Music Therapy and Palliative Care

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Introduction

The study of music includes, among other things, implementing proper structures of composition, timbre, and performance techniques to most effectively portray and evoke specific mental states or emotions. Studies like Sloboda's (1991) "Musical Structure and Emotional Response: Some Empirical Findings," have shown that particular musical structures and devices have an astonishingly predictable ability to produce, not just mental states or mood shifts (which are perhaps scientifically less reliable variables as self-reported phenomenon), but also measurable, physiological changes and events in listeners. Sloboda found that:

> Shivers down the spine, laughter, tears and lumps in the throat were reported by over 80% of respondents. Respondents were asked to locate specific musical passages that reliably evoked such responses. Structural analysis of these passages showed that tears were most reliably evoked by passages containing sequences and appoggiaturas, while shivers were most reliably evoked by passages containing new or unexpected harmonies (P. 110).

Other authors have used the electro-conductivity of participants' skin (a sign of the body's stress response), heart rate, respiratory rate and blood pressure to measure the level at which they fluctuate in response to musical stimuli, and have assumed that these reactions are analogous to certain mental and physiological states.

Not only do the formal elements of music which may be unfamiliar to the listener (a composition or song we've never heard before) have the power to affect

our physical and mental states, but specific music has strong associative properties for many people due to personal connections (either chronological or thematic) to respective particular events or time periods of a listener's life. These associations undoubtedly have an impact on the way music impacts our mental state or emotions. While our sense of smell is often cited as being closely tied to memory, it is perhaps our 'sense of music' which most strongly attaches to the more complex emotional and physiological memories.

In medical research and clinical practice, the influence of mental states – of moods, attitudes and emotions – is garnering an increasing amount of attention as an integral and active piece of what has historically been understood as our 'physical' health and well-being. If our understanding of the mind-body relationship can shift from a dualistic, 'mind-over matter' understanding of this relationship to a 'mind *matters,'* emergent theory of consciousness – the manipulation of mental states (and that which affects them) should become a vital element of many medical treatments and therapies.

There are many 'non-medical' factors clinicians investigate (ideally) in order to improve medical outcomes -- the home life of a patient, their religious beliefs and values, alcohol use, psychological states – but a patient's relationship with music can provide clinicians with a useful treatment tool, in part because of its unique placement at the intersection of universals and particulars – the documented predictability of musical structures' impact on physiological and mental states, *and* our individual associative relationships with particular music, respectively. Knowledge of a patient's alcohol use, or anxiety about specific medication side effects can help clinicians redirect treatment to provide better

care, and produce more successful outcomes. Likewise, the knowledge that a patient enjoys listening to Chopin's nocturnes may seem inconsequential in comparison to other medical data – until we lean that the patient cannot tolerate traditional pain medication, that insufficient pain relief is affecting the patient's quality of sleep, and that listening to Chopin shifts his focus, allows him to relax somewhat, and helping reduce perceived levels of pain. In such a case, music therapy may prove helpful with the patient's physiological and psychological recovery.

Music Therapy is a relatively 'young' field, and inevitably embedded in the reputation of any such endeavor is the skepticism and resistance of its integration into other, more institutionally established and research-heavy scientific enterprises. Among its liabilities, it may be considered, is its emergence from (and necessity to retain connection to) the subjective artistic and creative domains. Causal relationships between music tempo and heart rate have not been as exhaustively studied as the links between carbohydrate consumption and diabetes. However, while the documentation of medical research and the institutionalized protocols that govern pharmaceutical conclusions regularly stand up to empirical testing (not least due to concerns of liability), we actually understand relatively *very little* with regards to the 'how's or 'why's of the success of many medications – especially medications that affect mood and various other 'mind'-type functions. We also know very little about such medications and the way they interact with other realities, such as diet, life style, and other factors. But as long as a diligent benefit/risk analysis is conducted, verified and communicated openly, the exact chemical or molecular mechanism somehow

renders the whole enterprise less worthy. In this vein, skepticism about the worthiness of music therapy might be considered a bit baffling, since music has, by one description, been a 55,000 year experiment studying the effects of various forms of organized sound on mental states and well-being. Most composers have not published in scientific journals, but the results of their research may prove no less valuable. And fortunately, more researchers are directing their efforts to explore the effect of music therapy on different medical conditions and general well-being – most with methods that carry low-cost, low-risk overheads, and increasingly well understood benefits.

