the parent [82]. Consequently, parent-delivered interventions during painful procedures should also comprise social and affective communicative agents, such as the parent's voice, since pain is a highly subjective, perceptual, contextual and biopsychosocial experience [83]. Infant-directed singing performed by a parent is a relational, biopsychosocial, and multimodal intervention which augments the parent's focus on the infant in the present moment [83]. The parent's live lullaby singing serves as a repetitive social emotion communication tool for parents in regulating the infant's state, a real-time affect regulator of the infant's arousal systems increasing self-regulation and stabilising affect [1,70,73,74]. Through this relationship-based affective intervention, the parent communicates a shared affect and empathy for the infant during the painful situation. The parent's live singing is directly attuned to the moment-to-moment biopsychosocial experience of the infant [84].

Neonatal pain research, evaluating a range of non-pharmacological pain alleviating strategies suggests that a combination of parent-delivered interventions gives synergistic effects, especially combinations of multisensory strategies such as skin-to-skin contact and breastfeeding [11,85]. These strategies reduce pain by for example blocking nociceptive transmission or by activating descending inhibitory pathways, which are supposed to be functioning at term birth [86]. Oftentimes, interventions do not occur in isolation but instead are used concurrently. Live parental lullaby singing is a highly unexplored biopsychosocial intervention that could be a vital pain alleviating contributor, on its own but especially in combination with skin-to-skin contact and breastfeeding. The combination of the parent's voice, skin, warmth, breathing rhythm, taste and scent fully match and harmonize with the fact that infants are multisensory, biopsychosocial beings with an innate ability for amodal perception [3].

The mirror neurons provide infants with the innate general capacity to receive information derived from one sensory modality (e.g., hearing) and translate it into another sensory modality (e.g., motion). Such amodal perception plays a key role in affect attunement whereby the intention, through the characteristics of intensity, timing and shape in the interaction, can be perceived by the infant and parent on an

implicit level and evoke an intersubjective reciprocally-related response from both parties, each changing with the other. This creates an experience of emotional connectedness and a subjective experience of "I feel that you feel that I feel" [87 p. 91]. The mirror neurons make it possible for a parent to resonate on a neurobiological, intrapsychological and interpersonal level with the infant, an action that Stern termed affect attunement [3]. Through live parental infant-directed singing, both the infant and the parent become active agents in pain management, modifying their affective states in a reciprocal social biofeedback loop which enhances self-regulation in the dyad [20].

Benefits for parents themselves

One of the most stressful experiences for parents in the neonatal unit, aside from the loss of their parental role, is the worry that their infant will experience and suffer from pain [88,89]. These stressors are associated with higher stress levels in parents, which in turn may impact upon healthy attachment and bonding, aspects that are vital for the long-term development of the infant. Active involvement of parents during painful procedures is considered a critical first step in improving pain practices in neonatal care [89]. In addition to enabling better outcomes for their infants, parents who support their infants during medical procedures can experience benefit themselves. Parents who are present throughout their children's medical procedures report lower distress and more satisfaction with care [90].

Parents' social affective interactions with the infant such as the comforting parental infant-directed singing, trigger the endogenous opioid system and enhance oxytocin and dopamine release, which will calm the parent, reduce stress and alleviate pain in the dyad [83]. Parents' feeling of being helpful to their child/infant can contribute to a sense of control over a challenging situation [90], and affirm their parental role [9,91]. Interventions to improve parents' knowledge and involvement in infants' pain management are essential to implement in the care of the hospitalized infant [25].

Parents need to and want to participate actively in their infant's pain management, and parents should receive education and guidance in various formats, not just verbal information, on how to mitigate their infant's pain [83,91-97]. Educational programs for infant pain management can enable parents to acquire increased knowledge about infant procedural pain, and experience increased self-efficacy in their ability to address infant pain [91]. Furthermore, such educational approaches can lead to increased parental involvement in subsequent procedures [91]. Thus, educating parents in how to support their infants through painful procedures can contribute to sustainability of the therapeutic effect. Parents learn skills that they can use during the acute period of neonatal hospitalization, but also adapt as the infant develops and experiences other noxious procedures later in life.

