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Reporting quality of music intervention research in healthcare: A systematic review

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Abstract

Introduction—Concomitant with the growth of music intervention research, are concerns about inadequate intervention reporting and inconsistent terminology, which limits validity, replicability, and clinical application of findings.

Objective—Examine reporting quality of music intervention research, in chronic and acute medical settings, using the *Checklist for Reporting Music-based Interventions.* In addition, describe patient populations and primary outcomes, intervention content and corresponding interventionist qualifications, and terminology.

Methods—Searching MEDLINE, PubMed, CINAHL, HealthSTAR, and PsycINFO we identified articles meeting inclusion/exclusion criteria for a five-year period (2010-2015) and extracted relevant data. Coded material included reporting quality across seven areas (theory, content, delivery schedule, interventionist qualifications, treatment fidelity, setting, unit of delivery), author/journal information, patient population/outcomes, and terminology.

Results—Of 860 articles, 187 met review criteria (128 experimental; 59 quasi-experimental), with 121 publishing journals, and authors from 31 countries. Overall reporting quality was poor with < 50% providing information for four of the seven checklist components (theory, interventionist qualifications, treatment fidelity, setting). Intervention content reporting was also poor with < 50% providing information about the music used, decibel levels/volume controls, or materials. Credentialed music therapists and registered nurses delivered most interventions, with clear differences in content and delivery. Terminology was varied and inconsistent.

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Conflicts of interest

The authors declare that they have no conflicts of interest.

Conclusions—Problems with reporting quality impedes meaningful interpretation and cross-study comparisons. Inconsistent and misapplied terminology also create barriers to interprofessional communication and translation of findings to patient care. Improved reporting quality and creation of shared language will advance scientific rigor and clinical relevance of music intervention research.

Keywords

reporting quality; music; music therapy; intervention; systematic review

Both public interest in and publication of music intervention studies are increasing, with more than 1,300 articles indexed in PubMed over the last 20 years and 190 review articles examining the benefits of music interventions for a variety of health conditions and outcomes. The NIH-Kennedy Center *Sound Health: Music and the Mind* initiative is also working to accelerate our understanding about the use of music for health benefit through interdisciplinary scientific collaboration.[1] Concomitant with this growth are concerns about inadequate intervention descriptions and inconsistent terminology in published research, which limits validity, replicability, and clinical application of findings.[2–10] The growth of music therapy as standard care, along with increased use of music listening and music-facilitated movement interventions delivered by a variety of healthcare professionals, necessitates close examination of intervention reporting to improve specificity of meta-analyses, interprofessional communication, and integration of research findings into practice.

Reporting guidelines and music intervention research

The Consolidated Standards for Reporting Trials (CONSORT) and Transparent Reporting of Evaluations with Non-randomized Designs (TREND) guidelines were developed to improve the quality and transparency of published research, with one specific item on each checklist dedicated to intervention reporting.[11, 12] Subsequent publications explored the complexities of behavioral and non-pharmacological interventions, resulting in elaborated CONSORT guidelines for intervention reporting.[13–16] However, music interventions are especially difficult to fully describe due to the complexity of music stimuli (e.g., rhythm, pitch, tempo, harmonic structure, timbre), variety of music experiences (e.g., active music making vs. receptive music listening), and other factors unique to music interventions. To determine whether music intervention reporting guidelines were necessary, Robb and Carpenter (2009) examined how authors described music interventions and found significant gaps in reporting that hinder cross-study comparisons, generalization, and integration of findings into practice.[17] Subsequently, Robb, Burns, and Carpenter (2011) developed *Reporting Guidelines for Music-based Interventions* that specify seven components of music interventions that publishing authors are encouraged to report and discuss.[9]

The *Reporting Guidelines for Music-based Interventions* are available through the Equator Network and in the past six years referenced by authors in ninety-five publications, including nine review articles.[18, 19] Based on recent reviews, several areas of reporting continue to be problematic including the absence of intervention theory or scientific

rationale for the specified use of music,[20–22] details about the music used, [21–26] and information about who selected the music (patient, investigator, or therapist based on assessment).[25–27]

An additional concern has been inconsistent and inaccurate use of terminology that is well defined and consistently applied across studies. [21, 25] For example, some authors have used the term “music therapy” interchangeably, and at time inaccurately, with other terms to describe their intervention. [21] This creates confusion and contributes to problems with interprofessional communication because “music therapy” refers to a profession (as does nursing, occupational therapy, or medicine) and indicates the education, training, and credentials of the professional delivering the intervention, rather than providing information about the specific intervention.

Early and recent Cochrane reviews examining the benefits of music interventions for a variety of client and patient populations have raised awareness about the need to differentiate between music interventions that are delivered by a credentialed music therapist and those delivered by other health professionals. [2, 5, 8, 10, 31] Based on the background and training of the person providing the intervention, these reviewers have noted marked differences in intervention content, mode of delivery, and the use of clinical assessment to tailor intervention content based on patient needs and responses – and these factors are important to consider when conducting cross-study comparisons and meta-analyses. Using a two-category classification system (i.e., interventions delivered by credentialed music therapists and interventions delivered by other healthcare providers), Cochrane Review authors have been able to glean important information about the differential benefits of these two “types” of interventions for several patient populations. [3, 8] More importantly, they have begun to isolate specific attributes of the music intervention that may be responsible for change and patient factors that will help predict who would benefit from what “type” of intervention.

This differentiation is important as we seek to identify the mechanisms of action responsible for changes observed in music intervention research, and patient factors that predict who will derive the most benefit from which intervention. However, as noted by Cochrane Review authors, [3, 8] improved and consistent intervention reporting across all professions investigating the use of music to improve health will allow for more meaningful and nuanced subgroup analyses that move beyond the broader two-category classification system focused on professional background and training.

The primary aim of this systematic review was to examine the reporting quality of music intervention research published from 2010 through 2015. Our secondary aim was to gain a more complete picture of where music intervention research is being conducted (patient populations and primary outcomes of interest), as well as content of music interventions and training of those delivering interventions. Unique to this analysis was an examination of terminology to improve interprofessional communication and collaboration through improved consistency of terms, and development of shared language. Because our primary aim was to examine reporting quality, we looked at studies across a wide range of clinical populations, music interventions, and outcomes. Given the heterogeneous nature of the

resulting data set, an examination of intervention efficacy would not yield meaningful data and was considered beyond the scope of the current review. The following research questions guided our review:

1. What is the quality of music intervention reporting in published research?
2. What is the professional background of authors publishing music intervention research and where are they publishing their work?
3. What patient populations and outcomes are investigators studying?
4. What terms do authors use to describe music interventions and are those terms defined?
5. What is the education, professional background, and/or training of individual(s) who are delivering music interventions?
6. What is the content of music interventions and does it vary based on education, professional background, and/or training of the interventionist?

Methods

Identification of relevant studies

An interprofessional team comprised of undergraduate honors nursing students from Indiana University School of Nursing, undergraduate music therapy students from University of Kansas School of Music, and a graduate student and faculty member from each program conducted this review. As the first comprehensive review of music intervention reporting quality, our intent was to establish a baseline review that would capture reporting just prior to and after publication of the Music-based Intervention Reporting Guidelines. Establishing a baseline review for publications spanning 2010-2015 will help determine whether reporting quality improves over the next five to ten years. We operationally defined music interventions in healthcare as the use of music to manage symptoms, improve quality of life, promote physical and/or psychosocial function, and/or promote well-being (including spirituality) in patients with chronic or acute health conditions. We used this definition to inform article inclusion and exclusion criteria.