Review of Literature

Music Therapy in the NICU

Music therapy provides significant benefits to premature infants in both direct and indirect ways. Direct benefits include changes in quantitative physiological data as well as positive shifts in more 'behavioral' trends of the infants. In many studies, authors measured some sort of positive effect on discrete physiological data of the infant. Examples include: reduced heart rate, reported by Loewy (2014), Garunkstieneab (2013), Schwillig (2015), and Yildiz (2011); higher percent of active sleep reported by Loewy (2014) and Schwillig (2015); and reduced levels of salivary cortisol (a stress hormone) reported by Schwillig (2015). Positive shifts in behavioral trends or outcomes include: increased feeding efficiency or effectiveness reported by Loewy (2014) and Yildiz (2011); a faster transition to oral feeding from gavage feeding reported by Yildiz (2011); and increased infant smiling and perceived well-being reported by Haslbeck (2013).

Indirect benefits include positive effects on the parents of NICU infants as well as nurses and healthcare professionals working in NICUs. Pölkki, et al (2012) examined survey responses and determined that those surrounding the infants tended to believe that music therapy interventions had positive effects on everyone involved, including reducing stress, creating a more comfortable environment, and improving conditions for interaction and bonding. Haslbeck (2013) observed that creative music therapy was helpful in developing skills for positive interaction, support, and comforting. Loewy (2014) noted the benefits of 'songs of kin' (songs of personal or cultural significance to the parents) being used compared to 'standard' lullabies during music therapy – a finding which points to the importance of personal investment in the interaction for the parents, and the relevance of connection and bonding with concrete physiological outcomes All of these results seem to highlight the reality of infant care in a more general way – that the unique degree of dependence infants have on parents and caregivers is, in a sense 'designed' to create a positive feedback loop of nurturing interaction and investment.

However, the extremely high levels of stress present when new parents are facing the delicate state of health of a premature infant in the NICU – likely while attempting to attend to work, other children, etc. – can make calm interactions and bonding difficult. Music therapy's role in the NICU then, is not limited to the patient directly, but to the benefit of the family, staff, and environment, which in turn further improves the care of the infant indirectly.

Schwillig, et al (2015) attempted to ascertain the effect of music on NICU infants' levels of stress in stressful NICU environments. The primary measure of stress in this study was the level of salivary Cortsol, but other physiological measurements were taken, including heart rate, apneas, oxygen desaturations, etc.. Live harp music was played for 20 stable preterm infants for 15 minutes on three consecutive days. Salivary cortisol was measured before music was played, 25 minutes after music had ended, and 4 hours after music had ended. Salivary cortisol was significantly lower both at the 25 minute post-music time and the 4 hour post-music time – other physiological sings of stress and pain were also measured to have improved after the live harp music. The authors concluded that "Exposure to live music reduced salivary cortisol and had beneficial effects on the physiologic parameters of stable preterm infants in a NICU" (p. 104).

Yildiz and Arikan (2011) studied whether giving infants pacifiers and playing lullabies during gavage feeding (tube directly to stomach) would hasten the transition to oral feeding, have greater outcomes of sucking and feeding success. A total of 90 infants were studied, with 30 as a control group with no intervention, 30 with pacifier only, and 30 with lullabies playing during gavage feeding. The study found evidence that the pacifier group had the best results in terms of transitioning to oral feeding, followed by the lullaby group. The same was true with regards to sucking success(649).