Music therapy strategies for involving parents in procedural support

The neonatal music therapist has an important role as guide, role model and facilitator for parents, collaborating with them to bring about effective and nurturing pain management for their infant. Thus, the music therapist serves a supportive role to the parent-infant dyad/triad, always assuring that the parent-infant relationship remains the primary focus [98]. Since most parents (in some estimates, as many as 60%) already sing spontaneously to their newborns during hospitalization [99], the music therapist can work with such parents to shape these natural caregiving tendencies into attuned and sensitive responses. Other parents will be less inclined to use their voices, with certain personal experiences and beliefs, contextual considerations, and temporal aspects potentially limiting their use of parental voice as a nurturing resource [100]. In such cases, providing concrete information about the importance of parental voice for the developing infant can help center focus on the infant, and help lower reluctance to sing in shared spaces [98,100]

For parents who are reluctant to engage musically, a point of entrée can be to engage the parent in describing their prenatal uses of music and gradually begin to build a sense of their musical preferences and history [98]. Through such an interaction, it may be possible to identify a personally-significant lullaby or song of kin [72] that enables a personal point of contact that can be adapted and used over time to provide continuity of care as the infant develops [72,101]. The music therapist can guide parents in how to adjust a familiar and personally-meaningful song in terms of meter, tempo, and lyric content to provide a stabilizing and sedating effect for the infant [101]. Such songs can be adapted to attune to infant responses; mirroring facial affect, gesture and vocal tone in a way that demonstrates a coherence between parent and infant. During painful procedures, parents adapt the infant-directed singing skills they have learned in order to provide a calming and holding environment for the infant that avoids overstimulation. If the infant demonstrates significant distress, the parent can be coached in a form of tonal vocal holding [102] in which single sustained pitches are attuned to the infant's cry to sustain and frame the infant's tonal release. It becomes clear then, that the nuanced musical interaction between parent and infant is a complex one that is impacted by the internal states of both the parent and the infant. It is therefore important that music therapists are able to make full use of their professional competence when supporting parent-infant dyads/triads through a stressful complex of experiences.

One particularly important area of music therapist competence regards understanding infant neurodevelopment. Some parents are curious about how music therapy works and

are motivated to use musical abilities they hone in music therapy at other times with their infant, especially when infant responses to their voices are clearly evident [103]. The music therapist can, therefore, play a key role in helping parents to become more aware of the subtleties of their infants' responses, and attune their use of voice according to infant needs in the moment. When music therapists help parents recognize the engagement and dis-engagement cues their infants are sending in response to their infant-directed singing, parents can more accurately interpret these signals within a neurodevelopmental context [65,98]. Music therapy then becomes a *means* of observing and effectively responding to the infant in congruence with principles of neurodevelopmental care. Many neonatal units provide parents with training related to observing infant behaviors and signs of overstimulation or engagement. Music therapy provides a medium through which parents can practice observing and responding to their infants in relation to these principles. Thus, music therapy both coordinates with and extends the interdisciplinary team's initiatives to provide individualized, family integrated developmental care.

Challenges with parent-delivered procedural support

Empowering parents to use their voices to comfort their infants during medical and nursing procedures would seem a natural extension of their parental role, but the practice of parent-delivered procedural support in medical settings is not without challenge. Aspects related to stress and affect contagion, parent comfort with singing and readiness for taking a caregiving role during procedures, balance of power between therapist and parent, and perceptions of the greater interdisciplinary team, can each impact how effectively and pervasively parent-delivered procedural support is implemented.

Since infants use their parents to regulate their own affective states and behaviors, they may both be the source of each other's stress. Stress and affects are contagious. Affect contagion refers to the induction of an affect in one person from seeing or hearing someone else's affect display [104]. There might be a risk of affect contagion if anxious parents, in conjunction with painful procedures, transfer their anxiety to their infant. Parents of hospitalized infants often undergoing significant stress themselves, may have their own experiences of trauma that impact their ability to provide a calming and reassuring presence for their infants [101]. During a period of acute crisis, it may initially be quite difficult for parents to draw forth and connect with their own musicality and musical resources [98]. Principles of operant conditioning would suggest that the parent's perhaps paradoxical and stressed behavior in a pain context, could contribute to a more stressful experience for the infant and exacerbating the infant's pain experience [39]. Thus, although speculative, the infant might learn to associate the parent and/or the parent's voice and singing with pain. Such a negative association might be more likely if the parent routinely sings or plays music to the infant in a disconnected and unattuned manner in conjunction with painful procedures.

Consistent with trauma-informed approaches to music therapy [67,105], the music therapist may first need to help the parent to stabilize and self-regulate, before the parent is able to experience restorative experiences in relation with their infant [105]. Aligned with this reasoning, Ullsten [20] suggests, in the theoretical and practical family integrated model Nordic NICU MT pain management strategy, that the music therapist acknowledge previous intra- and interpersonal factors that are influencing the dyad's pain experience and pain expressions. Such an acknowledgement can take place in the pre-procedural preparation phase, where parents and music therapist can process these factors together prior to engaging in actual procedural support. The core principle in procedural support is for the infant and parent to be well regulated before the painful procedure begins and live parental singing is a means for obtaining this state [20]. Preparation makes an important contribution to the alleviation of pain and anxiety during the subsequent procedure. During the pre-procedural preparation phase, the music therapist should establish a rapport of trust and cooperation to relieve possible pre-procedural anxiety and stress in the parent and infant in order to promote comfort and coping [20].