Inclusion criteria

1. Peer reviewed articles published January 1, 2010 through December 31, 2015.
2. Articles published in English.
3. Music or music experiences are the primary intervention modality.
4. Intervention addresses a specified clinical need.
5. Patients involved in the study have a chronic or acute medical condition.
6. Experimental and quasi-experimental studies using randomized and non-randomized controlled trial designs.

Exclusion Criteria

1. Not a clinical music intervention study (e.g. basic music perception or science studies that use music as a stimulus in a laboratory context).
2. Music was not a primary intervention modality (i.e. bundled interventions where music was not an essential component).
3. Non-experimental study designs.
4. Review articles or program descriptions.
5. Studies with individuals without a medical condition, well populations, dental patients, or interventions targeting at-risk populations (e.g. preventive).

Search strategies

We searched for articles using MEDLINE, PubMed, CINAHL, HealthSTAR, and PsycINFO databases. Our search terms were *music* and *music therapy* AND *intervention* or *interventions*. Limits added to the database search included: 2010-2015, English Only, Humans Only, Clinical Trials, All, Comparative Study, Controlled Clinical Trial, Evaluation Studies, Journal Articles, Observational Study, Randomized Controlled Trial (See Appendix A for Full Electronic Search Strategy). This review was designed to examine reporting quality of peer-reviewed publications; therefore, grey literature, hand searching, and expert sources were not included.

Data extraction

We used the *Music-based Intervention Reporting Guidelines* checklist to examine reporting quality,[9] and developed a tool (with corresponding definitions) to guide secondary data extraction for each reviewed article (See Appendix B). Using this tool, we recorded the seven reporting criteria specified in the guidelines, author and journal information, study design, terminology, patient population, interventionist education/professional background, and intervention content.

Five interprofessional student dyads (one music therapy and one nursing undergraduate student) worked together to screen articles and extract data, with faculty members (SR, DHA) providing a subsequent, independent review for each article. First, we identified relevant articles using two levels of screening, followed by data extraction. First level screening included a review of study titles and abstracts, followed by second level screening of full text articles. Following article identification, two independent reviewers (one student dyad and one faculty reviewer) extracted data. At each level of screening and data extraction, results were compared across reviewers and discrepancies resolved through discussion and group consensus. As a final step, the first author entered data for each article into a customized *Access* database, which is a Microsoft database management system.

We minimized data extraction bias with three strategies: 1) the use of interprofessional student dyads (music therapy; nursing); 2) independent review and data extraction by each member of the student dyad, followed by reconciliation of any discrepancies within that dyad; and 3) second independent review and data extraction by the faculty team members,

followed by reconciliation of any discrepancies. In this study, we were interested in the quality and content of intervention reporting; therefore, we did not assess risk of bias for individual studies.

Results

Based on our search for relevant articles published between January 1, 2010 and December 31, 2015, we identified 860 articles. After removing duplicate articles (n=7), remaining titles and abstracts (n=853) were divided among team members and independently screened by two reviewers for inclusion or exclusion, with any discrepancies resolved through group consensus. After reviewing abstracts, we excluded an additional 618 articles, leaving 235 articles for full-text review. Based on full-text reviews, we excluded an additional 48 articles, resulting in our final data set of 187 articles (see Appendix C for references). The PRISMA Flow Diagram (Figure 1) illustrates the article identification process and reasons for article exclusion.

Study characteristics

Of the 187 articles included in the analysis, 128 were experimental and 59 quasi-experimental studies. Authors were from 31 countries, with the majority from the United States (n=64), followed by Taiwan (n=18), Australia (n=14), Iran (n=11) and China (n=10). Four studies had authors from more than one country.

Music intervention reporting quality

In Table 1, we report the valid percent of studies that provided information for each of the seven reporting criteria. Here we identify each reporting area as strong (≥ 80%), moderate (60-79%), or poor (≤ 59%) based on Table 1 summative data.

Reporting for *Intervention Theory/Rationale* was poor, with about half providing a theoretical framework or rationale that guided the selection of music and/or music-based experiences, and informed the hypothesized relationship of the specified music intervention to the outcome of interest.

Intervention Content reporting, which is comprised of five sub-categories, was strong for two areas including *person selecting the music* (89%), and *music intervention strategies* under investigation (100%). Overall reporting quality for the *music delivery method* subcategory, which has four additional sub-components (two for live music and two for recorded music), was moderate. For live music, reporting was strong for reporting the person who delivered the music (83%) and moderate for size of the performance group (62%). For recorded music, reporting was moderate for placement of playback equipment and/or the use of headphone versus speakers (65%), but poor for specifying decibel level (i.e., volume) of music delivered or the use of volume controls (23%). Finally, reporting quality was poor for two subcategories, *music* and *intervention materials*. For *music*, very few studies provided a reference for sound recordings or sheet music (15%), and for those studies that used improvised or original music, only 53% described the music's compositional features such as form, tempo, harmonic structure, or instrumentation. For *intervention materials*, only 34% of studies that used music materials as part of the intervention (e.g., playback equipment,

musical instruments) provided specific information about those materials, such as manufacturer, model, or type. Similarly, only 34% of studies provided detailed information about non-music materials (e.g., scarves).

Intervention Delivery Schedule is comprised of three areas including number of sessions, session duration, and session frequency. Reporting was strong for number of sessions (86%), session duration (81%), and session frequency (89%).

Reporting for *Interventionist* is comprised of two areas and both were poor. Of the studies reviewed, only 42% specified the interventionists' qualifications and/or credentials, and only 36% reported how many interventionists delivered study conditions.

Reporting for *Treatment Fidelity* was poor, with only 20% of studies describing strategies used to ensure that intervention conditions were delivered as intended across participants and interventionists.

Setting is comprised of three areas related to the treatment setting (i.e., location) and sound environment (i.e., privacy level, ambient sound) in the treatment location. Reporting was poor across all three areas, with few studies reporting the intervention location (48%), privacy level (18%), or ambient sound (12%).

Reporting for *Unit of Delivery* was strong, with 91% of studies indicating whether the intervention was delivered to individuals or groups of individuals.

Publishing authors and journal characteristics

To determine authors' professional backgrounds, coders looked at credentials, author information, and biographical entries. Degree and affiliation alone were not considered adequate given increased interprofessional staffing in university and healthcare institutions. For half of the studies (n=96, 51%), we were unable to identify the professional background of at least one contributing author. For articles where at least one author's professional background could be identified (total number of articles = 91; total number of authors = 181), the following professions were represented: music therapy (n=54), nursing (n=52), medicine (n=48), and other (n=27). Professional backgrounds captured as 'other' included twelve different professions such as statistics, psychology, and occupational therapy.

Studies were published across 121 different journals, with a majority of identified journals publishing only one experimental or quasi-experimental music intervention study over the 5-year review period (n=99, 82%). Journals with the highest number of publications during the review period included the *Journal of Music Therapy* (n=14, 12%), *Journal of Clinical Nursing* (n=11, 9%), *Music and Medicine* (n=8, 7%), *The Arts in Psychotherapy* (n=7, 6%), and *Complementary Therapies in Medicine* (n=6, 5%).

Patient populations studied and corresponding outcomes

Based on patient population descriptions provided by publishing authors, we grouped studies into fifteen categories, and listed the most frequently studied outcomes for each population (Table 2). The four most frequently studied populations included surgical (n=32;

17%), Alzheimer's/dementia (n=26; 14%), acute mental health (n=21, 11%), and cancer (n=18, 10%). In Table 2, we also list the most frequently examined outcomes for each patient population (i.e., measured in ≥ three studies; exception emergency room and tinnitus where criteria is ≥ two studies). To capture variability, we also report the number of studies where investigators measured an outcome "other" than those most frequently reported.