	Groups			
	Control (n = 30) Mean ± SD	Pacifier (n = 30) Mean ± SD	Lullaby (n = 30) Mean ± SD	F; p
Transition period to total oral feeding (hours)	280·30 ± 174·89	184·27 ± 78·17*	243·03 ± 123·34	4·064; <0·05
Duration of hospital stay (hours)	522·03 ± 269·83	368·90 ± 118·65*	496·30 ± 223·66	4·420; <0·05
Weight of discharge (g)	1863·67 ± 184·10	1803·00 ± 146·62	1864·33 ± 180·11	1·271; >0·05

One might pursue if a combination of pacifier and lullaby music would yield more positive results (than pacifier alone), since the two were not combined in the study.

Shabani (2016) assessed the effect of music therapy on physiological and behavioral pain responses of premature infants during and after blood sampling. This study was a cross-over clinical trial conducted on 20 infants in a hospital. In the experimental group, "Transitions" **music** was played starting 5 minutes before blood sampling and ending 10 minutes after the procedure was over. The infants' facial expressions and physiological measures were recorded from 10 minutes before until 10 minutes after sampling. The control group did not received the music therapy treatment. According to the author, there were significant differences between the experimental and control groups' heart rate during needle extraction and 5 minutes after sampling. The author concluded the music therapy reduces the physiological and behavioral responses of pain during and after blood sampling.

Moran, et al (2015) explored the effects of music therapy on vital signs of premature infants undergoing respiratory physiotherapy. They divided 26 premature infants into control group (N=12) and treatment group (N=14). All newborn infants were undergoing physiotherapy for 15 minutes: vibration and

aspiration. For the treatment, infants were exposed to classical music starting three minutes before the physiotherapy and ending three minutes after the end of these procedures. The heart and respiratory rate and oxygen saturation were measured before, during and after each sessions of respiratory physiotherapy. The authors found no statistically significant difference between the groups, but were able to determine that 30% of the variation in respiratory rate was due to the inclusion of music during and after the physiotherapy,

According to Malloch, et al (2012), infants in a Neonatal Intensive Care Unit, often do not have the kind of interactions that are optimal for their social development. Performing live music for them is an intervention that aims to improve the interaction between therapist and infant. This study examined the effectiveness of music therapy intervention in the NICU. Two groups of late pre-term and full-term infants were recruited to the study; one was given MT and the other was not. One group of healthy infants was used as additional control group. The effect of performing live music for them was assessed using two measures reflecting infant social engagement: the Neurobehavioral Assessment of the Preterm Infant (NAPI) and the Alarm Distress Baby Scale (ADBB). Results suggest that the music therapy intervention supports infants' neurobehavioral development. Hospitalized infants who received music therapy were better able to maintain self-regulation during social interaction with an adult, were less irritable, cried less, and were more positive in their response to adult handling, when compared with infants who did not receive the intervention.

Music Therapy for Pain Management

Specific medical improvements for chronic pain patients of note due to music therapy include: improvements in heart-rate variability (a measure of the body's ability to shift heart-rate to meet circumstantially appropriate needs and maximize energy efficiency) (Warth, 2015); both self-reported and observed pain scale scores (Kwan, 2013); lower post-procedural pain (Matsota, 2013); and improved levels of anxiety and depression (Parlar Kilic, 2014).

The treatment of chronic pain is one of the most common applications of music therapy, but while the depth of research and practice to draw from is helpful, the breadth and variety make sweeping conclusions somewhat more difficult. When exploring the effect of music on the health of NICU patients, the types of measurable physiological improvements do seem to match up with many of the claims about its benefits with other patient populations. In NICU music therapy implementation, and in general, the goals seem consistent – to take advantage of the positive effects that interactions with music could have on the interconnected nature of psychological and physiological states which predispose a patient to chronic pain and distress. Anxiety, discomfort, unfamiliarity, pain, stress and fatigue often play as pieces of the same clinical 'puzzle,' which often interact with each other to create complex clinical pictures which obscure causes and effects, as well as primary and secondary symptoms. Interacting with music seems to have a positive effect on these states, according to research findings.

