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Special Issue

Noteworthy: The Music in Music and Medicine

Guest Editors

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Editors

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Table of Contents I

Table of Contents II

Editorial

Preface to the Special Issue: Noteworthy: *The Music in Music and Medicine*

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What is the role of music in medicine? How are the body's unique systems integrated through rhythm and expressed through sound, motion and speech? Each of us physiologically holds a symphony of sounds and rhythms within our body, and these elements interconnect systems, such as cardio, pulmonary, neural with a variety of other functions. However, it is our mind's intentions, and the spirit, which arguably blends our intentions with a reliance on fate, that at times holds our sense of belief or otherwise. Depending on our physiology, body function, age, gender, sex and cultural belief system, we may be motivated to participate, or reflect, or we may be reticent to take action in our decision-making related to health. The music of the body speaks to our health or dis ease, and we are learning to listen.

It is an important year for our journal. We have enthusiastically hurdled through our 5-year anniversary. We have made strides in not only changing our production company, staff and platform from print to electronic (green) access, but additionally we have embarked upon some unique and special topics. The issue before you is a highlight of such ventures.

This journal, themed as '*Noteworthy: The Music in Music and Medicine*' marks another milestone in the marriage between music medicine and music therapy. It is apparent that music therapists are seeking deeper answers from quantitative and qualitative outcomes - in data that correlates the clinically significant music elements to an effect that is reliable and replicable. Furthermore, music therapists tend to have high regard for studies that analyze critical components of the music exchange, that are inclusive of a relationship, which may be quite difficult to quantify, though not impossible.

At the same time, doctors and nurses are searching for elements of music that can have a healing effect. Our medical colleagues recognize the potency of music therapy, and in particular the expertise and training that is involved in the discipline of music psychotherapy. Many hospitals are hosting music therapists for Grand Rounds and the consults that result in interested program building ventures are reflecting a rise in the number of hospital music therapy programs worldwide.

Music technology study holds interesting implications that relate to the music of medicine. A few years ago, several researchers investigated accurate rhythms versus human rhythms and their effects on listeners. They found that the statistical laws governing rhythmic fluctuations in human musical performances render a preference in most people for non-perfect, 'humanized' music.

When they compared the beats of a live musician with those of an electrical metronome they found that: the live musician "induces a unique colorful aspect (with) discrepancies as small as a few milliseconds, but (that) many music-lovers claim not only to hear a difference, but also to appreciate it. According to them, this human touch uniquely colors a piece of music each time it is played."

It is interesting that in current music producing, recording studios, beat tracks, which are essentially artificially created rhythms, are taken out of context and "post-processed." Where every beat is shifted slightly in time, this method, cited by researchers and gaining momentum in the pop production world is referred to as 'humanizing'.

What is it about the human element of music that is so preferred, even as our media would have us believe that there is a perfect-best? Listeners, according to this research, strongly preferred long-range correlated fluctuations in musical rhythms. Perhaps rather predictably, this study provided a basis for further investigation of the patterns of favorable fluctuation type, in an effort to create "humanizing inter-beat intervals." The research substantiates their production of an instrument for music beat production that coincides with the one "generically inherent in human musical performances."

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One could argue that "human" "musical" and "performance" are unique aspects of expression, for which there is limited "generic" relevance. This may be particularly realized as we begin to think about the ways in which aesthetic values are developed and the role that creativity plays in the development of human thinking coupled with the evolution of medicine, technology and our capacity to realize change. Desire for change is part of the human condition, and arguably a "human" beat pattern incepted within musical production might be short cited.

There will always be a natural tendency to develop, which may be represented in our human way to tighten, to do more, and go faster. It may also be represented in the atmospheric response to our activation. This summer was the hottest on record for our globe, and people are responding, organizing climate change summits worldwide. Our standard A pitch tuning too has risen gradually over the decades. "In 1938, an international standard for A was set at 440 hertz, but the pitch continued to rise. The New York Philharmonic, under Zubin Mehta, tunes to an A at 442 hertz, as does the Chicago under Georg Solti and the Boston Symphony under Seiji Ozawa. In Berlin, orchestras tune to an A around 448 hertz. In Moscow, the symphony's pitch is even higher, near 450 hertz."(1989, NYTimes [LINK]).

In *Music and Medicine*, we have our eyes on patients and our studies that influence how we can institute music in a way that can enhance treatment strategies. In this important journal Guest Editors Stephan Quentzel MD and Therese West PhD dare to delve into the nut of music and medicine, in '*Noteworthy: The Music in Music and Medicine*' these Editors have compiled a broad range of articles from current music therapists and doctors that practice from varying perspectives including GIM, Nordoff-Robbins, models of live music and theoretical models of how music decisions are made; in clinical work with individuals, groups, and a variety of settings, including Pain treatments, ICUs and clinics, bedsides and community centers. '*Noteworthy: The Music in Music and Medicine*' promises to be a unique and broad compilation but perhaps most importantly, it is a theme that is based on the active practices of a medical doctor and a music therapist, and their clear desire to bring together deeper thinking and understanding about the most critical element of music medicine and music therapy, the music. We are grateful for their efforts.

Guest-Editorial

Noteworthy: *The Music in Music and Medicine*

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Amidst the unfamiliar occurrence of receiving, rather than delivering, medical care, I awoke in the Intensive Care Unit (ICU) of a major New York City medical center, after extensive surgery, to the disquieting pulsation of the machinery around me. It hurt to move and to inhale. But my breathing rhythm and my heartbeat seemed to contrast with the rate of that damn nonstop electric beep in my room. And while sleeping is fundamental for recuperation, it is seemingly impossible to rest with an irritating "metronome" pounding endlessly. My own selection of recorded music, I thought to myself, would be a godsend. So why didn't the hospital warn me to bring my CDs or iPod tracks along with my insurance card and toothbrush?

I should have known better, as I am the Medical Director of The Louis Armstrong Center for Music and Medicine. I use some form of music medicine on countless numbers of patients, and I know how noisy and unsettling an ICU can be. Yet, unfortunately, preparing to enter the hospital by bringing favored recorded music is not the standard for health care institutions, nor for typical patients, not even for me. Despite my training and experience, I did not think to diverge from the norm by bringing along music. It can be hard for even a senior clinician like me to think outside the box, to redefine well-established norms, when the hospital is not encouraging that.

So I lay there, wrestling with post-surgical pain, cognitive haze, anxiety, helplessness, fevers and shallow breathing, not entraining my biorhythms to beautiful melodies but, rather, being attacked by the proximate mechanized beep, the jangle of discord in my room.

Then the first note of The Beatle's "Here Comes the Sun" washed across my eardrums and skin. I turned my head to my right, in the direction of the songstress, and opened both eyes. Sitting just four feet from my bed, guitar in hand, was the medical center's music therapist, a vision of loveliness who never before had set foot in the ICU. It could have been the effect of my morphine, but a halo seemed to surround her and to pipe her angelic voice toward me, like the round end of the bell speaker of an old Victrola might do.

The annoying electronic pulsation retreated instantly. Disappearing as well was my desire for selected recorded music, for at my bedside I had not only live music to suit me personally, but also an instant relationship with a tender therapist. We shared the medicine of music although I could not actually sing along. But I certainly did feel it, respond to it and participate in it. Other than her introduction spoken to me, we did not converse. But the interaction through our mutual presence and through the shared live music therapy was poignant and rewarding nonetheless. Her warmth, her mindfulness, her moment by moment adaptation of her musical engagement with me, all proved to provide therapeutic respite for me. My physical discomfort eased, my breathing evened, my sweating stabilized, and my biochemical rush of pleasure diminished not only the pain but also the defensive posture induced by living in the alien mechanized realm that is the ICU. And I shared human, caring time with this skilled and thoughtful music therapist who did not know me personally yet was able to sense, as a trained professional, how to reach me quickly with her therapeutic ways. In delivering music that was not only well performed but that was chosen to connect with me, the music of music therapy was highlighted. Beatles tunes, and other strategic selections, were both pleasing and familiar to me, to the point where the music practically seemed encoded already in my DNA. So while I could not, in my medical circumstance, sing along with it, nevertheless the music resonated in my mind, in my gut, in my cardiovascular system and in my immune cells, all helping to create in me a preferable inner state and a healthier physiological condition.

Oh, the power of song and the power of the songstress, the mythological siren. Oh, the power of music medicine and the power of the music therapist.

This mighty NYC medical center never before had enjoyed the healing activities of music therapy in the midst of its ICU. This bold, young, delightful music therapist, so much to her credit, simply pushed her way in when informed that one of her brethren in music and medicine was lying there in

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recovery. The quizzical looks on the faces of surrounding clinicians, staff and patients rapidly turned to engaged smiles once the melodious language between therapist and me floated into all corners of the ward. The therapeutic force of those few songs, performed live and in tune with the contextual demands and realities of the moment, brought a peaceful transcendence to the nurses, for their personal benefit and for enriching their clinical efforts with patients. In fact, one nurse commented that for purposes of stress management, team building and self-care, there ought to be regular live music therapy group sessions for the staff of the ICU, a normally demanding place to work.

Oh, the power of song and the power of the songstress. The Power of Song is the title of the wonderful documentary about the late, super great Pete Seeger, a therapeutic musician of the highest order, through music a healer of the individual soul and of the collective assembly, be it an audience of only two or the totality of the human population on earth. I cannot ponder about music and medicine without blessing the healing and transformative impact that the radically revolutionary Pete Seeger delivered and actually embodied.

The power of song references, in part as well, the theme of this edition of Music and Medicine, the journal of the International Association of Music and Medicine. So much music therapy research focuses on outcome. Music medicine relieves depression. Therapeutic music reduces anxiety. Music therapy calms pain. And so on and so on. However, rarely do we stop to analyze what it is that is therapeutic about the nature of particular music, this type versus that type, this rhythm or harmony or pace or tonality or progression that has this influence or that impact.

This volume of *Music and Medicine* is intended to do just that, to focus on the music of music medicine. Of course, different music influences different people in various and distinguishing ways, some for the better, some for the worse. But trying to understand, and ultimately predict, how varying music generates distinct neurochemical, psychological, interpersonal and spiritual activity in defined sets of people perhaps allows us, ultimately, to target our music therapy more precisely, more effectively and more efficiently.

While the rest of the giant medical industry talks increasingly of "personalized medicine," perhaps there is greater potential for "personalized music medicine" waiting around the corner, in part as we accumulate knowledge and sense and intuition about how specified music has particular effects on a spectrum of people. Thus, we focus herein on the music of music therapy, and we hope to propel forward growing clinical and research and personal attention to the uniqueness of one kind of music versus another, used for therapeutic purposes. We hope in this journal edition to nurture increasing wisdom to support progress toward refining "personalized music medicine."

At The Louis Armstrong Center for Music and Medicine we specialize in, among other facets of care, music psychotherapy for musicians. Music is a language of fluency for musicians, so it works intensely and productively as an avenue for expression and psychodynamic exploration. But each musician patient is different, and the music that impacts, in various ways, on each musician patient, varies. We see this everyday, but we would benefit as a clinical field if we could better categorize and predict these effects, if we could go even further in constructing "personalized music medicine" by knowing more about the music.

With an emphasis on the nature of the music itself that has it work as a form of medicine, this volume of Music and Medicine opens with two articles reflecting on different aspects of Guided Imagery and Music (GIM). Helen Bonny, the founder of this school of music therapy, constructed her own system for understanding how differing musical styles, arrangements, genres, rhythms, tonalities and progressions generate various effects in clients, with the goal of achieving altered states of consciousness linked to psychospiritual transcendence, healing and wellness.

Our first article, by Denise Grocke, "*The Legacy of Dr. Helen Bonny and Guided Imagery and Music*" offers not only an overview of the GIM approach but also it delves deeply into discussing the clinical roles of specific selections of music, as determined by Dr. Bonny. The author explores the empirical effects, as seen by Bonny, of particular passages of music on diverse symptoms and conditions, but she goes further to examine, as well, physiological research on The Bonny Method's impact on the human brain. She concludes, in looking to the future, how growing study of the neuropsychology of music and imagery, with resulting clinical use of the therapeutic ramifications, promises to make Helen Bonny's work at least as relevant and impactful going forward as it has been relevant and impactful over the last 50 years of music therapy. As all of the psychotherapeutic disciplines transition, or at least expand, from attention on "mind" to focus on "brain," GIM sits squarely as one of the important stepping stones on that path of scientific and clinical progress for music and medicine.

The second article on receptive music therapy, more specifically GIM, authored by Margareta Warja and Lars Ole Bonde, is "*Music as Co-Therapist: Towards a Taxonomy of Music in Therapeutic Music and Imagery Work*." Consistent with the theme of this volume in studying the music of music therapy, the authors report on their research comparing various rationales for music therapists to prescribe certain music, as with The Bonny Method, versus approaches that use patient preference in selection of medicinal music. This clearly is a longstanding hot topic in music therapy. This article interestingly serves us by looking to order rationally the selection of music as medicine.

When we focus on the music in music and medicine, Helen Bonny's systemized "prescriptions" of specific pieces to generate unique clinical results is central material for consideration. Therefore, it seems apropos in this very edition of Music and Medicine to include a memorial essay about this major figure in music therapy. Barbara Hesser has done us all

a great service in writing a moving tribute that speaks from the heart to present the work and the person of Helen Bonny. I am proud to include here a piece that dares to be emotional because music, therapeutic or not, is so heavily emotional in its form and its impact. It is important that an academic journal such as Music and Medicine employs the scientific method in investigating the many facets of music as a clinical tonic. Such rigorous study helps to move the field forward and helps entrench the field's legitimacy within the larger world of the biomedical sciences. But, at the same time, we must remain vigilant that the value of music therapy and music medicine not be reduced by us, its practitioners and advocates and researchers, strictly to its rational components. We want to celebrate the science of music and medicine yet not simultaneously obliterate recognition of the ethereal value and color of therapeutic music. It does not take from the scientific richness of music medicine if we also celebrate the emotional, mystical, intuitional and interpersonal magic of medical music. In this way, we are fortunate to have professor Hesser expound on the art and science of Helen Bonny and her work. As a society, we dare to praise the important piece of overall health care delivery that is art without diminishing the power of its science. Similarly, we do full justice in exploring music and medicine when we emphasize its scientific wonders, but also its soulful art.

We begin this journal edition with a dive into the art and science of music and medicine, using GIM as our centerpoint. Next, we explore a focus on therapeutic music in a very medical setting, the ICU. Toward that end, Annie Heiderscheit, Stephanie Breckenridge, Linda L. Chlan, and Kay Savik's article, "*Music Preferences of Mechanically Ventilated Patients Participating in a Randomized Controlled Trial*," revisits the burning question of what specific music works best as medicine for very particular patient subjects. Their research outcomes match my experience, described earlier, as a patient. They find statistically significant value in having ICU (ventilated) patients bring favored music with them to the hospitalization. And I wish that I had brought personally preferred music with me to my ICU adventure in order to have gained therapeutic benefit. Interestingly, while Heiderscheit et al find, importantly, the medicinal value of ventilated patients' selected music, they do not reduce the significance of music therapy down to a program simply of having patients reap all the benefit of music medicine by just bringing their five favorite CDs to their hospital stays. Rather, they appropriately leave for future research the study of additional rewards of music medicine, such as inclusion of a dynamic relationship centered around musical interaction between ventilated or ICU patient and trained therapist. Both personally selected recorded music and interaction with the music therapist and her live performance had great relevance for my personal ICU experience. The complexity of music and medicine, the art and science of music medicine, the many levels of music therapy, all allow for multiple therapeutic aspects of music to emerge in a single clinical setting.

That is where Jennifer Harris picks up with her article, "*Music for Life: Does Music Have a Role in Intensive Care Medicine?*" In this review piece, the author distinguishes the research on live and recorded music for critically ill patients. And while she draws in conventional measures of therapeutic value for music, such as psychological measures, she also delves into the inseparability of music and medicine by detailing physiological parameters effected by music and pertinent to patient recovery.

Harris presents overarching material on music medicine impacting at multiple cellular, bioactive, interrelated targets. The next three authors hone in on three in-depth, focused studies on music as a biomedical force within the complex integration of music and medicine as art and science. All three articles examine particular features of music, strategically delivered, to drive positive medical outcomes.

Stephane Guetin and colleagues' "*Evaluation of the Standardized MUSICCARE App in the Treatment of Pain: The U-Shape Composing Technique*" presents their MUSICCARE system, which builds on substantial music medicine effectiveness in inducing relaxation and pain relief (physical and emotional). The authors carry their model forward to study, with standardization and systematic evaluation, their variant of music medicine, which proves to be clinically successful for diverse pain patients. Emphasis is on unique musical composition to deliver targeted medical outcomes, tying the nature of the music with particular medical gains.

Gunter Kreutz looks in his article, "*Psychobiological Responses in Amateur Choristers: When Speech is Silver and Singing is Golden*," to pull the music-medicine connection out of the enclaves of the most ill persons and into the everyday hunt for psychophysiological wellness in the general community. He studies choral performers to understand how musical participation generates specific physiological and emotional changes. It fascinates me to juxtapose two music and medicine articles, one that finds musical intervention to be potent for a narrow population of very sick individuals like ventilated patients, and the other that examines opportunities for certain music, and particular engagement with music, to foster broad public health gains.

Colin Lee and Amy Clements-Cortes' article, "*A Clinical Analysis of Debussy's 'Lisle Joyeuse:' Implications for Music Therapy in Medical Settings*," is the endpoint of the stepwise, accumulative journey through this edition of Music and Medicine that focuses on the role and nature of music in medicine. Through the articles, we crescendo toward a detailed dissection in these authors' work of very particular music to examine the impact of its small, separate parts and its grand sum on medical outcomes and on the stand alone value derived from the music therapy process. It is a culmination here of integrating the art and science of music therapy and integrating the music and medicine of music medicine, but specifically with emphasis on the therapeutic music itself.

The final article in this thematic volume of Music and Medicine is Andrew Rossetti's "*Towards Prescribed Music in Clinical Contexts: More Than Words*." It sits at the end because it points in an interesting direction for music and medicine to develop further. Not only does he present the argument that we continue to gain from additional study of the music in music medicine and music therapy, but he goes a full step further. To his credit, he dares to challenge the common notion in the field that the therapeutic selection of music must be prescribed only by feel and intuition in the moment by moment of the psychodynamic relationship as it develops between therapist and patient. He fears that this allows too often for arbitrariness in the selection of therapeutic music to pass for selection driven by "clinical judgment." He advocates that the more we understand the psychological, physiological, neurochemical, spiritual and interpersonal ramifications of specific features of differing music used therapeutically, the more we should be developing a systematic approach to selecting the right music for the clinical job.

Of course, at least in my mind, it is not always the specifics of medical music that matter so much. At times, nearly any music could be chosen for the music therapy because the music merely stands in as a straw man for the real healing process, the relationship between music clinician and patient. This mimics how often the specifics of the psychiatric or the medical prescription do not matter much, as nearly any prescription could be chosen because the medicine merely stands in as a straw man for the real healing process, the relationship between clinician and patient. On the other hand, however, where the differing facets of the music, or of the medications, do drive different clinical results, as is often the case, then we should carefully catalogue those differences and their therapeutic impacts, as per Rossetti's point.

Rossetti risks being accused of proposing the mechanization of music medicine, so he makes his valuable argument less intensely than I would were I he. But I come from a medical perspective that leaves me horrified by the mighty gap between what we know across the board in clinical medicine to be best practices standards versus how clinical medicine actually is practiced across the board. This large deficit must be reduced appreciably in order to improve meaningfully on the quality, and cost, of health care in America. Music therapy and music medicine, as clinical disciplines, could stand similar progress.

One solution in organized medicine is the creation and advancement of decision support processes to help the practitioner, in real time, with his clinical decision-making. The boom in medical information systems means that increasingly the computer will be learning the patient alongside the clinician and it will "whisper in his ear" over time to assure the clinician's ongoing application of best practices in health care delivery.

Rossetti is proposing, in effect, a similar thing, but at a smaller scale proportionate to the fields of music therapy and music medicine, and sensitive to the cultural norms of these music-centered specialties. Advanced and comprehensive decision support systems in medicine would do wonders to improve care and cost effectiveness, yet they never will supplant the human clinician, the doctor-patient relationship, and the art of medicine. We can have all simultaneously and benefit as a result. Similarly, music therapy and music medicine can institute stricter, comprehensive evidence-based systemized standards to raise the overall quality and success of music-centered care. Yet at the same time, that need not replace the feel of the music clinician, the integral relationship between patient or client and music therapist, and the art of music and medicine. We can have all simultaneously and benefit as a result.

I am blessed to be surrounded by the incalculable amount of cultural material offered in NYC, so I attend a ton of live music performances. Frequently I am asked why I spend so much time, effort and money on it. I answer that all of my investment in music is worth it to luxuriate in the intermittent moments of joy and transcendence. My unique personal experience and biochemistry seem to leave me sensitive and predisposed to having musical input activate strongly my central nervous system pleasure centers. But the rewards are less physiological as well. Peak experience driven by musical highlights also escalate facets of my ethereal inner life: tranquility, love, purpose, liberation from the boundaries of time, escape from the biological limitations of the corpus, touching upon a universality (with audience members and/or musicians but also more widely), finding outlet for my emotional and creative juices typically suppressed by the demands of survival and rational daily life, excavating an ecstasy - a cosmic giggle - from the core of my being. Music is medicine.

Oh, the power of song.

While this editorial piece is written by me exclusively, the entire production of this volume of Music and Medicine would have been impossible without the brilliance, effort and dedication of my co-guest editor, Therese West. Her spirit binds these pages together.

"And then everything changed and I just went with the music…I was really living in the music. I was the music. I just became completely enveloped in the music which is a wonderful thing. I did not feel afraid again, though I was a little confused and apprehensive whenever the music stopped and changed. I was completely lost in the music, and had the strong feeling that music saves me. I was IN the music, and carried by it. I think I must have spent a long time just being carried by the music, in my head, as if on a magic carpet."

-A subject in the New York University Medical Center Psilocybin Cancer Anxiety Study, which therapeutically uses music in monitored clinical research investigating the effects of hallucinogen-facilitated mystical experience upon the existential and psychospiritual distress of patients diagnosed with cancer.

Courtesy of Anthony P. Bossis, Ph.D., NYU School of Medicine

Commentary

The legacy of Dr. Helen Bonny, and Guided Imagery and Music (GIM)

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Abstract

Guided Imagery and Music is a model of music therapy developed by Dr. Helen Bonny in the 1960-1970's. Research into the Bonny Method of GIM has advanced our understanding of the mechanisms involved when music evokes the imagination, enhances mood, and supports transformative experiences. Studies adopting qualitative approaches demonstrate the link between music elements and types of imagery responses, and EEG studies indicate possible pathways when music stimulates discrete areas of the brain.

Keywords: ***Guided Imagery and Music; Bonny music programs; EEG studies of music***

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In the late 1960's Dr Helen Bonny was appointed as music therapist at the Maryland Psychiatric Research Centre (MPRC), where her role was to support patients receiving medically-sanctioned *lysergic acid diethylamide* (LSD) treatment for "persons suffering from neurotic symptomatology, substance abuse and terminal cancer" [1]. The LSD session lasted approximately 12 hours, and Bonny was responsible for programming recorded music to parallel the stages of the LSD session. The use of LSD was abandoned when increasing recreational use resulted in bad trips, and restrictions were placed on its use. Bonny had witnessed extraordinary responses to the music however, and she believed music alone would enable patients know moments of a spiritual peak experience. Her method of Guided Imagery and Music evolved over several years to become the four-phase session that is practiced around the world in 25 countries [2].

Guided Imagery and Music (is) a "music-assisted transformational therapy that offers persons the opportunity to integrate mental, emotional, physical, and spiritual aspects of themselves" [2]. Normally the recipient of GIM (sometimes referred to as client, or traveller) listens to programmed classical music in a deeply relaxed state (also known as an altered state of consciousness), in which visual imagery, changes in mood and physiological effect in the body are experienced. Clients may not always be in a relaxed state, particularly if strong emotion is present, and at those times the focus for the client is to be fully present to the emotion. The method can be understood as based on the principles of music psychotherapy, where unresolved issues or concerns of the client are brought to the surface by the dynamic shifts in the music selections. The client's issues are represented in symbolic form in visual images, feelings states and body responses. The therapist engages the client in a dialogue to enhance the experience of the imagery through occasional verbal interventions that seek more information about an experience, or assist in enabling the client to deepen the experience more fully [3]. Each of the music programs (of 30-40 minutes duration) designed by Bonny incorporates selections from the Western classical tradition. A movement of a larger work may be programmed alongside a work of another composer or another stylistic period. The choice of music for each program is made according to its potential for inducing imagery and deepening emotion [3].

The Bonny Music Programs

Helen Bonny was an eager researcher, and during her time at the MPRC she completed her PhD based on her knowledge of how the music, in conjunction with an altered state of consciousness (ASC), enabled personal and spiritual growth. Over the period 1973-1989 she designed 18 core music programs for use in GIM, and her writings illuminate the characteristics of classical music in supporting diversity of experiences in GIM [4].

Each music program comprises a collation of 3-7 selections of music that form a contour of one kind or another. Different genres of music may be placed alongside one other, for example, a movement of a symphony may be followed by a section of a tone poem, concerto or string

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quartette, and the composers may represent different time periods: Baroque, Classical, Romantic, or 20th century.

Characteristics of Classical Music of the Western tradition

Bonny articulated the characteristics of classical music of the Western tradition that underpinned the structure of her music programs [5]:

1) That music acts as a catalytic agent [6] in stimulating imagery. Music may be associated with memories of significant places, persons and events, and thus on hearing the opening phrases of the selection, a memory can be activated.
2) Music evokes emotion through the dynamic shift between tension and resolution. Tension may be created when the listener's tendency to respond is inhibited by unexpected delays in the resolution of the music, so that anticipation and heightened arousal evokes stronger emotion, which is resolved as the music itself reaches a cadence point or climax [6]. The cycle of expectation, building of anticipation and subsequent release is played out melodically, harmonically and rhythmically and enhanced by dynamic fluctuations [5].
3) Repetition and variability play important roles. Repetition is important in establishing trust in the music stimulus in that a repeated melodic or rhythmic phrase gives an auditory sense of security. Variability through modulation to different but related keys also is heard as secure in that the progression follows a logical structure within the music. When a theme and variations is used in GIM, the recipient hears the melody in a different texture, timbre, and register, with each variation providing a new "color" to the theme. As the music is designed to stimulate imagery, each new color may introduce a different perspective on the one issue or imagery experience. In this way "music superimposes its structure on the unfolding experience" [7].
4) The music as container. Based on the work of Bion, the music as "container" theory asserts that music of a small container (repetitious, predictability, low level dynamic change) will be helpful to a recipient who needs structure and support in the imagery experience. Conversely a person who has learnt to use the unfolding imagery to good effect may tolerate music of a wide container, comprising music that is more challenging, has greater dynamic range, may include dissonance and a wide range of instrumentation including brass and percussion. Music that underpins a transpersonal experience allows a wide container to explore expansiveness of emotion, where a small container may be needed to express anger [5].
5) The quality of the performance is important. Bonny was particular about the selection of artists for her music programs. For instance, she preferred the recording of the Mozart *Laudate Dominum* (on the *Positive Affect* program) that features the soloist Lucia Popp. Bonny disliked strong vibrato for this work as it might convey a mature voice. She preferred Lucia Popp's "clear and lyrical" quality [5]. The qualities of the artist's interpretation therefore played an integral role in Bonny's choice of recording.

The contour of the music programs

Bonny was inspired by various theorists and leaders of the time in creating her music programs. One of the first programs however was developed from the six phases of the LSD session and her program entitled *Positive Affect* follows that contour

1. Pre-onset: Elgar: *Enigma variations* #8 and #9
2. Onset: Mozart: *Vesperae Solemnes* (Laudate Dominum)
3. Build to Peak: Barber: *Adagio for Strings*
4. Plateau: Gounod: St Cecilia Mass: *Offertoire*
5. Peak: Gounod: St Cecilia Mass: *Sanctus*
6. Return: Strauss R: *Death & Transfiguration*: Part 6 (excerpt)

Bonny (2002) illustrates the shape of the Affective Contour of the *Positive Affect* program as:

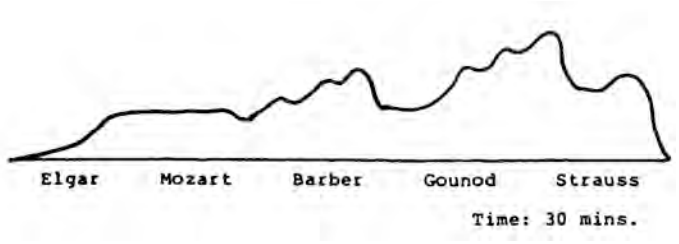

Figure 1: Affective Contour of the *Positive Affect* Program [8].

A diagnostic music program, now entitled "Explorations" was crafted to follow six of the ten visual scenarios developed by Hans-Carl Leuner in his method of Guided Affective Imagery [9]. The purpose of the scenarios was to present the patient with the visual image and then to "diagnose" how the patient responded affectively to the suggested image. Bonny matched six of the ten scenarios with a selection of music as follows [4]

1. Relaxing in the meadow: Ravel: *Daphnis and Chloe* suite #2 (segment)
2. Exploring a house as a symbol of the 'self': Brahms: *Symphony #1*, 3rd movement
3. Following a brook upstream to its source: Respighi: *The Pines of Rome* (Gianicola)
4. Following the brook downstream to the ocean: Debussy: *Nocturnes* (Sirenes)
5. Climbing a mountain and describing the view: Tschesnekoff: *Salvation is Created*
6. Return to normal consciousness: Debussy: *The girl with the flaxen hair* (prelude for piano).

Another program was developed to enhance opportunities for a peak experience. Bonny had been influenced by the humanistic philosophy of Abraham Maslow and peak experience as it related to self actualization. Bonny developed the music program *Peak Experience* to match the humanistic quest of "an experience higher than themselves" [10]. The selections for this program included:

1. Beethoven: 5^{th} *piano concerto* (Adagio)
2. Vivaldi: *Gloria* (Et in terra pax)
3. Bach/Stokowski: Toccata, *Adagio & Fugue in C major* (Adagio) - orchestrated by Stokowski
4. Faure: *Requiem* (In paradisium)
5. Wagner: *Lohengrin* (Prelude to Act 1)

One of the later programs Bonny designed was titled the *Death-Rebirth* program, which was intended for sessions in which the recipient would benefit from a deepened experience of the music, and then be uplifted to a rebirth experience. The selections for this program included:

1. Wagner: *Gotterdammerung* (Siegfried's Funeral March)
2. Rachmaninoff: *Isle of the Dead*
3. Bach: *Mass in B minor* (Crucifixus)
4. Mahler: *Songs of the Earth* (Der Abscheid)

Bonny suggested the *Death-Rebirth* program might be followed by the *Peak Experience* program, and she develop a contour for the double program:

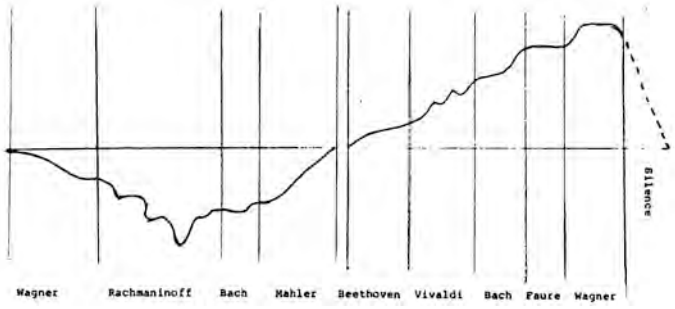

Figure 2: Profile of the *Death-Rebirth* and *Peak Experience* Program

Other programs were compiled for particular purposes:

The Quiet Music program (comprised entirely of impressionist music) was developed for a recipient's first session where the object was for the music to elicit imagery. Impressionist music with the characteristic use of open fifths, and spacious intervals, and predominantly string sounds, is particularly effective in evoking imagery of movement, such as water, dancers, or birds in flight [11].