Music intervention terminology

Across the 187 reviewed articles, authors used 51 different music intervention terms in the introduction and review of literature (Table 3). Of the 51 terms, 38 appeared in only one article, eight terms across two articles, and one term across three articles. The most frequently used terms included music therapy (n=129), music intervention (n=50), music listening (n=19), and music medicine (n=9). A majority of the time, authors did not provide a definition for terms (n=152, 58%). In Table 3, we further categorized the 51 terms into three levels of specificity, including broad or general terms (n=19), terms with increased specificity (n=17), and terms referencing a specific technique, experience, or intervention (n=15). Publishing authors defined specific terms more frequently than general terms (82% vs. 39%).

Interventionist education, professional background, and training

In Table 4, we summarize interventionist education, professional background, and training. A majority of authors (n=166, 89%) did not specify interventionist education level (i.e., bachelors, masters, doctorate), and 58% (n=108) provided no information on professional background. Of those providing information on professional background, a majority of interventionists were credentialed music therapists (n=61, 33%), followed by registered nurses (n=12, 6%). Five articles indicated the interventionist had specialized training, but only one offered information on degree level, and none provided information on professional background.

Music intervention content and interventionist professional background

In Table 5, we summarize the number (single component vs. multiple components) and type of music experiences that comprised the music interventions in this review. We defined single component interventions as interventions comprised of one music experience, and multiple component interventions as those comprised of two or more music experiences. Because some studies had multiple music intervention arms, the total number of interventions (n=201) exceed the number of articles (n=187).

About two-thirds of the interventions had a single music experience component (n=136, 68%), and of those the majority (n=104, 76%) were music listening interventions that used either live (12%) or recorded music (88%). The remaining interventions (n=65, 32%) had multiple music experience components with the majority having two (n=22, 34%) or three (n=28, 43%) components, followed by four (n=6, 9%), five (n=5, 7%), six (n=2, 3%), eight (n=1, 2%) and ten (n=1, 2%) music experience components. Table 5 provides a detailed list of music experiences used in single and multiple component interventions.

Table 5 also provides information about the professional background of interventionists delivering each type of music intervention experience. For those studies reporting interventionist qualifications for single component interventions, registered nurses delivered only recorded music listening interventions and credentialed music therapists delivered a majority of live music listening interventions, as well as interventions that used other music experiences such as improvisation, lyric analysis, songwriting, or movement (see Table 5). Credentialed music therapists also delivered most multiple component interventions. Three studies used interprofessional teams to deliver interventions, one was a single component intervention and two were multicomponent.

Discussion

Overall, reporting quality for music intervention studies was poor. Less than half of the reviewed studies provided information for four of the seven reporting checklist components including intervention theory, interventionist background/qualifications, treatment fidelity, and setting. In addition, we found mixed levels of reporting for intervention content, with less than half of reviewed studies providing information about the music, decibel level/use of volume controls, or materials. The absence of information across these areas is concerning because it lessens the scientific rigor, impact, and clinical relevance of the resulting work. We focus our discussion on findings related to intervention reporting in the areas of theory, interventionist qualifications, intervention content and fidelity, followed by identified problems with terminology that inhibit clear reporting.

Theory may be considered the most important reporting variable because it drives intentional use of music that is informed by research about social, psychological, perceptual, and/or neurobiological responses to music. There needs to be a clear scientific premise for why an investigator expects the specified use of music to influence the outcome of interest. Yet, less than half of the reviewed studies included a theoretical framework or offered a scientific rationale. Identifying and measuring not only outcomes, but also the proposed mechanisms of action allow investigators to move beyond basic questions about efficacy, and begin answering questions about how, why, and for whom an intervention works.[9, 20, 28–30]

Recent Cochrane reviews examining music interventions for a variety of client and patient populations have raised awareness about important differences in intervention content, complexity, and delivery that are directly related to the education, training, and professional background of the interventionist.[2, 3, 5, 8, 10, 31] Less than half of reviewed articles provided information about interventionist qualifications, but of those that did provide this information, credentialed music therapists and registered nurses delivered a majority of interventions. Consistent with each professions' training and scope of practice, music therapists used a wide range of music experiences that included both single and multiple-component interventions, while a majority of nurse delivered interventions used recorded music listening as a single-component intervention.

The professional background and training of music therapists and other healthcare professionals (e.g., nursing, medicine, physical therapy) are different, and will influence

their understanding about the nuances of music that influence clinical outcomes and their skill in using music as a therapeutic modality. As such, it is understandable and appropriate that intervention content would vary based on professional background. Equally important is the knowledge that nurses and other healthcare providers contribute through identification and understanding of health problems that may be amenable to music interventions. An important aspect of research translation and the development of targeted interventions is determining the type of intervention (content and complexity) that provides the greatest benefit, based on patient-specific factors, and the level of skill (interventionist qualifications) required to deliver that intervention. Investigators have begun to examine differential benefits of music interventions based on professional background and content,[3, 8, 21] but improved and consistent reporting are needed to conduct more meaningful and nuanced subgroup analyses to better inform selection and delivery of music interventions.

Despite music being the primary intervention modality, few authors provided detailed information about the music. This finding is consistent with prior reviews, and severely limits investigators ability to identify characteristics of music responsible for change and conduct quality cross-study comparisons.[2, 3, 8, 17] We know that compositional features of the music itself are often responsible for outcomes. For example, the use of rhythm, tempo, melodic contour, and/or harmonic structure to improve gait parameters[8, 32, 33] regulate breathing[34–36] regulate emotion, [37] elicit imagery[38–40] or influence other physiological or psychosocial responses.[33] We also know that relational aspects of interventions, such as group music making or the use of improvisation, are important features that also contribute to positive health outcomes. [41–43] Providing detailed descriptions of the music and music experiences used is essential if we are to examine and understand potential mechanisms of action. This is particularly relevant for the large number of single component intervention studies we identified where recorded music listening was the primary intervention component in managing acute pain and anxiety. Despite the large number of studies published, evidence to support its integration into healthcare remains equivocal, and is likely due to the absence of theory and detailed reporting that would enable more meaningful cross-study comparisons.

Treatment fidelity includes methodological strategies that help to ensure consistent intervention delivery over the course of a clinical trial, strengthening investigators' ability to attribute any observed benefits to the intervention under examination [44–46]. Given the complexity of music interventions, especially multiple component interventions, it is essential that investigators specify essential elements of the intervention and implement strategies to monitor consistent delivery. Unfortunately, few of the reviewed studies included information about treatment fidelity. Improvements in fidelity will reduce random and unintended intervention variability within studies and in turn may help address inconsistent findings observed across studies [44–46].

Finally, investigators need to provide a full description of the setting where music interventions are delivered, including privacy levels (e.g., open area vs. private room) and the amount of ambient sound in the environment. Understanding the sound environment influences our ability to interpret and translate findings to the clinical practice setting. For example, the introduction of music into an already stimulating environment, as opposed to a

quiet environment, may be an important factor that contributes to patient outcomes. For some vulnerable populations, such as those with dementia or premature infants, this also becomes a safety issue due to changes or developmental readiness to integrate sensory information [47–50].

