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Assessment of quality of scientific evidence on musical interventions in caring for cancer patients

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This integrative review aimed to assess the quality of scientific evidence on musical interventions in caring for cancer patients. The search strategy was conducted in July 2013, using descriptors indexed in the Bireme, Cochrane Library, Medline, Embase, Web of Science, CINAHL and Scopus databases. We selected four randomized clinical trials (two of high and two of low methodological quality) and two systematic reviews (both of high methodological quality). The greatest limitations of the clinical trials were in the descriptions of the resources and musical structures used; and of the systematic reviews, in their focus on the methodological designs. Most of the studies had high methodological quality, but the resources and musical structures used were neither described nor discussed, thereby trivializing the therapeutic potential of music and limiting replication of the studies and incorporation of evidence into clinical practice.

Keywords: Medical oncology. Oncologic nursing. Neoplasms. Music. Music therapy.

Introduction

Given the multidimensional complexity that permeates cancer diagnosis, treatment and prognosis, many initiatives structured around a variety of theoretical-philosophical reference points such as complementary holistic therapies, palliative care, anthroposophy and music therapy have used music as a care resource for cancer patients.

The constant contribution of nursing towards comprehension of the mechanisms that music uses when it triggers physiological reactions in human beings, along with its indications and limitations, can be emphasized[1]. Within this perspective, musical interventions "presuppose an intricate network of sensations, emotions, feelings and symbolic and cultural meanings", which are intrinsic to each human being and capable of resonating and producing various therapeutic effects[2] such as pain, stress and anxiety reduction, promotion of comfort, muscle relaxation and dignity among hospitalized people, and retrieval of institutionalized elderly individuals' reminiscences and identity, among other effects[1].

Regarding emotions, six psychological mechanisms for decoding information that induce emotions through listening to music are proposed: brain reflexes (interpretation of auditory perceptions through consonant and dissonant frequencies that determine sensations of pleasure or displeasure and excitement or relaxation); evaluative conditioning (repetitive pairing of music with other stimuli); emotional contagion (influenced by the emotional expressivity of the composition); visual imagination (interaction between music and mental images evoked while listening to music); episodic memory (evocation of affective memories linked to important moments of life); musical expectation (violation – unexpected or expected – of an essential specific characteristic of the music, linked to past experiences with the musical genre in question)[3].

The importance of musical experiences for oncological or palliative care patients, or for those who experienced significant existential anguish and suffering, can be highlighted[2]. Regarding palliative care, which is an interdisciplinary care philosophy that aims towards quality of life and prevention and relief of suffering among patients and their families who live with life-threatening diseases, a bibliographic review study concluded that, when used competently and sensitively, music converges with its philosophical assumptions, given that it acts therapeutically on all human dimensions, especially through promoting an atmosphere which supports emotional and affective expression[4].

In this context, encounters mediated by music constitute a resource within nursing care that inspires life during patients' days, imprinting in them the sensation of care and giving new meaning to their existence in the world with cancer. Music can support the sharing of experiences, expectations and coping strategies, i.e. being with other people in their existential fatefulness[5].

Despite this, experimental studies that have built the "state of the art" regarding musical interventions seem to have ignored the complexity of the musical stimuli that exist, as well as the mechanisms through which they induce therapeutic effects in human beings, when describing their interventions. In this light, the present study had the objective of evaluating the quality of the scientific evidence on musical interventions for caring for cancer patients as well as the quality of reports regarding resources and musical structures used.

Methods

The present work was an integrative review of the literature conducted in July 2013, structured into six stages: 1) identification of the topic and elaboration of the research question; 2) definition of the inclusion and exclusion criteria; 3) categorization of the selected studies; 4) evaluation of the studies included in the review; 5) interpretation of the results; and 6) summarized presentation of the knowledge[6]. The research question was: *what are the therapeutic effects of music on the human dimensions in caring for cancer patients?*

The inclusion criteria were that the studies should be randomized clinical trials and systematic reviews on musical interventions in caring for adult cancer patients, without restrictions on language or time of publication. The exclusion criteria were: musical interventions among children, adolescents or caregivers; interventions performed during clinical treatments (chemotherapy, radiotherapy or brachytherapy) or surgical, invasive and/or diagnostic procedures (biopsy, mammography or colonoscopy), since these would involving psycho-emotional issues (fear or anxiety) relating to the treatments and procedures and not to the disease itself.

