



Interventions of Music: Reviewing Evidence for Better Practice

Mindi Miller^{1*}, Brianna Fox² and Abbey Brown¹

¹Bloomsburg University in Bloomsburg, Pennsylvania, USA

²Brianna Fox, BSN, RN, Neonatal Intensive Care Unit at St. Luke's Hospital in Bethlehem Pennsylvania, USA

*Corresponding author: Mindi Miller, PhD, RN, CRRN (certified in Rehabilitation Nursing), Associate Professor in the Department of Nursing and an Honors Independent Study advisor, Bloomsburg University of Pennsylvania, Bloomsburg, PA, USA, E-mail: mmiller2@bloomu.edu

Abstract

There is growing evidence that music assists with healing and well-being. Music is known to have widespread common characteristics, yet there are individual cognitive and emotional differences that make the operationalization of music therapy challenging. The work of two baccalaureate honors students became the catalyst for doing additional literature critiques on music therapy. Best practice guidelines for music therapy is in its infancy, as is the specialty of certified music therapists. Music terms are often interchangeable, complicating the review of best practices. Music therapy infers long term use while music intervention implies short term applications. Musical activities used for multiple disorders and developmental stages involve intricate cognitive and neurological factors. Because of complex variables associated with music perception, a team approach using both quantitative and qualitative studies is recommended for planning effective and individualized music interventions. This overview is holistic and suggests improvement of best practice guidelines for music therapy.

Keywords

Music therapy, Music science, Psycho-neuro-immunology, Musical interventions, Best practice, Team approach

Background

Music as the “universal language of mankind” [1] represents an ongoing consensus about the worth of music. Some basic elements of music, like tone or rhythm, are considered to be cross-cultural and universal [2]. Salimpoor *et al.* [3] suggests that music has been part of every culture since prehistoric times. The concept of universality is not as clear-cut today, as the science of music uncovers individual variations. Published studies support the notion that music is a valuable strategy for promoting well-being; however, whether or not musical interventions produce consistent cognitive results and emotional responses between individuals and across cultures remains debatable.

Questions emerged from the research projects of two nursing students during their academic undergraduate Honors Program Independent Study. Is there a universal or at least consistent benefit of music in terms of therapy? Is there something about musical interventions that could have adverse results and therefore should not be implemented? The first student focused on music therapy for adolescent cancer patients [4], and the second student studied

music-based interventions on the behavior of challenged youth [5]. One project related to music as a strategy for improving physical symptoms and healing, while the other project used music to foster self-regulation and behavioral improvements. No published best practice guidelines were directly relevant to these projects.

The following discussion compares literature on music with questions from the Honors Projects, in order to help identify more specific best practice techniques. Publications associated with the history, culture, science, psychology, and therapy of music were appraised. Quantitative neurological studies had the highest hierarchy of evidence with random control studies, and case study qualitative articles ranked lowest on the evidence-based hierarchy scale. An analysis of methodology, however, is not directly pertinent to this review, since trends in the literature are used in conjunction with published best practice materials on music. The focus is not a meta-analysis but rather the location, assessment, and improvement of best practice guidelines related to music therapy.

Meaning of Music

The meaning of music is the first step toward understanding its uses. Cross cultural similarities and so-called universalities of music can be fascinating research topics. Egermann *et al.* [6] compared reactions to Western music between Pygmies in the rainforest with urban Canadians. The tranquil versus stimulating responses were similar, but the emotional aspects were different, such as the interpretations of good and bad feelings while listening to the same music.

Inconsistent reactions to music extend beyond cultural and environmental differences. According to Zatorre [7], an estimated 5% of our worldwide population have amusia or anhedonia, meaning that music of any type fails to illicit an emotional response. The individuals identified within this approximated 5% do not exhibit depression or overall insensitivity, as they derive pleasure from other leisure activities apart from music, like listening to sporting events. Amusia as a category also includes tone deafness (dysmelodia) or the inability to reproduce a tune or sing on key. Gosselin, Paquette and Peretz [8] found that amusic individuals usually demonstrated four emotional responses to music – peace, fear, sadness, and happiness. In addition to melody, rhythm and dynamics (acoustical variations) may play a role in music appreciation beyond pitch.