The Nurturing program was designed to create an auditory environment of nurture, in which the music in several selections has a rocking quality, and features female and male voices, and chorus [11]. Another program entitled Comforting/Anaclytic (meaning a return to childhood) features solo selections for female and male voices. Villa-Lobos' Bachianas Brasileiros #5 is sung in the Portugese language and features a middle section in which the voice descends the scale tone by tone with a motif of repeated notes. The effect is one of yearning or longing, and it facilitates a projection on to the sung voice of a woman lamenting some event. The recipient can therefore overlay his or her own yearning onto the woman's sung voice [11].

Bonny also developed several programs that are grouped as "working programs." The intention of these programs is to deliberately evoke strong emotion, to "loosen the soil."[11] One such program, Emotional Expression 1, commences with the 1^{st} movement of Brahms Piano Concerto no 2 in Bb. In her programs Bonny mostly used slow movements of symphonies and concertos, but for this program the 1^{st} movement "allegro non troppo" was selected. The movement lasts 17 minutes, and comprises thick textured chords of the piano across the full register. The solo instrument is accompanied by a strong orchestral background. The 2^{nd} and 3^{rd} selections of this program comprise sections of Brahms German Requiem (part 1 and part 5) in contrast to the solid and, at times, bombastic sound of the piano concerto. The program ends with a movement of Brahms symphony #4 [11].

A further program, entitled Affect Release comprises music to support the expression of anger and other strong emotions. Commencing with Mars, from Holsts' Planets Suite, the subsequent selections include Stokowski's arrangement of Bach's Prelude and Fugue in d minor (originally composed for organ), orchestrated for full orchestra. The program concludes with selections of Carl Orff's Carmina Burana. The music in this program features strong rhythmic features, wide-ranging and loud dynamics, that support clients as they confront memories that have evoked anger, frustration, or paradoxically, celebration [11].

The later music programs

In the late 1980's, Bonny underwent heart surgery, and during her rehabilitation period she was introduced to music of the 20^{th} century, particularly the works of Shostakovitch, and the Danish composer Carl Nielssen. Her final three programs Inner Odyssey, Emotional Expression 2 and the Body Program, stand out from the earlier music programs, in the use of dissonance and ambiguous elements [11].

The effect of music in generating imagery

Various theories and research studies have explored the effect of music to generate imagery, and the shifting nature of the unfolding imagery. Goldberg developed a Field Theory of Music and Emotion to explain the role of music in generating imagery and emotion [12]. Goldberg argued that music stimulates imagery that is bound to an emotional response, and that either the image itself, or the emotion aroused then activates further imagery experiences in response to the music.

Summer [13] further argued that in GIM it is the music, not the therapist, that is the primary therapeutic agent, and as such it becomes the object of the client's transference. She referred to this phenomenon as the "pure music transference" [13]. Clients new to the Bonny Method of Guided Imagery and Music however may not have established an ability to engage music in an intimate and focused-listening manner, and Summer [14] developed a theory to suggest that repeated listening to music with music-focused interventions is appropriate in the early phases of GIM.

Summer [14] tested her theory in a study of six participants using a music-centered GIM session comprising: 1) repeated music (instead of a music program comprised of different pieces, the music program included repeated hearings of the same piece); and 2) music-centered guiding (instead of verbal interventions that focus primarily on imagery, the interventions focused primarily on the music). After the GIM session, each participant was interviewed, and transcripts of the six GIM sessions and six interviews were analysed. Summer [14] confirmed that when repeated music and music-centered guiding were used, the intention of the therapist was to establish the music as the primary therapeutic agent of the GIM session. When the client's relation towards the music deepened, there was a concomitant transformation in the client's self relation through a projection-reintrojection cycle resulting in a reconstructive, transformation of consciousness [14].

One of the earliest studies of the music in GIM was Kasayka's [15] phenomenological study of the Peak Experience program. Kasayka adopted Ferrara's [16] five-stage model for listening to music using 1) open listening, 2) listening for syntactical meaning, 3) listening for semantic meaning, 4) listening for ontological meaning, and 5) open listening incorporating new understand from the previous listening experiences. She analyzed each of the five selections of the Peak Experience program using the five-stage model, and then conducted a qualitative meta-analysis comparing the music descriptions with a client's imagery. She noted key elements in the music that may have triggered imagery responses, such as the sequence of trills in the adagio of Beethoven's 5th Piano Concerto that triggered imagery of a ritual.

A study of pivotal moments in GIM [3] also adopted Ferrara's five-stage phenomenological model to analyze the music that underpinned the pivotal moment in GIM sessions of seven clients. Grocke [3] placed the phenomenological descriptions alongside the clients' imagery noting the shifts in imagery relative to the music description. In order to look across the music underpinning all clients' experiences, she developed a Structural Model of Music Analysis (SMMA) to compare the music elements of the selections. She found that for these seven clients "the music that underpins pivotal moments may prolong the moment or provide momentum for it. Typically the music is composed in a structured form within which there is repetition of themes. It is predominantly slow in speed, predictable in melodic, harmonic and rhythmic elements, and features dialogue between instruments" (p. 234).

Marr [17] took a different approach to investigate the role of music in activating imagery. She recorded six GIM sessions of three clients (two male, one female), and then transcribed the imagery as spoken by the client at the precise point on the score of the music program. She used the SMMA to analyze the key features and elements of the music. Reporting of imagery was evident when the music presented predictable rhythms, harmonic structure and long, symmetrical melodic phrasing. Reporting of imagery was sparse when the music had rapid changes in tonality, dynamic range, rhythmic pulse and melodic fragmentation. Images expanded with high pitch, light timbre and texture, while imagery became embodied with music characterized by low pitches and descending melodic line.

EEG Studies

Electroencephalographic (EEG) studies have provided more precise evidence for the effect of music on image creation. Lem [18] studied 26 participants who listened to Pierne's Concertstücke for harp and orchestra (duration 13:45) in a relaxed state (altered state of consciousness). Measures were taken via 12 electrodes placed in anterior and posterior positions across the scalp. Lem created a spectrograph of the contour (amplitude) of the Concertstücke, and created 26 descriptive segments of the work, based on musical properties, for example one segment comprised the introductory measures of the piece, another segment comprised the first theme, and the next the bridge between the first and second themes. The EEG tracings of the 26 participants were averaged and superimposed across the spectrograph and the 26 segmentations of the music. Lem found that the highest activation of EEG activity occurred at places where there were sudden changes in the music, such as the orchestral tutti that leads into the cadenza played on the solo harp. The cadenza commences pianissimo in the high register of the harp, thus the music shifts from a full orchestral sound, to a thin barely audible sound. The greatest activation was found in the anterior area of the brain and Lem argued it may have occurred as a result of the build-up of muscle tension activated by the orchestral tutti. In addition, the EEG tracings indicated decrease in EEG frequency over time, but increase in EEG amplitude, findings that are consistent with a deepening relaxation response.

Lem's second study [19] included two full music programs designed by Bonny: Relationships and Nurturing. Fifty healthy adults (female = 39) listened to the full music programs, and their responses were recorded using skin conductance to monitor change in emotional response through autonomic arousal. Participants reported their imagery on conclusion of the music program, and the imagery was categorized into Visual Imagery, Emotions, Body Sensations, Thoughts, Memories, and Spontaneous Imagery. Visual imagery was associated with a decreasing level of

arousal during the first 7 minutes of music, Emotions were associated with increased level of arousal in the middle section of the music program, and Body Sensations were frequently experienced during the final section the of music program that was characterized by low and stable dynamics.

McGraw Hunt [20] also utilized the EEG to record brain activity of four participants while they listened to a GIM music program. She pre-recorded a guided imagery script, which included six different experiences (affect, body, interaction, kinesthetic, memories and visual). Subsequently, the four participants viewed a video of the session and described their imagery during a phenomenological interview. These experiences were coded. The EEG tracing were analyzed examining relationships between regions of the brain activated during each script type. Findings suggested imagery generated brain activity in the regions of the brain where similar real-life experiences would be processed. Further, beta and gamma frequencies were implicated in participants maintaining an ASC, and in the meaning of the imagery.

Conclusion

Research into the Bonny Method of GIM has focused predominantly on showing effect for symptoms of diverse conditions, such as those recovering from cancer, childhood abuse, addictions, rheumatoid arthritis, depression and other illnesses [21]. The current focus on the neuropsychology of music and imagery, and the importance of mirror neuronal activity when listening to music that produces positive emotions, opens up exciting opportunities for studying the richness of music-evoked imagery.

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Full Length Article

Music as Co-Therapist: *Towards a Taxonomy of Music in Therapeutic Music and Imagery Work*

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Abstract

In receptive music therapy, music listening is used as a therapeutic medium in many different ways. The Bonny Method of Guided Imagery and Music (GIM) is a specific receptive music therapy model where the client or patient listens to selected classical music in an expanded state of consciousness in an ongoing dialogue with the therapist, facilitating symbolic and metaphorical imagery in many modalities. In this model, music is often considered a "co-therapist", and more than 100 music programs are used to address specific issues and problems. However, no classification of the music used in GIM exists. This article presents a matrix with 3 major categories: 1) Supportive music – 2) Mixed supportive and challenging music – 3) Challenging music, with three subcategories within each category. Based on a review of literature related to music listening in music and medicine the taxonomy is introduced and its relevance for the Bonny Method discussed, with special focus on two adaptations: KMR-Brief Music Journeys and Group Music and Imagery (GrpMI). Vignettes from KMR with one individual cancer patient and from GrpMI sessions with psychiatric patients are presented and related to the taxonomy.

Keywords: ***Guided Imagery; Therapeutic music; Psychotherapy; Music classification***

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Introduction

The intent of this article is to address the field of receptive music therapy, and more specifically Guided Imagery and Music (GIM), with the particular focus on criteria for selecting music in sessions. GIM "refers to all forms of music imaging in an expanded state of consciousness, including not only the specific individual and group forms that Helen Bonny developed, but also all variations and modifications in these forms created by her followers" [1]. (See also Grocke's introduction in this volume). In GIM, as in receptive music therapy in general, the selection of music for a client is a significant, but also a difficult, and even controversial issue. What music is appropriate for which clients, and how is the choice of music related to the pathology or physical/psychological/existential problems of the client? The literature contains many examples of playlists, music programs and recommended single pieces (for an overview, see [2]). However, there is no general consensus on how the music can be classified according to the therapeutic needs and stamina of the client/patient. The authors have independently worked with the classification issue as related to the musical repertoire of GIM and to various client groups. A synthesis of this work in the form of a matrix with 3 major categories: 1) Supportive music – 2) Mixed supportive and challenging music – 3) Challenging music, will be presented and developed into a simple taxonomy of two layers. The first part of the article will review literature related to music listening in music and medicine, introduce the Bonny Method, and lay out the structure of the taxonomy formulated by the authors. In the second part of the article two adaptations: KMR-Brief Music Journeys developed by Margareta Wärja [3,4], and Group Music and Imagery (GrpMI) [2] as used by Bonde and Pedersen [5-7] are presented to illustrate the background and clinical uses of the taxonomy. Vignettes from one individual cancer patient and group sessions with psychiatric patients will be provided.

PRODUCTION NOTES: Address correspondence to:

Margareta Wärja, Hästholmsvägen 17, 116 44 Stockholm, Sweden. Email: margareta.warja@expressivearts.se | COI statement: The authors declared that no financial support was given for the writing of this article. The authors have no conflict of interest to declare.

Background

Literature on therapeutic music listening

In Music Medicine the use of playlists is a growing and promising trend [8,9]. In a pilot study (n= 15) conducted at a noisy emergency department Short and Ahern [8] developed and tested a music tool to provide relaxation in the waiting

room of a large hospital. Using mp3 players, patients could select their preferred music from a series of playlists in 4 different genres. Findings suggest that most patients reported feeling better and that music matching their personal preferences was helpful. Further research is recommended. The research team at Aalborg University has tested a number of playlists (played through a sound pillow) for and with both coronary patients [10] and psychiatric inpatients, including the following genres: Easy listening, Classical, Jazz, MusiCure (specially composed music for hospitals), Nature sounds and Rock/pop [11]. Results are promising, and playlists enable patients to have a choice. Various approaches of music listening have been used in medical care: Depth Relaxation [12], Anthroposophic Music Therapy [13], Regulatory Music Therapy [14]. An early pioneering example of Music Medicine based on playlists in different genres was "Music Rx", developed by Helen Bonny [15,16] and based on her own experiences as a coronary patient. Bonny invented a number of taped music programs (from 25 – 35 minutes in length) to be used at different stages of medical treatment at coronary care units. The selected music was generally described as "sedative" and "not stimulating", and with the intent to evoke a positive mood [17]. Results from a pilot study testing the Music Rx format with 26 patients at two different hospitals suggested "significant findings in direction of decreased heart rate, greater tolerance of pain and suffering, and lessened anxiety and depression in patients listening to music" [18].

The Bonny Method

The Bonny Method of Guided Imagery and Music (GIM) (here referred to as the Bonny Method) is an individual receptive music psychotherapy approach developed by Helen L. Bonny and based on humanistic and transpersonal psychology. Today, the Bonny Method (with adaptations) is one of the major models of music therapy in the world and it is practiced in four continents [19,20]. The individual session lasts 90-120 minutes starting with a verbal dialogue identifying current life themes and finding a pertinent focus. This is followed by an induction/relaxation phase that moves into the music. Already in the induction the client enters a slightly altered state of consciousness (ASC) [1,16,21,22] that will expand during the music. A dialogue about the ongoing experience takes place in the music listening phase. The client's imagery can be clothed in various kinds of bodily felt senses (visual, bodily, auditory, gustatory, olfactory etc.). Dialoguing in this manner requires acquired therapeutic skills and in-depth knowledge about the music in the Bonny Method. The music is acknowledged as a "co-therapist" and as the primary mover and energizer of the both intra- and interpersonal experience where the therapist supports the client in a continuous deepening and surrendering to the musical space [23-25]. After the music journey there is a bridge back into ordinary consciousness. Drawing and/or using other multimodal art is suggested and applied along with the concluding verbal reflection to explore the imagery as well as psychological themes and evolving insights. Sequenced classical music is used to develop and support an unfolding imagery experience. Bonny generated 18 music programs for therapeutic purposes [16,26,27]. Since then, more than 100 music programs have been documented [27]. The term *program* refers to selected pieces of music designed to work in a precise sequence lasting between about 30 – 40 minutes. After experimenting with different music genres Bonny settled on classical Western art music for reasons of variability, complexity, aesthetics, and the necessity to provide some degree of tension and release to support and match internal states in order to facilitate exploration of unconscious material [16]. The concept of the "affective contour" [16,28] was fundamental to Bonny´s programming and was used to graphically depict and represent the dynamic changes and intensity in a given music when selecting music for a program. Bonny considered musical elements such as: pitch, dynamic range, rhythm and tempo, melodic contour, harmonic structure and instrumentation [5,28]. She was meticulous in finding a performance of a selected piece of an aesthetic quality that would fit into the intent and character of the program [26].

The original individual format of the Bonny Method is suited for clients with ego-strength and enough stamina to tolerate the intensity also of challenging music and the duration of about 30 – 40 minutes of music. It became evident that adaptations of the original format were demanded to meet specific needs and problems for clinical areas such as: crises and trauma, oncology, palliative care, cardiac diseases, neurological disabilities, and psychiatry. This has led to the development of discrete methods to be used both individually and with groups such as: Music Breathing [29], Music and Imagery (MI) [30], Supportive Music and Imagery Method (SMI) [31,32], Group music and imagery (GrpMI) [2], KMR-Brief Music Journeys [3,4] (the last 2 are introduced below).

Selecting music for music and imagery

The literature on receptive music therapy contains few examples of clear steps and/or procedures for selecting music for clients/participants. Grocke and Wigram [2] present guidelines for using pre-recorded music and selecting appropriate music based on its potential in specific clinical contexts. Thus, selecting music requires both thorough clinical and musical skills. A common approach is to use the *iso-principle*, referring to attuning and matching music to the mood and general energy level of the client [33,34]. In the Bonny Method the "affective contour" of the entire program is considered and assessed for a particular client. Summer [35] introduced two basic notions to be used in selecting music for a music and imagery session: *music as holding,* and *music as stimulating.* Applying concepts from developmental psychology formulated by Winnicott [36] she also suggested finding music that is "good-enough" to address states of "me-ness" and "not-me-ness" to work on forming an identity (a sense of a true self), which separates the person from others

and makes him/her recognizable and special. The true self relates to an individual's experience of "me-ness". In addition, Summer [37] has applied three concepts based on the work of Wheeler *supportive, re-educative* and *re-constructive* [38]. The therapist assesses current functioning level and needs of the patient and this will determine where on this psychotherapeutic continuum the work can be done. Thus the music (such as musical structure, predictability, complexity, dynamics) is attuned and adjusted accordingly. Summer provides examples of music corresponding to the 3 levels.

The development of the taxonomy

The authors have independently worked on developing procedures for selecting music for clients in therapeutic music and imagery work. Based on an analysis of the relationship between different types of music in GIM and the music-assisted imagery in 6 cancer survivors' individual Bonny Methods sessions Bonde [39] developed (a) 3 music categories Supportive, Mixed and Challenging, and (b) a grounded theory on this music-imagery relationship. This theory is briefly unfolded in *Table 3*. In forming the approach called KMR-Brief Music Journeys [3,4] Wärja outlined a method for selecting a piece of short music based on levels of intensity and musical complexity to be used in individual therapy and in working with groups (therapy and supervision) [40]. Music used in KMR includes only the supportive level of the taxonomy (*Figure 3 and 4a*).

Figure 1. Hevner's Mood Wheel (redesigned graphics by the authors).

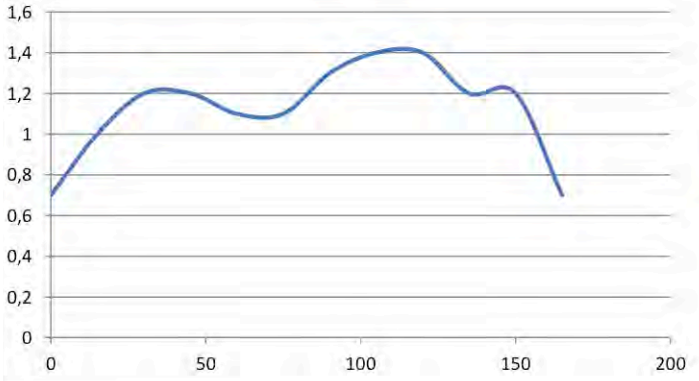
Supportive music is used to create a safe framework around the music-listening experience. It is used throughout the therapy, predominantly in the first five sessions. Supportive music is stable, fairly predictable and stays within the mood spectrum of categories 3-4-5-6 (i.e. light moods) in Hevner's mood wheel (Figure 1)[1]. The form types are simple, namely typically strophic (song form or variations), ostinato-based, dual or ternary. The imagery evoked and sustained by supportive music is easy and safe and has a static quality or develops slowly, be it memories, nature imagery or metaphoric fantasies. Emotional imagery is often comforting and reassuring.
Mixed supportive and challenging music is used to assess and facilitate the client's readiness to explore problem areas and new realms. Mixed music has a supportive beginning and ending, however some episodes may present the participant with a challenge, typically by changes in mood (also including categories 2 or 7), tempo and volume, a higher level of tension, which also means an increase in intensity. The form types are often more elaborate ternary forms with contrasting middle sections, or more rhapsodic forms. The images evoked and sustained by mixed music include core images and self-images pointing at problem areas or developmental potentials. Mixed music can be used throughout the session series. All GIM music programs include one or more selections of this type that may lead to more difficult emotional realms.
Challenging music is introduced when the participant is comfortable with the individual Bonny Method session format and has proved resonant to different musical styles and is able to work with therapeutic challenges. Challenging music serves as a musical container for therapeutic work with problem issues and difficult emotions. Challenging music is highly intense. It can be powerful, dramatic, but also sustained in a certain mood, typically categories 7, 8, 1 and 2 of Hevner's mood wheel, inviting the participant to confront problems or explore emotional dilemmas or losses. The forms of music here are often developmental (sonata form, metamorphosis) and include contrasts in many musical parameters. The three types or categories are independent of musical style and client preferences.

Table 1. A grounded theory model of how different categories or types of music influence the imagery *(adapted from Bonde [39]).*

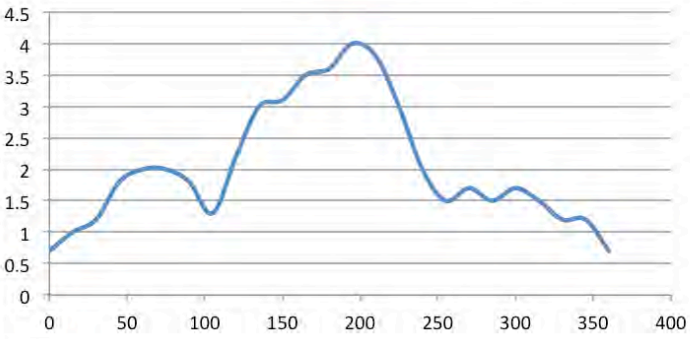
[1] The American psychologist Kate Hevner (1936) was a pioneer in developing instruments to study listeners' perception of mood in music. The `mood wheel´ is still used in GIM research.

The matrix of 3 prototypes of music is illustrated graphically in *Figure 2*. The x-axis indicates duration. Supportive music last only few minutes, while Mixed and Challenging music can be much longer. The y-axis indicates intensity on a scale from 0-5. Supportive music fluctuates typically around 1-2 in few minutes. Mixed music has a few episodes of high intensity (up to 4+), while challenging music can have many episodes with high intensity (up to maximum).

Intensity – Supportive prototype profile



Intensity – Mixed supportive-challenging prototype profile



Intensity – Challenging prototype profile

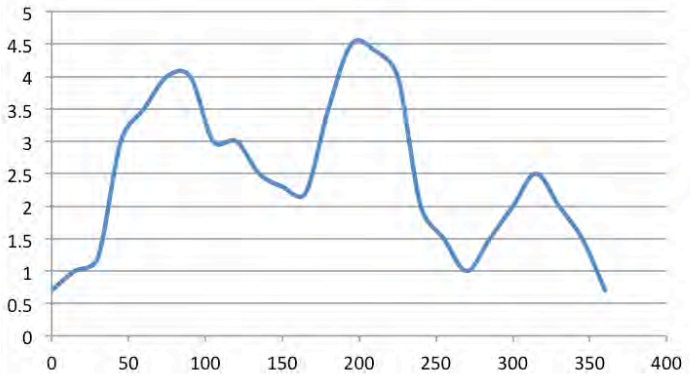


Figure 2. a-b-c. The prototypes of intensity profiles: Supportive – Mixed – Challenging. *The x-axis indicates levels of tension on a scale from 0-5. The y-axis indicates duration in seconds.*

In the taxonomy developed by the authors the 3 prototypes have been separated into three discrete sub-categories each (1-3, 4-6, 7-9). The level of intensity is gradually increasing from left to right (*Figure 3*).We will now unfold the taxonomy by presenting the types (or 'fields') at level 2 with summarized descriptions of the music qualities in each field, and with examples of music classified in the different fields (*Figure 4*).

Fields of supportive music

3 fields of varying musical complexity, all within the secure end of the matrix/taxonomy have been developed:

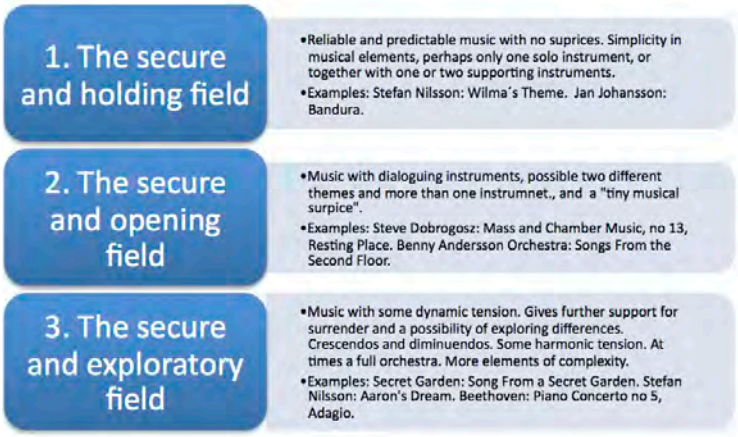


Figure 4a. The 3 fields of supportive music.

In these 3 fields the intent of the music is to provide security and holding. The fields are called: *Secure and holding* (Example: Stefan Nilsson: *Wilmas Tema ((Wilma´s Theme))*, Jan Johansson: *Bandura*), *Secure and opening* (Example: Steve Dobrogosz: *Mass and Chamber Music*, No 13, Benny Anderssons orkester: *Sånger från andra våningen (Songs from the Second Floor))*, and *Secure and exploratory* (Example: Song from a Secret Garden, Benny Andersson's Orchestra). There are no major musical surprises. The rhythm is steady and the melody and harmonic progression is clear and predictable. The pieces are mostly instrumental with some possibilities of using vocal music without words, or a 'foreign language' most likely not understood (lyrics will influence the images). The purpose of the fields is to provide music that allows for surrender and metaphorically speaking; "to give in to the musical embrace". The compositions are selected for their aesthetic quality, and for belonging to the "lighter moods" of the spectrum of Hevners's mood wheel [17].

Fields of mixed supportive-challenging music

In these 3 fields the intent of the music is to invite the listener to explore new vistas and experience emotions that may be somewhat challenging. They are called: *The explorative field with surprises and contrasts* (Bach: *Shepherd Song*, Respighi: *Gianicola*),

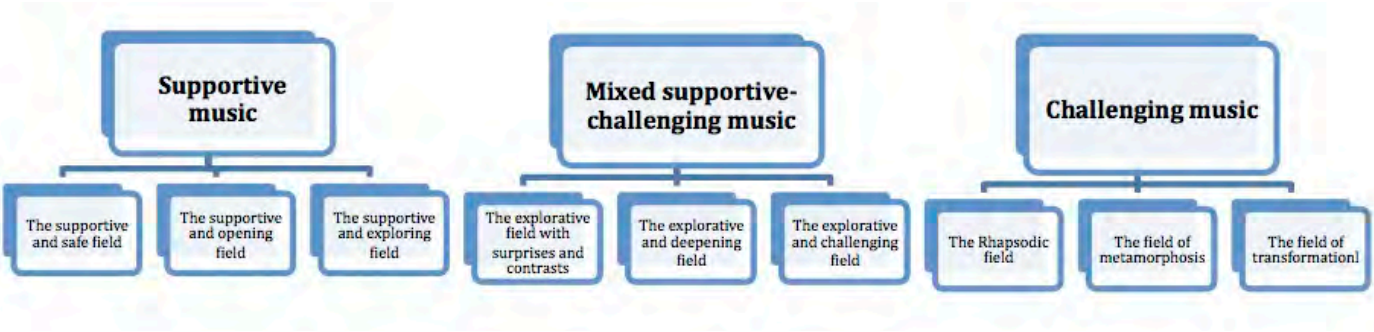


Figure 3. The Taxonomy of Music for Therapeutic Music and Imagery work.

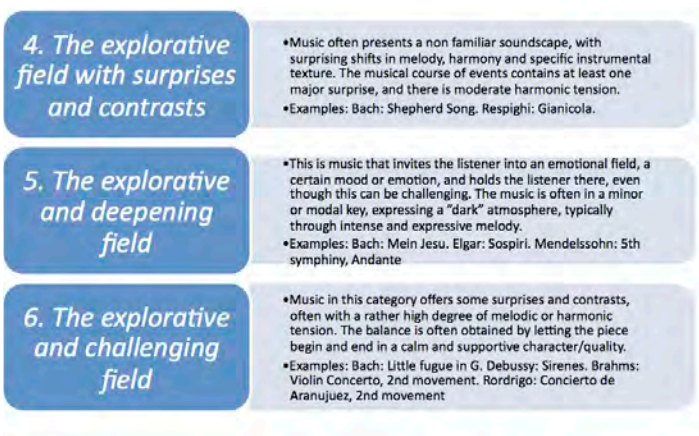


Figure 4b. The 3 fields of mixed supportive-challenging music.

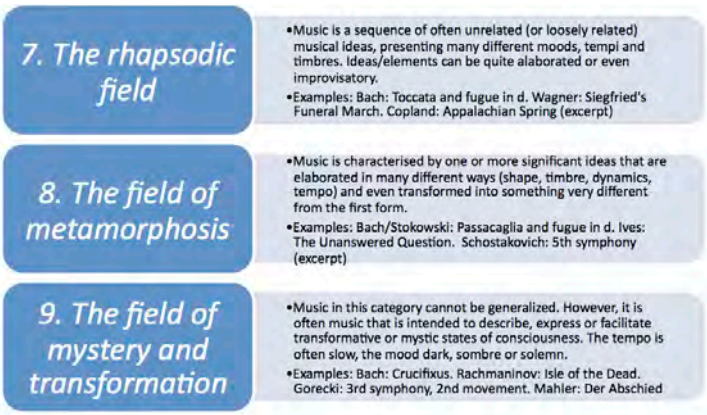


Figure 4c. The 3 fields of challenging music.

The explorative and deepening field (Bach: *Mein Jesu*, Elgar: Sospiri, Mendelssohn: 5^{th} *symphony*, Andante), and *The explorative and challenging field* (Bach: *Little fugue in g*, Debussy: *Sirenes*, Brahms: *Violin Concerto*, 2^{nd} movement, Tveitt: *O be ye most heartly welcome*). The music is no longer predictable, and it can present several types of musical surprises. The rhythm and tempo may change, and the melody and harmonic progression can be elaborate and somewhat surprising. The pieces are mostly instrumental, but voices can also be used (however text will be in 'foreign languages' such as Latin, French or German). Metaphorically speaking, this music introduces "not-me"-states and shorter episodes of high intensity and tension, including the darker categories of Hevners's mood wheel [17].

Fields of challenging music

In these 3 fields, the intent of the music is to invite the listener to explore new, enigmatic-mystic and even frightening areas of consciousness. They are called: *The rhapsodic field* (Bach: *Toccata and fugue in d*, Wagner: *Siegfried's Funeral March*, Copland: *Appalachian Spring*, excerpt), *The field of metamorphosis* (Bach/Stokowski: *Passacaglia and fugue in d*, Ives: *The Unanswered Question*, Shostakovich: 5^{th} *symphony*, excerpt), and *The field of mystery and transformation* (Bach: *Crucifixus*, Rachmaninov: *Isle of the Dead*, Gorecki: 3^{rd} *symphony*, 2^{nd} movement, Mahler: *Das Liede von der Erde*. Der Abscheid, excerpt).The music is unpredictable, and it presents a lot of challenges: changing rhythms and tempos, sudden shifts in timbre or mood, high degrees of harmonic and melodic tension. The pieces are mostly instrumental, but voices can also be used (however text will be in 'foreign languages' (for most Anglo-Americans) such as Latin, French or German). Metaphorically speaking, this music introduces and elaborates "not-me"-states and it includes episodes of high intensity and tension, including the darker and in principle all categories in Hevners's mood wheel [17].

Applying the taxonomy in clinical work

To illustrate how the taxonomy was developed, and how it can be applied in clinical work we will introduce 2 adaptations of the original Bonny Method: KMR-Brief Music Journeys [3,4] and Group Music and Imagery (GrpMI) [2] and give examples of choices of music. The experiences of working extensively with these approaches have contributed to the development of the taxonomy. The work in KMR provides examples of choosing supportive and least challenging music. A condensed case study of selecting supportive music to meet specific clinical needs will be provided. In selecting music

within the mixed supportive-challenging fields illustrations from GrpMI are used. Our experiences of choosing music from the challenging fields of the taxonomy are based on applying the original one-to one format of the Bonny Method. In this approach the verbal dialogue between client and therapist during the listening experience is of uttermost importance in using challenging music for therapeutic purposes. Procedures and rationales for choosing music within the Bonny Method frame have been discussed previously in the literature [16,22,28].