The search strategy ("oncology" [MeSH Terms] OR "oncologic nursing" [MeSH Terms] OR "medical oncology" [MeSH Terms] OR "neoplasm" [MeSH Terms] OR "neoplasms" [MeSH Terms] OR "cancer" [MeSH Terms] AND "music" [MeSH Terms] OR "music therapy" [MeSH Terms]) resulted in 228 studies in the following databases: Bireme (1), *The Cochrane Library* (3), *Medline* (35), *Embase* (21), *Web of Science* (57), *CINAHL* (6) and *Scopus* (105).

However, only six studies were selected through reading their titles and abstracts and, subsequently, complete reading guided by the inclusion criteria. The following were excluded: 89 duplicated studies, 63 studies that encompassed other topics (geriatrics, palliative care and alternative and complementary practices), 20 studies on children, adolescents or caregivers, 12 studies performed during clinical treatments, 10 studies performed during surgical treatments, 10 studies performed during invasive and/or diagnostic procedures, 11 studies that used other methodologies, six studies without abstracts available and one study that was not found to be complete.

In addition to the data commonly gathered in review studies (reference point for the study, country, language, methodological design and outcome), the researchers used the guidelines for musical intervention reports proposed by Robb et al.[7]. The randomized clinical trials underwent the methodological quality analysis proposed by Jadad et al.[8]. This scale consists of five criteria and ranges from 0 to 5 points, in which scores lower than 3 indicate that the study has low methodological quality and that it would be difficult to extrapolate its results to other scenarios[9].

The systematic reviews underwent the AMSTAR[10] quality assessment and were classified in accordance with the classification system used by the Canadian Agency for Drugs and Technologies in Health (CADTH). The scores in this system, which range from 0 to 11, correspond to high (9-

11), medium (5-8) or low (0-4) quality[11]. The descriptions of the musical interventions were evaluated based on the abovementioned guidelines.

Results

Out of the six studies selected, four (S1, S3, S5 and S6) were randomized clinical trials (RCTs) and two (S2 and S4) were systematic reviews. Regarding the musical intervention, three RCTs (S1, S5 and S6) were conducted in the United States by music therapists and one (S3) was performed in Taiwan, by nurses. The systematic reviews encompassed interventions performed both by music therapists and by healthcare professionals and were developed by American researchers, one (S2) in a partnership with Chinese researchers. The methodological designs of the studies are presented in Box 1.

Box 1. Characteristics of the studies according to country, year of publication, methodological design and outcome. Brazil, 2013.

Study	Country/ year	Methodological design	Outcome
S1[12]	USA 2013	Randomized clinical trial – mixed methods approach. N = 17 patients (experimental group: 10 and control group: 7). Comparison intervention: waiting list. Sex: experimental group – 6 women and 4 men; control group – 3 women and 4 men. Mena age: 59.85 years old. Ethnicity: American. Diagnostic: leukemia, not specified or others. Stage of the disease: not described. Scenario: Oncology-hematology unit of a hospital. Inclusion criteria: to be able to read and understand English, to be hospitalized at the oncology unit, to have completed 3 sessions with the researchers, to be 18 years old or older. Instruments: Spiritual Wellbeing Scale – Therapy and Functional Evaluation of Chronic Diseases (FACIT-Sp) Semi-structured interview (thematic analysis).	The experimental group presented higher scores on the peace and faith subscales of the Spiritual Wellbeing Scale – Therapy and Functional Evaluation of Chronic Diseases in the post-test than shown by the control group.
S2[13]	USA/ China 2012	Systematic review and meta-analysis. N = 3,181 patients – 32 randomized clinical trials (10 in English and 22 in Chinese). Nine databases (6 in English and 3 in Chinese – Cochrane, Medline, PsychINFO, AMED, CINAHL and EMBASE; CNKI, Wangfang and CBM, respectively). Sex: not described.	Seven high-quality studies indicated that music had positive effects on coping with anxiety, evaluated through the Self-evaluation Anxiety Scale; 2 moderate-quality studies suggested that music reduces anxiety, evaluated through Hamilton's Anxiety Scale; 8