Unique to this review was an examination of terminology used to describe music interventions. We found that publishing authors used a wide variety of terms that were frequently undefined. Although not part of our data collection, our team also noticed that at times terms were misapplied and we recommend subsequent reviews examine this variable. This is concerning because inconsistent, undefined, and misapplied terms impede accurate and consistent reporting, as well as meaningful interpretation of study findings. Professional background and training likely influence publishing authors' use, understanding, and interpretation of music terminology, and their assumptions about whether selected terms will be understood by an interdisciplinary readership. We also found that a large number of journals are publishing music intervention research, but on an infrequent basis. Journals that publish one article a year may be unfamiliar with music reporting guidelines and have diminished access to qualified reviewers, representing additional factors that likely contribute to inconsistencies in terminology.

Consistent with previous reviews, we found that the term "music therapy" or "music therapy intervention" was often misapplied and used as a global reference for all music interventions.[3, 21] However, the term only communicates information about the professional background and training of the individual who delivered the intervention, in this case a credentialed music therapist. Because "music therapy" is a profession-specific term, as is nursing, physical therapy, or speech therapy, it should not be used to describe interventions delivered by healthcare professionals who do not hold music therapy degree training and/or credentialing. This does not mean that music interventions delivered by other healthcare professionals do not have therapeutic benefit or value; rather the term is specific to one profession and only communicates a level of training and defined scope of practice. Even when used accurately, the term "music therapy" can be problematic because it is a global term that provides limited information about the actual intervention. Establishing standard terms and definitions will improve interprofessional communication, but will require a collaborative effort.

Discussions among our interprofessional team members revealed how our own professional background (nursing or music therapy) influenced our understanding and interpretation of study content as we scrutinized and discussed article content throughout the review process. Our interprofessional team represents a microcosm of the primary professions who are conducting music intervention research, and our experiences suggest that clarity of terminology will lessen confusion and improve interprofessional communication.

As such, we recommend that in addition to using a global term, such as *music intervention*, that publishing authors also use and define terms that are more descriptive of intervention content such as "recorded music listening program" or "group singing intervention" followed by details about the professional background and training of the person delivering the intervention. Authors will also want to define music terms that may be unfamiliar to

those with limited musical training. Establishing standard terms and definitions will improve interprofessional communication, delineation of music intervention content and delivery across professions, and translation of findings to practice.

Strengths of our study included use of an interprofessional team, an established checklist to assess reporting quality, and multiple, independent reviewers to increase validity and diminish risk of bias. Limitations included exclusion of non-English studies and strategies to identify articles published in non-indexed journals, which increased our risk for bias.

Conclusions

Findings from this systematic review reveal significant problems with reporting quality for music intervention research in healthcare that directly impedes meaningful cross-study comparisons, interpretation, replication, and generalization of findings. In addition, inconsistent and misapplied terminology represent a barrier to interprofessional communication and meaningful translation of findings to direct patient care. Problems with reporting quality and terminology may be due in part to several systemic challenges including differences in the professional background of investigators engaged in music intervention research, the large number and variety of publishing journals, and limited awareness and uptake of music intervention reporting guidelines. To improve reporting quality, we recommend that authors, journal editors, and reviewers use the *Reporting Guidelines for Music-based Interventions* to inform study design, dissemination, and peer review. We also recommend an interprofessional consensus meeting to develop and adopt shared language that accurately reflects the emerging continuum of music interventions, which will ultimately improve communication, collaboration, and meaningful uptake of findings to improve patient care.

Acknowledgments

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Appendix A. Full Electronic Search Strategy

#1	music/all subheadings
#2	music therapy/all subheadings
#3	#1 AND #2
#4	intervention/all subheadings
#5	interventions/all subheadings
#6	#4 OR #5
#7	#3 AND #6
#8	#7 with following limits applied: English Only; Humans Only; Clinical Trials, All; Comparative Study; Controlled Clinical Trial; Evaluation Studies; Journal Articles; Observational Study; Randomized Controlled Trial.

Appendix B. Data extraction tool and definitions

DATA EXTRACTION TOOL: Music Intervention Research in Healthcare (See Corresponding Definitions Page)

TEAM NUMBER/MEMBERS: _____

ARTICLE: _____

Author/Journal Information	**CIRCLE**		**Page #:**
Country of Origin	Circle <u>all that apply</u>: 1) United States; 2) Canada 3) Europe 4) Australia 5) South Korea 6) Japan 7) Indonesia 8) Other Specify:		
Authors' Profession:	Circle <u>all that apply</u>: 1) music therapy 2) nursing 3) psychology/psychiatry 4) medicine 5) other		
Study Design	**CIRCLE ONE**		
Study Design	<u>Experimental Designs</u> (more than one group; randomization) 1) 2 groups, randomized trial (randomization; control group; pre/post-test) 2) 2 groups, post-test only (randomization; control group; posttest only) 3) Randomized, Wait-list control Group 4) Factorial design 5) Cross over design 6) Other <u>Quasi-Experimental Designs</u> *Designs without Control Groups:* 1) One-group, posttest only 2) One-group pretest/posttest *Designs that Use a Control Group, but no Pretest* 1) Post-test only, non-equivalent groups 2) Case Control Design *Designs that use control groups & pretests* 1) Untreated control group design w/dependent pre/posttest samples 2) Matching through cohort controls *Interrupted time-series designs* 1) Single group time series design 2) Nonequivalent control group time series design		
Outcome of Interest/Corresponding Measure *Example:* Outcome of Interest: Anxiety Corresponding Measure: STAI	Outcomes (list)	Measures (list)	
Terminology (Terms/Definitions)	**CIRCLE/LIST**		**Page #:**
Did the authors use any of the following terms?	Circle all that apply: 1) Music Therapy 2) Music Medicine 3) Music Intervention 4) Other (please specify)		

Author/Journal Information	**CIRCLE**		**Page #:**
Did the authors define these terms? Indicate page number where term is defined	Yes	No	
Patient Population/Clinical Situation	**LIST**		**Page #:**
List all terms used to describe the patient population & clinical situation being studied. *Examples:* Cancer Patients Undergoing Surgery Cancer Patients/Chemotherapy Surgical Patients/Pre/Post-Op Alzheimer/Dementia Patients/Gait training			
Music-based Intervention Reporting Criteria	**CIRCLE/LIST**		**Page #:**
A: Rationale for Music Selection/Intervention Theory Provided a rationale for the music selected; specified how qualities and delivery of the music are expected to impact targeted outcomes.	Yes	No	
B: Intervention Content Provided precise details of the music intervention and, when applicable, descriptions of procedures for tailoring interventions to individual participants. Please code the following 5 areas:			
B.1: Person Selecting the Music Specified who selected the music.	Yes If yes, circle one: (1) pre-selected by investigator, (2) participant selected from limited set, (3) participant selected from own collection, (4) tailored based on patient assessment. (5) other	No	
B.2: Music			
When using published music, provided reference for sheet music or sound recording.	Yes	No	
When using improvised or original music, described the music's overall structure (i.e., form, elements, instruments, etc).	Yes	No	
B.3. Music Delivery Method (Live or Recorded)			
When using live music:			
(1) specified who delivered the music	Yes	No	
(2) specified the size of the performance group (e.g., interventionist only, interventionist and participant)	Yes	No	
When using recorded music:			
(1) specified placement of playback equipment and/or the use of headphones vs. speakers,	Yes	No	
(2) Specified decibel level of music delivered and/or use of volume controls to limit decibels.	Yes	No	
B.4: Intervention Materials			
Specified music material	Yes	No	
Specified non-music materials	Yes	No	
B.5: Intervention Strategies Described music-based intervention strategies under investigation.	Yes If yes, circle all that apply: 1) Breathing Entrainment 2) Imagery 3) Music-assisted relaxation 4) Songwriting	No	