An overemphasis on linear thinking about the presentation of pain and other symptoms also reduces of the interactions of these 'pieces' to a simplistic "if A, then B; therefore: if NOT A, then NOT B," treatment of symptoms. In formal

logic, this mistake is called the 'fallacy of the inverse,' and in clinical practice, it is often made while diminishing (or dismissing altogether) a patient's reported symptoms because of the absence of a common medical cause of similar symptoms. The patient's experience is described as psychosomatic, or ignored entirely in the calculation of diagnosis or treatments. In the case of medical circumstances which involve chronic pain, the cumulative nature can, over time, create 'feedback loops' when pain, blood pressure, anxiety and emotional disruptions amplify one another, and existential identification of cause and effect lose much of their practical value. Psychological symptoms of depression or anxiety, which were at first thought of as secondary, can become the "cause" of further pain and discomfort. Pain, over time, gives rise to a complex system – and the experience of the patient is an emergent phenomenon with qualities which are 'intertrinsic' to the relationships between elements of the chronic pain system – the ultimate character of the experience being dependent on not just each individual symptom or trait, but on the *interactions* between those elements. This sometimes makes the distinctions of primary and secondary less important than finding treatments which address multiple concerns -- with less attention paid to dualistic hierarchies which comfort an observer who is unwilling to take a patient at their word if it cannot be verified by imaging or blood tests. Music therapy, which frequently aims more directly at the psychological end of the mind-body spectrum than at a pure biochemical or biophysical intervention (vibroacoustic therapy is not necessarily musical in an aesthetic sense in nature), can address things like anxiety, comfort level, or relaxation in a way that has

reasonable efficacy – with little to no risk to the patient, and often at financial costs much lower than other clinical medical treatments (Kwan, 2013, p. 157).

Comeaux and Steele-Moses (2013) conducted a study to "determine if music therapy was an effective adjunct to decrease state anxiety, and increase pain management and environmental noise satisfaction in the postoperative patient"(314). Post-op patients were given MP3 players with which to listen to 30 minutes of pre-programmed music after the administration of analgesia. The control group individuals did not listen to music after analgesia. The authors found that pain management, as well as environmental noise satisfaction was significantly improved in the music therapy patients, while anxiety was not significantly improved.

TABLE 4.
Difference within Group from Time One to Time Two, Control (*N*=22)

Variable	μ	t	*p*
State Anxiety		0.149	0.883
Time One	36.05		
Time Two	35.68		
Pain Management Satisfaction		0.237	0.815
Time One	2.73		
Time Two	2.77		
Environmental Noise Satisfaction		0.568	0.576
Time One	3.14		
Time Two	3.05		

TABLE 5.
Difference within Group from Time One to Time Two, Music (*N*=19)

Variable	μ	t	*p*
State Anxiety		1.47	0.159
Music	39.63		
Control	37.11		
Pain Management Satisfaction		7.385	<0.001
Music	2.42		
Control	3.47		
Environmental Noise Satisfaction		4.371	<0.001
Music	2.74		
Control	3.53		

The findings regarding no change in anxiety levels despite improvements in the other measures, although they reference other studies that did find improvement in anxiety levels. The authors suggest further study and implementation because of the relative ease and low cost of using mp3 players with patients.

Parlar Kilic, et al (2014) conducted an experiment in an emergency room in Turkey. Patients were taken to an area where music either could be heard (100 patients), or could not be heard (100 – control patients). The music was played over a central speaker system so that it could be heard as part of the environment rather than as a treatment specific to a single patient. Patients took a pain survey to determine their overall level of pain and anxiety. The authors noted that there was a significant difference (less pain/anxiety) in the intervention group than in the control group. Both groups contained numerous different ailments and reasons for admittance to the hospital. The authors in this study also cited the non-invasive, inexpensive nature of using music as an intervention for patients.