KMR-Brief Music Journeys - the use of supportive music

The music used in KMR-Brief Music Journeys lasts 2-6 minutes. The timeframe of a typical session is 60 minutes. KMR has been developed over time and is embedded in theoretical frames of the Bonny Method [22], the phenomenological approach of expressive arts therapy [41], and existential psychotherapy [42]. A contained focus is established in a verbal dialogue and the client is encouraged to use music as support and, as the work progresses, a step-wise exploration of current life-themes. The session is unguided with the client reclining in a comfortable chair having eyes open or closed. Thus it becomes a shared listening experience between client and therapist. A slightly altered state of consciousness is induced. After the music listening experience follows art-making (or expression through other art modalities) and verbal reflection and integration. The session format is basically analogous to the Bonny Method (*Figure 5*). The intent of music is to maintain *support, holding, and safety*. Metaphorically speaking the purpose of the music is to provide positive "mothering qualities" [43]. The music is quite predictable, with a steady pulse, a clear and noticeable tempo, one or a couple of melodies/themes, a predictable thematic harmonic progression with a beginning and solid ending. Most music selections come from the non-classical repertoire, such as film- and folk music, with a few supportive pieces from the Bonny Method repertoire. The metaphor of 3 different "musical fields" (presented above in the taxonomy) is applied in selecting music for a particular client: *the field of security and holding, the field of security and opening,* and *the field of security and exploration.*

Here follows an example where the individual KMR format is applied as a short-term music and art psychotherapy intervention in an ongoing RCT-study in oncological rehabilitation with women treated for gynecological cancer [44]. The study is a mixed methods design measuring specific outcomes and describing experiences in regards to quality of life. Music listening, spontaneous drawing, and verbal reflection are used together to address experiences after cancer treatment. Brief single pieces of music are applied to focus on existential questions, bodily and sexual dysfunctions, and fear of recurrence, as exemplified below.

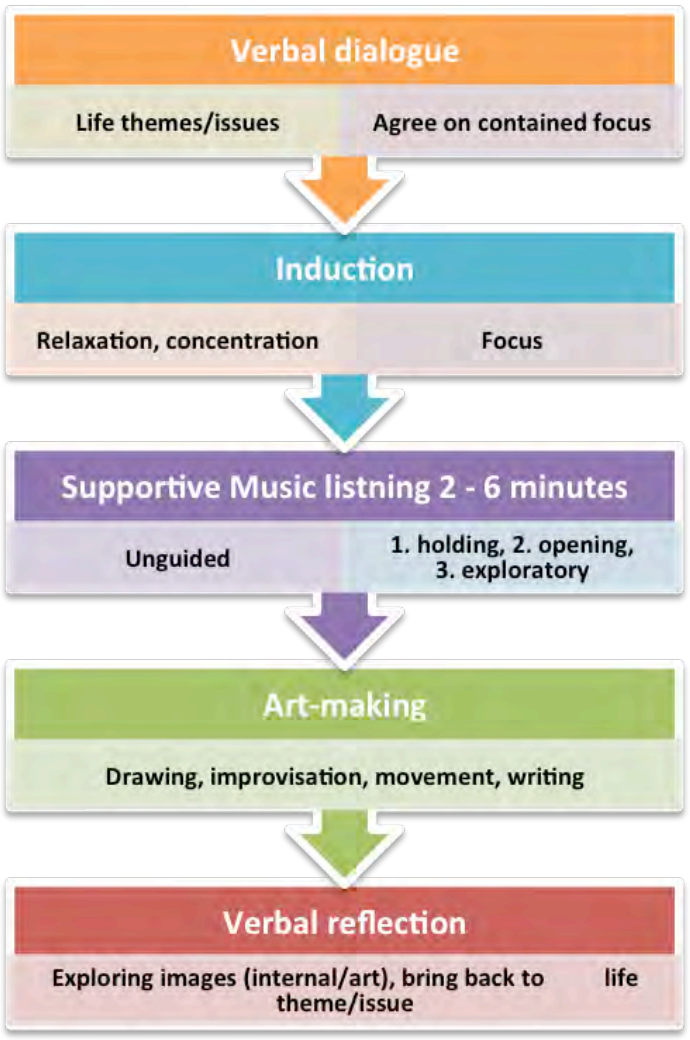


Figure 5. The structure of the KMR-Brief Music Journey session.

The act of choosing a piece of music is the responsibility of the therapist and involves interrelating parts such as: (A) relating the music repertoire to the 3 musical fields in the supportive end of the taxonomy, (B) assessing ego-strength and ability to regulate and tolerate affect, (C) listening for "the music" of the client during the verbal dialogue (i.e. how to match rhythm, tempo, pitch, timbre and dynamics of speech and semantic content), (D) evaluating how well a particular piece of music functions in the therapeutic process as a whole. The therapeutic process involves expressing and exploring difficulties, developing coping skills and finding resources.

In the preparatory pilot phase of the study a 47 years old women whom we shall call Anna, treated for uterine cancer, participated in a series of 15 sessions. In between sessions she decided to write a diary. The main focus was to address loss of femininity, sexual distress and fear of dying. *Table 2* provides an overview of main themes, imagery and selected music, and shows that all 3 fields of supportive music in the taxonomy were explored. During the first phase Anna worked on facing fears, slowly building trust to her body, and mourning her losses. She asked if it was possible to find meaning again, and if her body ever could be trusted. Sex had been a strong bond between Anna and her husband, which now was broken. She wrote: *Everything was torn out of me. All the femininity that I so painfully had built up... now taken away from me. I was an empty body without the weight of my uterus, this magical body part, although it never gave me any children, it had initiated me into the mysteries of life. It was there, in my most vulnerable body part that the cancer grew. How destructive.*

After medical treatment was completed Anna had experienced how people around meant she now should be grateful and have a positive outlook on the future. She on the other hand felt totally miserable, paralyzed and depressed. She wrote: "*I have disconnected the body and live in my inner world. The feeling is of being separated from my body. That is how it was during treatment. The hospital owned my body. At any time it can be taken away by the illness and by death.*" After having established a safe space with the help of *Sånger från andra våningen* (Songs from the Second Floor) the next necessary step was to move into suffering and fears of recurrence. Here the gentle and rich timbre of *Arons dröm*

Session	Title / Themes	Music / Field	Sophia's Images / Essences of Comments
1	**Safe Secure place** Red comforter.	B. Andersson: *Songs from the Second Etage.* ***No 2***	*The world of the dead.* *Cancer, the expected catastrophe.*
2	**Terror, death, aloneness, femininity** Death of grandmother.		*There is nothing positive in being a woman.* *Afraid of men's anger.*
3	**Boundaries**	S. Löfman: *Mack Jchi.* ***No 1***	*Mixed up pain of mother and grandmother.*
4	**Losses:** No children, sexuality My body and creativity	S. Nilsson: *The Dream of Aaron.* ***No 3***	*The cliffs by the sea. Sunny at first. Rain, wind and thunder. There is nowhere to hide. Feeling all the losses.*
5	**Darkness and cancer** Fears of cancer. How to go on and find meaning?	J. Johansson: *Bandura* (twice). ***No 1***	*Piece by piece I fall apart. I wish someone would hold me. All the pain and suffering in the world is around me.*
6	**The sensitive artist** Fate and destiny.	B. Andersson: *Songs from the Second Floor.* ***No 2***	*Can I trust my body again?* *Being caught in a spell of destiny?*
7	**Hope and comfort** Maybe sensitivity is also something good? Being able to tune in. Crying and crying.	Tense release induction. Letting the music hold the body. Fläskkvartetten: *Innocent.* ***No 3***	*The music is sad but brings comfort. There is a landscape of long paths. Walking there I can find hope and safety. It is just to endure this. To walk the paths and search for myself.*
8	**Two opposing forces** One part wants to die the other part wants to live.	S. Dobrogosz: *Resting Place.* ***No 2***	*My therapist asks me about wanting to die.* *No, I don't. I know I want to live.* *I bring the box of crayons with me home. I will paint!*
9	**Abundant art** Sharing art work from drawing at home.	No music.	*Energy and life. Pictures of femininity and sexuality. Death is purple.*
10	**Songs from the second floor** Stories of sexual assault.	J. Svendsen (arr) *Everything under the Holding of the Sky.* ***No 2***	*I am so angry!* *I paint a small child of shame behind a curtain.*
11	**Sexuality and anger** Bottomless loss. Fighting!	K. Jenkins: *Palladio, Allegretto.* ***No 3***	*I liked the fighting. Wanting to laugh. Finally! I found a whole and capable woman in the family who is not a victim: my aunt's grandmother.*
12	**Helpful mothers of the past** Whole body painting.	J. Johansson: *Bandura* and S. Nilsson: *The New World.* ***No 1***	*Yellow and orange of upper body, like burning.* *Blue is being stuck to the ground. Purple is like death.* *I will try to make contact to my mothers of the past.*
13	**Secret Garden: Songs from a Secret Garden** Purple in pelvis changes from death to wisdom. Meeting past mother figures.	Secret Garden: Songs from a Secret Garden. ***No 3***	*I realize that purple is not death. I need the purple. It brings spirituality and wisdom. Connecting me to my female ancestors. I feel strength in my pelvis.*
14	**Waking up** Art installation. "Terror, Femininity, Death, Boundaries". And hope.	Pachelbel *Canon in D.* ***No 2***	*I stay in daily contact with my female ancestors. I tell myself, and others that life will be ok again.*
15	**Harvesting** Ending, closure. Gratitude and separation.	Beethoven *Piano Concerto 5: 2.* ***No 3***	*Tired, feeling a bit numb after ending therapy. Have confronted my mother with clinging to her diagnosis. No more secrets!*

Table 2. Overview of a KMR series of 15 sessions.

(Aaron's Dream) gave strong support to give in and acknowledge her haunting terror of cancer. She was taken by how the music lifted and comforted her (this piece moves to a soft, yet determined and holding crescendo). She dared to face fears of falling apart and expressed a need to be held. The slow and tender rocking of a folk-tune called *Bandura* (played twice) gave a reliable space for surrender. Giving in to feelings was a turning point. In the seventh session the piece *Innocent* was selected to provide movement and further emotional support. Here a clear and nurturing cello voice floats gently through a rolling and slightly syncopated rhythmic landscape. It brought tears, comfort and rays of hope. After this session Anna began to draw at home. Images gushed out like a cleansing river and gave her renewed energy and direction. In session ten and eleven she worked on releasing anger related to earlier sexual assault that surfaced during cancer treatment. Here the sturdy rhythmic container of *Palladio* provided a space for fighting and empowerment.

The emotional bodily release opened up a to reaching out and explore a new sexual relationship with her husband. The final phase of the process focused on building strength, finding resources, and discovering wisdom. In the thirteenth session *Song from a Secret Garden* was used. Here a graceful melody played by solo violin that is picked up by a sonorous cello and supportive strings, led her to encounter what she experienced as "feminine wisdom". This was a welcomed surprise. In the closing session Beethoven's compassionate *Adagio* from the 5^{th} *Piano Concerto* offered an aesthetic embrace for harvesting the work. In the collaborative interview (a structured dialogue between interviewer, therapist, and client) [45] a few weeks after therapy had ended, one question specifically addressed what had been most helpful during the therapy process. Anna stated:

Most important was to have a space and a time to connect with my feelings. Without that my drawings and writings would have no deeper meaning. The music journeys were very helpful. They supported me to move into a kind of other state where it was easier and safer to begin to feel. But if I had not trusted you, (the therapist) I would never have dared to fully feel my feelings."

Group Music and Imagery (GrpMI) study – the use of music with a mixed profile

In an exploratory study, Bonde and Pedersen [6] documented processes and outcomes of Group Music and Imagery (GrpMI) [6] therapy with relatively well functioning psychiatric outpatients. Functioning was defined as a score of min. 41 (of 100) on the Global Assessment of Functioning (GAF) Scale. The participating patients (n=17) had different diagnoses, but all had social anxiety as an important problem area. GrpMI was offered in small groups (2-4 participants) in sequences of 8-10 weekly 90 minutes sessions (participants could continue participation in a new group, if they wished – and they often did). The format of the session was close to the standard format: 1.) A quite long (45-60 minutes) initial verbal dialogue focusing on participant's needs and concerns here and now led to 2.) A short relaxation induction and the therapist's choice of a piece of classical music (duration 4'-12') with a mixed supportive-challenging intensity profile. 3.) After an unguided music listening participants made 4.) An individual (mandala) drawing in silence. 5.) The session was concluded with a short discussion of the meaning and relevance of the music listening experience and the drawings.

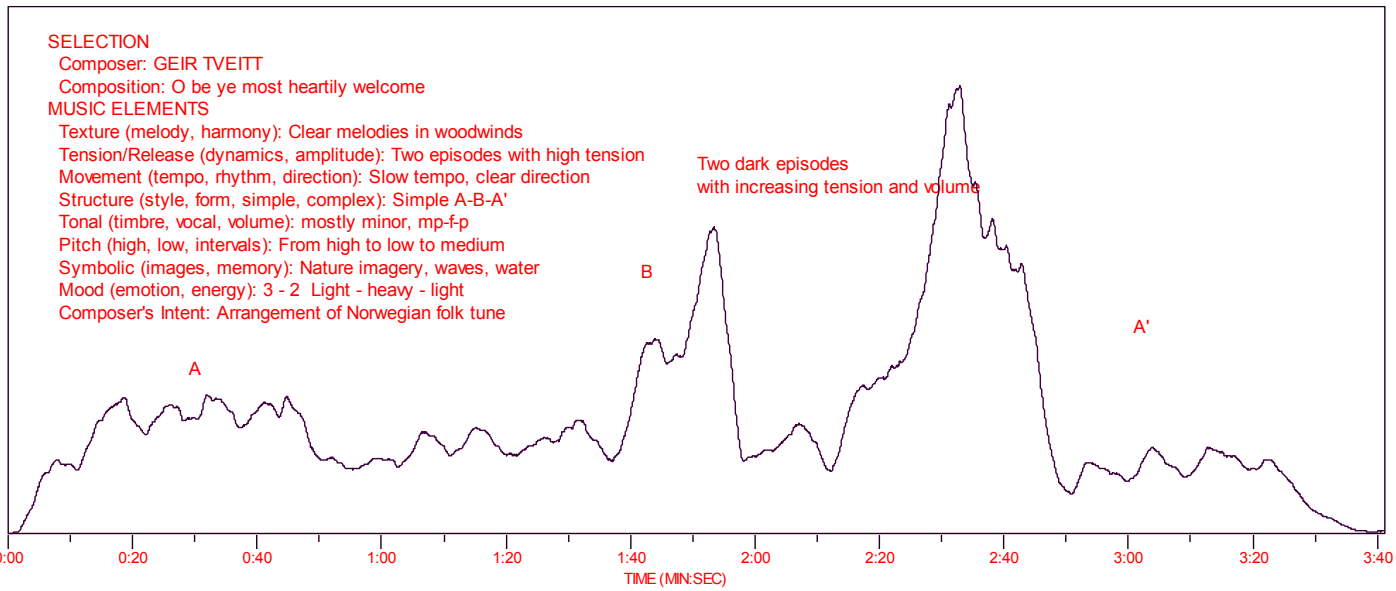


Figure 6. Annotated intensity profile (Mia) of Geir Tveitt: O be ye most heartily welcome. *The x-axis indicates levels of tension on a scale from minimum to maximum. The y-axis indicates duration in minutes and seconds.*

The processes and outcomes of the study have been reported elsewhere [5-7] so in this context focus will be on the music used in the sessions. The taxonomy presented in this article was not developed, when the study was designed, however, it was an explicit premise that the music should have a mixed intensity profile and the experiences gained from this study have been valuable in developing the taxonomy. This decision was based on the following rationale: The participants in the groups are persons in recovery. They need not only support, but also some grade of challenge in their process of returning to everyday life, with a need to see themselves and their life strategies with fresh eyes. As metaphor and analogy music can offer a non-threatening presentational symbol of emotional states and relational modes of being [46], and it has been documented that clients in GIM very often report their imagery experiences during music listening as metaphors [47]. Music with a mixed profile has the potential to present the listener with a limited and controlled challenge within a supportive framework (musical as well as social). However, supportive and even challenging music could be used at the discretion of the music therapist, if the session prelude indicated such needs, e.g. if the participants were expressively exhausted (-> supportive music) or ready and courageous (-> challenging music)

The mixed profile can be exemplified by the music that was used for the individual assessment of all potential participants: The Norwegian composer Geir Tveitt's *O be ye most heartily welcome*, an elegant contemporary arrangement of a Norwegian folk tune. This piece is the opening of the GIM program *Soundscapes* with Norwegian music only [48]. *Figure 6* shows the intensity profile of the piece, made in the Mia software program [46].

Framed by a beautiful and tranquil beginning and a corresponding ending the short piece has 2 'dark', more or less challenging episodes during which the listener might react. In the assessment the patient was sitting up; there was no relaxation, but an invitation to close the eyes and 'let the music take you wherever you need to go'. A typical example of an experience was this tiny narrative from a 44 years old woman: It was like a fairy tale of a person visiting a forest where there was light and darkness. A 'troll' was hiding in the shadows, but later it came forward and took what it needed before returning to the shadows, as the light returned. The experience was not scary, and she thought it was fine music.

In a group of 3 participants the piece was played again in a late session. None of the participants recognized the music. However, their experience was close to what came up in the assessment. The division of the music in 3 sections was a common, salient feature: A peaceful beginning (nature imagery) – a darker, more dramatic tension building to a climax (a stone quarry with a funeral procession; a ditch; an intentional interruption of the music) – a return to the mood of the beginning (with a touch of sadness). More examples of music used in the GrpMI session can be seen in *Table 3*.

Bach: Adagio in C (Baroque/Romantic) 5.12
Beethoven: Violin Concerto No.2 (Romantic) 10.13
Boccherini: Cello Concerto No. 2 (Classical) 5.53
Brahms: Violin Concerto No. 2 (Romantic) 8.56
Brahms: Piano Concerto No.2, 2nd movement (Romantic) 11.45
Brahms: Double Concerto No.2 (Romantic) 12.19
Britten: Sentimental Saraband (Romantic/20th century) 6.37
Copland: Corral Nocturne (20th century) 3.49
Elgar: Enigma Variations No.8+9 (Romantic) 5.38
Liadov: The Enchanted Lake (Impressionistic) 7.58
Picker: Old and Lost Rivers (20th century) 6.35
Ravel: Piano Concerto No.2 (20th century) 7.00
Ravel: Dahpnis & Chloë (excerpt) (Impressionistic) 7.15
Respighi: Gianicola (Impressionistic) 6.20
Shostakovich: Piano Concerto No.2, 2nd movement (20th century) 6.37
Villa-Lobos: Bachianas Brasileiras #5 (20th century) 6.41

Table 3. Examples of music with a mixed profile used in the sessions. *(All selections from GIM music programs, with durations taken from the 'Music for the Imagination' CD series or program lists).*

The GrpMI study documented that classical music with a mixed supportive-challenging intensity profile was effective in evoking imagery of therapeutic relevance for relatively well-functioning psychiatric outpatients. A specific selected piece of classical music with a mixed intensity profile, Tveitt's *O be ye most heartily welcome*, was an effective and reliable tool in the assessment of potential participants in GrpMI therapy for such patients. There is no reason to believe that music with the mixed intensity profile could not be used in GrpMI therapy with e.g. somatic patients in rehabilitation, however, this demands further research.

A 40 years old man whom we call Ole was referred to GrpMI in relation to individual outpatient psychotherapy. He had a long history of Obsessive-Compulsive Disorder and experienced a fast and significant effect of medical treatment. Like most of the GrpMI participants he had no experience with group therapy, and social anxiety was an important focus. Ole participated in 2 groups over 5 months. His goals were: 1) enhancing self-esteem and sense of identity, 2) experiencing focused attention and serenity, 3) increasing the capacity to accept support and care. Social anxiety was quickly reduced to a minimum in the first group (with 4 participants), and over time he developed a deep insight in his now abandoned compulsive behaviour and how it was related to his life history. He used music therapy to explore new ways of living and relating in a world no longer dominated by anxiety and compulsive rituals. In the group and through music listening he explored his relationship with all sorts of emotions, also complex and difficult feelings. He developed an open and honest communication with the other group

members who appreciated his sharing of experiences and reflections. After the last session of the 2nd group he sent an e-mail:

I have decided to stop participating in music therapy. It has been very good for me to be in the group, and I am grateful for the treatment you have offered me. I will never forget your role in the process of shaping my present, fantastic life. My family and I live a very different life than we did before. I am deeply grateful for the options the psychiatric system has offered me, including music therapy. There is a new freedom and lightness in my everyday life (without anxiety or compulsive drives and acts), something I have never experienced before. I can enjoy life with my family and other loved ones without neglecting disasters and threats in the world around me. "I know the world I sing is the world I live in."

Discussion and conclusion

Selecting the music in MusicMedicine and in receptive music therapy requires expert clinical and musical skills. Playlists and lists of recommended recordings to be used in music interventions in hospitals have been developed together with protocols for specific techniques to be used with specific clinical populations [2]. In the Bonny Method of GIM highly specialized music programs have been developed, and GIM therapists learn to select programs as related to their clients' needs. However, the literature does not include a more systematic classification of the music used in MusicMedicine, receptive music therapy, GIM and its individual and group adaptations.

When working with more severe psychological and interpersonal difficulties, life-crises, traumatic experiences and dissociation it is necessary to have a thorough method for selecting music. We have found that the taxonomy can serve that function. The ability to attach and create trust is the prerequisite for growth and for reciprocal relationships. The field of attachment is essential in understanding the concept of dissociation and its effect on trauma [49]. When trust is established there is also a sense of surrender to the other and a readiness to give and receive the experiences that will come with the mutual connection, such as communication of various affect states. In addressing experiences of crises and trauma the initial step is to establish a phase of stabilization and building of resources. It is essential to evaluate the ability of the client to regulate and tolerate affects [50,51]. Thus in the act of selecting a piece of music, as illustrated by the clinical vignettes (KMR and GrpMI), the levels of trust, basic attachment patterns, and affect regulation are carefully assessed and considered. The taxonomy is based on both many years of clinical experience and on research in the relationship between imagery and music in GIM [39,46]. We think the taxonomy is inclusive of more music genres than the music used in the Bonny Method (e.g. Easy listening, Jazz, Film Music and Folk Music). In developing the taxonomy, Hevner's Mood Wheel and Bonny's concept of affective contours are important frameworks. When making selections for a music program, Bonny considered the specific mood(s) and emotional potential of that particular composition. We propose that the 1st step in selecting a piece of music for clinical purposes is evaluation of the mood(s) characteristic of that piece. The 2nd step is to determine where in the taxonomy the piece will fit in. In addition, the clinical conditions must be assessed and carefully considered. This refers to alliance, ego-strength, level of attachment, needs for stabilization, current affects, therapeutic timing, and not least the therapeutic relationship. The clinical assessment and the matrix of the taxonomy creates the base on which the music selection rests.
In psychotherapy the therapist is attentive on the quality of the connection with the client and aims to create a relationship that can carry and hold a range of affect states and needs. Being able to feel, sort out, and possibly also understand something of the origins of ones problems are fundamental to psychotherapy. Much of the communication in psychotherapy takes place in the implicit domain of relational knowing and is more or less an unconscious process [52]. In a meta-analysis on what factors have effect in psychotherapy there was extensive support for relational factors (alliance) rather than what kind of method or technique that is used [53]. Another finding regarding working alliance was the importance of the client's subjective experience that the therapist cares for the patient in a positive way [54-56]. In receptive music therapy the therapist may choose music of the client. The question of how and in what ways the therapeutic relationship may influence the therapist when selecting a piece of music is of interest here. A related question in turn is how that choice influences alliance. One assumption is that the quality of the alliance presents an "implicit fuel" that is vital for the selection process. In other words, the relational field between the therapist and client provides an intuitive antenna for the therapist in selecting a piece of music. However, the question whether this is actually what is taking place is a point for more research.

Returning to the case vignette above (KMR-Brief Music Journeys) Anna stated that the music had the capacity to move her to a space of safety where she could connect, and begin to express and work with her feelings. This in turn helped her understand some of the roots of her fears, and how the cancer illness had brought back earlier traumatic experiences. She pointed out the importance of feeling safe and held in the therapeutic relationship. In this case vignette of 15 sessions (*Table 2*) the therapist chose music from only the 3 supportive fields to meet, contain, move and gently stimulate the therapeutic process in a direction of release, acceptance and change. Here the concept of "music as a god-enough mother" [43] can be discussed. This refers to the ability attributed to music of providing experiences of being present, holding, and nurturing. It also refers to the encouragement to move forward and explore new terrains in a way that is bearbable. The aim is to help the client tolerate affects and being able to experience different affect states while staying connected to one's body. Choosing music with this in mind means turning to the supportive end of the taxonomy. In an interview study

of 5 psychotherapists' perspective of the function of the music used in KMR-Brief Music Journeys [57] it was stated that the music was experienced as providing supportive and nurturing qualities which in turn strengthened alliance and trust building. The 3 different musical fields (*secure and holding, secure and opening, secure and exploratory*) provided helpful metaphors in selecting a piece for specific therapeutic issues. Another point to consider is to be aware of precisely how the music begins (tempo, instruments, dynamics), and which mood [17] is conveyed in the first half minute. Awareness of how the music ends, and an awareness of the aesthetic qualities of the music is also of importance. Prior to moving into the shared listening experience it is essential to build and develop "good- enough" trust. The therapeutic alliance creates the fundament for the client's ability to fully open up to receive the music. One finding from the study [57] was the importance experienced by the therapists to communicate both verbally and non-verbally their belief in the power of the music to bring about holding and provide a potential space for change to occur. This finding needs to be investigated further.

In conclusion, this article presents a fairly simple taxonomy in 2 levels - a main level of 3 specific 'generic' types of music with therapeutic potential, and a sub-level of 9 subtypes or 'fields'. Application of the taxonomy with greater awareness of the Mood Wheel needs more investigation and discussion. In summary: the mood of the music, its placement in the taxonomy, and clinical evaluations contribute to the therapist's choice of music. We think the taxonomy has the potential to facilitate a focused selection of music to address levels of emotional tolerance and to work with affect tolerance and regulation. So far, our clinical experiences are more or less limited to the fields of oncology and psychiatry. We know that the taxonomy makes sense and can be used in practice within these fields, but it will need further research to establish the taxonomy as a generic classification and clinical tool. More systematic clinical studies focusing on the uses of non-classical music and its relationships with the taxonomy are necessary. Developing a deeper understanding of the uses of more music genres is also of importance. It is especially relevant to study and describe music fitting into the mixed supportive-challenging and challenging subcategories as the music presented here is mainly from the classical Bonny repertoire.

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Commentary

In Memory of Dr. Helen Bonny (1921-2010)

Barbara Hesser[1]

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Dr. Helen Bonny was a mentor, colleague and friend to me, a relationship that began in the 1970's and lasted until the end of her life in May 2010. Helen was a pioneer in music therapy and, in her quiet way, she broke courageously from the traditional values defining the music therapy norms of her time. She was a fearless explorer of music and the healing potential of non-ordinary states of consciousness, and she persisted in these efforts throughout her life, even when there was disapproval and rejection from people in her profession who did not understand her work.

Helen Bonny always will be remembered professionally for creating the Bonny Method of Guided Imagery and Music (BMGIM). This powerful and transformative use of music grew from Helen's deep personal exploration of the power of music in her own life and healing. A lifelong violinist, Helen's personal transformative musical peak experiences while playing the violin led to the development of a music therapy approach that uses music to help others explore alternative states of consciousness for psychological and spiritual growth.

Recently, listening to a video of Dr. Stanislov Grof speaking on "The Psychology of the Future," I was reminded again that Helen was present at the beginning of this important movement. She knew and developed relationships with many involved in the Transpersonal Movement, including Dr. Grof, with whom she worked as a music therapist at the Maryland Psychiatric Research Center in the late 1960's during the last years of LSD psychotherapy research.

Helen's work is internationally recognized. Many throughout the world have trained in and practice the BMGIM. The Association for Music and Imagery (AMI) was formed in 1986 to maintain the integrity of the BMGIM and to support it's trainers and practitioners. Numerous scholarly books and articles are available for those who would like to know more about the original work developed by Helen and the adaptations that have grown over the years from her followers. Through my ongoing clinical practice of the BMGIM, I have come to a deeper understanding of the healing potential of music.

Personally, I am also most grateful to Helen for supporting my dedication to expanding the borders of what music therapy could be. She was devoted to the profession of music therapy and always was willing to dialogue with me about how to enrich and strengthen the field. I would turn to her to sound out my ideas about humanistic and transpersonal music psychotherapy. Even though it was physically difficult for her due to health issues that began in the late 1970's, Helen attended the World Symposium on Music Therapy at NYU in 1982, where a multidisciplinary group met for a week to discuss the power of music as therapy. I visited her in 1983 in her convalescence in Port Townsend, Washington, and it was there that she helped me to conceptualize and plan the Phoenicia Gathering, a small international retreat of humanistic and transpersonal music therapists that took place from 1985 -1992. Helen became a core participant of these yearly gatherings. In 1989, Helen, along with Carolyn Kenny and I, founded the Bonny Foundation, an Institute for Music-Centered Therapies, located in Newton, Kansas. This Institute was designed to further the explorations of music and consciousness in which we were all involved. These are but a few of the important and seminal events in music therapy that we have shared.

I have been privileged to know and work closely with Helen over these years. She is missed, but the support she provided to me and others, and the creative way she expanded the boundaries of music therapy, will continue forever to inspire us and to influence the theory and practice of music therapy.

Biographical Statement

Professor Hesser is the Director of Music Therapy Program at New York University. She is also the Director of the Nordoff-Robbins Center for Music Therapy at New York University. She has served the music therapy profession as President of the American Association of Music Therapy and was one of the founding representatives and officers of the World Federation of Music Therapy. She has taught and given workshops throughout the US and abroad. She is Vice President of Creative Arts As a Global Resource, Inc. In this capacity she is one of the directors of the Music as a Global Resource Initiative.

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Full-Length Article

Music Preferences of Mechanically Ventilated Patients Participating in a Randomized Controlled Trial

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Abstract

Mechanical ventilation (MV) is a life-saving measure and supportive modality utilized to treat patients experiencing respiratory failure. Patients experience pain, discomfort, and anxiety as a result of being mechanically ventilated. Music listening is a non-pharmacological intervention used to manage these psychophysiological symptoms associated with mechanical ventilation. The purpose of this analysis is to examine music preferences of 107 MV patients enrolled in a randomized clinical trial that implemented a patient-directed music listening protocol to help manage the psychophysiological symptom of anxiety.[1] Music data presented heretofore includes the music genres and instrumentation patients identified as their preferred music. Genres preferred include: classical, jazz, rock, country, and oldies. Instrumentation preferred include: piano, voice, guitar, music with nature sounds, and orchestral music. The analysis of three patients' preferred music received throughout the course of the study is illustrated to demonstrate the details and complexity involved in assessing MV patients, which substantiates the need for an ongoing assessment process.

Keywords: ***music listening, mechanical ventilation, music medicine, music therapy, patient preferred music, patient controlled intervention***

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Introduction

More than 1 million persons in the US, admitted annually to intensive care units (ICU) receive mechanical ventilation [1]. Mechanical ventilation is a supportive modality that does not treat the underlying cause of respiratory failure. Patients generally are not able to wean (gradual withdrawal of mechanical support) until the underlying cause of respiratory failure resolves and the patient is ready to breathe on his or her own. It is estimated that by 2020 approximately 625,838 adults annually will require prolonged ventilatory support (> 96 hours) [2], which has significant implications for healthcare processes and costs.

To promote tolerance and synchrony with mechanical breaths, patients frequently receive many intravenous sedative and analgesic medications by continuous infusions or bolus doses. However, the potent sedative and analgesic drug regimens these patients receive to reduce distress and oxygen consumption often result in long periods of unconsciousness. Current research in the area of sedation reduction and symptom management focuses solely on pharmacologic strategies to manage burdensome patient symptoms despite the documented deleterious effects of sedative agents [3,4]. Further, practice guidelines direct clinicians to first try non-pharmacologic strategies before pharmacological interventions to manage anxiety and distress associated with ventilatory support [5]. Effective interventions are needed to minimize mechanically ventilated patients' sedative exposure in order to reduce the incidence and severity of adverse, ICU-acquired sequelae that result from over-sedation and prolonged periods of unconsciousness and immobility, such as delirium and weakness [6].

Listening to music is a non-pharmacological intervention that can be utilized to help patients manage symptoms associated with being mechanically ventilated. Researchers have explored and investigated the use of a music listening intervention with mechanically ventilated (MV) patients as means of managing pain, discomfort, and anxiety. Researchers have found that MV patients who listened to 30 minutes of preferred music demonstrated a significant decrease in state anxiety [5,6]. Some research has shown that listening to music significantly decreases physiological measures associated with anxiety such as, heart rate, systolic and diastolic blood pressure, and respiratory rates [7,8].