Author/Journal Information	CIRCLE		Page #:
	5) Lyric Analysis 6) Movement 7) Re-creating music by singing/playing instrument 8) Improvisation 9) Instrument/vocal play 10) Listening 11) Other (please specify)		
C: Intervention Delivery Schedule			
Reported number of sessions,	Yes	No	
Reported session duration,	Yes	No	
Reported session frequency	Yes	No	
D: Interventionist			
Specified qualifications (i.e., degree)	Yes Please list:	No	
Specified credentials (i.e., certifications)	Yes Please list:	No	
Specified how many interventionists delivered study conditions	Yes Specify #:	No	
E: Treatment Fidelity Described any strategies used to ensure that treatment and/or control conditions were delivered as intended (e.g., interventionist training, manualized protocols, and intervention monitoring)	Yes	No	
F: Setting			
Specified where intervention was delivered (i.e., location)	Yes List location:	No	
Privacy level (e.g., private room, open treatment area)	Yes	No	
Ambient Sound (e.g., noise level in the environment)	Yes	No	
G: Unit of Delivery			
Specified whether interventions were delivered to individuals or groups of individuals.	Yes If yes, circle one: Individual Group	Yes	

DEFINITIONS: Data Extraction Tool

Author/Journal Information

1. Country of Origin: Where did the study take place? The setting (or location) of the study should be described in the article. You can also look at the affiliation(s) of the contributing authors to determine where the study was conducted.
2. Authors' Profession: On the title page, each author will have his/her credentials listed. Their credentials will be a better indicator of their professional background than their university or hospital affiliation. Some articles will provide author biographies.

Study Design

1. Study Design: See hand-out for overview of experimental/quasi experimental study designs.
2. Outcome(s) of Interest: What were the primary clinical outcomes of interest? There will often be more than one outcome. Other variables that might be measured (but you do not need to list) are baseline characteristics, mediators, or moderators.

   A mediator is a variable that accounts for how effects will occur by accounting for the relationship between the independent (e.g., intervention) and dependent (i.e., outcome) variables.

   A moderator is a variable that that accounts for the strength of the relationship between the independent (e.g., intervention) and dependent (i.e., outcome) variables.
3. Corresponding Measure: Provide the name of the instrument used to measure each outcome of interest.

Terminology

Look for the use of terms like “music therapy”, “music medicine”, or “music intervention” that may be used to globally describe the intervention. Circle or list terms, indicate if authors defined terms, and log the page number where you found this information. Record other terms that authors use to describe the intervention, indicate if a definition was provided and log the page number where you found this information.

Patient Population/Clinical Situation

List terms used to describe the patient population and clinical situation being studied. For example, a study that is using music to reduce anxiety in cancer patients pre-operatively – you would list CANCER PATIENTS; SURGICAL; PRE-OP

Music-Based Intervention Reporting

1. Rationale for Music Selection/Intervention Theory: Do the authors explain how/why they would expect music to address the clinical problem of interest? Do the authors specify an underlying theory for the intervention? This could be an explicit statement of a theory (e.g., Social Learning Theory) or it could be a summary of research findings supporting the relationship of the music to the outcomes of interest.
2. Person Selecting the Music
   1. *Pre-selected by Investigator*: Selected by investigator and standardized across patients.
   2. *Participant-Selected from Limited Set*: Participants chose from standard set of music selected by investigator.

3. *Participant Selected from Own Collection*: Participants use music from their own collection.
4. *Tailored based on Patient Assessment*: Music selected by interventionist based on participant-specific needs.

3. Music (published; original; improvised):
    1. *Published:* When using pre-recorded or playing live music that has been written by someone other than the interventionist, did the author provide a list of song titles/publisher information?
    2. *Original/Improvised:* When using music composed specifically for the study, or when music was improvised as a part of the intervention, did the author describe the structure/style of the music (e.g., form, elements, tempo, harmonic structure, etc)?
4. Music Delivery Method (live or recorded):
    1. *Live music*: This is music that was played/sung for the participant. Did the authors specify who performed the music (i.e., was it the interventionist or someone else)? Did the author indicate the size of the performing group (i.e., was it the interventionist alone or was it a group of instrumentalists/singers)?
    2. *Recorded Music*: This is music that was played from a recording. Did the author(s) describe the playback equipment and/or use of headphone vs. speakers? Did the authors specify the db level of the music (i.e., loudness of the sound) and/or the use of volume controls to limit db level?
5. Intervention Materials:
    1. *Specific list of musical materials:* List specific music-materials used (e.g., six nylon string acoustic guitar) vs. general list (e.g., guitar).
    2. *Specific list of non-musical materials*: List specific non-music materials used (e.g., five plastic frogs) vs. a general list (e.g., toys).
6. Intervention Strategies (or methods):
    1. *Breathing Entrainment*: Rhythmic/temporal qualities of music to structure rate of breathing; synchronization between breathing/rate of music
    2. *Imagery*: Music used to support visual imagery (specify if Bonny Method of Guided Imagery/Music used)
    3. *Music-Assisted Relaxation*: Music used to structure relaxation exercises (e.g., progressive muscle relaxation, autogenics)
    4. *Songwriting*: participants engage in lyric writing and/or musical composition

5. *Lyric Analysis*: participants discuss meaning of song lyrics
6. *Movement*: music is used to structure, facilitate, and/or encourage movement
7. *Re-Creating Music by Singing/Playing Instruments*: participants sing and/or play pre-composed songs/music
8. *Improvisation*: participant or interventionist creates music in the moment
9. *Instrument/Vocal Play*: play that combines non-music play materials with singing and/or instrument play
10. *Listening*: participants listen to music

7. Intervention Delivery Schedule:
    1. *Number of Sessions*: Total number of sessions participants received
    2. *Session Duration*: How long session(s) last (e.g., 30 minutes)
    3. *Frequency of Sessions*: Frequency and timing of sessions (e.g., 2 sessions per week)
8. Interventionist:
    1. *Qualifications:* Degree of individuals delivering the intervention (e.g., Bachelor's Nursing; Bachelor's Music Therapy, Masters Nursing, etc)
    2. *Credentials:* Credentials or certifications of individuals delivering intervention (e.g., MT-BC, CNA)
    3. *Number of Interventionists:* How many interventionists delivered study conditions?
9. Treatment Fidelity: Did the authors describe any strategies used to ensure that treatment and/or control conditions were delivered as intended (e.g., interventionist training, manualized protocols, intervention monitoring)?
10. Setting:
    1. *Location*: Where the intervention was delivered (e.g., home, examination room, patients private room, recovery room, etc).
    2. *Privacy Level:* Privacy level of space where the intervention was delivered (e.g., open treatment area with six patient beds divided by curtains).
    3. *Ambient Sound:* Sound level of treatment environment reported as db level or in descriptive terms (e.g., quiet area, high level of ambient noise).
11. Unit of Delivery: Specify whether intervention was delivered to individuals or groups of individuals.

Appendix C. Reference list for reviewed studies

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Highlights

- Publication of music intervention studies are increasing, as are concerns about inadequate intervention reporting and inconsistent terminology.
- Less than 50% of published music intervention studies provide enough detail about the music intervention, inhibiting meaningful interpretation and cross-study comparisons.
- Credentialed music therapists and registered nurses deliver most music interventions, with clear differences in both content and delivery.
- Terminology used to label and describe music interventions are varied, inconsistent, and at times misapplied creating barriers to interprofessional communication.
- Increased awareness and use of the *Checklist for Reporting Music-Based Interventions* are recommended to improve reporting quality, scientific rigor, and clinical relevance of music intervention research.