Table 1 Sociodemographic characteristics of the patients and reasons for applying to the emergency room

	Intervention group ($n = 100$)	Control group ($n = 100$)	*P*-value
Age (years) (mean ± SD)	30.15 ± 13.18	34.71 ± 14.14	0.019*
Sex (*n* [%])			
Male	51 (51.0)	55 (55.0)	0.571
Female	49 (49.0)	45 (45.0)	
Educational level (*n* [%])			
Illiterate	4 (4.0)	6 (6.0)	0.002*
Literate	4 (4.0)	7 (7.0)	
Primary education (age 7–11 years)	17 (17.0)	19 (19.0)	
Secondary education (age 12–14 years)	7 (7.0)	13 (13.0)	
High school (age 15–17 years)	22 (22.0)	37 (37.0)	
University	46 (46.0)	18 (18.0)	
Marital status (*n* [%])			
Married	45 (45.0)	53 (53.0)	0.041*
Single	53 (53.0)	39 (39.0)	
Widowed	2 (2.0)	8 (8.0)	
Reasons for applying to the emergency room† (*n* [%])			
Nausea/vomiting	35 (35.0)	31 (31.0)	0.547
Abdominal pain	25 (25.0)	34 (34.0)	0.163
Abdominal sensitivity	11 (11.0)	19 (19.0)	0.113
Headache	41 (41.0)	42 (42.0)	0.886
Vertigo	13 (13.0)	16 (16.0)	0.547
Diarrhea	7 (7.0)	7 (7.0)	1.000
Joint pain	11 (11.0)	36 (36.0)	0.001*
Total	100 (100.0)	100 (100.0)	

*$P < 0.05$. †More than one answer. Percentage was taken accepting N as 143 (intervention group) and 185 (control group). SD, standard deviation.

Table 2 Difference of VASP and STAI-S scores between intervention and control groups

Scores	Intervention group (mean ± SD)	Control group (mean ± SD)	*P*-value
Pain severity (VASP)	4.63 ± 2.08	6.00 ± 1.74	0.001*
STAI-S	38.96 ± 3.70	43.31 ± 5.70	0.001*

*$P < 0.05$. SD, standard deviation; STAI-S, State Anxiety Scale; VASP, Visual Analog Scale to measure the patients' level of pain.

Methodology

Based on the review of literature findings, I will be working, under Dr. Aguilar's supervision, on a pre-research project at St. Mary's Hospital. St. Mary's very graciously has agreed to allow us access to four of their patients. Under their supervision, I will give parents/caregivers of the infants a survey asking for familiar music ('songs of kin') that they feel would be relaxing. When possible, I will invite the parents or caregivers to be actively involved by singing a familiar lullaby or song of kin themselves to the infants. Using the scale currently used at St. Mary's to measure infants' pain, agitation, and sedation (N-PASS), I will assess the effect of the music therapy process on the babies. N-PASS looks at infants' level of crying irritability, behavioral state, facial expression, extremities tone, and vital signs. Nurses at St. Mary's NICU are trained to use this scale every hour on babies under their care. Therefore, I will use their observations along with mine to assess the effect of his therapy.

In the case of chronic pain patients, I will have the patients listen to self-selected music. The type of music chosen will be noted and I will use the scale currently used at St. Mary's to measure pain, which is a Likert-type of scale with which patients express their level of pain from 0 to 10, 10 being the highest level of pain possible. I will give them the measure scale before the treatment, and then again right after the music therapy experience, and once again a half an hour later to account for a longer-term effect of the therapy. After the proposed therapy plan has been implemented, I will put together a final document presenting a complete report of my research project, from the bibliography review, the methodology, the findings and the resulting therapy plan intended to

be applied during an Internship in the spring of 2017.

