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*   multilingual abstract | mmd.iammonline.com

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

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[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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