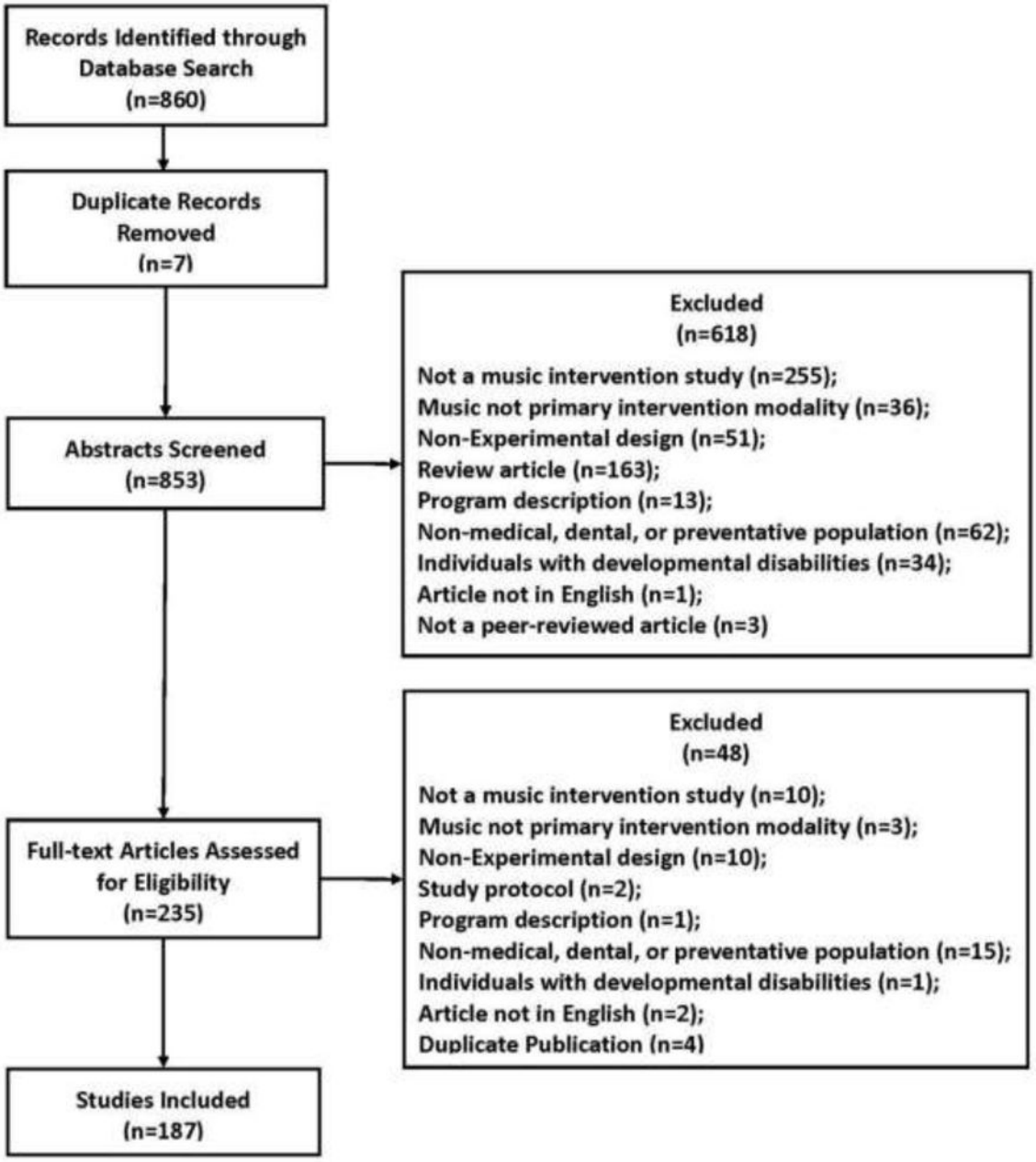

Figure 1.
PRISMA flow diagram

Table 1

Quality of intervention reporting based on the Checklist for Reporting Music-based Interventions

Music-based Intervention Reporting Criteria	Reviewed Studies	
	Yes (n) Valid %	No (n) Valid %
A: Intervention Theory/Rationale (n=187) Provide a rationale for the music selected; specify how qualities and delivery of the music are expected to impact targeted outcomes.	(96) 51%	(91) 49%
B: Intervention Content Provide precise details of the music intervention and, when applicable, descriptions of procedures for tailoring interventions to individual participants.		
B.1: Person Selecting the Music (n=187) Specify who selected the music: pre-selected by investigator, participant from limited set, participant selected from own collection, tailored based on patient assessment.	(166) 89%	(21) 11%
B.2: Music Specify the specific source of published/recorded music, or describe qualities of improvised/original music:		
(1) When using published music, provide reference for sheet music or sound recording. (n=162)[a, b]	(25) 15%	(137) 85%
(2) When using improvised or original music, describe the music's overall structure (e.g., form, elements, instruments). (n=64)[b, c]	(34) 53%	(30) 47%
B.3. Music Delivery Method (Live or Recorded)		
When using live music, specify: (n=81)[d, e] (1) Who delivered the music, and	(67) 83%	(14) 17%
(2) Size of the performance group (e.g., interventionist only, interventionist and participant).	(50) 62%	(31) 38%
When using recorded music, specify: (n=139)[e, f] (1) Placement of playback equipment and/or the use of headphones vs. speakers,	(90) 65%	(49) 35%
(2) Decibel level of music delivered and/or use of volume controls to limit decibels.	(32) 23%	(107) 77%
B.4: Intervention Materials Specify music and/or non-music materials.		
(1) Music materials (n=187)	(64) 34%	(123) 66%
(2) Non-music materials (n=76)[g]	(26) 34%	(50) 66%
B.5: Intervention Strategies (n=187) Describe music-based intervention strategies under investigation (e.g., music listening, songwriting, improvisation, rhythmic auditory stimulation).	(187) 100%	(0) 0%
C: Intervention Delivery Schedule (n=187) Report number of sessions, session duration, and session frequency.		
(1) Number of Sessions	(160) 86%	(27) 14%
(2) Session Duration	(152) 81%	(35) 19%
(3) Session Frequency	(166) 89%	(21) 11%
D: Interventionist (n=187)		
(1) Specify interventionist qualifications and/or credentials.	(78) 42%	(109) 58%
(2) Specify how many interventionists deliver study conditions.	(68) 32%	(119) 64%
E: Treatment Fidelity (n=187) Describe strategies used to ensure that treatment and/or control conditions were delivered as intended (e.g., interventionist training, manualized protocols, and intervention monitoring).	(38) 20%	(149) 80%
F: Setting (n=187) Describe where the intervention was delivered (i.e., location, privacy level, ambient sound).		
(1) Location	(90) 48%	(97) 52%

Music-based Intervention Reporting Criteria	Reviewed Studies	
	Yes (n) Valid %	No (n) Valid %
(2) Privacy level	(34) 18%	(153) 82%
(3) Ambient sound	(22) 12%	(165) 88%
G: Unit of Delivery (n=187) Specify whether interventions were delivered to individuals or groups of individuals, including group size.	(171) 91%	(16) 9%

Note: Reporting table used with permission. Robb SL, Burns DS, & Carpenter JS. (2011). Reporting guidelines for music-based interventions. Journal of Health Psychology, 16(2), 342-352.

[a] Several studies (n=4) lacked enough information to determine if authors used published music; these were coded as 'no' not reported.

[b] The number of studies across "published music" and "improvised or original music" exceeds total studies reviewed (n=187) because some studies (n=31) used both published music and improvised/original music, with additional studies (n=8) captured across both areas due to poor reporting.