Multiple authors throughout the years have written about

perceptual patterns associated with music. Higgins [9] wrote a book investigating music as a universal language, including a chapter on animals. This author *pitched* music as a communication tool that could cross cultures and be used to assist with political *disharmony*. The puns of *pitched* and *disharmony* are not part of the author's book but are used here to provide some insight into musical analogies. Music has become part of language, as words denote and define circumstances by using musical terms, like *discord*, *dissonance*, *harmonious*, and *melodious*. In any regard, calm music played during moments of tension can help to change the atmosphere and promote discussions and negotiations.

According to Merriam-Webster [10], the term universal means that everyone - the collective whole - experiences or reports the same phenomenon; whatever the characteristic or behavior, it applies to everybody. Music as a universality may be more theory than fact, since there are different levels of reported amusia ranging from inability to perceive or match the melody to a lack of emotional response altogether to music. The fields of neural science and cognitive research analyze and map patterns of musical perception. This data provides insight into what might constitute best practice in music therapy, including the need for treatment variations.

Science of Music

Over the last few years, neuro-imaging studies have provided a wealth of information related to the science of music. It is now known that dopamine is released from the ventral and dorsal striatum after hearing enjoyable music. Excluding those with mental illness, research results are supporting the theory that a few individuals do not respond emotionally or physiologically to music while exhibiting neuro responses during other activities perceived as pleasurable [7]. Both quantitative and qualitative data support the notion that there are varying degrees of music perception and appreciation. In these cases, best practice would be to use a therapeutic venue other than music. Gosselin, Paquette and Peretz [8] sampled individuals who struggle with pitch, rhythm, or musical dynamics and found that music predominately elicited emotional reactions similar to those with musical abilities. In other words, people who are not musically inclined may still experience emotional responses to music. When mapping MRI and hard science results to subjective reports, interesting correlations emerge. Alluri *et al.* [11] studied the three limbic regions of the brain in musicians and non-musicians, noting more process motor connections in musicians, more subcortical region connectivity in non-musicians, but no difference in the mesocorticolimbic reward network between the groups.

Research into genetics suggests that absolute or perfect pitch - the ability to recognize a key/note/cord without hearing the musical scale - may be an inherited skill associated with a cell-surface-bound receptor (EPHA7). If there is innate musical ability, this characteristic may play a role in musical sensitivity and subsequent neural responses. Another genetic example comes from those with Williams-Beuren syndrome. These individuals have a chromosomal abnormality resulting in low IQ and difficulty with spatial skills, yet these individuals often exhibit an unusually high skill level in music [12].

Apart from musical talent and training that may influence cognitive changes, other variables affect musical perceptions, such as hearing differences. Cochlear implant recipients, for instance, previously reported negative reactions to music [13]. However, reports of enjoyment improved with the advancement of implant technology. Adams *et al.* [14] found that normal hearing subjects described listening activities with higher pleasure than subjects with cochlear implants, although 79% of those with implants voluntarily listened to music and reported pleasure from this activity.

Perceptions of Music

There is beneficial subjective data from self-reported musical tendencies, but there is a higher level of evidence derived from objective studies. Chanda and Levitin [15] analyzed the neurochemistry of music and identified four domains: 1) Reward, motivation and

pleasure; 2) Stress and arousal; 3) Immunity; and 4) Social Affiliation. The authors connected neurochemical systems with each domain, respectively: dopamine, cortisol, serotonin, and oxytocin (p. 179). Research into music and health extends beyond mere description to include studies that compare medication regimes with groups using music therapy without drugs. Evaluations center on whether or not there is an increase in dopamine from music listening that is similar to opioid use, or if music evokes oxytocin-like feelings of social comfort. This research is ongoing.

There is a body of literature related to health and happiness. The underlying theme in these studies relates to a psycho-neuro-immunologic affiliation with mood. According to Chanda and Levitin [15], musical activities increase the level of immunoglobulin A, an antibody that fights bacteria and other illness-causing cells. Music is also known to decrease stress, and since there is a connection between stress and illness, musical activities may foster therapeutic responses - with or without healthcare oversight. After conducting a systematic review of publications spanning two decades, Fancourt, Ockelford, and Belai [16] developed a taxonomy of music that can serve as a framework for additional research into stress-related variables and the potential benefit of music therapy.