		Age: not described. Ethnicity: English and Chinese. Diagnosis: the majority of the studies included various types of cancer (breast, lungs, maxillofacial cancers; nasopharyngeal carcinoma, leukemia and malignant tumors). Stage of the disease: not described. Scenario: not described. Inclusion criteria: randomized controlled studies on the effects of musical interventions on physical and psychological outcomes in cancer patients; published in English or Chinese from 1966 onwards or the beginning of the database up to March 2011; the research terms (and their variations): "music" or "music therapy" or "musical intervention" or "medicinal music" and "cancer" and "pain" and "radiotherapy" and "chemotherapy" and "oncology"; there were no restrictions regarding age, sex, ethnicity or type of scenario. Instruments used: GRADE (Grading of Recommendations Assessment, Development and Evaluation). Comparison intervention: standard treatment alone, standard treatment with other therapies, standard treatment plus placebo. Studies using placebo involved the use of headphones without music or any other type of hearing stimulus provided to the participants.	moderate-quality studies showed that music reduces anxiety, evaluated through the Trace-State Anxiety Inventory (IDATE); 7 moderate-quality studies showed that music improves depression; 7 moderate-quality studies observed that music had positive effects on pain management; 2 moderate-quality studies suggested that music worsened fatigue; 4 moderate-quality studies indicated that music reduces heart rate; 3 low-quality studies suggested that music can reduce respiratory frequency; 2 moderate-quality studies indicated that music improves quality of life. Individual randomized clinical trials suggested that musical intervention is accepted by patients and is associated with better psychological results. The effects of music on vital signs were small, especially regarding blood pressure. High-quality trials are necessary to continue to determine the effects of musical intervention.
S3[14]	Taiwan 2010	Randomized clinical trial. N = 126 patients (experimental group: 62 and control group: 64). Comparison intervention: resting in bed. Sex: 88 men (70%) and 38 women (30%). Age: ranged from 18 to 85 years, with mean of 54 years. Ethnicity: Taiwanese. Cancer diagnosis: 51 head or neck (41%); 25 gastrointestinal (20%); 16 hematological (13%); 15 genitourinary (12%); 7 lung (6%); 1 bone (1%); 11 other types (9%). Stage of the disease: 2 in stage I (2%); 3 in stage II (2%); 10 in stage III (8%); 68 in stage VI (54%); 33 provided insufficient information about the stage (26%); 2 recurrences (2%); 8 could not be measured (for example, leukemia) (6%). Scenario: oncology unit, palliative care and	To provide culturally appropriate and familiar music was a key element of the intervention. The findings corroborated the theory for oncological pain of Good and Moore (1996), which states that soft music was considered safe, effective and appreciated by the participants; the study provided significantly ($p < 0.001$) greater relief of oncological pain than painkillers alone. Thus, nurses should provide calm and familiar music to complement analgesia for people with oncological pain.

