



# Prioritizing Dose in Music-Listening Intervention Research

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## **Author's contribution**

The sole author designed, analysed, interpreted and prepared the manuscript.

## **Article Information**

DOI: 10.9734/JOCAMR/2021/v15i330268

### Editor(s):

(1) Dr. Francisco Cruz-Sosa, Metropolitan Autonomous University, México.

### Reviewers:

(1) Sonali Mohan, Centre for Advanced Research in Indian Music Therapy, India.

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(3) Andrews Samraj, Mahendra Engineering colleges, India.

Complete Peer review History: <https://www.sdiarticle4.com/review-history/72314>

**Letter to the Editor**

**Received 15 June 2021**  
**Accepted 20 August 2021**  
**Published 23 August 2021**

## **ABSTRACT**

Music listening interventions (MLI) have grown into a major subcategory in the world of complementary and alternative medicine research. These studies have led to an epistemic explosion in MLI clinical application across many disciplines. However, this body of research still contains a critical handicap that will limit its potential: dose and dosing. Inconsistencies in *how much* of an MLI a research participant receives in a study will continue to impact generalizability until an MLI's dose is both defined and incorporated into clinical trials. This brief paper explores MLI dose, and attempts to frame MLI dose research as a priority for all researchers who utilize this intervention in their studies.

*Keywords: Music; dose; dosage; intervention; music-listening.*

## **1. INTRODUCTION**

Music-listening interventions (MLI) involve dedicated, directed use of passive music listening with the intention of eliciting a biophysiological response. MLIs have generated

positive clinical data in a wide range of clinical phenomena, including pain mitigation [1,2,3], anxiety mitigation [2], chemotherapy-induced nausea and vomiting mitigation [4], and fatigue [5]. This trend is encouraging, and demonstrates the dedication and resolve of investigative teams,

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especially within a larger research atmosphere that sometimes disfavors complementary modalities as less than scientifically based. Still, despite the epistemic gains in MLI research, a critical handicap remains that may prevent the field from graduating into the realm of clinical practice guidelines. That handicap is dose. At the present time, there appears to be no universally acceptable conceptual nor operational definition for what constitutes MLI dose. Without this first step toward dose standardization, critics of the science can easily dismiss MLI research findings by suggesting participants received different music doses within a study. Worse still, dose discrepancies within a study make data pooling and meta-analytic studies nearly impossible to run without serious threats to validity. By prioritizing dose in MLI research, investigators can move the science forward with the data necessary to begin establishing conceptual and operational definitions, standardized dose schemas, and studies that investigate dose-response relationships.

## 2. DISCUSSION

The first area researchers must define is what, conceptually, an MLI dose is. Merriam-Webster lists the definition of 'dose' as the "measured quantity of a therapeutic agent." (<http://merriam-webster.com/dictionary/dose>). If we accept this, it then becomes necessary for MLI researchers to discuss, argue, critique, and amend what constitutes a "measured quantity." This is not as simple as it may first appear. Agreeing on the measured quantity implies agreeing on the variables that together form said quantity. Contemplating these variables inherently involves contemplating the operational definition's components for MLI dose. Is the decibel volume part of an MLI's dose? If it is, then study designs should investigate it by administering MLIs at different decibel volumes and performing hypothesis testing for dose-response relationships. A similar question can be asked with regard to the duration of an MLI. If the research community agrees that duration of exposure to an MLI forms a dose variable, then it makes logical sense to design study arms comparing MLIs with different durations, again with hypothesis testing for dose-response relationships.

MLI frequency (how often an MLI is engaged) may be another possible variable inside the operational definition for MLI dose. Would MLI researchers agree that a participant who

engages an MLI more frequently than another has received a higher total music dose? If so, this total dose must be weighed against any known length of effect, if any literature exists to demonstrate it. To give a clinical example, a 2017 study by Bilgic and colleagues [6] had participants receive an MLI during chemotherapy infusion. Measures for the MLI's effect were taken pre-MLI and again one week after. It is not yet known, however, if the therapeutic effect of an MLI lasts this long. The concept of an MLI therapeutic window, however, is also novel and not yet well researched. If researchers knew how long a single MLI lasted therapeutically, study designs could account for this by specifying MLI frequencies that coincide with the end of the therapeutic window.

The examples above of decibel volume, duration of listening, and frequency of engagement are simply a few ideas for MLI researchers going forward. The suggestions are not meant to be comprehensive, and it may be that more variables exist that constitute MLI dose. The important point is that we begin the conversation of dose, dosage, and how to best build studies to examine these. Increasing generalizability of MLIs is the best means by which to move the evidence level to that of clinical practice guidelines, and it is the opinion of this paper that attention to dose is a key factor. This point was not lost on the 2018 Music and the Brain: Finding Harmony [7] workshop at the National Institute of Health in the United States, the published paper from which listed MLI dose as a necessary area for future research.

## 3. CONCLUSION

This paper has argued that the dose of a music listening intervention is presently undefined, and that it should be a research priority for MLI investigators. Fundamental to this work is a conceptual and operational definition that is widely agreed upon. Once in place, these definitions require consistent use with the intent of producing strong data that can be analyzed across multiple studies. As the pool of interested MLI researchers continues to grow, it will be to everyone's benefit when MLI dose is addressed, examined, and lays a stronger foundation for music listening research in the future.

## CONSENT

It is not applicable.

## ETHICAL APPROVAL

It is not applicable.

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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