[c] Several studies (n=8) lacked enough information to determine if authors used improvised or original music; these were coded as 'no' not reported.

[d] One study lacked enough information to determine if authors used published music and was coded as 'no' not reported.

[e] The number of studies across "live" and "recorded" exceeds total studies reviewed (n=187) because some studies (n=25) used both live and recorded music, with additional studies (n=8) captured across both areas due to poor reporting.

[f] Several studies (n=7) lacked enough information to determine if authors used improvised or original music; these were coded as 'no' not reported.

[g] Applies only to studies using non-music materials.

Table 2

Populations studied and corresponding outcomes

Patient Population	(n) %	Corresponding Outcomes (most frequently cited)[a]	(n) Valid %
Surgical	(32) 17%	Anxiety	(22) 69%
		Pain	(14) 44%
		Vitals[b]	(9) 28%
		Sedation	(6)19%
		Depressive Symptoms	(4) 13%
		Satisfaction	(4) 13%
		Stress	(4) 13%
		Relaxation	(3) 9%
		Other[c]	(11) 34%
Alzheimer's/Dementia	(26) 14%	Agitation	(11) 42%
		Emotional State/Mood	(6) 23%
		Quality of Life/Well-being	(6) 23%
		Depressive Symptoms	(5) 19%
		Cognitive Function	(5) 19%
		Behavior State	(5) 19%
		Anxiety	(4) 15%
		Participation	(3) 12%
		Communication	(3) 12%
		Other[c]	(9) 35%
Acute Mental Health	(21) 11%	Depressive Symptoms	(7) 33%
		Other Disorder-Specific Symptoms	(4) 19%
		Mood	(3) 14%
		Anxiety	(3) 14%
		Other[c]	(16) 76%
Cancer	(18) 10%	Pain	(10) 56%
		Anxiety	(9) 50%
		Quality of Life/Well-being	(5) 28%
		Vitals[b]	(4) 22%
		Relaxation	(3) 17%
		Other[c]	(17) 89%
Disease/Symptom Management[d]	(13) 7%	Pain	(6) 46%
		Anxiety	(5) 38%
		Quality of Life/Well-being	(4) 31%
		Vitals[b]	(4) 31%
		Depressive Symptoms	(3) 23%

Patient Population	(n) %	Corresponding Outcomes (most frequently cited)[a]	(n) Valid %
		Other[c]	(9) 69%
Infants/NICU/PICU	(11) 6%	Vitals[b]	(5) 45%
		Behavioral State/Distress	(5) 45%
		Other[c]	(6) 55%
Brain/Spinal Cord & Neurological Disorders	(11) 6%	Mobility	(4) 36%
		Quality of Life/Well-being	(4) 36%
		Voice Quality	(3) 27%
		Cognitive Function	(3) 27%
		Other[c]	(8) 73%
Heart, Lung, & Kidney	(10) 5%	Pain	(4) 40%
		Anxiety	(3) 30%
		Dyspnea	(3) 30%
		Other[c]	(10) 100%
Intensive Care Unit	(10) 5%	Sedation	(5) 60%
		Anxiety	(4) 60%
		Vitals[b]	(3) 40%
		Other[c]	(7) 70%
Pregnancy/Labor & Delivery	(10) 5%	Pain	(6) 60%
		Anxiety	(5) 50%
		Other[c]	(5) 50%
Acute Care/Hospitalization	(7) 4%	Pain	(5) 71%
		Vitals[b]	(4) 57%
		Anxiety	(4) 57%
		Mood	(3) 43%
		Other[c]	(4) 57%
Older Adults/Long-Term Care	(7) 4%	Depressive Symptoms	(4) 57%
		Other[c]	(7) 100%
Diagnostics[e]	(6) 3%	Pain	(5) 83%
		Anxiety	(4) 66%
		Satisfaction	(3) 50%
		Other[c]	(2) 33%
Emergency Room	(3) 2%	Anxiety	(2) 67%
		Pain	(2) 67%
		Other[c]	(2) 67%

Patient Population	**(n) %**	**Corresponding Outcomes (most frequently cited)[a]**	**(n) Valid %**
Tinnitus	(2) 1%	Tinnitus Severity	(2) 100%
		Other[c]	(2) 100%

[a]Specific outcomes are listed when measured in ≥ 3 studies (exception is Emergency Room and Tinnitus where we list outcomes reported in ≥ 2 studies).

[b]Vitals includes heart rate, blood pressure, respiration rate, oxygen saturation.

[c]Other refers to the number of studies where investigators measured an outcome other than those listed in the table.

[d]Patients' care focused on disease/symptom management (e.g., fibromyalgia, diabetes, chronic pain).

[e]Patients undergoing diagnostic procedures (e.g., colonoscopy, needle electromyography).

Table 3

Music intervention terminology specificity and definition frequency

Terminology/Specificity (General to Specific)	Frequency (n)	Definition Provided (n) Valid %	
		Yes	No
GENERAL (n= 19 Terms)			
Music Therapy	129	(54) 42%	(75) 58%
Music Intervention	50	(10) 20%	(40) 80%
Music Listening	19	(7) 37%	(12) 63%
Music Medicine	9	(6) 67%	(3) 33%
Music Activity	2	(2) 100%	–
Music Program	2	–	(2) 100%
Therapeutic Music	2	–	(2) 100%
Individualized Music	1	(1) 100%	–
Music as Therapy	1	–	(1) 100%
Music as a Nursing Intervention	1	–	(1) 100%
Music as a Therapeutic Modality	1	(1) 100%	–
Integrative Therapy	1	(1) 100%	–
Group Music Activities	1	(1) 100%	–
Auditory Intervention	1		(1) 100%
Oriental Medicine Music Therapy	1	(1) 100%	–
Non-Pharmacological/Complementary	1	(1) 100%	–
Neuro-Music Therapy	1	–	(1) 100%
Music Supported Therapy	1	(1) 100%	–
Music Supported Music Therapy	1	(1) 100%	–
SUBTOTAL	225	(87) 39%	(138) 61%
INCREASED SPECIFICITY (n=17 Terms)			
Music Relaxation	2	(1) 50%	(1) 50%
Relaxation and Music	2	–	(2) 100%
Sedative Music	2	(2) 100%	–
Cognitive Behavioral Music Therapy	2	(1) 50%	(1) 50%
Ambient Therapy	2	(1) 50%	(1) 50%
Music Analgesia	1	(1) 100%	–
Imagery with Music	1	(1) 100%	–
Contingent Music	1	–	(1) 100%
Audio-analgesia	1	–	(1) 100%
Passive Music Listening	1	–	(1) 100%
Slow Breathing	1	(1) 100%	–
Sleep Induced Music	1	(1) 100%	–
Singing Training	1	–	(1) 100%