		gastroenterology and pneumology units. Inclusion criteria: to have cancer diagnosis; habitual pain reported during the previous 24 h; to be 18 years old or older; to be able to speak Chinese and/or Taiwanese; to be willing and able to consent. Patients who underwent major surgical procedures during the previous month were excluded. Instruments: VAS – verbal numerical scale – use of opioid painkillers and interview.	
E4[15]	USA 2008	Systematic review. Sample size: 1,891 cancer patients (30 randomized quasi-experimental clinical trials). Diagnosis: cancer patients. Patients who underwent biopsy and aspiration for the diagnosis were excluded. Stage of the disease: various. Scenario: various.	The results suggested that musical interventions can have a positive effect on oncological patients' anxiety, with reduction of 11.20 units in the IDATE scores and -0.61 on other anxiety scales. The results suggested that there was a positive impact on mood, but no evidence was found regarding depression. Positive effects were observed regarding anxiety, pain, mood and quality of life among cancer patients and small effects on heart rate, respiratory frequency and blood pressure. The quality of the scientific evidence of the studies was low. It was not possible to compare the effectiveness between the interventions provided by music therapists and by other healthcare professionals.
S5[16]	USA 2001	Randomized clinical trial (pre-test and post-test). N = 8 patients (experimental group: 4 and control group: 4). Comparison intervention: waiting list. Sex: women. Mean age: 48 years, standard deviation 6.56 years. Ethnicity: American. Diagnosis: 7 with breast cancer and 1 with ovary cancer. Stage of the disease: not described. Scenario: therapeutic consultation office. Inclusion criteria: cancer diagnosis relating to the endocrine or immunological system (ovary, breast, prostate, endometrium, leukemia or lymphoma); age group from 30 to 65 years old; conclusion or absence of chemotherapy and/or radiotherapy treatment; abstinence from drugs, absence of smoking habits and	The experimental group presented better mood and quality of life in the post-test (one week after the last session) and in the follow-up (6 weeks after the intervention), compared with the control group. However, the subscores of the quality of life scale – depression and confusion – showed a slight increase in the follow-up of the experimental group.

		limited alcohol consumption (≤ 10 doses per week); absence of therapy with prednisone; absence of history of acute psychiatric disease; preserved cognitive/mental function. Instruments: Quality of Life Scale – cancer (QOL-CA); Profile of mood states (POMS) (1971) – answered in the pre-test, in the post-test and during the 6th week of follow-up.	
S6[17]	USA 2003	Randomized clinical trial. N = 80 patients (experimental group: 40 and control group: 40) Comparison intervention: routine hospice care. Sex: male and female. Mean age: experimental group – 66 years old and control group – 65 years old. Ethnicity: American – 25% black and 75% Caucasian in each group. Diagnosis: various types of cancer. Stage of the disease: cancer in terminal stage with prognosis of 6 months of life or less. Scenario: home environment. Inclusion criteria: cancer diagnosis in terminal stage; adults; living in their homes; prognosis of life of at least 2 weeks according to the nursing evaluation on admission; to be able to answer questions regarding their perception of quality of life; to consent to be part of the research. Instruments: Hospice Quality of Life Index-Revised (HQOLI-R), which was a self-report measurement provided during each visit; Palliative Performance Scale for evaluating the subjects' functional state.	The experimental group presented better quality of life than the control group. The quality of life in the experimental group increased over the course of the period during which they received more music therapy sessions. Without music, the quality of life in the control group diminished. There was no significant difference between the groups regarding the functional state of the subjects, duration of life, or time of death, in relation to the last visit scheduled by the music therapist or family support adviser.

According to the methodological quality analysis proposed by Jadad et al.[8], although two RCTs (S1 and S3) were not described as double-blind studies, they presented high quality. On the other hand, the others (S5 and S6) were considered to be low-quality studies because they did not describe the randomization sequence properly, as observed in Table 1.

Table 1. Evaluation of the quality of reports on randomized clinical trials, according to Jadad et al.[8]. Brazil, 2013.

Items	Studies selected			
	S1	S3	S5	S6
Was the study described as randomized?	Yes	Yes	Yes	Yes
Was the study described as double-blind?	No	No	No	No
Was there a description of exclusions and losses?	Yes	Yes	No	No

Was the method to generate the randomization sequence described and appropriate?	Yes	Yes	No	No
Was the double-blind method described and appropriate?	No	No	No	No
Points	3	3	1	1

Based on the AMSTAR[10] quality evaluation and in conformity with the classification system used by CADTH[11], studies S2 and S4 obtained scores of 10 and 11 respectively and therefore presented high quality, although S2 did not provide a list of studies excluded (Table 2).

Table 2. Evaluation of the methodological quality of systematic reviews, according to Shea et al.[10]. Brazil, 2013.