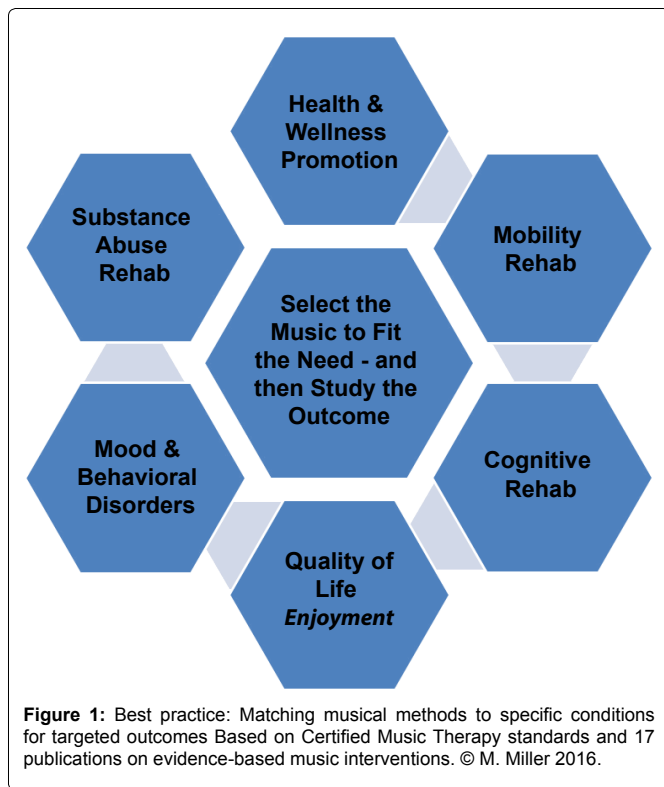
Worldwide research investigates music and emotional connections [17]. Cognitive responses to music are not, however, limited to emotional reactions. Brain areas related to attention, movement, memory, and planning are activated when music is heard [14]. Scientific studies into the physiology, neurology, and genetic associations with musical skills, emotional responses, and therapeutic applications will no doubt continue. There is also a growing field of music therapy that is adding to this database.

Use of Music

Using music to promote well-being would be easy to do if there were consistent cognitive results and emotional responses to music. Although there is evidence to support music as therapy, the variables are multifaceted and require thorough assessments. For instance, musical interventions are used for a number of dissimilar conditions and ages, so the goals and musical protocols change depending on the issue. Sometimes stimulation is needed, while at other times sensory overload must be avoided. Music is used for premature infants, children with autism, and various ages of individuals with mood disorders or medical and rehabilitation challenges. Music may encourage better physical performance, promote relaxation during procedures, improve behaviors in the mentally ill, or enhance peacefulness during death. The challenge is knowing what music to use when and what music to play for whom. Perhaps the core of "best" practice is selecting music that fits a client's need (mobility, mood, speech, or other healthcare goal) and then studying the outcome to identify applicability to similar clients and populations.

Selecting treatment is particularly challenging for disorders of consciousness, and more empirical data is needed about brain functioning for those experiencing various levels of alertness. Kotchoubey, Pavlov and Kleber [18] outlined musical stimulation for the four domains of perception, cognition, emotions, and motor functioning. For example, pitch and harmony assist with perception while syntax and meaning promote cognition. Listening to music is not therapeutic by default, since the type of music and the timing of the musical intervention influences outcomes. In fact, music can result in adverse outcomes, such as agitation.

There is a place for randomized clinical trials for music-based interventions. Learning more about neurobiological responses and enhanced brain connections will help guide efforts toward recovery. Both gray and white matter, as well as forebrain and hindbrain areas show sensory, motor, and multimodal brain changes associated with music; and, this is particularly evident after dancing and singing interventions [19]. More studies are needed into how music is used, such as simply listening to it, or using music while performing a task,



or actually playing and making music. Would more engagement and interaction with music facilitate better therapeutic outcomes?