Terminology/Specificity (General to Specific)	Frequency (n)	Definition Provided (n) Valid %	
		Yes	No
Recreational Music Therapy	1	–	(1) 100%
Purpose-Designed Musical Compositions	1	–	(1) 100%
Neurologic Music Therapy	1	(1) 100%	–
Preferred Music Listening	1	(1) 100%	–
SUB-TOTAL	22	(11) 50%	(11) 50%
SPECIFIC TECHNIQUE or INTERVENTION (n=15 Terms)			
Rhythmic Auditory Stimulation	3	(1) 33%	(2) 67%
Modified Melodic Intonation Therapy	1	(1) 100%	–
Melodic Intonation Therapy	1	(1) 100%	–
Heidelberg Model of Music Therapy for Tinnitus	1	(1) 100%	–
Guided Imagery with Theta Music	1	(1) 100%	–
Binaural Beat	1	(1) 100%	–
Jacquez-Dalcroze Eurhythmics	1	(1) 100%	–
Therapeutic Music Video Intervention	1	(1) 100%	–
Tailor-Made Notched Music Training	1	(1) 100%	–
Ronnie Gardiner Rhythm and Music Method	1	(1) 100%	–
Music Reminiscence Therapy	1	(1) 100%	–
Patterned Sensory Enhancement	1	(1) 100%	–
Neuromonics	1	(1) 100%	–
YUBA Method	1	–	(1) 100%
Music Therapeutic Caregiving	1	(1) 100%	–
SUB-TOTAL	17	(14) 82%	(3) 18%
TOTAL: TERMS (n=51)	264	(112) 42%	(152) 58%

Table 4

Interventionist education, professional background, and training

Interventionist Education, Professional Background, Training (n=187 studies)	(n)[a] Valid %	Degree Level (n) Valid %			
		Bachelors	Masters	Doctorate	Not Specified
Professional Background (Requires Degree & Credentialing)					
Credentialed Music Therapist (MT)	(61) 33%	(3) 5%	(7) 12%	(8)13%	(43) 70%
Registered Nurse (RN)	(12) 6%	–	(1) 8%	–	(11) 92%
Counselor	(1) < 1%	–	–	–	(1) 100%
Neuropsychologist	(1) < 1%	–	–	–	(1) 100%
Psychiatrist	(1) < 1%	–	–	–	(1) 100%
Psychotherapist	(1) < 1%	–	–	–	(1) 100%
Occupational Therapist	(1) < 1%	–	–	–	(1) 100%
Certificates					
NMT Certificate[b]	(2) 1%	–	–	–	(2) 100%
Certified Music Practitioner	(1) < 1%	(1) 100%	–	–	–
Certified RGRM Facilitator	(1) < 1%	–	–	–	(1) 100%
Other					
Music Therapeutic Caregiving Training	(1) < 1%	–	–	–	(1) 100%
Sonas Training	(1) < 1%	–	–	–	(1) 100%
Professional Musician	(1) < 1%	–	–	–	(1) 100%

RGRM= Ronnie Gardiner Rhythm and Music; NMT= Neurologic Music Therapy

[a] Three studies had interprofessional intervention delivery.

[b] Both professionals were also Credentialed Music Therapists.

Table 5

Music intervention content and interventionist professional background

Music Experience Intervention Components *(Definition)* **(Total Interventions n=201)**[a]	**(n) Valid %**	**Interventionist Professional Background**			
		Not Specified	**Credentialed Music Therapist**	**Registered Nurse**	**Other**[b]
Single Component Interventions (n=136)					
Listening *Participants listen to live or recorded music.*	(104) 76%[b]	(75) 72%	(14)13%	(12) 12%	(4) 4%
Live Music	(13) 12%	(5) 38%	(6) 46%	–	(2) 15%
Recorded Music	(91) 88%[b]	(70) 77%	(8) 9%	(12) 13%	(2) 2%
Music-Assisted Relaxation *Music used to structure relaxation exercises (e.g., progressive muscle relaxation, autogenic).*	(7) 5%	(5) 71%	(2) 29%	–	–
Re-Creating Music by Singing/Playing Instruments *Participants sing and/or play pre-composed songs/music.*	(3) 2%	(1) 33%	(1) 33%		(1) 33%
Improvisation *Participants or interventionist creates music in the moment.*	(3) 2%	–	(3) 100%	–	–
Lyric Analysis *Participants discuss meaning of song lyrics.*	(4) 3%	–	(3)75%	–	(1) 25%
Songwriting *Participants engage in lyric writing and/or musical composition.*	(3) 2%	(1) 33%	(2) 67%	–	–
Imagery *Music used to support or facilitate visual imagery.*	(1) <1%	(1) 100%			
Movement *Music used to structure, facilitate, or encourage movement.*	(2) 1%	(1) 50%	(1) 50%	–	–
Breathing Entrainment *Rhythmic/temporal qualities of music structure rate of breathing; synchronization between breathing/rate of music.*	(1) <1%	(1) 100%	–	–	–
Instrument/Vocal Play *Play that combines non-music play materials with singing and/or playing instruments (e.g., children's finger puppet action songs)*	(1) <1%	–	(1) 100%	–	–

Music Experience Intervention Components *(Definition)* (Total Interventions n=201)[a]	(n) Valid %	Interventionist Professional Background			
		Not Specified	Credentialed Music Therapist	Registered Nurse	Other[b]
Other					
Music Recreation	(3) 2%	–	(3) 100%	–	–
Pacifier Activated Lullaby/Music	(2) 1%	(1) 50%	(1) 50%	–	–
Therapeutic Singing	(1) <1%	(1) 100%	–	–	–
Modified Melodic Intonation Therapy	(1) <1%	–	(1) 100%	–	–
Multiple Component Interventions (n=65)					
Re-Creating Music by Singing/Playing Instruments *Participants sing and/or play pre-composed songs/music.*	(38) 58%[b]	(11) 29%	(24) 63%	(1) 3%	(4) 11%
Listening *Participants listen to live or recorded music.*	(35) 54%[b]	(12) 34%	(21) 60%	(2) 6%	(2) 6%
Improvisation *Participants or interventionist creates music in the moment.*	(23) 35%	(5) 22%	(18) 78%	–	–
Movement *Music used to structure, facilitate, or encourage movement.*	(21) 32%[b]	(7) 33%	(12) 57%	(1) 5%	(3) 14%
Music-Assisted Relaxation *Music used to structure relaxation exercises (e.g., progressive muscle relaxation, autogenic).*	(16) 25%[b]	(2)13%	(12) 75%	–	(3) 19%
Imagery *Music used to support or facilitate visual imagery.*	(13) 20%	(3) 23%	(8) 61%	(1) 8%	(1) 8%
Instrument/Vocal Play *Play that combines non-music play materials with singing and/or playing instruments (e.g., children's finger puppet action songs)*	(12) 18%	(6) 50%	(6) 50%	–	–
Songwriting *Participants engage in lyric writing and/or musical composition.*	(12) 18%	(1) 8%	(11) 92%	–	–
Lyric Analysis *Participants discuss meaning of song lyrics.*	(8) 12%	(1) 12%	(6) 76%	–	(1) 12%

Music Experience Intervention Components *(Definition)* **(Total Interventions n=201)**[a]	**(n) Valid %**	**Interventionist Professional Background**			
		Not Specified	**Credentialed Music Therapist**	**Registered Nurse**	**Other**[b]
Breathing Entrainment *Rhythmic/temporal qualities of music structure rate of breathing; synchronization between breathing/rate of music.*	(7) 11%	(1) 14%	(6) 86%	–	–
Other					
Music Reminiscence or Life Review	(7) 11%	(3) 43%	(4) 57%		
Vocal Breathing Exercises, Therapeutic Singing, or Singing Instruction	(5) 8%	(2) 40%	(2) 40%		(1) 20%
Song Recording or Music Video Creation	(3) 5%		(3) 100%		
Music Attention Control Training	(2) 3%[b]		(2) 100%		(1) 50%
Music Assisted Counseling	(1) 2%		(1) 100%		
Vibroacoustic Stimulation	(1) 2%		(1) 100%		
Music Recreation	(1) 2%	(1) 100%			

[a] Several studies had more than one music intervention arm, resulting in 201 interventions.

[†] This intervention component was delivered by more than one interventionist from different professional backgrounds.