Items	Studies selected	
	S2	S4
1. Was a project provided "a priori"?	Yes	Yes
2. Was there duplication in the selection of studies and data extraction?	Yes	Yes
3. Was a comprehensive bibliographic investigation/search performed?	Yes	Yes
4. Was the publication status (in other words, gray literature) used as an inclusion criterion?	Yes	Yes
5. Was a list of studies (included and excluded) provided?	No	Yes
6. Were the characteristics of the included studies provided?	Yes	Yes
7. Was the scientific quality of the included studies evaluated and documented?	Yes	Yes
8. Was the scientific quality of the included studies used properly in formulating the conclusions?	Yes	Yes
9. Were the methods used to match the results from the studies appropriate?	Yes	Yes
10. Was the likelihood of publication bias evaluated?	Yes	Yes
11. Were conflicts of interest informed?	Yes	Yes
Quality	10	11

Regarding the evaluation of the quality of the musical intervention reports of the RCTs, conducted using the checklist proposed by Robb et al.[7] (Box 2), deficient description of the musical resources and structures used can be seen. Apart from the song *Amazing Grace*, which was superficially mentioned, the study S1 neither described the other songs used nor their overall structure. The study S3 only referred to the musical styles used, and did not describe the sound resources and structures used. Although the study S5 reported the album used in the intervention, it mentions that other complementary classical selections were used, but does not describe them. In the study E6, the researcher does not describe the songs and material used, or the duration of the music therapy sessions.

Box 2. Methodological description of musical interventions relating to the RCTs, in accordance with the checklist proposed by Robb et al.[7]. Brazil, 2013.

Checklist	**Randomized clinical trials**			
	S1	S3	S5	S6

A. Theoretical framework: rationale for the song selected; to specify how the musical qualities can trigger the desired outcomes.	Musical preference of the patient. The music therapy interventions should be based on three context-support elements: structure, support for autonomy and active participation). Live song of the patient's preference can express his individuality and work as a method for analyzing particular events.	Soothing music, 60-80 beats per minute (bpm), without lyrics, with sustained melodic quality, and with controlled volume and tuning).	*Bonny* method of guided images and music	Cognitive-behavioral approach in which the music therapy interventions are projected to treat the problems identified and allow expression of emotions respecting the process inherent to the live musical dialogue.
B. Content of the intervention: details of the musical intervention and description of the intervention procedures constructed with individuals.				
B.1 Person who selects the song: to specify who selects the song – pre-selected by the researcher; the participant selects a pre-determined set list; the participant selects from his own collection; based on the participant's evaluation.	Patient selects from a pre-determined set list.	Patient selects from a pre-determined set list.	Pre-selected by the researcher.	Researcher, based on the patient's evaluation.
B.2 Song: when it is a recording, indicate the reference (album), musical score and musical analysis; when the song is improvised or original, describe the overall structure of the song (shape, elements, instruments etc.).	*Amazing Grace* (the others were not described).	Taiwanese folkloric songs, Buddhist hymns, instrumental music – harp and piano.	Collection of songs for imagination and other classical selections (not described) to complement the collection, when considered clinically appropriate.	Not described.
B.3 Method (musical reproduction - live): equipment used, headphones, who determines the volume, decibel limit; size and performance of the	Live music.	Musical reproduction.	Guided images and music (GIM) – musical reproduction.	Various music therapy techniques (music of choice, music that evokes reminiscence, singing, listening, listening to live