Once parents are able to start singing in a calm manner as part of soothing their infants, they themselves may calm physiologically, enabling a coherence between their physiological and behavioral levels that can promote mutual regulation [106]. The stimulus-response principle mentioned above is probably not applicable in live parental lullaby singing, since the vocal communication in the infant-directed singing is live and probably attuned to the infant's inner state. The risk of conditioning is more pronounced if the painful procedure is accompanied by recorded music or a parent's recorded voice. The needs of parents cannot be separated from the needs of infants experiencing pain, and both must be considered and addressed in music therapy in order to support effective parent-delivered procedural support.

Some music therapists, especially those who work in contexts where parental presence during hospitalization is limited or compromised, may find it difficult to relinquish the role of expert when working with families. As a part of family integrated care, music therapists aim to position parents as experts on their infants. The cultural contexts surrounding neonatal care vary in significant ways [107], and in some contexts, music therapists have used their professional competence and related evidence base to argue for the necessity of their positions within the interdisciplinary team. It may then seem counterproductive to downplay that expertise in an effort to provide sufficient space for parents to explore and manifest their own expertise. Furthermore, some

approaches to music therapy with infants, such as Shoemark's concept of contingent singing [108], are intricate and nuanced, and require significant training on the approach to enable intended use.

Given their stressful circumstances, it can be quite difficult for some parents to develop the capacity for attuned musical interactions with their hospitalized infants as efficiently as an experienced music therapist might be able to provide. However, it is crucial that music therapists challenge themselves, questioning both their assumptions and practices that might inadvertently be disempowering parents. Music therapists should aim to develop reflexivity in regard to their practices, so that they can assure a balance of power in collaboration with parents. Examining power balance is also relevant when considering the greater interdisciplinary team's attitudes toward parent-delivered procedural support.

In infant pain management there are still mindsets and staff behaviors that restrict parental participation in neonatal pain relief [9]. There are few studies about nurses' perceptions of parental participation and guidance in infant pain management [7,109,110]. In a comparative focus group study with neonatal intensive care nurses in Sweden, Finland and the United States [7], the nurses' perceptions of parental participation ranged from preferring to exclude parents through sharing some control to full collaboration with the parents. When nurses were controlling the pain management parents were passive or absent, while nurses believed that they protected parents from emotional distress caused by seeing their infant in pain. When nurses were sharing some control with parents, they facilitated parental involvement even if it caused nurses or parents anxiety. In the nurse-parent collaboration, the pain management became individually tailored to the infant when the nurses negotiated the optimal pain management approach with the parents. The nurses believed they were acting in the best interest of the infant by empowering parental participation [7].

Other studies have also shown that nurses tend to protect parents from additional anxiety during the stressful NICU experience [111]. However, parental participation can also be a source of stress for the nurses who increase their control by forcing parents to withdraw when they find it uncomfortable to perform painful procedures under parent's observation [7]. Parental participation during painful procedures should not be based on the nurses' perceptions of good care, but on the individual needs and wishes of the parents. When counselling parents to use non-pharmacological methods, neonatal nurses should actively interact with families and discuss parents' individual needs [109]. A cross-sectional survey of nurses' pain assessment and pain management practices in Finnish NICUs [110] also confirmed these results, indicating that there is an obvious need to strengthen the parent's role in infant pain management. The survey [110] disclosed that nurses mostly used nurse-initiated pain alleviating interventions where parents can be included but parental presence is not required, such as oral sweet solutions, swaddling, containment or facilitated tucking and positioning. In contrast, counselling parents to continue breastfeeding or guide them to use skin-to-skin contact or music, such as singing to their infant, was rarely reported as used to alleviate infants' pain [110]. It seems that there is a need for educational interventions for nurses in order to improve pain management with parent-delivered procedural support.

Future directions towards a family integrated procedural support

There are many challenges and barriers in implementing parent-delivered procedural support including music therapeutic interventions in neonatal pain management. A fundamental barrier is the lack of research on combined parent-delivered pain alleviation, including relationship-based live interventions such as the parent's musical presence [112]. There is also a dearth of research about which painful procedures would benefit most from a family integrated music therapy approach and which music therapy techniques, besides live lullaby singing, would be efficient to use in neonatal procedural support. The research by Ullsten et al. [113, 114] is to our knowledge the only music therapy research so far measuring the pain-relieving effects of *live* lullaby singing on behavioral and physiological pain responses during venipuncture in preterm and term neonates. The live lullaby singing in this study was not performed by a parent but by a music therapy student in training. In addition to a limited research base informing the use of music therapeutic interventions for parent-delivered procedural support, a lack of awareness within health system structures also presents a potential barrier to implementation. Healthcare professionals' attitudes and beliefs, as well as parents' lack of knowledge and information can influence and limit optimal pain management for hospitalized infants [96].