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A Cochrane Review on the use of music interventions with MV patients was recently published and included 8 randomized and quasi-randomized controlled trials, of 213 patients. These studies suggest that a music listening intervention is a viable intervention for managing stress and anxiety that may positively impact heart rate, respiratory rate, and anxiety in MV patients. While the research does conclusively support the use of music listening as an effective intervention, the authors suggest that additional research is needed to further explore and understand the effects of music listening with MV patients. Additionally the review recommends that these interventions be facilitated and provided by a trained or board certified music therapist [9].

Music preferences for music listening protocols

Research surrounding the use of music listening is abundant in the literature however studies often tend to focus on the effect of the music, providing limited detail regarding the actual music utilized in the study [10,11]. In some cases the music may simply be referred to as 'relaxing', 'easy listening', environmental', modern music' or 'patient selected' with no further descriptors about the music [12-16].

In the majority of studies, researchers provide a set selection of music from which patients chose music to listen to during procedures. For example, in one case study, researchers utilizing music listening during chest tube removal provided a library of ten cassettes tapes with music from ten different genres. Patients most often selected music from the following genres: classical, country or easy listening [17]. Research for preoperative patients demonstrated that they primarily selected classical, jazz, country & western, new age or easy listening music; however the music in those categories were recorded by primarily contemporary artists [10,13,14,18,19].

Some discussion exists in the literature as to whether or not patient preference is important or influential in music listening protocols to outcomes. In 1 of these studies patients neglected to bring their preferred music from home to listen to during their procedure, so there was no true comparison between research-selected or patient-selected music [18.20]. Researchers in 2 recent studies found that outcomes were not significantly different between patients who listened to researcher-selected and patient-selected music. However, one study had a limited sample size, including 60 participants, a majority of whom were from a specific patient population (African American females making less than $20,000 per year). The second meta-analysis found that music 'based on research' was more effective than music based on 'participant preference' [21]. However, the meta-analysis did not evaluate the effectiveness of patient preferred music that also conforms to research based guidelines of 60-80 beats per minute.

In the ongoing discussion about patient-preferred music, a number of studies including the recent meta-analysis, do note that music must be tailored appropriately to individual preferences to realize the greatest benefit from the intervention [7,8,22-24,26]. These studies emphasize the importance of personal history [22,23], association or familiarity [13,22-24], and musical experience to the chosen music [25]. In order to take into consideration personal history, association, familiarity, musical experience and tailor individual preferences a music preference assessment is necessary [23,24,26].

Research with MV patients have included the use of the following music: *Music Tx* designed by Dr. Helen Bonny and classical music [7,8,19] and in a recent review of the use of music with MV patients it was reported that the majority of studies use various categories of relaxing music [21]. Researchers in case illustrations have also described 2 cases from a randomized controlled trial utilizing a patient-directed music listening intervention. These 2 case illustrations provide greater detail regarding the process of assessing a MV patient's preferred music, the successful implementation of a music listening intervention, and a description of how the intervention can be individualized based on patient needs. The patients in these illustrations preferred classical, jazz, oldies, classic rock, country, and rhythm and blues [23].

The secondary analysis that follows provides information and direction regarding music preferences and music selection for clinicians and researchers developing and instituting music listening interventions with mechanically ventilated patients or other patient populations. This analysis reflects the wide variety of music preferences and the types of music requested by mechanically ventilated patients that we encountered throughout the course of this study.

Method

Overview of the Main Parent Study

Our data presents the results of a secondary analysis from a parent study for which the primary aim was to determine whether a patient directed music intervention was effective in reducing anxiety throughout the course of mechanical ventilatory support. Patients had to be alert, making their own care decision, and interacting appropriately with the ICU nursing staff to be eligible for the study. The parent study utilized a three group randomized clinical trial to address its primary aim [1]. Patients receiving mechanical ventilatory support in 1 of 12 participating ICUs in the Minneapolis-St. Paul area were randomized to: 1) patient-directed music (PDM), where patients listened to preferred music through headphones whenever desired for as long as desired each day while receiving ventilator support, 2) active control conditions

[1] Chlan, L., Weinert, C., Heiderscheit, A., Tracy, MF, Skaar, D., Guttormson, J., Savik, K. (2013). Effects of patient directed music intervention on anxiety and sedative exposure in critically ill patients receiving mechanical ventilatory support. JAMA: Journal of the American Medical Association. Published online May 20, 2013. 309(22); doi:10.1001/jama.2013.5670

of headphones only, where patients were free to wear noise-canceling headphones whenever desired for as long as desired to block out ICU noise, or 3) control group of usual ICU nursing care for each respective unit. Additional details and findings from the parent study are available elsewhere [23,24,26].

The use of a patient directed music protocol with patient preferred music for this study allowed patients to choose the music they wanted and how much music they wanted. This generated and provided a significant amount of music data. To explore the music data for this study a secondary analysis was needed. For this secondary analysis, a descriptive design was utilized to illustrate and discuss music preferences of the PDM group. The scope, depth, and patterns of these preferences is outlined in this descriptive data.

Music Preference and Implementation of the Music Listening Protocol

The music listening protocol supervised by a board certified music therapist incorporated patient-preferred music that was 60-80 beats per minute. The patient-directed protocol allowed patients the power to choose their preferred music, as well as how much music they wanted and how long they wanted to listen. The music therapist assessed music preferences of each patient in the music listening group, instructed patients on how to operate the MP3 player, and also ensured the proper operation of the music equipment.

When a new patient was randomized to the music group, he/she was given an MP3 player and a starter set of five compact discs of relaxing music with various instruments including guitar, harp, Native American flute, piano, and guitar and flute. These CDS were selected utilizing music between 60-80 beats per minute and because they provided a variety of instrumentation to allow for patient preferences. The five CDs that were utilized in the starter set were purchased from the Target *Lifescape* ^{TM} series. This CD starter set allowed patients to begin listening to music immediately. The music therapist would then complete a music preference assessment within 24 hours of enrollment in the study.

The Music Assessment Tool (MAT) (in *Appendix A*) developed by Chlan and Heiderscheit was utilized to assess patient music preferences [18]. While patients who are mechanically ventilated are typically unable to speak, this required the music therapist to gather information regarding their preferences in numerous and various ways. This included reading lips as patients mouthed words and confirming what they had mouthed, patients writing down their preferences, as well as, talking with family members, loved ones or caregivers and clarifying accuracy with patients. Use of the MAT allowed the music therapist to collect consistent information throughout the study and ensured treatment fidelity. Patients in the PDM group selected music from 15 different genres using the MAT form [24]. The genres on the MAT form included [24]: classical, religious/sacred, rock, rhythm & blues, country, hip hop, reggae, jazz, rap, new age, world music, alternative, heavy metal, oldies (1950-1970), pop music, and other. The music genre categories were limited to these 15 broad categories in order to ascertain music preferences quickly and efficiently and as to not tax the patient. From these 15 categories patients could also provide information about specific groups or artists they preferred and they could specify other music genres, groups, or artists they preferred as well.

After identifying patients' music preferences with the MAT form, the music therapist created compact discs for the patient that included music from the genres, music groups, and artists that the patient preferred. To comply with copyright laws, all music was purchased in CDs or in downloadable format. The music was uploaded into *iTunes* on designated research computer. The music therapist would determine which pieces of music and songs were within the 60-80 beats per minute and those pieces were included on the playlists and burned onto the CDs that were distributed to patients in the music group. These CDs were delivered to the patient the following day and the music therapist would continue to daily assess the patient's music preferences and provide CDs of that music as requested. Information regarding preferences was gathered throughout a patient's enrollment in the study in order to provide a full scope of music that was representative of the patient's preferences. There was no limit to the amount of music provided to a patient. Additionally, patients could select music from any genre, music group, or artist at any time during enrollment, regardless of previous selections. The music therapist would then be responsible for finding music from those genres, groups, or artists that fit within the protocol of being 60-80 beats per minute.

The music therapist met with PDM patients daily throughout their enrollment in the study to provide for opportunities to request additional music and ongoing support for implementing the PDM protocol. Mechanically ventilated patients are often tired, weak, and struggle to communicate. Therefore it was important to recognize that patients could not recall or communicate all of their preferences in one visit. This warranted utilizing an ongoing assessment process and gathering information during each encounter with the patient [17]. When patients were unable to communicate, family members were consulted to provide information regarding the patient's music preferences.

Data Analysis

Patients' preferred music selections were identified and labeled by genre and primary instrument. Music genres were defined by the categories on the MAT form; primary instrument was identified as the salient instrumental sound or sounds in the music. Music preferences of patients in the PDM group with the longest study enrollments were also compared.

Correlation between number of days enrolled and number of CDs distributed by subject was determined using Spearman's Rho (2-tailed) due to the skewed distributions of both number of CDs and days enrolled. Chi-square test of association was used to compare genre preferences by gender. When comparing music preferences between genres, each genre was recorded as either listened to or did not listen to music from this genre for each patient in the music group. Average age was compared between those who did and did not listen to specific genres using an independent t-test. Analysis was performed using SPSS v.20. Results were considered significant at $p < .05$.

Results

A total of 373 participants were enrolled in the parent study. 126 of these were randomized to the PDM group, which is the focus of this secondary study. Patients in the PDM group had a mean age of 60.4 years ($\pm$15.4) with a wide age range of 23-91 years; 54% were female. Prior to study entry, PDM patients had been in the ICU for a median of 6 days (range 0-40) and had been receiving ventilatory support for a median of 4.5 days (range 0-35). PDM patients were enrolled and maintained on protocol for a median of 3.1 (range 1-28) days. Median total ICU days for the PDM group was 15.2 (range 1-53 days). PDM patients listened to music a median of 63.8 (range 0-580) minutes/day. All Subjects were Caucasian except for one Hispanic subject.

Music data exists for 107 of the 126 subjects in the PDM group. Missing music data was primarily due to short enrollment times in the study, compounded by patients' inability to identify music preferences as a result of sleep or fatigue. Of the 107 participants for whom music data exists, 59 were female and 48 were male.

1,580 CDs were distributed to patients in the PDM group and over the course of 44 months for this study. The median number of CDs distributed per subject during study enrollment was 13 CDs (range 0-56). It is important to note that this number does not include the five CDs in the starter set. Patients were able to continue to use and listen to CDs from the starter set throughout the study as well if they chose to. The number of CDs each patient received was correlated with length of study enrollment (rho = .36). This correlation indicates that patients experiencing a longer study enrollment time, continued to request additional CDs, which provided a greater selection for listening (*Figure 1*).

The data demonstrate a wide variety in music selections. Based on patients' music requests, the 15 broad genre categories of the MAT form were slightly rearranged and augmented for analysis. Specifically, the genres alternative and hard rock were grouped under the larger genre category of rock and the category of blues was created since this was genre that patients requested under the previous genre other. The oldies genre was expanded to include the 1940s decade, since a number of patients requested music specifically from that era. This left 14 broad categories.

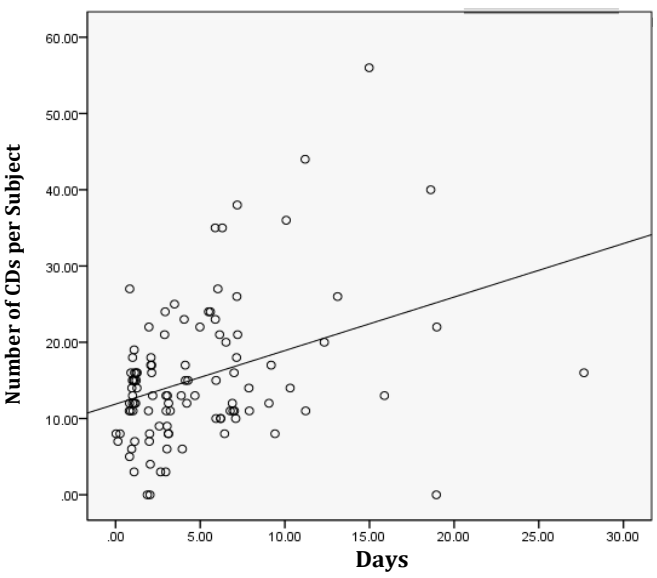

Figure 1. Correlation between days enrolled in study and number of CDs distributed

Despite the variety in music genres selected by patients in this study, preferences can be discerned. Classical music was the most commonly requested and distributed genre; this includes classical music with and without accompanying environmental or nature sounds such as water, bird songs, or wind. Country, religious or sacred music, and jazz were also commonly requested music genres, and in total 120 CDs from these genres were distributed to patients. *Figure 2* depicts genre selections for all patients during the course of the study.

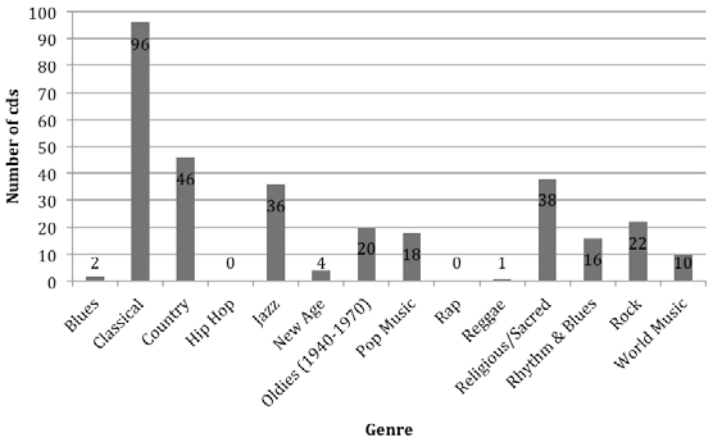

***Figure 2. Distributed CD genres;** Additionally, "Holiday" music was delivered 4 times to patients who requested it during the Christmas holiday season.*

Patients selected music that consisted of at least 25 different primary instrumental sounds. As *Figure 3* illustrates, patients most frequently requested music with prominent instrumental sounds of piano, voice, and guitar.

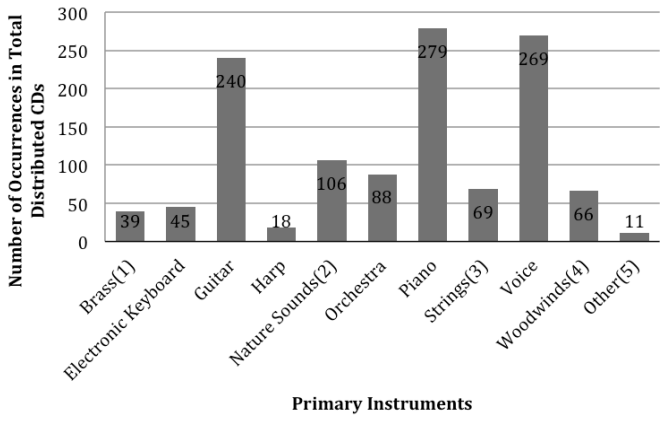

Figure 3. Primary instruments in distributed CDs; *(1)Brass includes solo trumpet; (2) Nature sounds =birds, loon, ocean waves, rain sounds, water sounds, and combinations of these sounds; (3) Strings includes solo cello; (4) Woodwinds includes saxophone, classical flute, Native American flute, Celtic flute; (5) Other=accordion, drum, steel drum, and ukulele*

Their choices over time reveal that piano, voice, and guitar were the most common primary instrumental sounds in almost all of the CDs delivered (*Table 1*). There were few genre preference differences between participants of varying genders and ages. The only significant difference between genders was jazz, which men preferred significantly more frequently than women (*Table 2*).

Genre	Male (n=48) N(%)	Female (n=59) N(%)	*p-value*
Blues	16(33%)	14(24%)	*.27*
Reggae	1(2%)	1(2%)	*NA*
Classical	36(75%)	45(76%)	*.88*
Country	19(40%)	21(36%)	*.67*
Jazz	36(75%)	32(47%)	*.03*
Hip Hop	0	0	*NA*
New age	14(29%)	12(20%)	*.29*
Oldies (1940-1970)	21(44%)	22(37%)	*.50*
Pop Music	6(13%)	13(22%)	*.20*
Rhythm & Blues	14(29%)	15(25%)	*.67*
Religious/Sacred	9(19%)	11(19%)	*.99*
Rap	0	0	*NA*
Rock	21(44%)	17(29%)	*.11*
World Music	10(21%)	10(17%)	*.61*

Table 2. Genre (ever listen to) compared by gender

Similarly, there were surprisingly few significant differences between the average ages of those who did and did not listen to specific genres. Those who listened to rock were significantly younger than those who did not. Those who listened to oldies were significantly older than those who did

CD Delivery	Brass[1]	Electronic Keyboard	Guitar	Harp	Nature Sounds[2]	Orchestral	Piano	Strings[3]	Voice	Woodwinds[4]	Other[5]
First	15	16	74	9	45	36	95	33	94	34	1
Second	13	12	70	4	19	24	76	12	74	20	1
Third	6	5	33	2	12	14	39	7	40	9	2
Fourth	2	3	23	0	7	5	23	7	21	6	0
Fifth	2	3	13	1	4	3	13	1	13	6	1
Sixth	1	1	10	0	5	3	10	2	10	0	0
Seventh	0	1	3	1	3	2	6	2	4	0	1
Eighth	0	0	4	0	10	0	6	1	3	0	0
Ninth	0	0	1	0	2	1	4	3	3	0	1
Tenth	0	1	3	0	0	0	3	0	4	0	1
Eleventh	0	0	1	1	0	0	1	0	1	0	0
Twelfth	0	1	2	0	0	0	1	0	1	0	1
Thirteenth	0	1	2	0	0	0	0	0	1	0	1
Fourteenth	0	1	0	0	0	0	1	0	0	0	0
Fifteenth	0	0	0	0	0	0	0	1	0	0	1
Sixteenth	0	0	1	0	0	0	1	0	0	0	0

Table 1. Primary instruments in each CD delivery; *(1) Brass includes solo trumpet; (2) Nature sounds =birds, loon, ocean waves, rain sounds, water sounds, and combinations of these sounds; (3) Strings includes solo cello; (4) Woodwinds includes saxophone, classical flute, Native American flute, Celtic flute; (5) Other=accordion, drum, steel drum, and ukulele*

not. The genres of blues and R&B were very close to significance, with those who listened typically being younger than those who did not (*Table 3*).

Genre	Did not listen Mean age (SD)	Listened Mean Age (SD)	*p-value*
Blues	63.0(14.7)	53.6(15.0)	*.004*
Reggae	60.5(15.3)	53.0(18.4)	*.49*
Classical	57.0(16.2)	61.5(15.0)	*.49*
Country	61.2(15.7)	59.1(14.7)	*.50*
Jazz	56.7(15.5)	62.5(14.9)	*.06*
Hip Hop	0	0	*NA*
New age	60.6(14.9)	59.9(17.0)	*.84*
Oldies (1940-1970)	56.1(14.6)	66.7(14.3)	*<.001*
Pop Music	61.3(14.7)	56.4(18.0)	*.22*
Rhythm & Blues	63.0(15.2)	53.5(13.7)	*.004*
Religious/Sacred	60.2(14.5)	61.5(18.8)	*.77*
Rap	0	0	*NA*
Rock	65.0(13.8)	52.0(14.5)	*<.001*
World Music	60.6(16.0)	59.4(12.0)	*.75*

Table 3. Genre compared by age

An in depth examination of 3 patients with the longest study enrollment, demonstrate that genre and instrumental preferences tended to remain stable over time. Additionally, these examples further illustrate that patients often continued to request music throughout the course of their enrollment. This could be the result of their impaired ability to recall information due the stress and anxiety of being in the ICU as well as sedation.

Patient F, age 53, was enrolled for 28 days, the longest enrollment in the PDM group. Patient F chose only classic rock and country music. Patient N, age 72 and enrolled 19 days, primarily received classic country music and oldies. Patient N's only genre variation occurred on the second and third CD deliveries, when Patient N also requested classical and big band music.

Patient M, age 34 and enrolled for 19 days, exhibited the greatest variation of the three longest enrolled patients. Patient M requested many sub-genres of jazz and classical music, as well as contemporary Christian, R&B, blues, and classic rock. Most of the variation in Patient M's music requests occurred in the early part of study enrollment. Beginning with the third CD delivery and remaining consistent through the eighth and final delivery, Patient M requested and received only jazz or contemporary Christian music.

Stability in music selection appears to be similarly true of patients who received greater numbers of CDs during their study enrollment, regardless of the number of days of enrollment. An example of this is Patient Q, age 56 and enrolled over 15 days, who received more music than any other participant in the music group. Patient Q requested and received classical, new age, jazz, pop, and world music. However, 45 of the 56 CDs that Patient Q received included classical music, with the other genres included throughout this patient's sixteen CD deliveries. This illustrates Patient Q's preference and request for a broad range of classical music.

Discussion

Music data collected in this study clearly demonstrate the breadth of musical genres and instrumental sounds that patients chose when given open opportunity to select their preferred music. Although patterns in participants' music choices can be observed as a group, it is important to note that factors such as gender, age, race or ethnic heritage, and personal experiences may impact patients' individual music preferences [12,15,23,27-30]. These individual differences may influence how effective a music listening intervention is for particular patients [11,31].

In this study, few significant differences in music preference were noted with regard to age. However, the age of patients receiving mechanical ventilatory support can range greatly, as it did in this study (25-93 years). Individual music preferences may also vary greatly, and making assumptions about preferences based on age may be misleading [23]. For instance, although those who listened to oldies in this study were significantly older than those who did not, it is not safe to assume that elderly patients prefer oldies, or that young people do not prefer to listen to oldies.

With regard to race, only one subject was not Caucasian, which reflected the demographic makeup of the region in which the study was conducted [32]. It is not surprising, then, that the genre world music, which included Native American, Caribbean, Celtic, French, Hawaiian, Italian, and Spanish music, represented just 3% of all music selections in this study (*Figure 2*). Race and ethnic heritage are factors known to influence music preferences [33-38]. Geographic regions with more diverse populations may have patients with more diverse music preferences than those found in this study.

Minimal differences were observed with regard to music preferences and gender in this study. However, other studies have demonstrated that gender differences may be more pronounced [39,40]. Furthermore, all of the patients with longest enrollment in this study, Patients F, M, N, and Q, were male. Music preferences for female patients may differ more over time. As with age, clinicians should not make assumptions about music preference based on gender because such assumptions may be misleading.

The number of CDs requested and received by patients each day was affected by such variables as patient health, which impacted what music preferences they were able to identify and request. For instance, on some days patients were sleeping when the music therapist visited. Other patients presented as too fatigued to discuss new music preferences when the music therapist visited, requesting to listen to music during the visit instead. Specific music preferences and needs

can be affected by emotional state [41]; therefore utilizing an ongoing assessment process is important.

While the data illustrates the music preferred, requested by and provided to the patient, it does not demonstrate which CDs the patients listened to throughout the course of the study. Since this was a patient directed music protocol patients could listen to their selected music whenever they chose to. While the data recorder on the MP3 player could record when and how long a patient listened to music, data regarding the specific CD, genre, artist or group could not be delineated. Due to patients fragile state, patients were not asked to recall what music they listened to and due to the busy nature of the ICU environment, researchers did not ask nurses to gather this data.

While research regarding the use of patient selected music has demonstrated mixed results this may be due to limited selections being provided to patients [15,27,41]. Research does demonstrate that utilizing patient preferred music can significantly reduce anxiety, decrease sedation, and facilitate relaxation [10,11,15,19,21,28]. Assessing patient music preferences requires a specific skill set and the consideration of the variety of factors that impact music preferences [23,24]. Assessing patient's individual music preferences allows the clinician or researcher to determine the music the patient prefers in light of individual differences such as age, gender, race or ethnic background, and particular experiences and circumstances, rather than limiting or restricting listening choices and options. Therefore, in this study, the music therapist played a crucial role in determining patients' preferred music each day, as well as maintaining patients' ability to listen to their preferred music. The music therapist provided a consistent assessment process for each patient, ensured that subjects were able to operate the MP3 player and were informed of the music delivered, and that the equipment was functioning properly.

The task of assessing critically ill and mechanically ventilated patients was difficult due to their limited ability to communicate, as a result of being intubated. Ascertaining information and music preferences from a patient was done by reading lips, asking questions to allow a patient to respond with only head nods, asking the patient to write down information, or talking with family members or loved ones. Attending to each of these tasks was vital to ensure that the experimental protocol was implemented consistently for each patient throughout the course of the study. This also provided treatment fidelity for the PDM group.

Most intensive care units are not likely to have a music therapist on staff nor do they have access to a music therapist. While the role of the music therapist was crucial for this study, it is feasible to implement a music listening protocol without the presence of a music therapist. Nursing staff can work to communicate with the patient or family to determine what music the patient prefers. It may be helpful to utilize an assessment tool such as the MAT [24]. This tool provides a overview of music genres and instrumentation to help determine what patients preferences, without taxing them with unnecessary questions. It is also helpful for caregivers to identify specific artists or music groups in the assessment process, as patients may not like some artists or groups, even within their preferred genre(s). For example, a patient may prefer country music, but may not like Garth Brooks, or may only like classic country singers such as Merle Haggard and Loretta Lynn. Identifying specific artists or music groups helps to clearly delineate patients' listening preferences, with more effective results [9]. In the event the patient is not able to effectively communicate his or her preferences, conversing with family members or loved ones to determine the patient's music preferences may be helpful. In some instances, family members may be able to bring in music that the patient already owns as a part of his or her personal music collection.

Conclusion

Mechanical ventilation is a supportive modality for patients experiencing respiratory failure. Patients experience pain, discomfort, and anxiety as a result of being MV. Music listening is a non-pharmacological intervention that can be utilized to help manage the psychophysiological symptoms associated with MV. While music can be a useful intervention, assessing and determining the patients' individual and specific music preferences is a vital component to the effectiveness of the intervention. The wide variety of music preferences among study participants illustrates the necessity for assessment prior to initiating a music listening intervention in order to maximize patient benefit. Additionally, due to the critical status of a MV patient's health, it is important to complete the assessment of music preferences in a thorough yet concise manner, recognizing that this information may need to be obtained in an ongoing fashion in order to maximize the intervention benefits for the patient. This supports the significant role of the board certified music therapist to not only assess patient music preferences, but to implement the music listening intervention.

The role of the music therapist in this study ensured that the broad scope of patient music preferences were accurately and fully assessed. A music therapist's specialized training regarding music, music genres, utilizing and applying music therapeutically to best meet patient needs, as well as their knowledge of specialized patient care were key to the successful implementation of the music listening protocol. The breadth and depth of the music that patients requested illustrates their desire for their preferred music and furthermore that preferred music has a extensive scope and cannot simply be reduced to several CDs made available for patients to choose from. The data from this study demonstrates that patients continued to request and receive their preferred music throughout the course of the study, as they continued to identify a variety of selected music that they preferred to utilize. A music therapist's involvement in the study ensured that they had the variety of music they wanted and needed to maximize the effectiveness of the music listening intervention.

This patient controlled intervention allowed patient's to identify and request their preferred music without limitations, except for using music between 60-80 beats per minute. This freedom of complete choice provides patients a sense of being empowered in their own care. At a time when they ventilated, feeling overwhelmed and powerless, a patient directed music listening protocol under the prescriptive care of a board certified music therapist allowed patients to make decisions daily about what, when and how long they wanted to listen to music. This type of carefully designed and administered patient-directed protocol provides opportunities for patients to be empowered in their care on a daily basis and afforded the opportunity of an aesthetically pleasing environment amidst the often traumatic environment of an ICU.

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Appendix A - MUSIC ASSESSMENT TOOL (MAT)

Background Information:
Patient Name: _____
Date:_____
Diagnosis: _____
Age: _____
Education: _____
Vocation: _____
Ethnic background: _____
Religion/Faith practice: _____

Date of ICU admission:
_____

Reason for admission:
_____
_____
_____
_____
_____
_____

Significant events prior to admission:
_____
_____
_____
_____
_____
_____
_____
_____

Current mood state:
_____
_____
_____
_____

Any hearing impairment? Please specify:_____
_____
_____
_____
_____

PART I: Patient Music Assessment

1. Do you like to listen to music? Yes No

2. Do you play an instrument(s)? Yes No
If yes, what do you play?
_____
_____
_____
_____
_____
_____

3. Are you a professional musician? Yes No

4. Are you a hobbyist musician? Yes No

5. When do you like to listen to music? (Check all that apply)

___ Relaxation	___ Stress reduction	___ During meals
___ Pure enjoyment	___ To pass time	___ W/ family/friends
___ During exercise	___ For prayer	___ During work

Other_____
_____
_____
_____

6. What types of music do you enjoy? (Check all that apply)

___ Classical	___ Religious/Sacred	___ Rock
___ Rhythm & Blues	___ Country	___ Hip Hop
___ Reggae	___ Jazz	___ Rap
___ New Age	___ World Music	___ Alternative
___ Heavy Metal	___ Oldies (1950-1970)	___ Pop music
___ Other		

_____
_____
_____
_____
_____

7. Any particular group(s) and/or artist(s) you prefer?
_____
_____
_____
_____
_____
_____

8. What instruments or instrumental sounds do you like? (Check all that apply)

___ Orchestral	___ Harp	___ Classical guitar
___ Vocal	___ Flute	___ Folk guitar
___ Piano	___ Saxophone	___ Percussion/drumming
___ Brass or horns	___ Clarinet	___ World instruments
___ Oboe	___ Ocean waves	___ Environmental sounds

Other:_____
_____
_____
_____

9. Are there any types of music that you DO NOT like?
_____
_____
_____
_____
_____
_____

10. Are there any groups or artists you DO NOT like?

_____
_____
_____
_____
_____
_____

11. Are there any instruments or instrumental sounds that you DO NOT like?

_____
_____
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12. Are there any cultural considerations or is culture an important aspect to your music selection?

_____
_____
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13. Any other information you would like to share or that you feel I should know?

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Comments and observations: _____
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Full Length Article

Music for Life Sustenance: *Does Music have a Role in Intensive Care Medicine?*

Jennifer N. Harris[1]

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Abstract

The application of music as a therapeutic, strategized intervention in the intensive care environment is considered as critical consideration and evaluation of current research is explored. Through a comprehensive literature review, it is considered why music might prove suitable in ICU care, and how it can significantly affect cardiovascular, respiratory and metabolic parameters amongst other physiological and psychological aspects pertinent to recovery. Consideration of music application outside of the intensive care unit in affiliated areas is discussed as well as its use in targeted therapy application with specific patient groups. The importance of distinguishing between a live or recorded musical intervention and the music type itself is highlighted, particularly with respect to research where this has typically been poorly defined.

Keywords: ***Music, Intensive Care, Vital Signs, Physiology, Pain, Cardiovascular, Respiratory, Sleep***

multilingual abstract | **mmd.iammonline.com**

Introduction

Music is a universal modality spanning not only across all known cultures, but historically through centuries, with instruments discovered as long as 35,000 years ago [1]. The intimate relationship that humanity and music seemingly share, has been postulated to contribute to psychological well-being [1], and has furthermore revelead evolutionary advantages [2], but what is perhaps the most intriguing and of recent attention, is the profound impact that music has contributed to body physiology alongside its resonance with the human psyche.

Musical "chills" for instance, is currently recognized to be the result of a dopamine release in the brain [3]. Pleasurable stimuli that provide such a release in this way may be considered as addictive or on the other hand, might be apt to confer to meet some sort of survival benefit. It is therefore interesting to consider that music is equally impacting on a physiological as well as an emotional level. With an increasing evidence base that music not may not only influence the brain in a similar way as a pharmacologic agent might, it is also notably significant that music affects the metabolic, cardiovascular and respiratory systems. In this way, it seems reasonable that music and music therapy should hold a scientifically sound place in mechanisms involving conventional healing, particularly whereas a scientific basis is lacking, and thus merits academic attention.

PRODUCTION NOTES: Address correspondence to: Jennifer N. Harris BA (Hons), BMBS, Paediatric Surgery, John Radcliffe Hospital, Headley way, Oxford, OX3 9DU. Email: jen.nicole@hotmail.fr | COI statement: The author declared that no financial support was given for the writing of this article. The author has no conflict of interest to declare.