group.				music, analysis of lyrics, playing an instrument, parody, singing with accompaniment using the iso-principle, planning memorial service funerals, presenting music, and assisted music for support counseling.
B.4 Material of the intervention: specify musical and non-musical material.	Fender FA 100 acoustic guitar and musical set list.	Audio tapes and headphones.	Sound system with CD-player (Sony CDF 363); chair; sofa; recorder with lapel microphone (Sony Wm D6C).	Not described.
B.5 Intervention strategies: write the strategies under investigation (listening to music, song writing, improvisation, analysis of lyrics, rhythmic stimulation of listening).	Listening to music. Each session included 3 to 8 songs of the patient's preference or suggested by the researcher.	Listening to music. The participants from both groups were firstly invited to listen to a brief introductory tape and choose the type of music they thought would best relax or distract them.	Listening to music. Discussion of issues that encompass the disease and current mood, and definition of session goals (15 min.); Relaxation and images: transition to the music (15 min.); listening to music (30 to 40 min.); The patient commented on the imagistic experience and correlated the images with the personal process. POMS and QV-CA were filled out (30 to 40 min.).	Music therapy visits. Listening to music.
C. Intervention framework: number of sessions, duration, frequency.	Three sessions on consecutive days, with duration of 15 to 30 min.	One session with duration of 30 min.	Ten weekly sessions, with duration of 90 to 120 min.	At least 2 sessions (without description of duration).
D. Performer of the intervention: specify	Music therapist.	Nurse.	Accredited music therapist with	Three accredited music therapists and

qualifications and credentials of the professional who performs the intervention; specify how many professionals participate in the study.			experience of the *Bonny* method.	2 music therapy interns under clinical supervision by the researcher, both trained by the researcher.
E. Fidelity of the treatment: describe the strategies used to ensure that the treatment and/or control conditions are conducted as desired (training, protocols, monitoring).	Monitoring.	Monitoring.	Protocol.	Training.
F. Scenario: describe where the interventions were performed, including place, level of privacy and sound environment.	Oncology-hematology unit of a hospital.	Oncology, palliative care and clinical units.	Therapy consultation office.	Home environment.
G. Target-population: specify whether the interventions were performed with individuals or groups (including the size of the group).	Cancer patients.	Cancer patients.	Cancer patients.	Cancer patients.

Regarding the systematic reviews, it was seen that the researchers focused their evaluations on the methodological quality of the studies. However, the descriptions of the musical interventions were limited, insufficient, diversified and inconclusive, thus hampering comparative analysis. The studies S2 and S4 indicated that there is a need to develop new investigations with detailed descriptions of the musical stimuli used. The study S4 suggested that the relationship between frequency and duration of the sessions and the effects of the treatment should be evaluated.

Discussion

The first point that drew our attention was the small number of clinical trials and systematic reviews relating to human dimensions of oncological patients, thus showing that the reasoning of procedures and management of complications from the disease is still the tonic in our environment.

We recognize the emphasis given to the hierarchical model, which assigns levels of evidence according to the methodology used in various studies. Exactly because they are so valued, it is crucial that when healthcare professionals read a clinical trial, they should be able to evaluate its quality and understand its limitations. The idea induced is that if, when caring for patients, a professional does not behave in accordance with what was "demonstrated" in one clinical trial or another, or in systematic reviews and meta-analyses, he will be out-of-date regarding his knowledge and will be instituting care "without scientific evidence". Clinical trials are a useful tool for clinical practice, but cannot be used simplistically and en-masse. They should be regarded as a source of evidence for guiding decision-making, but cannot be used as if they were unquestionable dogma[18].

On the other hand, although good clinical studies conducted by researchers have led to advances in science, methodological rigor is still needed even when more integrative healthcare resources are used. In this regard, essential aspects of musical interventions have been neglected.

There is no doubt that musical interventions within the field of healthcare field have shown the therapeutic effects of music, irrespective of which professionals have implemented them. However, the great challenge of reflecting on why this happens and how music acts to produce these effects on human beings[2] has been little questioned, investigated or discussed.

This task becomes particularly hard in the light of the way in which the methodological description of musical interventions has been presented. Because of the complexity of musical stimuli and other intervening factors such as the choice of music, means of delivery or combination of music with other intervention strategies, the methodological descriptions of various musical interventions have been insufficient to allow generalizations, comparisons, replications and execution[7]. Like in the systematic reviews (S2 and S4) evaluated here, the present study also showed that the descriptions of the musical interventions of the clinical trials evaluated present limitations.

This reflection relates to the four basic principles that govern the use of music in nursing care, which are consequent to its universal characteristics. The ontological principle refers to experiences of sound and music and to the essence of human beings as musical beings. The physical principle translates the way that human beings perceive and are affected by music, i.e. how sound and musical stimuli that are conducted through the auditory nerve to the cortex produce physiological, mental and emotional sensory responses[1].