References

Comeaux, T. & Steele-Moses, S. (2013). The Effect of Complementary Music Therapy on the Patient's Postoperative State Anxiety, Pain Control, and Environmental Noise Satisfaction. *Medsburg Nursing., 22(5)*

Garunkstiene, R., Buinauskiene, J., Uloziene, I., & Markuniene, E. (2013). Controlled trial of live versus recorded lullabies in preterm infants. *Nordic Journal of Music Therapy, 23*(1), 71-88. doi:10.1080/08098131.2013.809783

Haslbeck, F. B. (2013). The interactive potential of creative music therapy with premature infants and their parents: A qualitative analysis. *Nordic Journal of Music Therapy, 23*(1), 36-70. doi:10.1080/08098131.2013.790918

Kilic, S. P., Karadag, G., Oyucu, S., Kale, O., Zengin, S., Ozdemir, E., & Korhan, E. A. (2014). Effect of music on pain, anxiety, and patient satisfaction in patients who present to the emergency department in Turkey. *Japan Journal of Nursing Science, 12*(1), 44-53. doi:10.1111/jjns.12047

Kwan, M., & Seah, A. S. (2013). Music therapy as a non-pharmacological adjunct to pain management: Experiences at an acute hospital in Singapore. *Progress in Palliative Care, 21*(3), 151-157. doi:10.1179/1743291x12y.0000000042

Loewy, J. (2015). NICU music therapy: Song of kin as critical lullaby in research and practice. *Ann. N.Y. Acad. Sci. Annals of the New York Academy of Sciences, 1337*(1), 178-185. doi:10.1111/nyas.12648

Malloch, S., Shoemark, H., Črnčec, R., Newnham, C., Paul, C., Prior, M., . . . Burnham, D. (2012). Music therapy with hospitalized infants-the art and science of communicative musicality. *Infant Mental Health Journal Infant Ment. Health J., 33*(4), 386-399. doi:10.1002/imhj.21346

Matsota, Paraskevi; Christodoulopoulou, Theodora; Smyrnioti, Maria Eleni; Pandazi, Ageliki; Kanellopoulos, Ilias; Koursoumi, Evgenia; Karamanis, Periandros; Kostopanagiotou, Georgia. *Journal of Alternative & Complementary Medicine*. Apr2013, Vol. 19 Issue 4, p298-307. 10p. 6 Charts. DOI: 10.1089/acm.2010.0235.

Moran, C. A., Cacho, R. D., Cacho, E. W., Sousa, K. G., Souza, J. C., Filho, G. G., & Pereira, S. A. (2015). Use Of Music During Physical Therapy Intervention In A Neonatal Intensive Care Unit: A Randomized Controlled Trial. *J. Hum. Growth Dev. Journal of Human Growth and Development, 25*(2), 177. doi:10.7322/jhgd.103004

Nayeri, N., Shabani, F., Karimi, R., Zarei, K., & Chehrazi, M. (2016). Effects of music therapy on pain responses induced by blood sampling in premature infants: A randomized cross-over trial. *Iranian Journal of Nursing and Midwifery Research Iranian J Nursing Midwifery Res, 21*(4), 391. doi:10.4103/1735-9066.185581

Pölkki, T., Korhonen, A., & Laukkala, H. (2012). Expectations associated with the use of music in neonatal intensive care: A survey from the viewpoint of parents. *Journal for Specialists in Pediatric Nursing J Spec Pediatr Nurs, 17*(4), 321-328. doi:10.1111/j.1744-6155.2012.00343.x

Schwilling, D., Vogeser, M., Kirchhoff, F., Schwaiblmair, F., Boulesteix, A., Schulze, A., & Flemmer, A. W. (2015). Live music reduces stress levels in very low-birthweight infants. *Acta Paediatrica Acta Paediatr, 104*(4), 360-367. doi:10.1111/apa.12913

Sloboda, J. A. (1991). Music Structure and Emotional Response: Some Empirical Findings. *Psychology of Music, 19*(2), 110-120. doi:10.1177/0305735691192002

Yildiz, A., & Arikan, D. (2011). The effects of giving pacifiers to premature infants and making them listen to lullabies on their transition period for total oral feeding and sucking success. *Journal of Clinical Nursing, 21*(5-6), 644-656. doi:10.1111/j.1365-2702.2010.03634.x