Setting the Scene

Music therapy is a relative newcomer to healthcare; its début attributed to post-World War II (USA) where it was used as an intervention for trauma victims. From niche beginnings, this has led it toward becoming an internationally recognized medical treatment option for a number of conditions from Autism to Alzheimer's [4]. Music is defined by the Oxford Dictionary (2010) as "vocal or instrumental sounds (or both) combined in such a way as to produce beauty of form, harmony, and expression of emotion" [5]. This phenomenon can be applied clinically according to the American Music Therapy Association "to accomplish individualized goals within a therapeutic relationship by a credentialed professional" to effectuate various nonmusical outcomes encorporating psychological, cognitive, social and physiological domains [6,7].

A recent critical review concerning noise in hospital intensive care environments found a poorly managed soundscape on the Intensive Care Unit (ICU) to be detrimental to patient health [8]. Despite being an everyday occurrence for some healthcare professionals, the ICU environment remains a strange, uncomfortable and hostile place for patients and relatives, who are often scared and confused. With most patients on mechanical ventilation, and of critical status, it is of paramount importance that any such variables conferring negative affects are well controlled.

The Environmental Protection Agency recommends maximum sound levels on an ICU must be between 40-45 decibels, decreasing to 35db at night [9], however the reality is

that it ranges from 58-72 [6]. This merely provides another stimulus to raise stress hormones, which in turn impedes the immune system leading to reduced healing and immunity [6]. With patient's clinging to their last shred of vitality, a non-hostile and psychologically impacting complementary therapy it seems, is an ideal intervention; Queue the music.

Why does Music Lend itself to Manipulation of Human Physiology?

Schneck and Berger stipulated a number of attributes that both the human body and music possess; The body is a controlled system, run biorhythmically, and thus lends itself to a symbiosis with music. Only humans learn to play instruments, and moreover play them cooperatively in groups [10]. Indeed, Music itself is a human construct designed as a form of emotional expression. It therefore stands to reason that it should drive the very organism that created [4] it, and not surprisingly, this is supported by a developing evidence base demonstrating it's ability to entrain various physiological variables [11-13]. Breathing particularly, with an ability to succumb to voluntary control, can be easily metered by musical experience [11-13].

The human system functions through feedback mechanisms and regulation of homeostatic operating 'set-points'. These can be modulated via external stimuli and through sensory integration occurring in the brain [4]. Though research has addressed music as one of these external stimuli, there remains a number of pitfalls in existing literature. The selection of musical stimuli is not standardised, and often referred to heterogenously despite a wide range of genres. There is often no non-musical control group leading some to hypothesis that human presence alone may be a confounding variable, and musical choice, whether by researcher or participant is rarely specified [14]. Importantly, the interventional type, whether passive listening or active therapeutics is often considered synonymously [14], despite evidence that human musical intervention bears the ability to adapt pitch, tone, tempo and tonality, thus entraining and manipulating physiological variables whilst addressing numerous other therapeutic patient needs [15].

How is Music Processed by the Brain?

It appears reasonable to start by considering the basic mechanisms of how we perceive and process these aforementioned 'vocal or instrumental sounds.' Sound waves enter the external auditory canal triggering a vibration of the eardrum or 'tympanic membrane', which is then transmitted via three tiny bones called 'ossicles', through the oval window into the fluid filled cochlea. Hair cells located on the basilar membrane of the cochlea convert these vibrations to an electrical potential so that it may be conducted by the auditory nerve. A swift passage through the nervous system, first the cochlear nuclei, upper motor neurons and thalamus take the impulse to the primary auditory cortex of the temporal lobe [16].

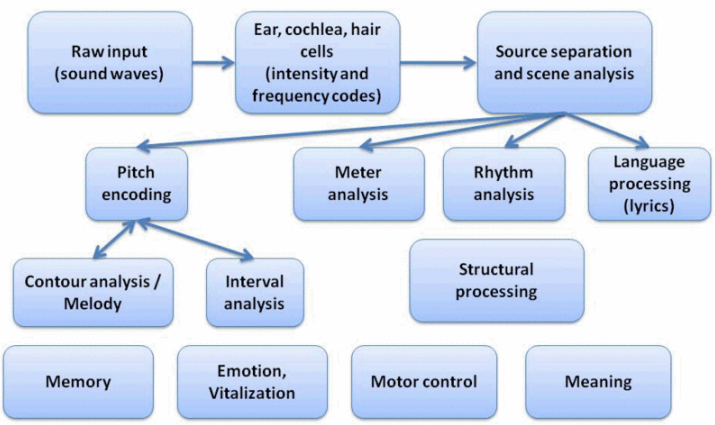

Figure 1: A modular framework to describe music perception in the human brain (CC 2008 Felipe Gerhard)

Pitch, contour or melodic shape, syntax and meter are some of the aspects to be analyzed [17]. Pitch is determined by its frequency and where specifically, it stimulates the basilar membrane along its length [16]. Since nerve fibres of the vestibulocochlear nerve cross over in the Medulla, information gleaned from both ears is processed on each side of the brain. Hyde and colleagues found, however, that the right secondary auditory cortex takes part in more fine pitch processing than the left. Furthermore, rhythm is processed in the left frontal and parietal cortex and right cerebellum predominantly [17]. The right auditory cortex also predominates in establishing tonality [18]. It must be remembered that music remains a multisensory experience, and hearing is only one of the sensory modalities in play. This bares particular importance when considering an integrated therapeutic approach with live music.

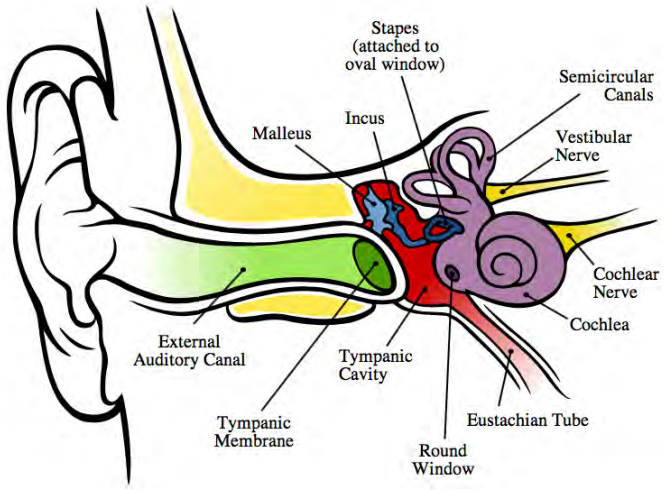

Figure 2: Anatomy of the Human Ear (CC 2009 Chittka L, Brockmann A)

The Targeted Impact of Music on Various Human Processes

As a safe, intervention, that may reduce the need for medications with high side-effect profiles, there is research supporting the impact of music on a diverse series of human biological events. These will be considered here categorically. All hold clear importance in an ICU setting as they impart a direct impact on patient prognosis.

Music and Vital Signs

Vital signs are the most fundamental of variables that could be measured in critical care patients. These include pulse, blood pressure, temperature, and heart rate. They are recorded observations that predict a patient's stability, and should be conducted on a regular basis. Adequate documentation of these parameters has been shown to improve all-cause mortality [19]. A Cochrane review of eight major studies has shown a significant impact of music in improving heart and respiratory rate in mechanically ventilated patients although no significant difference to blood pressure was noted and oxygen saturation did not appear to be affected at all [20].

In all cases but one, this did not require the use of a certified music therapist. Whether employing one along with the ability to situationally regulate tone, key, tempo and other musical parameters, might further increase these outcomes is yet to be established. It is perhaps telling of the nature of these studies that participants totaled only 213 in all eight combined, stressing the need for further research, with larger scale randomized control trials (RCT). This also limits the conclusions that can be drawn from the study particularly when considering blood pressure and oxygenation parameters, which could in fact prove dependent on music should a larger sample size be employed.

Maleki and colleagues found a significant difference between patients exposed to music with traumatic brain injury and those with no exposure. Beneficial effects on the physiological parameters were noted in the musical group leading to reduced blood pressure, pulse, respiratory rate and temperature with an increase in arterial oxygen concentration. This study recommends that hospitals put in place the means to play light music to patients [21]. It could be further extrapolated by increasing the sample size, which was small at 35 patients. The notion of musical preference would also have to be accounted for, as undesirable music may adversely affect patient recovery. Important further considerations currently not made, include patient satisfaction or indeed medical outcomes. There is also no reference to cost-effectiveness in any case [20].

Music and Metabolism

Metabolism, stemming from the Greek 'Metabole' meaning 'change' is a word for the many chemical processes occurring in the body [22]. Yamasaki summarized current research on the impact of music on metabolism, learning that music can have positive effects on metabolic recovery from stress, but also gut and intestinal motility [23]. The latter bares great importance following gastrointestinal surgery, since complications such as obstruction leading to further surgery may ensue in the unlucky patient, and must be avoided in patients of critical status.

With regards to the stress response, mixed results are found regarding music's impact on hormonal metabolism. Trappe showed less of an elevation in cortisol when music is played, a hormone that rises in situations of physical or psychological stress [24], and a study of 40 patients under regional anaesthesia for spinal surgery also found significantly reduced cortisol when music was played [25].Though released for immediate beneficial properties following a dramatic physiological incident, the negative flip-coin is that cortisol actually reduces immune defenses by prohibiting the production of interleukins and thus the proliferation of T cells. It also reduces the inflammatory response, and increases the catabolism of fat and protein. All these processes are detrimental to the recovering patient [16], thus any positive benefit conferred, particularly by a non-invasive, non-expensive and enjoyable intervention such as music, deserves further interest.

Nevertheless, a lack of consensus is illustrated in results of a RCT over 12 ICU's in the USA, which found no significant difference in cortisol with music exposure [26]. Two further studies considering how prior music listening could ameliorate physiological response to a stressor, also showed no reduction in cortisol, despite other physiological improvements [27,28]. In all cases however, live music was not employed, and although there was an element of patient choice from a preferred collection in the former RCT, the latter two studies used one researcher-selected piece (Miserere, Allegri, & Pachelbel's Cannon in D major) with little selection logic revealed. They were also limited by specific populations (women only in one, and undergraduate students in the other) and results may have differed had cortisol been measured during music exposure not proceeding it.

No studies as yet demonstrate the mechanism by which music might reduce cortisol, however Koelsch and his team did postulate three means:

1. Up regulation of the dopamine system in the brain, with corresponding changes to the way we perceive stress and pain.
2. Down regulation of the central nucleus of the amygdala, affecting our level of fear and worry, but also nuclei involved in generating the hypothalamus-pituitary-adrenal (HPA) or stress hormone axis.
3. Finally, the use of cognitive resources including attention, leading to a distraction process [25].

An additional attestation to music's metabolic impact is the reductive effects it has on lipids and lactic acid levels both

during and following exercise. A recent study has shown that listening to motivational music following exercise in 20 young men lead to increased voluntary activity in participants, and a statistically significant decrease in blood lactate levels [29]. This has been considered from a sporting perspective, however just as lactate levels rise in physical stress, so they rise in physiological stress inhibiting effective metabolic processes, and therefore it can be assumed that music will aid these parameters in acute medicine also.

Music and Pain Management

Pain has been reported as moderate to severe in the majority of patients on ICU [30,31]. Moreover, when inadequately managed it predisposes to many complications [30]. It is believed that because the experience of pain is partially subjective, by altering pain perception, one can alter the physical experience of pain. Music acts to achieve this by altering neurochemical processes in the brain, but also down-regulating the HPA axis leading to reduced production of stress hormones. Both these processes help to disrupt the feedback loop where pain causes stress, and stress in turn increases pain perception [32].

Often in intensive care, pain is managed by pharmacological means alone. Yet music could form part of a multi-modal pain management plan, and although it has little impact on acute pain stimuli, anxiolytic effects have been confirmed prior to, during and following surgery [33], as well as during invasive procedures and the domain of terminal care [34]. Trappe while discovering music's aforementioned ability to lower cortisol, also recorded a significantly greater relaxing effect preoperatively than midazolam [24] suggesting that music intervention may play an important role in decreasing medication use. A current RCT containing 200 patients further supports its use in palliative medicine, showing a significant decrease in numeric pain rating scales [34].

Bernatsky and team found that music selected by the patient had more beneficial effects than music selected by others [32]. In an intensive care environment, ascertaining patient preference may not be possible, therefore it would seem of great importance to involve friends and relatives to determine a patient's musical inclination. Although both individual differences and degree of pain stimulus will rationally impact it's effectiveness, Matsota et al conclude that music is still an inexpensive and readily available option for pain relief, free of adverse effects [33]. The conclusion that it can serve as a form of complementary pain management therefore seems important to recognize.

Music, Anxiety and Sleep Quality

Anxiety, alongside psychological upset including delirium, confusion, nightmares and hallucinations, contributes to a harrowing ICU experience [35]. Psychological well-being is further impacted by the poor quantity and quality of sleep evidenced in critical patients [36]. Despite this, few studies focus on the patient experience on ICU [35]. A recent multicenter RCT employing patient-directed music tailored by a music therapist across 12 ICU's in the USA, found significantly reduced daily anxiety measures using a visual analogue scale, as compared to controls [37]. When considering that increased sedation has been shown to lengthen the mechanical ventilation period and hospital stay, whilst increasing the risk of renal failure, these findings merit further academic attention, and may provide an effective safe intervention that can be integrated into standard care.

Promising impact on sleep quality has also been attributed to music therapy. The association of music and sleep in the form of lullabies bears an established evidence base in the neonatal intensive care domain [38], however promising results are also seen in a 2012 RCT which reported improved nocturnal sleep, self-reported sleep quality, and reduced heart rate in ICU patients exposed to music [39]. Furthermore, a recent meta-analysis of 10 randomised trials with a total of 557 participants, found significant improvement in sleep quality in patients with acute and chronic sleep disorders [40]. This meta-analysis again only considers passive or pre-recorded music, thus highlighting an unmet need for a live musical therapeutic focus.

Music and Cardiovascular Health

When St Joseph's hospital in New York installed 'muzak' in their ICU, heart attacks were reduced, and the mortality rate fell to 8-12 percent below the national average [6]. A study at the Maryland University Medical Center measured blood vessel diameter in subjects under four parameters namely; Listening to recorded music that bought them joy, a further genre that made them anxious, a funny videotape and a relaxation recording. After due consideration, a number of further variables were controlled including avoidance of emotional desensitization by disallowing the group to listen to the piece for at least two weeks beforehand, and random allocation to the order in which each subject was exposed. Results showed a 26% increase in blood vessel diameter after listening to the joyful music, and a 6% average decrease after listening to the anxiety-inducing music. Like so many of its kind this study was limited in that it only utilized 10 participants, however the large statistical differences are never the less encouraging [41].

When considering the impact of recorded music oncardiovascular variables, Bernardi et al found reductions in blood pressure with increased skin vasodilation when listening to a uniform passage of music from a Bach Cantata. Conversely, progressive crescendos in Beethoven's 9th Symphony Adagio caused vasoconstriction and increasing blood pressure in direct correlation to musical phraseology. Phrases of two Verdi Arias also demonstrated entrainment of cardiovascular autonomic variables at around 10 seconds for participants [42]. These phenomena highlight the importance of music choice (incorporating phrasing, tempo and instrumentation) and adaptability to patient physiological

status when using music in a therapeutic sense. This adds weight to the use of live musical intervention which affords both individual and situational adaptability, and may further amplify these results.

Contrary to reason, but encouraging from a clinical perspective, no differences were found between the 12 musical and 12 non-musical participants studied. This study is not only limited once more by its sample size, but the limited use of 'choristers' as musical participants, whom may have a greater exposure and appreciation of classical music than other types of musicians, thus limiting generalisability.

Which Music Works Best and Who are we Targeting?

Florence Nightingale noted most particularly that voice and soft strings were beneficial to patient health[6]. A 2012 review found that classical and vocal music are the most likely to have beneficial cardiovascular and respiratory effects on the body, and thus have a practical application in intensive care medicine.[16] Interestingly, Bach, Mozart and a number of Italian composers have the most reported strongly positive effects, and heavy metal was found to have an opposing effect, even proving harmful in some instances [24].

It is, however, important to account for individual differences, and also acknowledge varying approach needs to different target populations. The effects of music in geriatric patients in intensive care is quite profound. Music from youth leads to motivation, increased mood and vitality and is consequently important for patients with depressive symptoms [24]. A study considering elderly patients undergoing hip and knee surgery found reduced levels of confusion and pain, as well as improved ambulation in those that listened to music [43].

Music in neonatal ICU has long provided a focus for the application of live music therapy. A meta-analysis of nine randomized trials concludes there is a significant clinical benefit of music therapy in these patients, however it was noted that music was often combined with other interventions such as skin-to skin contact [44] perhaps complicating the isolation of cause and effect. Improved physiological variables are seen across the board. For example Chou et al found raised oxygen saturations in neonates receiving music therapy with endotracheal suctioning [45]. Caine noted positive impact on long-term variables including length of hospital stay, weight gain and stress behaviors [46].

Music's impact is not best restricted solely to patients. Perez-Cruz investigated relatives and healthcare workers' (HCW) preference at having background music in patient areas. A study was conducted using 99 patients, 101 relatives and 65 HCW's. On average 71% of all three groups had a preference for background music, with black ethnicity predicting a lower preference [47]. This shows that whilst music in public areas is a desirable notion, it is still limited to a small degree, by public preference for different music styles, which will vary between age, ethnicity and religious choice. Nevertheless, it has a promising application in aiding relatives through the strange and difficult time of having a loved one on ICU.

Related Applications: Preceding and Following the Ward Experience.

The stress and anxiety reductive effects of music have also been considered beyond the acute ICU setting. A small 2009 study based on 23 patients exposed to recorded music during critical ambulance transit found opinions that music improved comfort and relaxation, but offered only a minimal reduction in anxiety. No statistically significant change in vital signs was documented, however conclusions cannot be drawn from a study with such a small sample size, and patient opinion alone detects this as an area of further consideration and research [48].

There is evidence that the patient ICU experience can be complicated by post traumatic stress, anxiety and depressive symptoms.[49] This highlights the importance of a supportive network around the discharged patient, where musical therapeutics may prove a promising intervention. Holm et al (2012) considered the use of music in occasions of less favorable outcome, ascertaining positive feedback from nursing staff regarding the use of ambient music in after death care on ICU. They postulate that music played during the preparation of the body promoted peace, respect and dignity, and that music played during the viewing might aid the grieving process for relatives. They did however find that the use of music was situational. For example it was sometimes inappropriate after a frantic resuscitation attempt, and the importance of choice for both family and healthcare staff was noted [50].

Conclusion

Research evidence considering the impact of music on health and body physiology is promising. Though many original studies have sample sizes, there is statistical evidence that music, particularly live music, impacts the body's metabolism, cardiovascular, respiratory and gastrointestinal health amongst other processes. It seems sensible to introduce such an intervention into a healthcare setting, especially when such a diverse range of positive effects can be seen with little in the way of side effects. Currently most music under consideration is prerecorded [12], and stronger results might be obtained by employing the use of certified music therapists in the ICU, where musical interaction can be tailored to both the patient and sensitive surroundings. Current knowledge needs to be confirmed with larger scale RCTs, but should consider also the practicalities of implementing musical therapeutics in hospitals. Investigation of the scientific processes instigating these observed physiological changes could then be considered, as well as the global impact on patient outcomes both short and long-term.

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Biographical Statement

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Full-Length Article

Evaluation of the Standardized MUSIC CARE© App in the Treatment of Pain: *The U-Shape Composing Technique*

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Abstract

Numerous studies emphasize the application of music therapy and music medicine in the treatment of pain. The MUSIC CARE© app that was designed at the University Hospital of Montpellier applies the U-shape music composing technique taking into account the available evidence of the literature on relaxation paradigms. The main objective of this article is to summarize recent research on the standardization and evaluation of this new app of music medicine in the treatment of pain. Following a comprehensive review of the literature, a series of controlled, randomized, multi-centered studies were conducted including patients seeking care in such diverse setting as rheumatology, functional rehabilitation, oncology, geriatrics, anesthesiology and intensive care, neurology, obstetrics, pediatrics and general pain treatment. The effect of the MUSIC CARE© app has been evaluated on different types of acute and chronic pain of various origins (i.e. mechanical, inflammatory and neurological fibromyalgia). Physiological effects on hemodynamic and respiratory markers as well as psychological outcomes, including the relationship between care-provider and patient have been emphasized within multiple trials. The MUSIC CARE© app reduces pain, anxiety and depression to a significant degree and decreases the need for anxiolytics and antidepressants. Our first randomized controlled trials demonstrate the benefit of using MUSIC CARE© application in the management of pain. Future directions for the use of the app in various settings are discussed.

Keywords: ***Music Care, Pain, Anxiety, Relaxation, Composing Technique*** multilingual abstract | **mmd.iammonline.com**

Introduction

Since prehistoric times healers have used music in the adjuvant treatment of patients [1]. Between 1500 and 1600 BC, Egyptian hieroglyphics provide incantations for curing infertility, rheumatic pains and insect bites with the use of music. At the end of the 19th century, dentists used music to decrease pain intensity, discomfort, and complaints of anxiety as well as the frequency of nausea by using music. In 1960, these observations were confirmed by Gardner [2], who reportedly reduced pain in 90% of 5000 patients, by providing recorded music experiences for patients to utilize during dental surgery. Since then, these results have been replicated in various types of acute and chronic pain [3]. Beginning in the early 1990s, the re-introduction of music

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Stéphane Guetin, PhD, 8 rue La Vacquerie - 75011 Paris , Tel: (+00 33) 06 20 47 67 57, Email: s.guetin@music-care.com | COI statement: The authors declared that no financial support was given for the writing of this article. The authors have no conflict of interest to declare. Stéphane Guétin is the CEO of MUSIC CARE©, he was not involved in contact with clients or analysis of data. The authors have no conflict of interest to declare.

therapy and music medicine has been established in many medical procedures and particularly in the treatment of pain - attracting interest in the literature [4-10]. Numerous researchers have sought to identify the main factors of effectiveness of music medicine as well in this particular field of treatment [11]. It is known that music affects the cognitive component, diverting attention from pain, as emphasized by the Gate Control Theory. A recent meta-analysis has highlighted the influence of music on cognitive functions, stating that music is the most effective mediator of emotional processing. This suggests, that music that is pleasant for the patient may help to reduce the overall sensation of pain [11]. The impact of music therapy may also be explained by its specific neurophysiological effects [12], including 5 active components:

(1) sensory (against causing stimulation of afferent fibers)
(2) cognitive (often diverting attention by creating images and thoughts away from pain)
(3) affective (mood-altering associated with conditions such as depression or anxiety and thereby reducing tensions and feelings of anxiety)
(4) behavioral (acting on the muscle tone and psychomotor)
(5) and psycho-social also involved in the reduction of chronic pain phenomenon: the music is chosen according to personal preferences of the patient, meeting individual demands. In addition to verbalizing emotions music may further help to release tension and promote communication [13] (*Figure 1*).

The aim of the present report is to summarize the efforts undertaken to evaluate a new technique of music therapy in the treatment of pain: the U-shape composing technique.

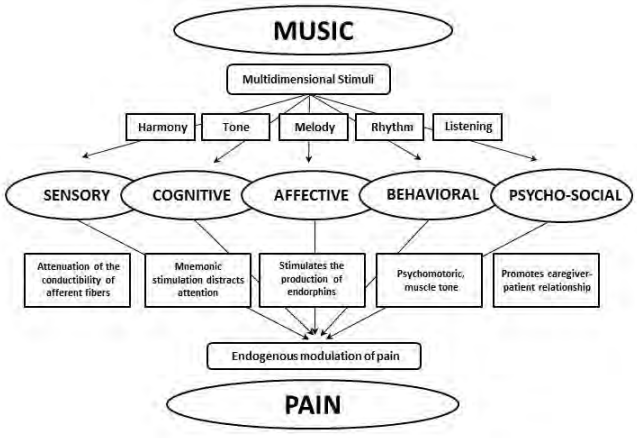

Figure 1. Main modes of psychophysiological measures of music therapy

Methods and Results

Standardization of technical therapeutic music interventions to assist in the management of pain may serve to be useful as a treatment strategy. Numerous factors, stemming from scientific recommendations, enable the use of music therapy, which is an optimal intervention. The main characteristic of a successful music medicine application, however, seems to be related to the selection of a musical performance based on the patients' preference and cultural background with respect to the genre of music that is selected [14]. Instrumental music sessions between 20 to 60 minutes, consisting primarily of harmonic variations (i.e, rhythmic and melodic) are recommended. Patients should place themselves in a relaxed position (i.e., lying or recumbent) and use closed headphones combined with an eye mask [15]. While, music interventional sessions are often applied by a large variety of health care professionals – particularly when recorded music is recommended, it is often nurses that apply the music recordings- [1,14,15]. The consultation with or supervision by a professional trained music therapist is strongly encouraged.

Based on these considerations a standardized receptive music therapeutic relaxation technique has been developed at the University Hospital of Montpellier: the U-shape composing technique. The musical sequence, varies from 20 to 60 minutes, is divided into several stages that progressively enable the patient to relax according to the technique of a mounting U [12,16, 17] (*Figure 2*). The technique is based on the reduction of musical rhythm, orchestral, frequency and volume (downward phase of the "U"), with increasing relaxation. A maximum relaxation phase (lower part of the "U") is followed by a re-energizing phase (ascending limb of the "U"). All musical sequences have specifically been designed by Music Care©.

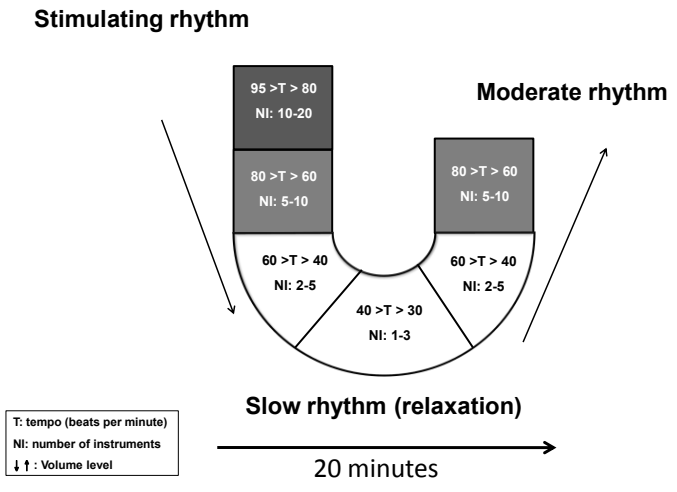

Figure 2. Technical standardized music therapy. The"U" sequence

The proposed method and the objectives are explained to clients during a first assessment interview. In order to gain a better understanding of the patient's musical preferences a questionnaire is used to assess the clients favorite genres of music and previous experience with music (i.e. active music making). During the course of the study in hospitals, health care professionals are rigorously trained and have tablets with a variety of therapeutic music sessions (U-shape) available through the MUSIC CARE© app, to meet the patients preferences and needs. This choice of musical styles to meet the demand of patients using a simplified questionnaire allows individual customization and further promotes a therapeutic relationship (*Figure 3*).

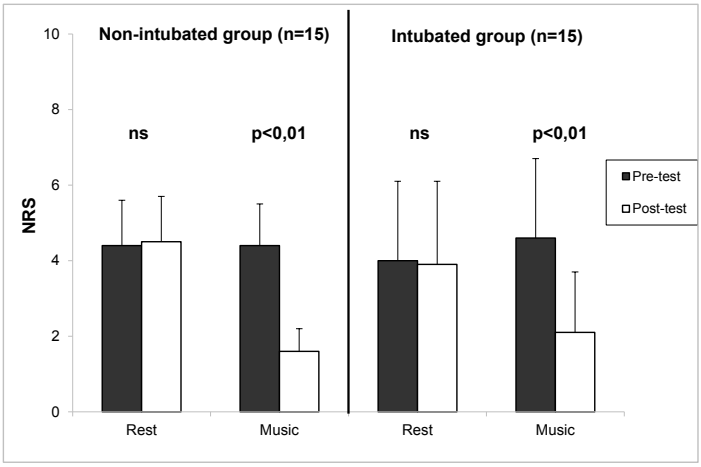

Figure 3. Acute pain; *Mean values of pain levels for each group of patients (intubated and non-intubated) obtained before (pre) and after (post-test) each study session* [10]

Evaluation of the effectiveness of music therapy on acute and chronic pain

This technique revealed good effectiveness in the treatment of chronic pain [12] and acute pain [17]. In acute pain, the main results of these randomized controlled trials report outcomes on physiological variables, such as heart rate, breathing, blood pressures (systolic, diastolic and mean) and bispectral index (BIS). The results show that the therapeutic music programs have helped to promote a state of relaxation and reduced pain intensity on an average of 50%, assessed by Visual Analogue Scales (VAS) [17] (*Figure 3*).

In the context of chronic pain, the results of a controlled study, showed promising results on reducing the intensity of pain (VAS) ($p < 0.001$) and specifically on decreasing the consumption of anxiolytics and antidepressants (*Figure 4*) [11]. In the music therapy group, the proportion of patients consuming anxiolytics decreased from 90.9% to 42.9% in a 60 day follow-up (-53%). In the control group these proportions are respectively 79.1% and 66.7% (-16%). Another randomized controlled trial in chronic low back pain patients has shown that the beneficial effects improved with the increasing number of sessions. And 76% of patients reported improvement in the first session of music therapy, 73% in the second, 88% improved in the third and 94% in the fourth session [12].

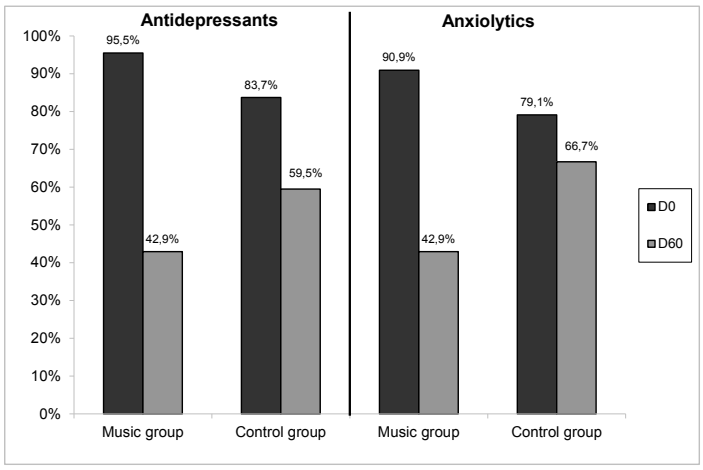

Figure. 4. Chronic Pain: Percentage of patients who consume antidepressants and anxiolytics D0 and D60; *Controlled, randomized, single-blind (n = 87). The music therapy group participate in daily music therapy in addition to standard treatment between D0 and D60. The control group received the standard treatment between D0 and D60.*

The effectiveness of this music technique on anxiety and depression was also demonstrated in a randomized controlled trial in people with Alzheimer's disease [19]. In a more general way, it would be interesting to assess the impact of the program on pain in non-communicating elderly. The pain is very difficult to assess in these patients, as there is still inconclusive evidence on the onset of behavioral changes associated with Alzheimer's disease and those related to poorly managed pain due to non-verbalization of the pain by the patient. According to the literature, fewer analgesics are prescribed to elderly people with dementia. Thus, for these people, this program may support the management of pain and may help to indirectly reduce psycho-behavioral disorders such as agitation, wandering, anxiety and depression.

Applications of music therapy in the management of pain

The Association for Music Therapy Clinical Research and Applications (AMARC) in collaboration with the Centre for Memory Resources and Research (CMRR) and the communication service of University Hospital of Montpellier have developed a network that extends throughout the care hospital. All hospital rooms of the Evaluation Center and Pain Treatment as well as certain services at Neurology and Anesthesia and Intensive Care units are equipped with this new technology. At the Territorial Hospital in Noumea, there are also 15 departments fully equipped, including the Interventional Radiology, Obstetrics, the Stomatology, Unit

Ambulatory Medicine, Pediatrics, and others. Currently, this therapeutic music program is primarily used in the context of nursing, implemented in app connected to the internet -which enables regular updates and the assessment of accurate statistical data. The terminal provides access to a library of various musical libraries, adapted to patients' requests. Organized in several selections, the patient chooses individually or with the help of a trained nurse, a U-shape session corresponding to a musical style of his preference (i.e., classical, jazz, world).