The musical principle is shown through the musical elements inherent to the intervention. Some of these are coupled to the physical dimension, such as the rhythm, while others are coupled to emotions, such as the melody. The social dimension is taken into account through the historical-cultural context in which the music originated, which enables the sensation of belonging to a group, a place, a history and a time. In the spiritual dimension, which has been little understood and investigated, the musical elements converge to articulate all human dimensions, thus enabling

profound contact with human beings' own essence, the universe, God, or any other conception of spirituality[1].

The relational principle translates the interpersonal relationship mediated by music: a phenomenon created by human beings. As a care resource, music emerges from the intentionality of care, through facilitating the encounter between the caregiver and the care receiver, and providing support for expressions of affection, compassion and solidarity, through the gestures, looks, smiles and smooth touches inherent to producing music[1].

However, the instrument that evaluated the quality of the reports on musical interventions[7] showed how deficient the description of the resources used is, especially with regard to those of the musical structures involved (i.e. musical principles): tone, mode (major or minor), rhythm (two, three or four beats to the bar, and so on), tempo (bpm), genre (European classical, popular, religious, etc) and timbre (instrumental and/or vocal grouping). The use of various music therapy techniques, in different contexts, can also hamper control over the underlying variables and consequently interfere in the evaluation of the therapeutic effects of the music.

The systematic reviews also focused on evaluating the methodological designs, to the detriment of evaluating the quality of the reports regarding the sound resources and musical structures used. Taking evidence-based practice into consideration, the following question arises: regarding the properties of the music, what was shown? Thus, its limitations are displayed and the validity/reliability of the evidence and inferences published can be questioned, along with its replication and incorporation in the clinical practice.

On the other hand, there are many reports that have highlighted the therapeutic effects of music, such as:

> Music managed to make three gigantic contributions to my rescue: the first was as a powerful anesthetic. A buffer for pain and suffering. Going from my mother's lullaby songs and the games of improvised singing, to 'the challenge' of my father, the hit parades of portable transistor radios and a permanent companion in hospitals. Music represented the beginning of a train of thought for hope.[19] (p.7)

These effects relate to people's experiences of long treatments and long hospital stays, through their recognition of music as a natural "anesthetic" that held their hopes during hard times, with a physical principle. Every case study or experience is unique and has unquestionable value. These reports describe individual strategies in which the elements proposed for analyzing musical interventions may even be described, but are not usually the focus of the description and have a very limited "n". In this regard, musicians with links to teaching and the use of music within the field of healthcare recognize the difficulty of indicating a specific song because both the instrument and the musician interfere with the result.

Singing therapy is an intervention with an anthroposophical approach and, although it is structured from the patient's musical history, it is attentive to musical structures, i.e. melodies that alternate between major and minor modes; songs constructed on pentatonic scales; or liturgical modes such as the Gregorian singing or canons. Regarding children, it is adapted to their stages of affective/cognitive development. It also retrieves the professional/patient relationship – the relational principle – as the most important aspect to be considered[20]. The unity of each relationship comprises an extra "ingredient" in the analysis of the final results.

It is important to highlight a study on music therapy interventions that was conducted with the aim of contributing towards the reception in the waiting room of a primary healthcare unit, where users can interact by suggesting songs, singing, composing or playing a musical instrument, as well as through body movements and emotional expressiveness. The results showed the appreciation and integration of professionals and users, expression of feelings, harmonization of the soundscape, users' autonomy, protagonist role and self-assurance, and also discovery of new potentials and overcoming of limits, thereby bringing the benefits established through hospital humanization to primary care[21]. Although the distinction and articulation of the abovementioned four basic principles aforementioned can be seen, the importance of qualified listening and the feeling of belonging inherent to the intervention is paramount, i.e. meeting with other people, through the relational principle.