Empirical evidence helps to answer the honors students' questions about consistent benefits or adverse results from music therapy. Fox [4] compared studies on music interventions between adolescent and adults receiving chemotherapy and found similar responses between the age groups. This honor student noted that in addition to the soothing effects of music, additional knowledge is needed into whether or not there are immunological boosts as a result of music therapy in different age groups receiving chemotherapy. The project by Brown [5] involved playing music during meals and study periods to see if noise levels decreased in preschool children with a history of traumatic experiences. More conversation and slower paced meals were noted, although there was no measurable change during work times. Additional research is needed to determine if a change in music or other variable would result in calmer student demeanors during work and study sessions. A certified music therapist continues to work with these challenged youth. Such involvement with a musical specialist shows best practice, as musical methods are better matched to age and condition for targeted outcomes.

Music Therapy

Music therapists are experts in the use of music as therapeutic intervention techniques and thus can assist with developing appropriate care plans that incorporate music. The World Federation of Music Therapy (WFMT) and the American Music Therapy Association (AMTA) provide information about Board Certified therapists and music consultants with evidence-based clinical expertise in musical interventions [20,21]. Credentialed professionals are those who completed an approved program in music therapy [22].

There are countless situations where an expert music therapist would be a valuable member of the healthcare team. Cerebral vascular accidents, for example, may occur in different areas of the brain that involve multiple functional categories. Speech and emotion, along with several other functions, are controlled in the cerebrum, coordination and balance are in the cerebellum, and hearing and speaking are part of the brainstem. Different care plans would be needed, depending upon the desired outcomes, such as singing to promote speech, or musical rhythms to guide balance and ambulatory improvements.

Based on the reviewed literature, assembling a team is the

Table 1: Summary of literature on music therapy.

Database Search - March 2011 to March 2016	
Boolean Key Terms below – English - Peer Reviewed	
Cochrane	Results
Certified Music Therapist	12
Music Therapy	23
Nurs' and Music'	5
EBSCOhost (CINAHL Complete)	Results
Certified Music Therapist	9
Music Intervention' and Nurs'	90
Music and Nurs' and Best Practice'	2
Music Therap' and Nurs'	206
Google Scholar	Results
Certified Music Therapist	14,600
Music Intervention' and Nurs'	16,400
Music Therap' and Nurs'	15,300
Music and Nurs' and Best Practice'	16,900
Nursing Reference Center by EBSCOhost	Results
Evidence-based Care Sheets	10
Search Everything	Results
Certified Music Therapist	1,023
Music Intervention' and Nurs'	15,247
Music Therap' and Nurs'	12,826
Music and Nurs' and Best Practice'	15,207

appropriate start to music therapy. The first person to be included in this team is the patient, with the inclusion of family and perhaps friends as well. Questions need to be answered regarding personal views of music in order to help shape the music therapy being planned and to prevent adverse responses. What type of music is preferred? Are there religious or cultural considerations? Is there any music that would elicit negative emotions, like a song that is associated with a traumatic event or the loss of a loved one? What is the purpose of the music therapy – comfort, distraction, motivation, attitudinal, cognitive or physical rehabilitation, or some other goal toward quality of life?

Ideally, the team is holistic in focus and includes nurses, the primary care provider, physiology and imaging specialists, mental health consultants, and other pertinent experts who work together with the music therapist to develop interventions for improvement. Team members will vary, depending upon client needs. Figure 1 shows the general categories where music can be selected to target and to nurture cognitive connections and improvements.

Raglio and Oasi [23] discussed the use of music to help meet specific health goals and measurable results. The brain becomes part of the plan, since music therapy exerts an influence on limbic, paralimbic, and cortical levels. Sounds (musical or otherwise) can change vital signs and neurochemistry. Relaxation and joy produce or mimic dopamine, serotonin, and opioid-like responses, whereas stress results in different chemistry.

Listening to music alone is not considered music therapy by some, since interventions with music typically require action. If the patient makes choices, then there is likely to be a better therapeutic outcome. Raglio and Oasi [23] outlined categories of music therapy that include relational (interventions of relationship), rehabilitative (improvement interventions), individualized (favorite music), music medicine (specific regimes), and general music-based approaches (making music). These interventions should be implemented per evidenced-based approaches that can be applied to diverse clinical settings with ongoing evaluation (p.2).