The use of an interface linked to Internet provides several advantages. It is mainly used to control the number of broadcasts of sessions per room and consequently for each patient. All data concerning the use of this music therapeutic terminal are processed in this manner for statistical analysis. The number of sessions per patient, the choice of sessions based on the patient's socio- demographic data, the available clinical records as well as other clinical parameters such as pain intensity and level of anxiety are synchronized. Depending on the most widely used sessions, the goal is to build a music database for the application of the MUSIC CARE© app.

As part of a wider development of this technique, larger multicenter studies are in progress at the national and international level. All of the inter-center data are aggregated and will provide a growing database. The results will enhance the understanding of the influence of music during particular periods of treatment and care.

Discussion

Research has demonstrated the usefulness of music medicine in management of pain [20,21]. In line with existing evidence, our results confirm the beneficial effects of therapeutic music programs on pain. They also confirm the effectiveness of music programming on sensory cognitive, emotional, behavioral and social pain components. Using the U-shape technique has several advantages:

- This music therapeutic technique is adaptable to patients with different cultural background, beyond language borders. It can also be used in non-communicating people (loss of meaning of words and verbal language) with dementia of the Alzheimer type, as musical abilities are generally preserved.
- It can be performed individually. This is essential because it is difficult to get some patients' agreement to group sessions conducted in hospitals in context of other relaxation techniques.
- Finally, the music therapeutic sessions do not require the caregiver's presence throughout the procedure but only at the beginning (installation of the patient) and end of the session (verbalization of feelings), allowing a better time management for the nursing staff.

Our results can also be compared to results obtained by evaluations of other relaxation techniques. Many studies show the impact of relaxation therapy [22] or hypnosis [23] in the context of pain treatment. Modes of action of the technique of receptive music therapy we used can be compared to those of the techniques mentioned earlier. The aim is to modify the state of consciousness using positive suggestions. Here, verbal suggestions are replaced by a musical induction - the archaic model of language. This musical induction tailored to the patient's emotional and affective preferences, will gradually bring the patient into a hypnotic and relaxation state by variations in musical elements such as rhythm, frequency, and volume.

Individual receptive music therapy is also an effective means of enabling patients at the end of the session to express their emotions felt during the listening part. Music processing acts here as a catalyst, allowing patients to verbally express their pain. Music used therapeutically therefore is an effective treatment aiming toward optimal psychophysiological changes in the pain patients may experience.

The literature shows that the impact of therapy is variable depending on the study [3]. It is important to note that most of these studies don't take the patients' musical preferences into consideration. It has been repeatedly demonstrated that the selection of a particular music varies between patients but also between different intervention sessions of one patient. These days, it is indispensable to provide several musical styles in order to best match the emotional and affective component of the patient [3,11-18]. This is undoubtedly, one of the main factors predicting the success of a music therapy session.

While the effect of music therapy in the treatment of pain has been demonstrated, this research also allowed validating the specific parameters of success, to evaluate the long term effectiveness and to develop a music database to meet the patients individual preferences. Taking into account the ease of implementation and low cost of use, combined with a lack of side

Conclusion

MUSIC CARE© app using U-shape technique changes the painful experiences through sensory, cognitive, emotional, behavioral and social effects, integrating perfectly into multidisciplinary care. The technology of the app, allows an extension of the use of therapeutic music for all patients. Further studies are currently in preparation, thus contributing to the reconnaissance of music therapy specific intervention programing and music medicine in the treatment of pain. Currently, many health centers, public hospitals and clinics are already using this technique. These centers participate in multicenter studies, leading us gradually to a better understanding of the effect of music on the human body and especially the pain.

Acknowledgements

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Biographical Statements

Since 1999, Stéphane Guétin, a music therapist who holds a PhD in Clinical Psychology, has been focusing his efforts on evaluating the benefits of music therapy by conducting numerous clinical research studies that have been presented at international congresses and published in international journals. In partnership with Montpellier University Hospital (INSERM U1061), MUSIC CARE has developed innovative music therapy and music intervention solutions that can effectively relieve pain, anxiety and depression in hospitalized patients.

Full Length Article

Does Singing Facilitate Social Bonding?

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Abstract

Psychobiological effects of amateur choral singing were studied in a naturalistic controlled within-subjects trial. A mixed group of novice and experienced singers (N = 21) filled out brief *ad hoc* questionnaires of psychological wellbeing and gave samples of saliva for measuring levels of salivary oxytocin, cortisol, and dehydroepiandrosteron (DHEA) at the beginning of 2 rehearsal sessions and 30 minutes later. The singing condition included warm-up vocal exercises and repertoire pieces. In the chatting condition, dyads of participants talked to each other about recent positive life experiences. Within-subjects, repeated measures analysis of variance (ANOVA) on self-reported and physiological measures revealed significant Time X Condition interactions for psychological wellbeing and oxytocin. Comparisons of mean scores showed patterns of changes favouring singing over chatting. There were no significant interactions for cortisol, DHEA as well as for the cortisol-DHEA-ratio. These results suggest that singing enhances individual psychological wellbeing as well as induces a socio-biological bonding response.

Keywords: ***Amateur singing, Psychological wellbeing, Oxytocin, Cortisol, Dehydroepiandrosteron***

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Introduction

Why do people like gathering and singing together in groups? Some evolutionary theorists suggest that singing may have evolved as a means to facilitate social bonding [1], group cohesion [2], or to enhance pro-social, cooperative behaviors as well as empathy between individuals [3]. One implication of these theories is that singing should provoke the release of so-called social hormones such as, for example, oxytocin [4]. The present research was designed to test this assumption in a naturalistic setting.

Recent studies suggest that singers even without any formal training may experience flow (a psychological concept related to perceived happiness) during group singing [5]. Members of amateur choral societies frequently report a range of psychological, e.g., enhanced feelings of positive affect and energy, and physical benefits, e.g. improved posture, breathing, or physiological arousal, in response to singing [6] (for a recent review see [7]). In fact, psychological benefits of group singing have been affirmed in a systematic review as one of the robust findings of a body of research [8], which is otherwise characterized by lack of theory-building and frequent methodological flaws [7]. Notably, chronic illness is not uncommon among amateur choristers [9,10]. According to qualitative self-reports, singing is often used as a means to manage the psychological side-effects of a range of psychosomatic and physical disorders including arthritis, lung problems, chronic pain, or cancer [11].

Psychoneuroendocrine responses to music have been studied in various naturalistic settings including music listening and singing [12,13]. For example, Beck, Cesario, Yousefi & Enamoto [14] reported differential effects of rehearsing and singing in public on immune and stress responses in semi-professional singers. Some participants showed several-fold increases of salivary Immunoglobulin A (s-IgA) after two hours of singing. S-IgA is a protein that is released in the mucous tissues of the upper respiratory tract and considered the first line of defense against bacterial and viral infections [15]. By contrast, cortisol, a stress hormone that is key to the hypothalamic-pituitary-adrenal-system (HPA-axis; [16] was found to increase during public choral performance [14]. Kreutz, Bongard, Rohrmann, Hodapp, & Grebe [17] found that increases of S-IgA were present during singing only, but not during listening to choral music. In the same study, cortisol concentrations decreased during the latter condition and remained constant during singing.

Oxytocin (OT) is a hormone that is associated with procreation in animals [18] as well as with intimate relationships and buffering stress in humans [19,20]. Accordingly, it is considered as a biological correlate of social

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affiliation throughout life [21,22]. Increases of OT were found in patients after open-heart surgery, when they listened to soothing music [23]. In one study, which is most similar to the present endeavor, Grape, Sandgren, Hansson, Ericson, & Theorell [24] found that OT increased in both amateur and professional singers after 30 minutes of a singing lesson. In the same study, the amateur singers only reported increasing joy and elatedness after singing.

Dehydroepiandrosteron (DHEA) is an androgen produced by the adrenal cortex affecting various bodily functions. Recently, DHEA has been implicated as anti-ageing [25,26]. Because DHEA functions as antagonistic to cortisol, increase in the cortisol/DHEA ratio is associated with higher infection risk in older adults [27]. Positive effects of exercise on immunity using this measure have been observed in older adults [28]. Music-related studies on DHEA have remained inconclusive. Whereas DHEA was found unchanged, decreased cortisol/DHEA ratios have been observed in at least three studies [29-31].

In sum, these various strands of research converge in suggesting positive psychological effects of amateur singing on individual health. Therefore, it was hypothesized that singing in groups leads to significant increases in individual self-reported measures of wellbeing and in decreases of negative affect. Moreover, it was expected that group singing would induce significant increases of oxytocin. Finally, it was expected that singing leads to significant decrease of the cortisol-DHEA ratio, which is considered a biological marker of psychophysiological wellbeing. Contrary to singing, it is expected that talking to each other does not evoke similar psychologically beneficial and/or hormonal effects as does singing.

Materials and methods

Recruitment of Participants

Participants were recruited by advertisement via television (Westdeutscher Rundfunk, WDR, Cologne). There were no limitations as to which individuals might apply for participation in terms of demographic variables, ethnicity, health status, or the like. However, individuals with little or no prior singing experience were particularly encouraged to be interviewed for the study. The interviews were conducted in small groups and involved informal questioning of the prospective choristers about their motivations and prior singing experiences. In addition, they were asked to reproduce a musical scale played by the choir master by singing a few tones, in order to see, if prospective participants would show a minimum of motivation for singing at all. There were no rejections on the basis of the interviews, because all applicants met these requirements. However, the recruitment procedure ceased with the inclusion of the 40th chorister for logistic reasons as well as to ensure a sufficient sample for the prospective research study. Participants attended a series of 10 rehearsals in which a pre-selected repertoire of pieces was prepared for public performance at the end of the rehearsal period. Participation was free of charge and subject to varying numbers of attendees between rehearsals.

Participants

A total of 40 choristers originally took part in the study. 10 individuals dropped out over the rehearsal period, but gave no reason for leaving the choir, except for a few individuals who indicated a conflict with other obligations. The 2 experimental sessions were attended by 24 and 25 individuals, respectively. Within this cohort 21 participants (16 female, 5 male; age groups: 18-24: 1; 25-49: 7; 50-65 years: 14) were identical in both sessions. The arbitrarily selected age groups suggest a median age of over 50 years in this cohort. 9 participants reported no previous experience in choral singing at all. The other 12 participants had been singing at least for one year with a maximum of 40 years (Median = 5.5 years). None of the singers were currently enrolled in any other chorus. 12 individuals reported to be taking pharmaceutical medication. Of these, 9 were suffering from chronic illness, whereas 4 indicated other reasons for their prescriptions. To respect individual integrity and privacy, participants were not required to provide more detailed health information. Thus, to explore the potential influences of these between-subjects measures, choral experience and taking medication were considered in the ANOVA model.

Questionnaires

General questionnaires on basic demographics (sex, age group), music and singing background as well as health status and medication were administered. They were designed to inform about previous experiences in instrumental and singing lessons as well as the years of singing activities, particularly memberships in choral societies.

To assess psychological changes during the different conditions, an ad hoc questionnaire of subjective feelings was developed. It consisted of four target items, two positive: ("I am feeling well" ["Ich fühle mich wohl."]; "I am in good spirits." ["Ich fühle mich guter Dinge."]; and two negative: "I am feeling tired" ["Ich fühle mich müde."]; "I am feeling bored." ["Ich fühle mich gelangweilt."]. In addition, four filler items were included, which were not considered in the analyses. Each item was rated on a 7-point Likert-type rating scale, with 1="not at all" ["trifft gar nicht zu"] and 7="very much so" ["trifft völlig zu"].

Design and Procedure

2 out of 10 subsequent rehearsal sessions (sessions 7 and 8) were selected to implement the research protocol. Each involved one baseline and one follow-up measurement after 30 minutes. At these points of time each participant filled out the psychological feelings questionnaire and gave saliva. All

participants provided informed consent individually before the study began.

In the singing condition (session 7), which was led by the choir master, every attempt was made to preserve the naturalistic character of this intervention. Importantly, no interruptions by the experimenter or changing tasks took place in the 30-minute period between the baseline and follow-up measurements. The rehearsal began with approximately 10 minutes of warm-up exercises that was followed by rehearsing sections of pre-selected repertoire pieces. The rehearsed music was chosen by the television producers as part of a preconceived programme for a public performance of the choir in a philharmonic concert hall in Cologne, which took place after the last session of the rehearsal period had been completed. However, the television crew documenting the development of the project in other rehearsal sessions and at the concert was not present during the data collection sessions. The programme included three pieces in four-part choral arrangements for soprano, alto, tenor, and bass. Indeed, the particular piece that was rehearsed during the remaining approximately 20 minutes after the warm-up was a four-part version of *California Dreamin'*, a well-known pop song composed by John Phillips and first performed by The Mamas and the Papas in 1965 (see *Appendix*). The two pieces that were rehearsed at other occasions were *Irgendwo auf der Welt [Somewhere in this world],* composed by Werner Richard Heymann in 1932, and *Falling Slowly,* composed by Glen Hansard and Markéta Irglová in 2006.

The rehearsal was conducted in sections from individual as well as combinations of parts of the song such that – with some intermission in which the choir master gave instructions on technical and expressive aspects of the performance – all choristers were engaged in singing for at least 10 minutes before the second measurement took place.

By contrast, in the chatting condition (session 8), the participants were instructed to have a chat with their neighbor sitting next to them about recent positive life events for 10 minutes. To model the exposure to the choir master's verbal instructions at the time of the singing rehearsal, a short paragraph on the origins of singing were read aloud to the participants, before they swapped seats with their neighbors in order to form new pairs to continue chatting about recent positive life events for another period of ten minutes. Then again, a short paragraph was read aloud about the origins of singing. The whole procedure was repeated a third time such that for each ten-minute pairwise chats, novel pairs of chatters were formed.

Participants were asked to remain seated throughout in the singing and chatting conditions. The conductor ensured by appropriate gestures that the loudness level during chatting should not exceed a certain limit. Participants reported no complaints or difficulties while chatting to each other.

Hormone collection and analysis

Saliva was collected by Salivetts® (Sarstedt, Germany). Participants were asked to spit into the tubes until filled with about 10-15mm of saliva from the bottom. Salivettes were kept ice-chilled and sent to the lab[1] via express mail. Saliva samples were centrifuged at 4 °C at 1500g for 15 min, and the liquid samples stored at −20 °C until assayed. The dry samples were reconstructed in the assay buffer immediately before analysis. Trained medical personnel conducted all preparations and processing of the saliva samples in strict accordance to the instruction manuals of the respective ELISA kits (see below). In particular, routines to guard against potential inference effects were installed where appropriate and multiple measurements were performed and the concentrations of samples were calculated according to relevant standard curves.

Determination of Hormone concentrations

Determination of hormones was performed using commercial ELISA kits (DRG Instruments GmbH, Marburg, Germany). The use of the specific kits (Oxytocin: EIA-3117; cortisol: SLV-2930, Dehydroepiandrosterone: SLV-3012) was consistent with previous research (e.g., [19]). Details concerning the assay procedures, norms, and quality control measures are presented in the respective user's manuals.

Data analysis

The IBM SPSS Statistics® package 20.0 was used for all descriptive and inferential statistics. A series of 2 x 2 repeated measures analyses of variance (ANOVAs) were run with condition (singing/chatting) as the within-subjects and time (baseline/30 minutes later) as the repeated measure. With a given minimum sample of n=21 and an expected effect size f=.4 ("large effect") the critical F-value required to detect significant interactions was determined at $F(1,20)=3.861$.

Results

Table 1 shows the mean scores of the self-reported positive and negative feelings at the beginning of each session and 30 minutes later. A significant Time X Condition interaction emerged for positive feelings [$F(1,20)=9.655$, $p<0.01$, $\eta 2=.326$], and this effect was robust after the inclusion of either taking medication or choral experience as a between-subjects factors. Subsequent comparisons of means show that positive feelings increased significantly after both singing [$t(21)=5.593$, $p<.01$] and chatting [$t(20)=2.400$, $p<.01$]. A significant interaction was also observed for negative feelings [$F(1,20)=4.735$, $p<.05$, $\eta 2=.191$]. This interaction dropped to a trend ($p<.1$) after the inclusion of either taking medication

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		Condition			
		Singing		Chatting	
		M	*SEM*	*M*	*SEM*
Positive feelings	*Before session*	3.705	0.276	3.952	0.241
	30 minutes later	5.386	0.267	4.546	0.273
Negative feelings	*Before session*	2.727	0.252	2.762	0.277
	30 minutes later	1.864	0.201	2.796	0.349

***Table 1: Positive and negative feelings before and after singing and chatting*;** M = Mean; SEM = Standard Error of Mean.

or choral experience as a between-subjects factor. Subsequent comparisons of means show that negative feelings decreased significantly after singing [$t(21)=3.0448$, $p<.01$], but not after chatting [$t(20)=.336$, $p=.741$].

Table 2 shows the mean scores of the biological markers at the beginning of each session and 30 minutes later. A significant Time X Condition interaction emerged for oxytocin (OT) [$F(1,21)=7.988$, $p<0.05$, $\eta 2=0.276$], and this interaction was unchanged by the inclusion of taking medication and choral experience as between-subject factors. Subsequent comparisons of means show that OT increased significantly after singing [$t(21)=12.300$, $p<.001$], but not after chatting [$t(21)=1.289$, $p=.21$]. The median of oxytocin concentration increases was 39.46 % (SD=29.13) with the lowest at 15.97 and highest individual increase at 142.62 %. It should be noted, however, that high relative increases do not necessarily reflect high absolute levels of concentrations. In other words, although no single decrease of OT concentrations was observed across subjects in the singing condition, the absolute levels varied considerably from individual to individual.

A final set of ANOVAs was run for cortisol, DHEA, and for the cortisol/DHEA ratio. No significant interactions emerged in any of these analysis. The direction of changes of mean cortisol/DHEA values, which were of greatest interest in the present study, was contradictory to the hypothesis being tested. However, these differences did not even mark a trend. These findings remained unaffected by logarithmic transformation of the hormone measures.

Discussion

It was hypothesized that singing in groups leads to significant increases of behavioral as well as of biological indicators of psychophysiological wellbeing. In particular, we expected higher values in these measures after singing as compared to chatting. These hypotheses were confirmed for self-reported positive and negative feelings as well as for oxytocin, a hormone that is associated with stress reduction as well as social bonding [3,4]. No changes were found with respect to the cortisol/DHEA ratio. The implications of these findings will be discussed below.

The finding that psychological measures of wellbeing increased during singing is in line with previous research using different measurement instruments such as the Positive and Negative Affect Schedule (PANAS; [17]), the Profile of Mood States (POMS; [34]), or visual analogue scales [24]. Thus the present findings corroborate the view that half an hour of singing is sufficient to enhance perceived psychological wellbeing. It is of note that in our study chatting in dyads also led to relatively smaller amounts but still significant increases in positive feelings. Chatting, however, was not associated with reduced negative feelings as represented in a combined measure of tiredness and boredom, whereas singing did show such a significant decrease at group

		Condition			
		Singing		Chatting	
		M	*SEM*	*M*	*SEM*
Oxytocin (pg/mL)	*Before session*	13.044	1.141	14.282	1.404
	30 minutes later	18.083	1.316	15.898	1.392
Cortisol (ng/mL)	*Before session*	2.611	.135	2.233	.134
	30 minutes later	2.997	.110	3.017	.308
DHEA (pg/mL)	*Before session*	217.41	35.86	197.11	27.96
	30 minutes later	184.30	41.77	139.07	21.44
Cortisol/DHEA	*Before session*	28.051	64.114	16.880	13.951
	30 minutes later	33.262	27.042	29.350	21.056

Table 2: Oxytocin, cortisol, dehydroepiandrosteron (DHEA) and cortisol/DHEA ratios before and after singing and chatting; M = Mean; SEM = Standard Error of Mean; ng/mL were converted to pg/mL for cortisol before calculating the cortisol/DHEA ratio.

level. Note that baseline values in both conditions were already in a more positive range for positive feelings and in a more negative range for negative feelings. This means that participants showed little indication of irritation or stress at the beginning of each session. In a previous study, in which singing was compared to listening to choral music, a quite different pattern of psychological changes was found. In particular, positive affect was unchanged after listening, whereas negative affect increased [17]. Therefore, listening to music may not always be superior to induce positive affect as compared to other vocal interventions such as chatting about pleasant life events.

To our knowledge, this is the first study to reveal that concentrations of salivary oxytocin (OT) increased during singing but not during chatting in the same group of individuals. A previous study also has shown increases of OT after singing [24]. However, that study looked at singers receiving individual singing lessons and did not include a control condition. The present findings thus confirm the main hypothesis that singing induces a sociobiological bonding response that is similar to those elicited during intimate social relationships [22]. Interestingly, such social bonding responses are not evoked by verbal communication, even when positive topics during conversations are encouraged. These patterns of findings thus offer support to evolutionary theories suggesting that singing and music emerged to enhance social bonding and mutual attachment in larger groups of individuals. Informal follow-up questioning of the choristers in this study indicated a high interest in sustaining the choral activities in the same group. In fact, a previous survey among 3145 choristers [35] revealed an average experience of 19.5 years of singing. This means that since the first commencement in singing activities (mostly during childhood and adolescence), singing was absent for only 4 to 5 years in the choristers' lives as adults. In other words, amateur choristers often ascribe high priority to singing as their main long-standing leisure activity in adulthood. In light of the present finding, such strong attachment to group singing may be explained, at least in part, by sociobiological bonding responses as observed in the present study.

An important facet of OT responses in social relationship is so-called affect synchrony. According to one study, the "temporal coordination between the parent and infant's affective behavior is an important component of sensitive parenting that contributes to infant development" (p. 753) [38]. In fact, these authors observed that OT accounted for a significant amount of variance in predicting parental affect synchrony with their infants. However, affect synchrony also occurs in intimate relationships among adults with the implication of reducing attachment anxieties and buffering stress.

Finally, there was no effect observed with respect to changes of the cortisol/DHEA ratio. Determination of this ratio is considered an improvement over measuring these hormones in isolation. Previous research has shown this ratio to decrease in response to music, while DHEA was unchanged (see [36] for a summary). The change of means in the present study did not point into this direction. Clearly, further research is needed that should include extensive baseline measurements and a longer intervention period to uncover patterns of changes of this ratio in a more systematic fashion.

Limitations

One obvious limitation of the present study arises from the 2 conditions, in which singing in a group was compared to chatting in dyads only. Although an attempt was made to model the choirmaster's instructions in the singing condition as short oral presentations in the chatting condition, there cannot be certainty whether the collaborative use of the singing voice is the only remaining difference between the two conditions. For example, the song lyrics could have induced more positive feelings than the verbal exchange of positive life events.

With respect to the *ad hoc* measures of positive and negative feelings in this study, it is of interest that both quantitative and qualitative responses of different kinds have produced converging evidence by showing that positive emotions might increase after singing [6]. For example, reduction of tiredness after both singing and listening to music occurred in another study on group singing [34]. The present findings confirm that singing is effective in inducing positive changes in these psychological variables.

Although positive feelings were assessed, there were no direct behavioural measures taken with respect to social bonding. In fact, it seems feasible to ask about the degree of enjoyment of participating in the respective activities. However, an even stronger indicator of attachment obviously is commitment. A large proportion of members of the chorus subscribed to continue singing with their choirmaster beyond the official termination of the choir. This continued interest in singing with the same group of people suggests that social bonding was successfully evoked during the sequence of 10 rehearsal sessions.

Another limitation arises from the fact that in the previous study on oxytocin-increasing effects of singing, OT was measured in plasma while the present study used saliva samples instead. However, previous studies suggest significant correlations between plasma and salivary OT at the level of r=.46 ([37], p. 673), and r=.41 ([38], p. 756). Since both measures were also associated with behavioural variables in each of the cited studies, they appear to reflect relevant biological activity of this hormone.

Conclusions

The present study shows that group singing may lead to increases in positive feelings, decreases in negative feelings as well as to increases in the release of the hormone oxytocin, which has previously been implicated in intimate social bonding [32,33,38]. By contrast, the cortisol-DHEA ratio

remained unaffected. Taken together, these findings support the theory that singing facilitates social bonding.

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Biographical Statement

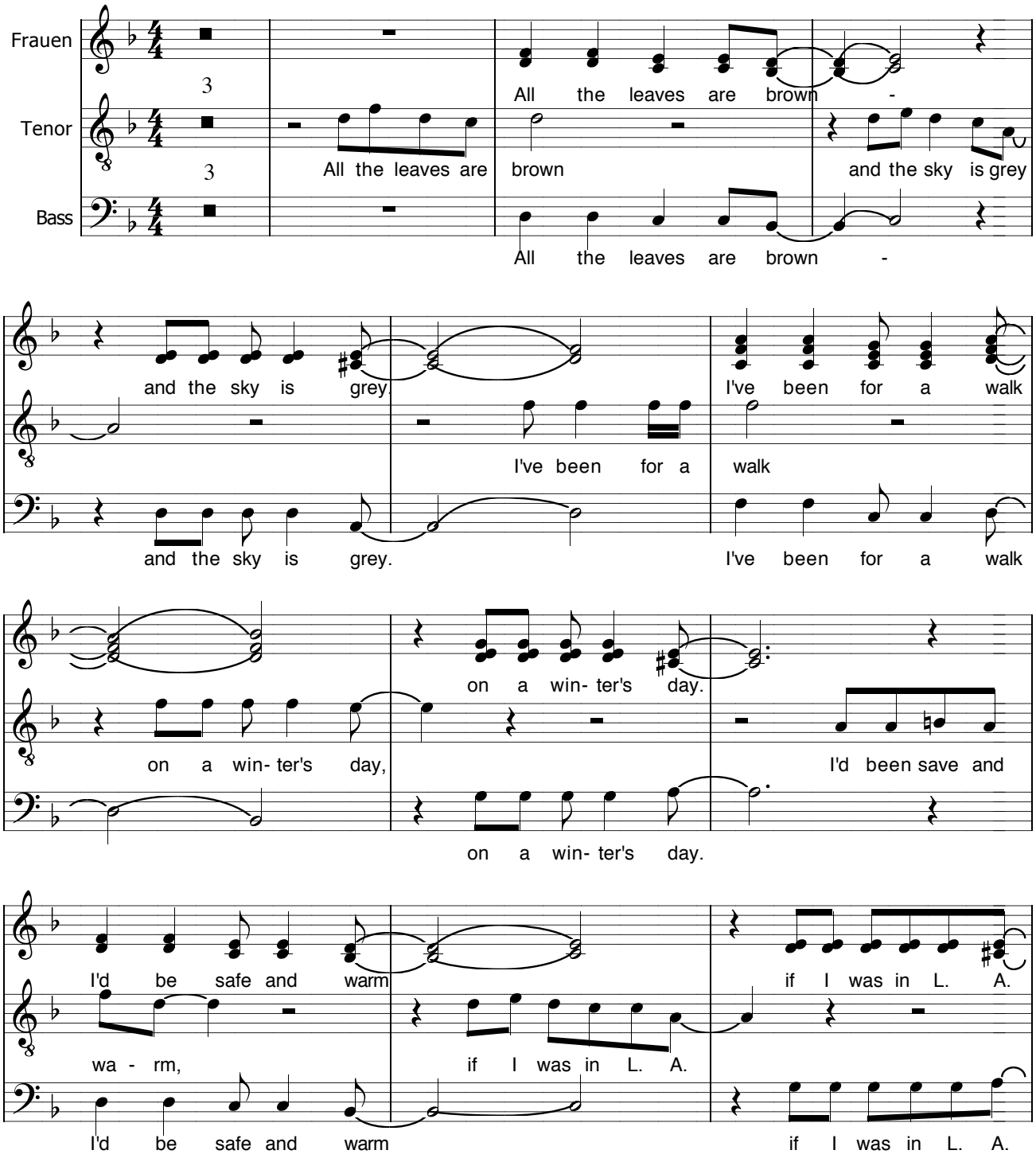
Gunter Kreutz, PhD, is professor for systematic musicology at the Carl von Ossietzky University in Oldenburg, Germany. His research interests include playing music, singing, dancing and listening to music in every-day life.