We have in this perspective paper stressed the importance of increased knowledge in facilitating practice change in the NICU; not just educational programs for parents but also a wider knowledge mobilization for health professionals and other stakeholders in prevention of procedural pain, in parent-delivered procedural support, and interprofessional collaboration [96,115]. Nurses' knowledge and attitudes towards parental involvement in infant pain management play a critical role in facilitating change in the NICU [9,56,112]. But even more important for improving the management of infant pain and translating research into practice is to involve all healthcare professionals. Teamwork has been shown to be a prerequisite for parental involvement in procedural support [96]. The resource-oriented family integrated music therapist would be a useful partner in the interprofessional team, as the aim of these teams is to integrate the knowledge, skills and expertise of different professionals including the experience of the parents [96]. Since FCC is a broad concept and clinicians

have varied perceptions of and expectations about what the core concepts of FCC comprise and how to translate these values into action, standardized FCC interventions and core outcome measures are still lacking and consequently research has difficulties comparing results to show the clinical effectiveness [56]. FIC on the other hand, is a structured model of NICU care [56] which could serve as an inclusive framework for evolving neonatal music therapy as procedural support. FIC and resource-oriented neonatal music therapy both emphasize a combination of psychoeducation, physical support, and psychological/affective support in order to improve pain management for the infant and her/his family.

In this perspective paper, we have argued that music therapy provides a means through which parents can access and learn to use their nurturing resources to promote neonatal procedural support. The Nordic NICU MT pain management strategy [20] provides a detailed theoretical resource-oriented model of how parent-delivered infant-directed singing can be comprehensively used within family integrated neonatal care. When including parents' voices and musical presence, this strategy can be useful in informing interdisciplinary neonatal pain research as well, bringing forth a more systematic and structured scheme to investigate live parental infant-directed singing as procedural support. In regard to this, a clinical study, informed by music therapy expertise and research and using the Nordic NICU MT pain management strategy as a model for its design, has recently commenced data collection [116].

A logical next step for research includes balancing power by including parents as co-researchers in action research initiatives. Parents can then determine the type of research that needs to be completed regarding parent involvement in pain management, and express desired directions for enabling systemic change. The concepts articulated in the Nordic NICU MT pain management strategy can be translated into a resource-oriented psychoeducational service for parents [20], loosely akin to the Time Together program of Helen Shoemark [117], which explore empirical outcomes and parental perspectives.

Conclusion

Parents represent a valuable but often overlooked and under-utilized resource in neonatal pain management. Integrating parents in procedural support and pain management is consistent with family integrated care and helps equip parents with nurturing skills they can use beyond the acute period. In conjunction with painful procedures, resource-oriented family integrated neonatal music therapy provides a means by which parents can learn to recognize, sensitively respond to, and regulate their infants in alignment with principles of neurodevelopmental care. In music therapy, parents are empowered as experts on their infants, and the music therapist plays a collaborative role in supporting the parent-infant dyad/triad. The music therapist facilitates parent-infant relation and supports the parent-infant dyad/triad emotionally, musically, and developmentally. When parents use infant-directed singing as procedural support and pain management, they can draw upon innate musical resources that reinforce their parental role. Music therapy represents a cohesive extension of family integrated care to the realm of pain management, with parents using their voices in attuned and mindful support of their infants.

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Biographical Statements

Alexandra Ullsten, PhD, Post doc, Music & Art Therapist, Region Värmland. Affiliated Researcher, School of Health Sciences, Örebro University, Sweden. In 2010, Alexandra Ullsten pioneered the implementation of neonatal music therapy in Swedish healthcare and her research interest is in family-centered neonatal music therapy and pain management. Alexandra is Principal Investigator of the Swedish multi-center randomized controlled trial SWEpap.

Tarja Pölkki, PhD, RN, Professor at the Research Unit of Nursing Science and Health Management at the University of Oulu, Finland. Her research group develops evidence-based consistent practices to promote the well-being of children and families in nursing. Tarja's research interests include enhancing family-centered care and improving pain assessment and pain alleviation in neonates requiring intensive care.

Claire M. Ghetti, PhD, MT-BC, CCLS, Associate Professor of Music Therapy at The Grieg Academy - Department of Music, University of Bergen, Norway. Claire is Principal Investigator

of the multinational randomized controlled trial LongSTEP evaluating impact of music therapy on parent-infant bonding for preterm infants and their caregivers. Her research centers on how music therapy promotes resources and contributes to the prevention of traumatization in intensive medical contexts.