Best Practice Guidelines

Although this overview is not a meta-analysis of research, a pursuit for published best practice guidelines was conducted by searching Cochrane, EBSCO Host including CINAHL Complete and the Nursing Reference Center, Google Scholar, and Search Everything databases. Table 1 summarizes the number of articles found. The dearth of actual evidence-based guidelines for music therapy is

apparent. The Cochran database shows merely five studies related to music and nursing interventions that included sleep, dementia, and pediatric pain and fear of needles. The Nursing Reference Center by EBSCO Host only lists *Evidence-based Care Sheets* related to music, and details within these guidelines are scant.

Evidence-based Care Sheets have two sections: *What We Know* and *What We Can Do*. These sheets or guidelines do serve a good purpose by providing an overview of research and a list of references that support the use of music for depression, anxiety, pain-reduction, stroke, and other rehabilitation conditions. References are also coded as to the strength of the evidence within the publications. However, the second section has limited information about the type of music, activity and listening regimes, or expected outcomes. Wording is typical general, such as learning about an issue or condition, educating families, and referring the patient to specialists. There are logistical practices listed, like providing a headset and cleaning the ear pads, but other techniques like how to select the best music for an outcome (mood, mobility, or other improvement) are not addressed. There are recommendations within some *Care Sheets* for a board certified music therapist to assist with the treatment plan and evaluation of the implemented music therapy. The copyright dates are 2015 and 2016, showing that these *Care Sheets* are new.

Thousands of articles have been published about using music in healthcare as shown in [table 1](#). When using the search terms nursing, music, best practice, and evidence-based care, only 17 total publications are found. Although not best practice in terms of solid evidence, there are more than 200 resources that mention music as an appropriate nursing intervention. For instance, publications that include the nursing process often list music interventions within implementation sections of care plan books. There are multiple neuroscience studies mapping cellular changes from exposure to music, although findings and recommendations from these studies are not yet articulated within the scope of best practice guidelines related to music therapy.

While browsing the databases, an integrative review was discovered that summarizes 50 studies from 2001 to 2011 on music therapy and nursing [24]. Nurses are using the “song” to facilitate parent-child bonding, reduce aggression, promote sleep, and to generally improve client mood. This compilation includes studies from Brazil, China, and the U.S.A. This evidence is valuable and cross-cultural, but not explicitly incorporated into practice protocols. As studies continue to show trends in music therapy, best practice guidelines will be able to incorporate more details on groups of patients with similar healthcare issues and rehabilitation needs. Thus, best practice becomes “better” practice as guidelines become more specific.

Summary

To summarize, best practice includes matching music interventions with specific physical and emotional needs. Music therapy involves more than just playing music for pleasure, although music can be informally perceived as therapeutic. Music therapy includes the consideration of multiple factors. Sensory deprivation versus sensory overload, for instance, requires different protocols and could even mean the exclusion of music.

When there are brain disorders, the cognitive response to music may be different than expected, thus requiring ongoing assessment and refinement of the therapy plan. The literature supports the need for a neuro-scientific basis when using any form of music as therapy. Diverse specialists conducting music therapy research continue to add to the database and will promote even better practice in the future. Nurses and other care providers like occupational therapists and physical therapists can extend their research agendas to include music-related studies that contribute to practice databases.

Music as a universal language assumes that everyone is in the same universe and on the same sheet of music in terms of cognitive perception. From pygmies to a music individuals, the response to

music varies, especially when health issues exist. Multiple books and thousands of articles have been written about music and its relationship to cognitive processes, healing, and quality of life. Like all therapeutic interventions, music should do no harm. The literature on music in healthcare is vast, although articles do not typically correlate music therapy protocols with different conditions and ages. Musical interventions may be beneficial, albeit not always statistically significant.

A recently developed resource, the *Evidence-based Care Sheets* published by EBSCO, presents music therapy as a nursing intervention for those with specific healthcare needs. A way to improve care is to build and refine these best practice guidelines. Currently, the section on evidence is considerably larger than the section on recommended best-practice interventions. A recurrent suggestion from the psycho-neuro-immunologic literature is to have a team of healthcare experts including certified music therapists assist with planning and assessing outcomes of musical interventions. A more holistic and inclusive plan of care occurs when music therapy is a team effort. In short, it is simply not enough to just play music and call it music therapy.

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