Appendix

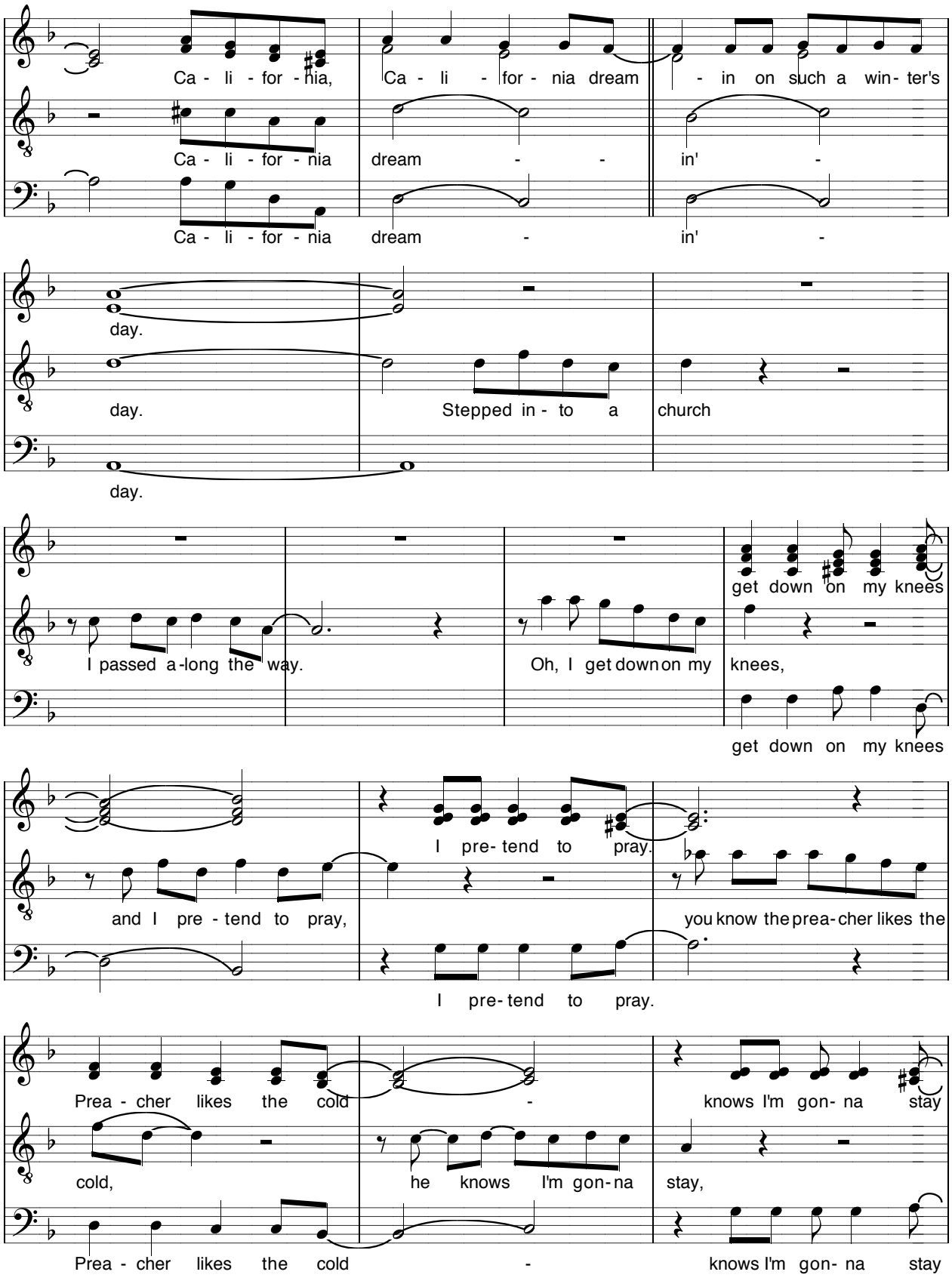
California Dreamin'

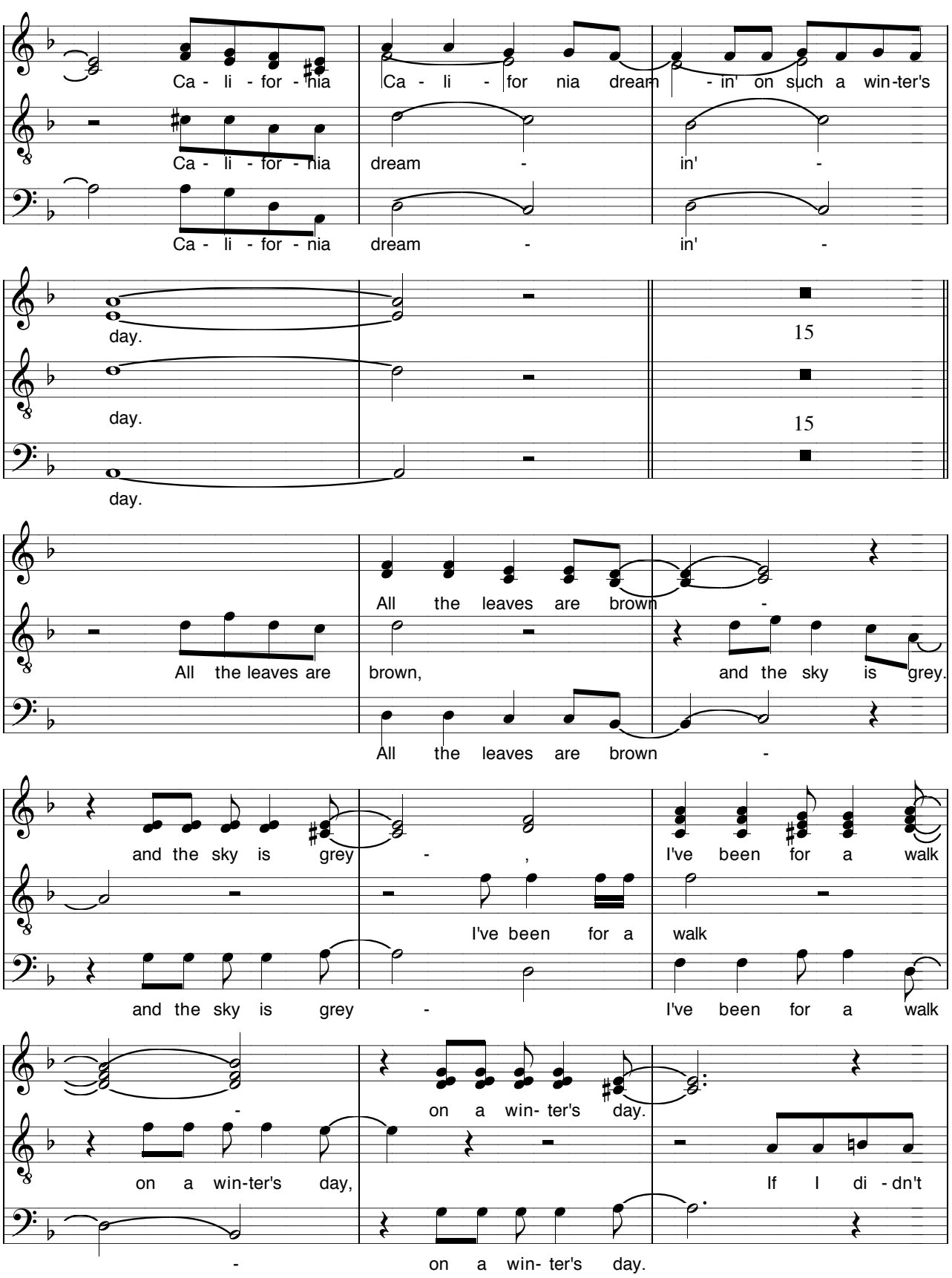
Singgemeinschaft Hard

John Phillips/Michelle Phillips
Arr. Axel Girardelli

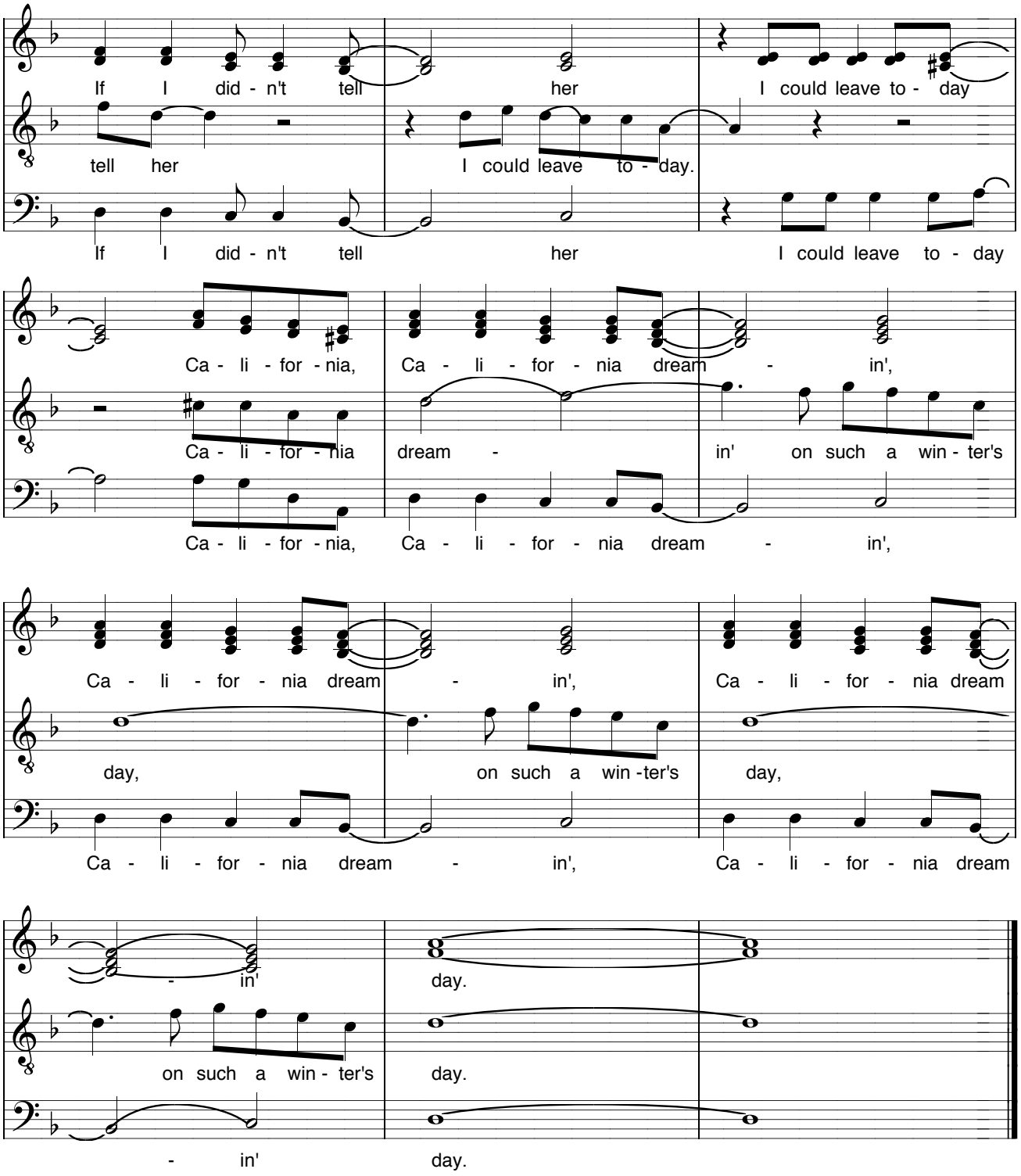


California Dreamin' Seite 2




California Dreamin' Seite 3
Ca - li - for - nia Ca - li - for nia dream - in' on such a win-ter's
Ca - li - for - nia dream - in' -
Ca - li - for - nia dream - in' -
day.
day.
day.
15
15
All the leaves are brown -
All the leaves are brown, and the sky is grey.
All the leaves are brown -
and the sky is grey - , I've been for a walk
I've been for a walk
and the sky is grey - I've been for a walk
- on a win- ter's day.
on a win-ter's day, If I di - dn't
- on a win- ter's day.

California Dreamin' Seite 4



Full-Length Article

Applications of Clinical Improvisation and Aesthetic Music Therapy in Medical Settings: An Analysis of Debussy's '*L'isle joyeuse'*

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Abstract

The application and use of clinical improvisation is an important technique in medical music therapy. Through the analysis of Debussy's '*L'isle joyeuse'* this study aims to provide the beginnings of a new way of working within a music-centered philosophy for music therapists in medical settings. The piece is divided into eight sub-sections, offering practical suggestions for how the music can be adapted and used for specific clinical outcomes. Each analysis may be used separately to create smaller improvisations or collectively in varying combinations, to create larger improvisations. Throughout the study connections are made between musical process and clinical outcome. Due to the transparent and ever-changing environment of patient's experiences in hospital settings, the potential for the free-flowing form of improvisation is emphasized as an important clinical technique. This paper offers a contemporary and *musically scientific* view of clinical improvisation in medical settings.

Keywords: ***Music-Centered, Clinical Improvisation, Music Analysis, Clinical Musicianship***

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The linking of music medicine and music–centered music therapy [1] is an important contribution to the development of contemporary clinical practice [2]. Music medicine is primarily concerned with evidence-based practice [3] which fosters improved understanding of outcome effectiveness and precise aspects of music therapy contributing to such effectiveness [4], whereas music–centered music therapy is focused on musical content and process [5]. In music medicine clinical interventions are facilitated with both live and recorded music, looking to the effects of music and sound and their effects on such parameters as stress and pain.[6] The focus is on music-based interventions applied within a therapeutic relationship [7]. In music–centered music therapy the creative and aesthetic content of creating live music is paramount in forming a therapeutic alliance that in turn affects the outcome of therapy [8].

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Colin Andrew Lee, PhD, MTA. Music Therapy, Faculty of Music, Wilfrid Laurier University, 75, University Avenue Waterloo, Ontario, Canada N2L 3C5, Email: clee@wlu.ca | COI statement: The authors declared that no financial support was given for the writing of this article. The authors have no conflict of interest to declare.

The field of medical music psychotherapy has strong foundations in the work of Dileo [9] and continues to play an important role in the advancement of music and medicine. It is has been demonstrated that music interventions reduce stress in patients with chronic pain or tinnitus, children with migraines [4], as well as reducing other forms of stress [9-12] and increase relaxation [13]. In the realm of psychotherapeutic support, music is used for expression, reflection, and catharsis as well as cultural, spiritual and social issues all center to a patient's process [14].

Research in medical music therapy has identified the need to "define specific characteristics of the music as well as types of music therapy approaches required for specific therapeutic purposes" [15]. This requires attention to identifying specific musical elements, instruments and performance methods. It is how music is used rather than the phenomena itself that is the most misunderstood between disciplines. In music-centered practice the essential building blocks of tones, rhythmic cells, harmonic progressions, textures and form are all considered with precision [5]. The skills and understanding of clinical musicianship, music analysis and musicology in this context are paramount. In music medicine it is the science of outcome and the non-musical parameters for specific physical symptoms that is the foundation for its knowledge base [4,16]. Music medicine is based on the physical and emotional well-being of the client established from specific non-musical criteria that are objective, measurable sources of information that can be communicated and documented with respect to the value and benefit of interventions [17]. In music-centered

music therapy the premise is the same, the difference being that the musical qualities of the intervention itself guides the therapist's knowledge and intuition for desired clinical outcomes [18]. From a musical understanding, balanced with the physical and emotional needs of the client, the therapist is able to facilitate the direction of therapy. This in turn affects the outcome and facilitation of clinical aims.

Music therapists facilitate musical responses dependent on patient's individual needs. What music does a therapist offer that will address the often complex medical and emotional needs of the patient? Music medicine supports the notion that preferred music is an important indicator for reaching specific aims and objectives. "It is well established in music therapy research literature that the most effective music to use with clients is the music style and genre that is familiar and preferred by the client" [19]. This is mostly achieved through either the use of songs, as a part of active music making, or through pre-recorded music for either the facilitation of imagery (GIM) or relaxation.

Preferred music is an important consideration in assessing a patient's needs. The therapist must be careful when offering music that a patient has had past associations with. For example, if a patient has had past positive memories with a song, it does not mean that he/she will have the same sentiments when listening in different life contexts. Positive song themes from a person's past may be sources of sorrow [20] when presented in the present. Preferred music can enhance patients' purpose and self-worth by stimulating creative participation alongside providing several benefits, including affording patients: a sense of achievement; greater control in their environment, a physically and mentally stimulating experience; and heightening their awareness and exploration of emotional needs [21]. The effects of preferred music on pain perception have demonstrated that participants' chosen music was found to increase tolerance and perceived control ratings in both males and females, and that preferred music was both distracting and provided a positive affective impact on the pain experience [22]. When undergoing radiation therapy, patients who listened to self-selected music reported lower anxiety and treatment-related distress [23]. It has also been shown when a patient has minimal experience with relaxation or imagery that preferred music is of benefit [24].

It is the premise of this paper and the following analyses, that non-preferred music could have an equally important role in facilitating desired clinical outcome, especially when advocating the use of improvisation. Every therapeutic encounter and musical response by the patient will be different. What may be musically significant to one patient may mean nothing to another. With this in mind the therapist must provide a delicately balanced panorama of musical idioms and styles that will address the complex musical and non-musical issues of each individual patient. The equilibrium between offering preferred and non-preferred music is a complex one that should be treated carefully. It is the authors' belief that the inspiration of hearing new musical textures can be equal to music that has past associations. The following analysis can serve both as a model for therapist's clinical dissection of other compositions known to the patient, or just as importantly in providing new and unknown musical textures that will address specific medical and expressive aims.

Background

Debussy's music (1862-1918) is full of imagery and color painting [25,26]. His free-flowing yet highly articulated aesthetic form can be used to great effect in therapy [27,28]. *'L'isle joyeus'* is based on a painting by Antoine Watteau (1684-1721) '*L'embarquement pour Cythère'* and was chosen for analysis due its clarity of form, expressionistic content and emotional intensity. Learning how to create his subtle yet exquisite musical landscapes can be positive for many clinical scenarios.

Pre-composed music is used extensively for patient-preferred music [29-32]. Extracting clinical-musical resources from pre-composed music to influence clinical improvisations is an altogether different technique [34]. Aesthetic Music Therapy (AeMT) [5,8,34-36] as a newly defined music-centered model developed by Lee, has taken its core from the comparative microanalysis of pre-composed music, and the implications of these results for the developing discipline of clinical improvisation. By combining musicological and clinical outcomes equally a critical balance can be found, one that defines a musically empirical standard that could provide innovative ways of considering the process and outcome of music therapy practice.

AeMT's documented case studies [5,36] bears testament to the use of Western composer's styles and the direct adaptation of their pre-composed music to influence the structural content of clinical improvisations. Work's such as Mozart's Requiem, KV626, Beethoven's String Quartet Op.132, Britten's opera 'Peter Grimes' Op. 33, and Bartok's String Quartet No IV, have all provided the musical backbone for clinical music-making. Further styles influenced from popular (blues and jazz) and world music [30] (Indian Ragas and Argentinean Tangos) have added to the richness of styles available to the therapist. By distilling and analyzing the musical infrastructures of movements and critical passages, the therapist is able to expand the landscape of musical responses available for their developing clinical musicianship. Specific works can be bought into sessions as requested by the patient, or can be used in direct response to the therapist's understanding of the aims and objectives of developing work. This paper is based on the research and principles of AeMT.

Clinical Application

Edith was a 65-year-old female dying of Stage IV pancreatic cancer. When she was diagnosed, her cancer was advanced and had already metastasized. This meant that surgery was no longer a curative treatment option. The malignancy was apparently resistant to both chemotherapy and radiation

therapy as well. Edith had lost considerable weight the past 6 months and had very poor appetite. She was lethargic and sleepy most of the day. She experienced nausea, and considerable pain in the abdomen and lower back. She required assistance with bathing, using the toilet, mobility, and at times, feeding due to weakness. The therapist met her on the palliative care unit of a large metropolitan hospital. She expressed her interest in using music for relaxation and reminiscence. Edith's husband had died suddenly of a heart attack two years prior. She expressed feelings of sadness because she never had a chance to tell him how much she loved him and to say her final goodbye. Edith was hopeful that in her death she would be reunited with him. She suffered from high levels of anxiety and low mood. In the first three sessions the therapist implemented music for relaxation, and preferred songs for reminiscence. Music for relaxation was implemented to further Edith's feelings of comfort while decreasing pain perception and also to meet the client in her physical state of reduced energy and lethargy. During the initial assessment session, Edith expressed interest in using music and reminiscence as a therapeutic technique. Edith was able to use music for relaxation, but still expressed anxiety about delving into memories that concerned her husband. Despite this, she still chose to reminisce. In the fourth session, the therapist decided to incorporate Debussy's '*L'isle joyeuse'* as a means to inspire images of her memorable trip to Paris. This piece was selected because of its clean musical lines and emotional intensity with the hope that it would provide a warm space to help stimulate imagery. By distilling sections of the piece and using them as a basis for a developing improvisation, the music was able to meet the patient's needs. As the music began, Edith described a memory of her and her husband. "Jonathan and I travelled to the beautiful countryside of Paris for our 25th anniversary right before he died. This music reminds me of the trip". She went on to describe many picturesque views with vivid details of colour and feelings she experienced. After the piece ended the therapist used the images and feelings as a springboard for discussion that were subsequently transcribed. This work led to increased feelings of comfort and reduced the anxiety she felt. Using a Likert scale 0-5 with 0 being no anxiety to 5 being extreme anxiety, Edith's anxiety went from 4 pre-session to 1 post-session.

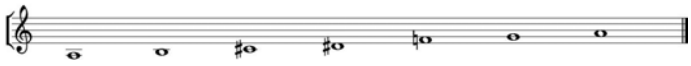
Analytic Criteria

The following analyses have been dissected to provide musical themes and forms that can be used for creating clinical improvisations in medical settings. This one example can serve as a template for other clinical analyses dependent on the needs of the patient. The exercises are mainly focused on keyboard, but can be also adapted for guitar[1] and single-line orchestral instruments. The use of voice, either with words or vocalize, is encouraged throughout. The sub-sections can be used either in isolation or combined to provide diverse musical responses for various client groups. It is suggested, if possible, that the original score be studied before implementing the analyses. The following stages form the basis for the results:

1. Musical analysis – description of musical content
2. Practical application – exercises for the development of clinical musicianship skills
3. Clinical treatment – specific receptive and active techniques[2]

The composition is based on the following modes and scales:

Example 1 –Whole-tone Scale



Example 2 –Lydian Mode

Example 3 –Diatonic Scale

Analysis 1 (bars 1–6)

The piece opens with a long C# trill, followed by a fast melodic passage suggesting the whole-tone scale. The emphasis on trills continues throughout this section with the melody evoking an illusion to pan–pipes [37].

Bars 1-6 can be distilled to provide three sub themes ***A***, ***B*** and ***C*** that can be used as motives for creating space and openness. Theme ***A*** contains a descending chromatic scale with chords based from the whole-tone scale.

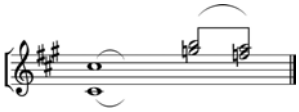
Example 4

[1]Due to the nature of the piece, guitar tabulature has not been included. Therapists who use guitar as their main instrument are encouraged to explore ways of transcribing the analyses for their specific individual clinical work.

[2]The suggestions offered come from the author's experiences of this piece in both clinical and educative settings. It is hoped that other varaied adaptations will become evident as therapists use the piece for different clinical situations.

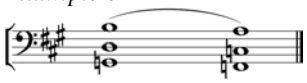
Play different groupings with the descending melody and chords to create sequences that are open and suspended. Improvise extended trills followed by faster phrases to create the opening mood of the piece. ***B*** is a combination of a bell like tone on C# with two intervals of a major third.

Example 5



Practice ***A*** and ***B*** separately and then together creating a musically transparent experience. Two original chords in the bass ***C***–not included in the score–are offered to balance to the overall texture of this section.

Example 6



Themes ***A***, ***B***, and ***C*** can be used in isolation to create short improvisations, or combined to create a musical forms as the basis for longer and more developed experiences. The crystal-like ungrounded essence of this sub-section should be chosen for specific clinical situations that require emotional clarity and simplicity of form.

Clinical Applications

Receptive

- Relaxation – This analysis can be used to create space for relaxation, providing a platform for openness and stillness. It could help improve mood, reduce anxiety for medical and surgical patients, while also enhancing comfort and relaxation [38-41].
- Inhalation and exhalation – Use the C# trill to focus on inhaling, and the following faster moving melody on exhaling. This analysis can be used for breath management exercises paired with choral singing and speech for patients with Chronic Obstructive Pulmonary Disease (COPD) [42].

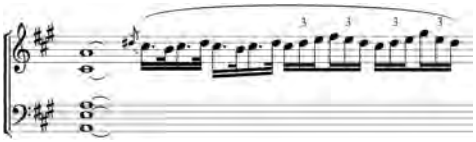
Active

- Music and Movement – The trill passages can assist small hand or foot movements. Also to help maintain muscle strength or rehabilitate affected areas of motor functioning, making repetitive tasks easier, more stimulating and improving motivation [43-46].
- Improvisation – C# tone can be offered to a client, which will then become the focus for an ongoing dialogue [47].

Analysis 2 (bars 7–13)

The tonic key of A Major is now established. Two melodic phrases ***A1*** and ***A2*** are introduced, balanced between the Lydian mode and whole-tone scale. These exotic phrases can be used as improvisational nuclei for therapists who play single-line orchestral instruments, varied world instruments or voice.

*Example 7 – **A1***

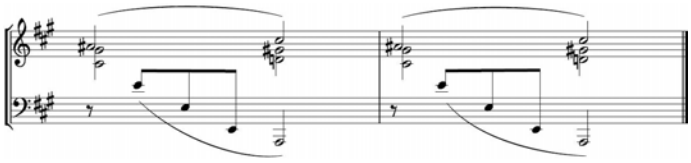


*Example 8 – **A2***

These phrases should be played with flexibility and freedom of melodic line.

B, (bars 12 and 13) acts as a musical pause and can be used as a link back into ***A***, (bars 7–11).

Example 9



Clinical Applications

Receptive

- GIM combined with relaxation to encourage psychological, physical and mental relaxation. GIM reduces psychological distress that is known to suppress human immune and endocrine functions [48].

Active

- Music and Movement [49]– moving head in circles, or make sweeping motions with hands or legs. Melodic fluidity over tonic chord for promotion of fine motor control movements. For paraplegic and/or quadriplegic patients in rehabilitation to help experience aspects of their personality that were previously functioning and help reintegrate their self and body images [50].
- Improvisation – to decrease client's sense of isolation, while promoting space and relaxation [51].

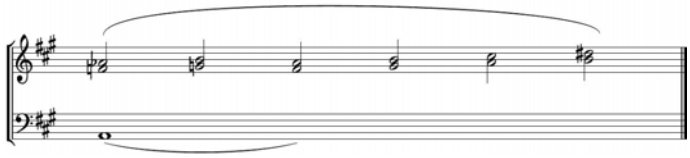
Analysis 3 (bars 19–27)

This section includes a Dominant 7th major chord over which minimalist triplet figures are played.

Example 10 – ***A1***

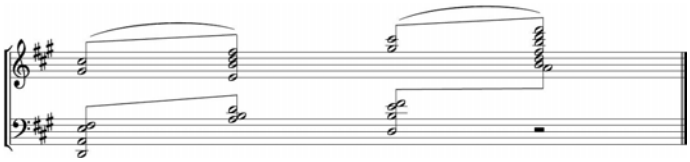
This passage provides a duality of expression inferring a balance between a diatonic centre and the whole-tone. A sub motive of 3rds creates balance in the musical form. Play slowly and carefully over the tonic. Explore in different registers and at different tempo.

Example 11 – ***A2***



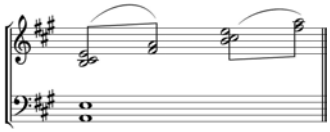
This example includes ascending chords on the sub-dominant that includes major 2nds. Explore these chords with different instrumental combinations and voice.

Example 12 – ***B1***



The tonic key is stated in the bass with an open 5th and simpler more transparent intervals in the treble.

Example 13 – ***B2***



Use themes ***A1***, ***A2***, ***B1***, & ***B2*** individually and in combination to create divergent musical figures for improvised musical experiences.

Clinical Applications

Receptive

- Relaxation – Progressive muscle relaxation, focusing on the musical tension of ***A1–A2,*** and release ***B1–B2.*** Listening to an improvised realization of the analysis could positively affect neurophysiological and emotional responses [52,53].

Active

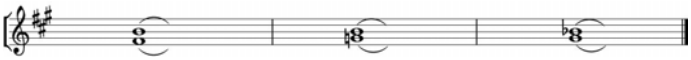
- Improvisation – For use with non-pitched instruments or a single tone (A). To create movement, ***A1*** balanced with rising 3rds ***A2***, leading to a more sustained musical dialogue, ***B1*** and ***B2***.

Analysis 4 (bars 36–51)

This luminous section can be used to great effect in many clinical situations. The beauty of sounds if placed precisely and clinically can produce effective results. Play the passage slowly from the original score. Place each tone carefully to create the incandescent qualities of the passage. Emphasize the rhythmic content of duple vs. triple meter.

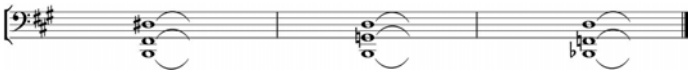
The three sets of essential tones can be used for the client to be an essential part of the music. The movement from a perfect 4^{th} to major 3^{rd} and minor 3^{rd} will create unexpected musical experiences for the client.

Example 14 – Essential Tones
Bars 36–39



The suggested grounding chords add textural and harmonic balance to the higher pitched qualities of the score. The chords have been prepared with open intervals to add warmth and direction. The harmonic core of B major, root position to G major, first inversion and finally B flat, root position combined with the previous essential tones can add clarity to an ongoing musical dialogue between therapist and client.

Example 15 – Grounding Chords
Bars 36–39



Play these passages in varying combinations to create different and varied musical experiences.

Receptive

- Guided Imagery – Create open, expansive sounds. The richness of the suggested grounding chords can be used for relaxation and imagery [54].

Active

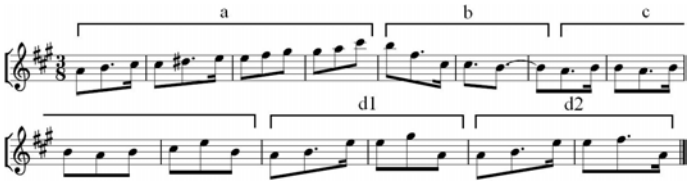
- Improvisation – The essential tones used individually to create a bell piece. Un-tuned percussion can add to the emotional/musical quality of the passage [55]. The Lydian

mode modulating to B flat major can be used to create clarity and attention.

Analysis 5 (bars 67–98)

This slower middle section is pianistic and grounded in the tonic. The left hand with its rhythmic divisions of five against three, suggests music that is open and improvised. The right hand lyrical chords provide warmth that is reminiscent of Chopin and Rachmaninoff.
The melody has 4 sections: ***a***, step-wise and ascending, ***b***, moving downward back to the tonic, ***c*** moves between tones A and B before ***d***, which again creates leaps in the melody.

Example 16



Analyzing this carefully constructed melody can equip the therapist with clinical/musical tools to encourage and develop melodic expression for the client. The balance between step-wise movements and leaps can provide an emotionally impactful experience. Often clients when improvising either with voice of on tuned instruments will oscillate around tones in close proximity. By improvising melodic arches clients can be encouraged to take musical/creative steps that include broader and more emotionally open musical phrases.

Receptive

- Relaxation – This analysis is effective for relaxation, deep breathing and emotional grounding [56,57].

Active

- Improvisation – Legato playing, using instruments that have broader qualities. For vocal development [58], breathe control and singing. To decrease isolation through improvised dialogue [51].

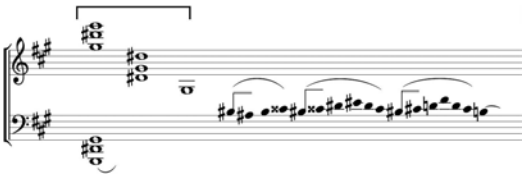
Analysis 6 (bars 99–114)

This section, now in the dominant, highlights the musical authority of the interval of a 5th in contrary motion. ***A*** should be played clearly and with a sense of detachment (piano no pedal).

Example 17

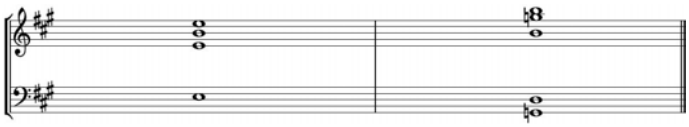
B, in comparison, is a section that is broad and legato. Consider this extended phrase as a mini cadenza free from any defined rhythmic structure.

Example 18



The return to the staccato ***A*** should be similar to the opening but in lower registers. The final chord can either return to the tonic (1) or modulate to G (2).

Example 19



Receptive

- Relaxation – For breathing patterns, played slowly and openly. Contrast each sections between slow detached playing, ***A***, and longer legato lines ***B***.

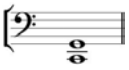
Active

- Improvisation – For use with interventions that require clarity of dialogue. Tuned instruments on E (***A***) and G # (***B***). The musical elements in this section can be used as a means to mirror a traditional therapeutic dialogue [59]. In *Paraverbal Therapy*, improvisation can express the communicative needs of children and can be a means to facilitate verbal dialogue. This music could also help patients overcome an emotional barrier through verbal expression [60].

Analysis 7 (bars 145–159)

This sub-section is analyzed in six cells that can be isolated and combined in different combinations. The music is constantly moving. Each cell should be practiced separately and then combined to produce a part-improvisation or one single improvisation.

Example 20 – Cell 1 – Rolling bass figure to be played freely and out of tempo

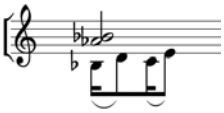


Example 21 – Cell 2 – Step-wise melody

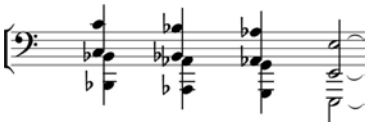
Example 22 –Cell 3 – Repeating minimalist phrases

Example 23 – Cell 4 – Two-part cells in 3rds

Example 24 – Cell 5 – 2nds and 3rds



Example 25 – Cell 6 – Descending octave and 2nds



Receptive

- Relaxation –The cells can be used as luminous responses to inactive clinical situations such as breathing patterns. The quality and emotional intent of this sub-section should be used carefully and with clinical/musical intent.

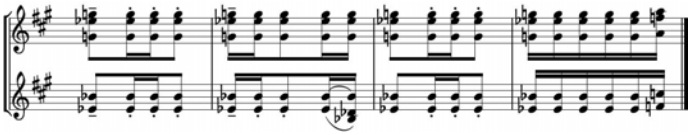
Active

- Improvisation – The cells presented can be used for different instrumental combinations to create an improvisation based on themes that provide different musical responses. This section emphasizes a balance between freedom and exploration of expression [61].

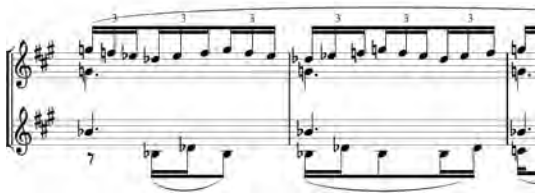
Analysis 8 (bars 200–220)

This passage introduces a new configuration. It has three sub-sections:

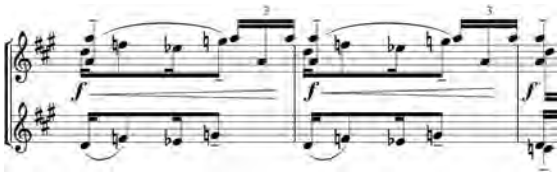
Example 26 – Sub-section ***A*** – March-like figure in chords



Example 27 – Sub-section ***B*** – Moving minimalist figure



Example 28 – Sub-section ***C*** – Bell-tone



Explore the two different moods of ***A*** and ***B***, followed by the bridge passage ***C*** to create a distinctive improvisation that balances the different styles.

Receptive

- Listening – The distinctly different styles can be used to help alleviate postoperative pain [62], reduce anxiety, improve pain management, and improve mood. Gutgsell [63] found that a single session incorporating therapist-guided autogenic relationship and live music was effective in lowering pain in palliative care patients [39].