Despite this, the feelings and emotions expressed through music, through the ontological principle, constitute an enigma that, by itself, is susceptible to risks and ambiguities. The secret of success or failure of the musical project may be hidden in knowing how to deal with equivocation of the component structures. This vulnerability may be presented at several levels. According to the musicologist Carl Dahlhaus, the expression of feelings is genuinely more related to musical interpretation than to composition[22]. In discussing sound language, the responsibility that healthcare professionals should have when proposing to use a sound resource or "compound sound" with therapeutic purposes should be emphasized, because inadequate use of music can lead to undesired effects[23].

The polysemic nature of music is responsible for the difficulty that we found in explaining it and using it in a desirable manner for different clinical situations or when we thought about the human dimensions that we wanted to address.

Although the musical experience is individual, which often favors using an individualized musical set list, neuroscience studies have indicated that the brain's processing of music is more physiological than what is determined by individual preferences.

The elements that comprise the music, whatever the pitch (different intonation of notes from bass to treble), the duration (time interval over which the sound lasts), the intensity (the same as volume) and the timbre (characteristic that qualifies and differs the sounds), are processed by the human brain. This means that musical preference can determine specific behavior (individual or even collective, and it is learned), but it does not necessarily have an intrinsic relationship with the

psychological-physiological effects that are observed and reported in the literature. Before the current idea that music can be a therapeutic resource, evolutive issues originally existed (which therefore had nothing to do with preferences).

The perceptual basis of music derives from auditory mechanisms. Their syntactic components may have been co-opted from the language and its effects on our emotions might have been triggered by acoustic similarity with other sounds of greater biological relevance, such as vocalizations or animal sounds. Thus, it would be an evolutionary history of the language, directed towards social cohesion (as in group activities relating to war or religion) or even through its pacifying effect on babies[24]. On the other hand, the harmonic structures and tone scales depend on learning, which leads to the existence of cultural differences in the musical universes of different populations. However, when related to emotions, as the main path of human response to music, they are not enough to block its effects.

Studies increasingly indicate that the human response is intrinsically connected to the sound material offered. A study conducted on a native African population that did not know the western music system, presented similar results regarding the recognition of basic emotions (happiness or sadness, for example), in comparison with the ability of Western listeners who were familiar with this tonal system, in this same task[25]. This, once again, emphasizes that mastery of music and its constituents is needed by professionals who aim to make it a therapeutic resource, as well as the need for detailed descriptions of the musical interventions used in scientific studies.

Musical experience is therefore founded on a trio: the listener, the sound material and the context. Thus, it is important for therapists who conduct such interventions to create the context needed for using sound material that best applies to the therapeutic objectives, which are determined jointly with their patients[2].

Conclusion

Because of the complexity and multi-dimensionality inherent to caring for cancer patients, many studies on musical interventions have been developed. However, these have often focused on the adverse effects of anti-neoplastic treatments and diagnostic procedures and have not addressed the human dimensions of those who experience diseases (in this case, oncological conditions). This explains the small sample of the present study. The absence of randomized clinical trials and systematic reviews within this context, conducted in Brazil, can be highlighted.

According to the evaluation instruments used, four studies presented high methodological quality and, although the majority of the items of the checklist for intervention reports were referenced, the resources and musical structures (which place value on the therapeutic potential) were not described, nor were they analyzed and discussed. This shows the complexity of the "music" strategy as a therapeutic resource.

A tendency not to describe the resources and musical structures used in musical interventions was observed, even after the publication of the guidelines that were used for analyses in this study. Without mastery of pharmacokinetics and pharmacodynamics, healthcare professionals would not prescribe or administer a drug. However, this kind of care has not been implemented regarding musical interventions. Within this perspective, in order to systematize the use of music as a care resource, through evidence-based practice, and to avoid its trivialization, it is essential to draw up projects and reports for future research on musical interventions using these guidelines.

Collaborators

Vladimir Araujo da Silva was responsible for the conception, design, analysis and data interpretation, and for writing the manuscript. Eliseth Ribeiro Leão was responsible for the conception, design, data analysis, critical review and approval of the version to be published. Maria Júlia Paes da Silva was responsible for the conception, data interpretation, writing, critical review and approval of the version to be published.

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