Active

- Music and Movement – Clients who become active and who need energy in their responses. Active music making may contribute to increased energy [64]. Improvisation – Possible implications for clients with traumatic brain injury to increase expression and help re-establish relationships [65].

Conclusion

This article proposes a method of analysis, linking music-centered practice and music therapy in medical settings. The richness and artistry of great composers' music can become essential tools in facilitating specific medical interventions. If we believe that the creative quality of music should be equal to the clinical nature of non-musical aims, then studies such as these should be seen as essential for developing contemporary practice. Debussy's '*L'isle joyeuse*,' was chosen because of its clarity of compositional design, emotional authenticity, and impressionistic textures. By dissecting the structure of the piece into sub-sections, musical and clinical form become allies. Using the sections either separately or in different combinations, Debussy's style becomes available for extending the therapist's musical palette. In this context the

scientific structure of music is directly applied to the scientific organization of medicine and clinical outcome.

It is not the intention of this investigation to recommend a standardized analytic model but rather to provide the beginnings of a potential new area of research. The inventive character of music is full of inspirations and emotional truths. Music can be counted and considered mathematical, but it is also equally beyond pragmatic understanding. The balance then between empirical veracity and creative freedom becomes ever more complex, especially when connected to the complexities of the therapeutic process and relationship. Through the comparative research of musical analysis and clinical outcome it is possible to prescribe musical elements that could have implications for medical procedures. This being said it is the belief of the authors that music in music therapy should never be prescriptive, and that each musical intervention should have varied responses and outcomes depending on the emotional and physical needs of each individual patient.

Music medicine is now in a period of growth. Research designs that synthesize theories of music and medicine are long overdue and an essential step in finding a more professionally balanced practice. Music itself is what drives music therapy. By discovering protocols that consider equally the art and science of practice, a new era of research could emerge–one based on criteria that balances equally theories of music and medicine.

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Full-Length Article

Towards Prescribed Music in Clinical Contexts: *More Than Words*

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Abstract

The use of pre-recorded music has become status quo in a growing number of clinical music & medicine contexts. The process for choosing music used in both music therapy and music medicine interventions however has received surprisingly little attention in the literature, and might benefit from a more systematic approach. Applications made should ultimately provide for greater therapeutic efficacy. The following guidelines seek to contribute to the development of such a system in an effort to move toward a less arbitrary practice- thereby focusing greater attention to accurately match pre-recorded music to meet desired clinical goals. A systematic approach was developed and implemented in a music psychotherapy program which treated patients receiving radiation therapy for cancer in contexts in which the use of live music interventions were not feasible (e.g. during simulation for external beam radiation therapy and radiation therapy). The protocolized music therapy intervention that sought to address state anxiety in patients with cancer was examined in a randomized control study [1]. This article will describe a developing system resulting from this study, thereby qualifying the clinical context of how musical decisions are made.

Keywords: ***Music therapy, prescribed music program, music characterization system, radiation oncology, state anxiety***

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Introduction

Music is a rich complex sensorial phenomenon that produces equally rich complex responses in humans. The mechanisms involved in the way humans perceive music are only at best superficially understood by science. It is well understood, documented and recognized [2-6] however that responses to musical stimuli may be used as a potent therapeutic tool in trained hands. Prerecorded music has for decades been applied in music therapy and music & medicine to address numerous areas of patient and client need [7-10].

The efficacy of its use with a myriad of populations has been examined in a substantial amount of clinical (and non-clinical) study conducted by medical staff [5,11,12], neuroscientists [13-15], psychologists [16-18], and music therapists [19,20] alike. The question and object of polemic related to *what* music provides the greatest clinical benefits, and its obvious answer remains- that there is no simple answer to such a question. Where one might begin to look for an answer, simple or otherwise, would lie in the differences in human response to the varied individual elements that are combined in music rather than seeking to rationalize a theory based on broad-stroke concepts such as genre preferences related to one's culture per se, for instance. One such proposal for coming into a method of understanding and prescribing music programs based on patients' musical preference is the Music Characterization System explored in this article.

Emotional and physiological responses to music are the object of extensive research in current literature [21-23]. Much of this work takes into account the individual elements of music and its structural features and attempts to correlate them to specific responses. This is evidenced by the work of Zentner on music and emotion, [24,25] Thayer on music's effects on heart rate variability and vagal tone, as well as on systems models of musically induced emotion [26,27] and Juslin & Sloboda's work on music, emotion, and response [28]. The concepts formulated in these works, may collectively be understood in the following way: one could focus on an expected outcome, and through systematic analysis of various music pieces arrive at one or a combination of features that might best provide that specific outcome.

Notwithstanding the trends of *positive* outcomes in research, in the vast majority of studies where pre-recorded music has been used in clinical contexts, the rationale and process for determining *aspects of how specific pre-recorded* music has been selected and/or how it should be implemented, appears

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limited. Systematic approaches for choosing specific music, meant to be designed as part of a music & medicine treatment application, are scarce. Equally as scarce is a prior diligent individual patient assessment, which explicitly determines the specific goals of the to-be-implemented, prescribed music. An exception is The Bonny Method of Guided Imagery and Music (BMGIM) and its derivative models [29] (generically known as GIM). Another exception is the Nordoff – Robbins model, which exclusively uses live music in its therapeutic processes. Even as this model of music-base is live, the guidelines concerning the 'what and how' of musical decision-making by the therapist, may prove to be equally as useful in directing the specific guidelines that inform the decisions made in a pre-recorded music-base, yet this has not been well addressed in the literature. The differences and similarities between the proposed Music Characterization System and GIM will be explored later in this article.

The Music Characterization System (MCS)

The Music Characterization System (MCS) is not proposed to be a fully formed model, but rather a work in development for use in music psychotherapy interventions, where assigning music in a clinically fragile contexts became an emergent and growing necessity. For example, Intensity Modulated Radiation Therapy (IMRT) Simulation for Radiation Oncology Treatment is a lengthy imaging and diagnostic procedure known for inducing acute anxiety and claustrophobic events in cancer patients. Logistics make efficacious live music interventions during the procedure next to impossible. However, a prophylactic live music intervention prior to simulation followed by a prescribed music program of pre-recorded music to be used during simulation itself has been effectively implemented to address patients' needs [11]. The MCS was formulated in an effort to systematically and clinically design relevant and emotionally supportive music for a prescribed music program that would accompany patients throughout the course of their RT. The MCS principles have been utilized within other medical contexts as well. It is not meant to be utilized exclusively with patients who present with fragile circumstances, although its development first occurred within this treatment population.

Limitations Encountered in the Current Use of Pre-Recorded Music in Clinical Contexts

An apparent process in place for many practitioners and therapists rests on providing music designated by its branders as "calming" [30-32] or "relaxing" [31-34] with relatively little regard as to *what* constitutes such claims [35]. One wonders if the often suggested proposed effects of "calming" and/or "relaxing" music is indeed so for all people and in all contexts. A review of the current literature revealed that most studies' use of pre-recorded music in clinical contexts provided vague identification of the music utilized, and in description was often limited solely to genre [30-34]. For example, a recent study carried out at the Yale School of Medicine, reflected medical diligence and rigorous data collection methods. Yet, where one of the study's proposed goals was to better the multiple methodological problems of previous studies on music and preoperative anxiety, there was, surprisingly, no mention of the music used other than that it was "selected by the patient" [36]. No mention is made of what selection options were provided or how selection was achieved. Further recent studies report equally limited approaches: in music anesthesia "jazz music was chosen to extend the database of genres assessed in music and pain research [37]," in cancer related pain "Patients could select from classical, jazz, folk, rock, country and western, easy listening, and new age" [38]. There is often no discussion or process where the clinician makes use of any inventory (emotionally, or physically) to calibrate particular music for a patient, or even how the tricky question of accurately classifying music to a specific genre might be approached.

Genre-basing music use, while seeming to be a straight - forward way of classifying music culturally, is in actuality quite difficult. There are a variety of components and elements of music parameters one needs to consider in order to be accurate in identifying a piece of music's genre, per se. There may, for instance, be something in the similarities of the loudness, structure or intensity, the energy or emotional valence of a particular piece of music that influences choice- and this surpasses what one might have understood a patient's fancied genre to be. Perhaps a variety of genres, relative to style share similar social and cultural associations that could lead to confusion in classification.

A recent study examining prerecorded music's impact on anxiety and stress in a general practitioner's waiting room in the UK clearly shows the importance of avoiding arbitrarily chosen music [39]. Even though it is stated in this study that "the majority of the patients were in favor of music in the waiting room and preferred classical music" no mention is made of what specific pieces were used, or their characteristics, or how they were chosen from within the vast repertoire of Western classical music. Perhaps not surprisingly, the results were meager: music vs. no music "had no impact on health status…or anxiety state," and that "written comments from participants and staff were overwhelmingly negative" [39]. These outcomes present a clear need for informed and analytic choices to be considered in the clinical application of music that we administer.

In thinking about the use of music in the context of its use in a medical implementation, it could be seen as being akin to a circumstance in which a patient is asked what her preferred meds were and upon receiving the answer "anxiolytic"- to prescribe and provide any such anxiolytic as the practitioner wished and at an arbitrary dosage. The clinical use of pre-recorded music without rigorous assessment, music analysis, and subsequent crossing of data is equally absurd, and in some contexts may even be potentially dangerous [40,41]. In recent years we have become aware of the negative impact music can make in people who have been subjected to traumatic

circumstances [42]. This controversy has elucidated new attention to music's potential to induce highly negative outcomes. This should not be overlooked as the corollary to understanding and reporting desirable outcomes in music therapy clinical trials call upon us, to understand as well, that which is undesirable.

According to a personal communication from R. Spintge, MD in July, 2014: "*Acoustic environmental pollution was the term I use for arbitrary background music or musicians in the OR etc. -because even if patient´s needs are considered (in most cases NOT), we must also consider the people working in that environment. For them it may be even torture, (and) at (the) least acoustic pollution.* […] *As the playing of music has been used for intended therapeutic effects, it is clear that it may also have undesired side-effects, too. The first condition goes together with the second.* […] *Thus in defining music medicine, we established standards for research and application stating that contraindications and side-effects have to be considered, especially when using pre-recorded music.*"

A somewhat more informed choice in making decisions about the use of music is found in several studies [43-46]. These clinical trails point to *patient preferred* music as apparently being more effective as a therapeutic intervention than an arbitrary music selection. While in all likelihood patient preferred is of value, adding identification of specific qualities existing in the selections of preferred music will likely contribute to increased desired response and clinical relevance. Moreover, in such cases where a clinician were to determine that using the patient identified music would pose a risk of engendering a negative associative process between the patient and her/his significant music (such as when that music is used during a particularly intrusive medical procedure), music with strongly similar characteristics could be identified and used as an alternative. If the selection of music is limited to one genre alone, there could be a risk of limiting clinical effectiveness. In the reviewed studies mentioned above, "patient preferred" appears to be defined as patients identifying their preferred *genres*. This presents inherent problems. Defining genres in itself can be highly subjective, and there are no standardized clear-cut criteria for inclusion or exclusion of a specific piece of music in a given genre. For example, if a patient were to indicate "rock" as a preferred genre, this kind of classification would be vague enough to leave the clinician to face choosing between perhaps a dozen sub-genres that could be identified as rock. Levitin´s examination of studies on genre identification and definition, and his ideas on identifying pan-genre musical similarities in relation to patient-specified preferences is worth consideration. In a recent paper he "introduces a model of musical preferences based on listeners' affective reactions to excepts of music from a wide variety of musical genres." Findings from 3 independent studies converge to suggest that a latent 5 factor structure underlying music preferences is genre free and reflects primarily emotional/affective responses to music.[47] In following this line of thought, a strong case could be made to forgo genre based music selection, and to look elsewhere for the defining factors of efficacious clinical use of pre-recorded music.

Thayer pointed to the possibility of isolating discrete music elements and correlating them to specific responses. He showed that modulation of specific musical elements (namely tessitura and tempo) in a Schubert piece could elicit specific corresponding experienced emotions. This study showed that altered musical compositions can elicit correlative changes in brain electrical activity consistent with self-reported emotions, and that these same emotions can be recovered as reflected from measured cardiorespiratory responses. It may be therefore posited that individual musical elements play an important role in our emotional as well as physiological responses to music, and that awareness of and intentional use of these elements may lead to more effective use of music in therapeutic contexts [48].

Assessment & Guidelines

Music and its infinitely variable elements can indeed produce vastly varying responses – from activation to catharsis, and on the polar end of the spectrum, from relaxation response to sedation. To elicit a specific clinical response however, one could argue that one must approach the process through specificity and systematic guidelines. First, through detailed assessment, to determine preferences, culturally, physiologically and cognitively, and to meld these with specific individualized goals. Second, by means of equally detailed analysis of music elements in patient preferred music to provide effective music stimuli. Initial guidelines for such an approach – with analysis of significant musical and extra-musical elements; a Music Characterization System for producing prescribed music listening programs – will be explored below.

Prescribed Music

The term "prescribed music" was chosen to fit an analytical clinical process that provides a catalyst for eliciting therapeutic change. This term is in keeping with the concept "to write down as a direction," from the Latin *praescribere* - "write beforehand" [49]. The music selection process and the use of the resulting music listening program conform to the following definitions of "prescribe:"

a : to lay down as a guide, or direction
b : to specify with authority (criteria)
c: to designate or order the use of as a remedy [50]

Considerations in Moving Toward a Music Categorization System for Analysis of Pre-Recorded Music to Identify Salient Properties for use in Clinical Music & Medicine Interventions

Analytical systems for identifying music in which musical elements may elicit peak experience can be found in Bonny Method Guided Imagery & Music and its derivatives [51-53]. Summer emphasizes the use of an systematic analytical approach in her postulates on "matching" music to patient, and states: "It is essential to study the elements of a classical piece of music (rhythm, tempo, timbre, tessitura, harmony, melody) as they are presented in its exposition, the opening measures of the piece. By matching these elements in the music's exposition with qualities of the client's behavior which are reflective of the inner feeling state, the music therapist provides an 'affective attunement' through classical music" [54]. The goal of this music-centered music therapy model is primarily to stimulate imagery, memory, and feelings that are verbally processed after the listening session to promote self-actualization [55]. This approach may vary from one with strictly clinical goals related to modulation of state, and autonomic nervous system response.

The Nordoff – Robbins Model also relies heavily on analytical processes. Analysis of the music elements employed in largely improvised live music informs both musical awareness and psychological thinking during interventions [56]. Turry describes the process thus: "dynamic forces in musical elements are primary agents for change" with "spontaneous improvised music making" being the primary therapeutic activity [56]. It can be described as a "transformative music psychotherapy approach" [56].

Though the co-relation of specific music elements and their combined effects on emotional and physiological response are not completely understood. This has increasingly been the object of research that has contributed to a growing understanding. 3 such elements were isolated and examined in a recent study conducted in the Netherlands [57]. Variations in tempo, mode, and percussiveness[1] were shown to influence psychophysiological response such as ANS function, arousal, and heart rate variability [57]. The combination of discrete elements forms music's structure. Music is thought to evoke emotions via its structural properties through which listeners form associations with specific works [23,25] and, in much the same way as a movie soundtrack serves as a guide to and elicits emotional response in listeners, a well constructed prescribed music program can guide emotional response in patients during procedures.

A strong motivation for seeking out a clarifying approach to pre-recorded music selection is inherent inaccuracy in the genre-based approaches so prevalent in the literature. It is difficult to assign music to specific genres with precision.

In a comparison of various studies it was observed that varying genre classifications share similar music elements – structure, loudness, intensity among others - and that they perhaps also share similar social and cultural associations, and that possibly a particular emotional valence or level of energy could be common to a range of different genres. This suggests that preference is tied to succinct music facets, and that self-reported preference reflects preferences for external properties of music [47].

A state may be defined as a group of characteristic behavioral and physiological changes that recur in regulated patterns. Awareness of regulated patterns of a specific music work may be quite useful to match or mirror states so as to 'meet the patient where she/he is' and then through the process of entrainment[2]* redirect through musical changes to a more desired state. Awareness of specific parameters may be employed to more closely entrain or calibrate toward patients' physical and emotional states, and as well as toward observable indicators such as heart rate and respiratory rate, ultimately modifying them to meet [58].

Justification for the Use of Prerecorded Music in Clinical Contexts

IMRT Simulation is the first encounter with treatment for a cancer patient who is undergoing radiation therapy, and is commonly reported as being one of the single most anxiety producing moments in the entire treatment trajectory [11]. This seems often to be due to fear of the unknown, and is compounded by the fitting for a restraining device that is to be used in external beam radiation therapy. It is not feasible for a music therapist to provide a live music therapy intervention in this setting.

Hence, the use of pre-recorded music becomes a necessity. A recent study on music's impact of state anxiety in newly diagnosed patients with cancer undergoing simulation for radiation therapy [11] has shown that prescribed music programs are effective in reducing state anxiety and provide temporal structuring to reduce the distortion of perceived treatment time.

In the prescription process, careful assessment of the patient includes: Mood state, sensitivity to claustrophobic events, past situational trauma, in-place coping structures, significant stressors, and level of state anxiety, as well as preferred music, specific pieces, composers, performers, and instrumental groups. The patient's significant cultural aspects are also noted. The prescribed music program is constructed on the spot from a large data bank of music files (many

[1]A term used in the study to describe timbre and the proportion of the attack portion of a sound and the sound that continues after the initial attack. The attack portion of musical instruments' sound contributes greatly to our identifying and differentiating between different instruments.

[2]Entrainment within the study of chronobiology, occurs when rhythmic physiological or behavioral events match their period and phase to that of an environmental oscillation, and in the biomusicological sense refers to the synchronization of organisms to an external rhythm.

previously analyzed) with works from many varied ethnic cultures (including eastern European, middle Eastern, South American and Asian cultures) as well Western culture. When a patient is assessed with high state anxiety, music from her/his expressed preferred genre and/or composer is analyzed in following the music categorization system to determine its salient characteristics. It is synchronized at a particular juncture as deemed by the therapist who has oversight of the duration of the treatment and has assessed the level of anxiety presented at baseline. Approximately 40 minutes of music is analyzed to correspond with the time frame of the simulation procedure. The first piece of music in the program ideally is set to contain such elements of music that meets the patient where she/he is in accordance with their state and level of activation [60]. This is the first step in entraining with the patient and thus providing a medium for the patient to begin an interactive process. The remainder of the program is calibrated to a classic relaxation curve so as to reduce the patient's activation with lower anxiety response, and to modulate mood state where indicated. This occurs through her/his entrainment with the music, and is both physiological and emotional. Progressively, the music works toward slower tempi, reducing musical intensity and movement, as indicated.

Entrainment with the patient through music should also be approached on a medical-music psychotherapeutic level [60]. The innate character of the music best reflects our intent of meeting the patient where she/he is. For example, it may prove to be more effective in soothing an agitated person if we first mirror and connect with that observed state musically, and modulate or redirect that state through changes in the music. Ideally, through interaction with the music stimulus, change will occur in the patient, moving him/her toward a more alert or calm, and organized state. Hence, entrainment is also about our clinical perception of the patient that transcends our attunement to the vital signs.

The Music Characterization System

The Music Characterization System consists of 12 musical elements and 4 descriptive non-musical elements. Each of the music element parameters is given a numerical value. This is to facilitate being able to see a given piece's characteristics at a glance. Extra-musical elements are identified and explained with descriptors or a brief narrative.

The numerical values are arranged from low to high with lower values identifying the music as less 'active' while higher values indicate that the music is more 'active.' Less active music may equate to what is generalized as being 'relaxing' and more active music as being 'stimulating.' The descriptors of the extra-musical elements serve to clarify which perceived or felt emotion(s) may be experienced by the listener, and also to identify specific metaphors or images that may arise through associative processes.

These parameters can be seen as 'containing' as opposed to 'limiting.' Intentionality may be seen as the single most important element in any therapeutic intervention. The musical / extra-musical parameters may serve as both a guide and an identifier of the intentionality of the music. It also serves as a system for double-checking that the music patients are listening to coincides with the clinical intentionality of our intervention.

Parameters can be viewed 'pan-genre' or kept to a particular genre, as warrants the clinical context, and the preferences of the patient. Our innate creativity as therapists and musicians is an important resource, and should never be overlooked. As many music-based therapeutic processes in clinical contexts necessarily involve first matching and then modulating states, initial and continuous observation is paramount.

Individual Music Elements

Tessitura: In accordance with Porges' Polyvagal Theory, optimal music for providing a sense of safety falls within the range of the human voice, that is to say within two octaves above and two octave below "middle C" [61]. Variance is rated from low to high with 1 having a variance of an octave and 5 a variance extending past the stated four-octave range.

Intensity: Intensity is a combination of other musical traits, among them volume, rhythmic and harmonic complexity, and movement. A rating of 1 would be music with a low even volume, with little syncopation, and dynamic change (which could be described as "languid") whereas music rated at 5 would be loud, syncopated, and dynamic (and could be described as "ferocious").

Dynamic range: The amount of change in the music, the diversity of its elements, with 1 being minimal or no change, and 5 constant active dynamics.

Tempo: 1 indicates a slow pulse of around 50 bpm, and 5 a rapid pulse characteristic of up-tempo bebop, for example.

Harmonic simplicity/complexity: This refers to the amount of harmonic movement. A rating of 1 would refer to music with one tonal center in which the tonic, or tonic and dominant chords where used exclusively. A rating of 5 would apply to music with multiple tonal centers and frequent modulation, as well as music using polytonality.

Apparent volume: The mixture of other musical elements (timbre, intensity, etc.) that contribute to perception of music as loud 'sounding' (as in rock or a full orchestra) to soft 'sounding' (as in a vocal lullaby, or solo acoustic instrument) with 1 being softest sounding and 5 loudest sounding.

Rhythmic simplicity/complexity: Refers to the frequency of syncopations present in the music as well as the variance in

rhythmic patterns themselves. A rating of 1 would apply to music with minimal syncopation and simple repetitive rhythmic structures whereas a rating of 5 would identify a highly syncopated and variable rhythmic structure.

Melodic contour: Indicates intervallic movement in the melody. A rating of 1 would be applied to a melody of mostly repeated notes and stepwise movement while 5 designates melody with frequent intervallic leaps.

Dissonance: Equating dissonance with harmonic tension and identifying the interval of the perfect 5th as consonance, followed by simple diatonic triads in root position, with major tonality being less dissonant than minor due to the inherent tension in altered dominant chords. Identifying chromaticism and polytonal chord forms as dissonant. A rating of 1 would be given to music with no harmonic minor seconds and few tritones while music containing altered dominant structures and polychords would receive a rating of 5.

Timbre: Refers to the contrast of "sharpness" or "shrillness" as opposed to "mellowness" or "roundness" of the sound. Mellow round sounds indicate a rating of 1, while metallic, nasal or distorted sounds receive a rating of 5.

Structure: This refers to the existence of musical structure in contrast to its absence. Structured music such as ABA form that contains well-structured phrasing would be rated as 1. Free flowing unstructured pieces would be rated as 5.

Predictability: Refers to the sensation of 'logical' harmonic, melodic and rhythmic movement that complies with our expectation in the flow of the music. A certain element of *surprise* in music is necessary to maintain interest, however, predictability (musical and extra-musical) may be seen as contributing to feelings of safety and security. A rating of 1 will be applied to music that is entirely predictable. This element of music is desirable in music used for sedation. A rating of 5 would be given to music that contains frequent harmonic, melodic, rhythmic or dynamic "surprises" or sudden unexpected musical events such as sfozando, altered dominant chords, drastic changes in timbre, etc.

Non-musical Elements

Perceived Emotional Content: To avoid current emotion science polemics, this refers to descriptors drawn from the common lay perception of emotions i.e. depressing, sad, melancholy, neutral, happy, joyous, ecstatic, etc.

General Descriptors: i.e. placid, building, stately, complex, aggressive, etc.

Predominant Musical Metaphors/Imagery: Can include literal or non-literal music metaphors.

Predominant Metaphors: Metaphors and images encountered in or invoked by the music. This may be thought of also as "messages in the music."

Conclusion

The apparent need for accurate and efficacious choices in using pre-recorded music in music therapy and music & medicine contexts has been identified [7,10,11,62]. Music and genres identified by patients as preferred are a step towards this, though identification solely by genre has inherent limitations. Through careful live music assessment with subsequent observation during music therapy sessions with hundreds of patients receiving radiation therapy for cancer, an initial system for prescribing music was designed and implemented using a Music Characterization System that is under development, and has been presented in this article. Pre-recorded music was analyzed according to musical and extra-musical elements and calibrated to detailed patient assessment of mood state, state anxiety level, in-place coping structures, psycho-social status, past situational trauma, history of and sensitivity to claustrophobic events, to seek to produce specific desirable physiological and emotional responses in these patients during radiation treatment [11].

This article provides theory and speculation derived from analyses of clinical practice interventions of prescribed music. As a concept of prescribed music requires further development, implementation, and clinical testing, and may prove useful and generalizable to a myriad of clinical music & medicine contexts, it is my hope that both research and clinical retro analyses of effective music prescriptions will lead to more critical assignment of recorded music in medical settings, most particularly, those where live music may not be permitted. The Music Characterization System presents a beginning theory based on study and clinical case analyses.

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Production Editor's Note

New Author Guidelines: *One Size Fits All?*

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That's it! The second and final issue of *Music and Medicine* in 2014. In 2015 we will return to four, quarterly published issues. In order to ensure fast and professional production of articles submitted to *Music and Medicine*, we made small adjustments to our author guidelines that will apply for all future submission.

We introduce different types of articles, in order to reflect the broad variety of submission we receive from authors worldwide. While *Music and Medicine* will continue to publish classic empirical papers, we introduce shorter brief reports with no specified article structure to emphasize clinical reports that are more qualitative in nature. Further changes include the citing of references within the text (square brackets instead of superscript numbers) and quality standards for the submission of artwork and figures.

While we are confident, that these changes will further increase the high quality and appearance of *Music and Medicine*, authors may always address the editorial team with special requests to ensure that our production reflects your efforts and ideas. As always, we are happy to hear your feedback and suggestions.

Aims and scope

Music and Medicine is an international journal that offers an integrative forum for clinical practice and research of applied music in medical settings and allied institutions. The Editors seek empirical research studies, clinical case reports, and applied models explicating theory, development, and practice across the health, behavioral, and neurosciences. Music and Medicine emphasizes research practices that integrate music, music psychology, music cognition, music neurology, music therapy, and infant and early child development into medical practice and knowledge. The journal addresses research and clinical practices related to music psychotherapy and wellness practices inclusive of the health of musicians. Methodology will favor both quantitative and qualitative research outcomes. Articles from a wide variety of perspectives including academic and practice forums are featured. Medical music perspectives from the neurosciences, clinical and integrative medicine, oncology, music therapy, psychology, infant stimulation, pain and palliative medicine, spiritual care, early intervention, nursing research, health research, and social work will be prominent. Topics appropriate for the journal include, but are not limited to: Analgesia and Music Sedation; Brain Music Approaches; Cancer Care: Active and Receptive Music Approaches; Cardiology and Rhythm; Clinical Improvisation in Health and Disease; Dementia, Stroke and Music Memory; Environmental ICU Music; Infant Stimulation; Integrative Music Medicine; Medical Conditions and Treatment of Musicians; Medical Music Psychotherapy; Mood Disorders and Music Psychology; Music and Culture in Medicine; Music Health and Well Being; Music in Transition: NICU, Hospice to End of Life; Music in Surgery: Pre-op to post-op; Music in Traumatic Response and Injury; Neurologic Music Approaches; Pain and Palliative Medical Music Strategies; Psychosocial Music Interventions; Respiratory Music Advances: Asthma, CF, COPD; Song, Sound, and Resonance in Mind-Body Medicine; Stress Response and Music Relaxation; Vibration and Toning in Medicine.

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- **Letter to the Editor/Comment;** (maximum of 1000 words, 20 references). A comment addresses a work previously published in Music and Medicine. No article structure. Letters to the editor and comments are not subjected to blind peer-review.
- **Book Reviews** (maximum of 1000 words)

PRODUCTION NOTES | Address correspondence to:

Dr. Julian Koenig, Address: Department of Psychology, Emotions and Quantitative Psychophysiology, The Ohio State University, 175 Psychology Building, 1835 Neil Avenue, 43210 Columbus, Ohio, USA Email: koenig.393@osu.edu | COI statement: The author declared that no financial support was given for the writing of this article. The author has no conflict of interest to declare.

Manuscript preparation

Each submission should consist of a *title page* and a *main document file*. The *title page* should include: (i) manuscript title and all author names, degrees, affiliations, mailing addresses, and e-mail addresses for correspondence, (ii) a short title (running head), (iii) a one-sentence biographical statement for each author, listing credentials and one or multiple places of affiliation, (iv) grant or financial support information and/or a conflict of interest statement as well as (v) any acknowledgments.

The *main document file* should be single-spaced, uses a 12-point font; employs italics, rather than underlining; includes tables, figures, notes, and references. Every effort should be made by the author to see that the main document file contains no clues as to the author's identity: Information pertaining to the identity of the author or institutional affiliation should be listed as endnotes on a separate page.

On the first page should be the title, a non-structured abstract (maximum 200 words), and 4-5 keywords. In-text reference citations should be identified by numbers in square brackets in order of appearance.

A complete, numbered listing of references should be provided at the end of the article. Reference listings should be in sequence in the order they are cited in the text. Journal names should be abbreviated as specified by the National Library of Medicine. References should not include any unpublished observations or personal communications. See sample formats below.

Journal article, 6 authors or less:

1. Armstrong DD. Rett syndrome neuropathology review 2000. Brain Dev. 2000; 19: 79-85.
2. Schoni MH, Casaulta-Aebischer C, Martinet LV, Kim S, Lee TJ, Leem J. Nutrition and lung function in cystic fibrosis patients: A brief review. Clin Nutr. 2001: 23(1): S72-S76.

Journal article, more than 6 authors (list first 3 authors + "et al."):

1. Crews DW, Gartska WR, Meyer B, et al. The physiology of the garter snake: Analysis and updates.Sci Am. 1980;245:158-159.

Journal article published online (hyperlink or DOI):

1. Blackburn TA. Updating autologous chondrocyte implantation knee rehabilitation. Nature. 2007;235:430-433. Available at: http://provide-full-link.com. Accessed January 7, 2008.
2. Harrison CL, Schmidt PQ, Jones JD. Aspirin compared with acetaminophen for relief of headache [published online March 21, 2008]. J Curr Clin. doi:10.1038.nm10244.

Book:

1. Voet D, Voet JG. The Science of Biochemistry. 3rd ed. New York, NY: J Wiley; 1990.

Chapter in a book:

1. Kuret JA, Murad F. Adenohypophyseal hormones. In: Gilman AG, Taylor P, eds. The Pharmacological Basis of Therapeutics. 8th ed. Orlando, FL: Grune & Stratton; 1976:1334-1360.

Paper presented at a conference:

1. Eisenberg J. Market forces and physician workforce reform: Why they may not work. Paper presented at: Annual Meeting of the Association of American Medical Colleges; October 28, 1995; Washington, DC.

Article published online:

1. Blackburn TA. Updating autologous chondrocyte implantation knee rehabilitation. Nature. 2007;235:430-433. Available at: http://provide-full-link.com. Accessed January 7, 2008.
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Web site:

1. FDA resources page. Food and Drug Administration Web site. Available at: http://provide-full-link.com. Accessed June 23, 2000.

Music Reporting Guidelines

The 'music' of the article should be described in full detail. This includes but is not limited to defining aspects of the music in terms of whether it was: live or recorded, pre-composed or improvised, played or sung, and the researchers' decision-making processes related to the music selected. Include music titles, the composer and edition/version/sound track and year it was recorded. If live music is used, describe the name and model of the musical instruments used and how the music was played (modality, style, dynamic, timbre etc) solo or ensemble. Readers should understand how the music intervention was set up: patient preferred recording brought into therapy or research, or spontaneous favorite song (known) or co-created in the moment. Music medicine intervention descriptions should provide details about how and why the music was selected and how it was incorporated into treatment interventions. Appendices and links in the text to audio recordings of music are encouraged; consent/permission is required.

Artwork and Tables

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End the review with: First and last name & institutional affiliation of reviewer and a brief biographical note inclusive of the reviewer's credentials, place of work and interests is required.