

basis of these findings. More generally, algorithmic music allows the participant to bypass cultural factors, such as genre, musical skills and knowledge, personal background, etc. With respect to the specific area of pain, it is possible to model music based on two aspects that the literature has deemed fundamental: relaxation and distraction [5]. To date, the modeling has concerned three levels of perceived pain intensity (high, moderate, and mild).

Algorithmic music allows a modulation and regulation of the stimulus that can also adapt to different levels of perceived pain. Randomized controlled studies that compare the effects of algorithmic music (based on specific structures and parameters), traditional music (based on similar characteristics and chosen taking into account the subject's musical tastes), and usual care are needed to increase the scientific level of knowledge in the approach to treating pain with music. A first pilot study was carried out in the context of work-related stress [6], and others are ongoing in oncology (reduction of anxiety and stress in radiotherapy treatment) and in the area of persistent pain in patients with fibromyalgia. Algorithmic music is an attempt to bring art and science closer together, in order to increase awareness and effectiveness in the use of music listening in therapeutic contexts; it constitutes a

new perspective integrating art, science, and technology in the service of medicine, in clinical work and in research.

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Letter to the Editor

OXFORD

In Response: What Happens When Algorithmic Music Meets Pain Medicine

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Conflicts of interest: None.

Dear Editors, We would like to thank Dr. Raglio for writing his letter in response to our original research article, “The Impact of Music on Nociceptive Processing,” and acknowledge several important points that he raises therein [1]. We very much agree that the analgesic effect of music is complex, with any given type

of music being variably effective, based on individual preferences. This personal and interindividually variable nature of music enjoyment may in fact complicate the study of specific components of music impact on pain, making the discernment of relevant patient individual psychosocial phenotypes crucial to understanding

variations in effect. While one can understand the average effect of certain song components (sound, melody, harmony, rhythm, texture, structure, or expression), any given element may impact individual listeners differently. To account for individualized thrills associated with music, some investigators have allowed study participants to select their preferred music from a predefined library or the participant's personal library. Dr. Raglio's letter stated that we had used such an approach, allowing subjects to choose their own music through an app. However, this actually was not the case, and we apologize if this was not clear from the methods. In our study, we in fact utilized an app called Unwind, which creates music algorithmically, but with several specific tracks available as samples for participants to hear, and participants then selected the one that appealed to them the most [2]. We read with great interest Dr. Raglio's reference to Melomics-Health's use of a generative algorithm to create new music based on a therapeutic logic [3]. As Dr. Raglio enumerates, this algorithmic strategy of music generation, which appears somewhat similar to the app we used, has several advantages to user-selected or therapist-selected music. Algorithmic music that employs isolated components of music that are known to be rewarding may present specific, culturally agnostic stimuli to participants in the laboratory setting, allowing a relatively proven but somewhat standardized stimulus to study the impact on pain mechanisms. Additionally, algorithmic music can produce "new" musical signatures, and as such it may add novelty, which is in itself engaging and rewarding, by remixing targeted interventions that have an evidentiary basis on laboratory work using the same musical components. Future work investigating the relative importance of novelty, familiarity, and emotional attachment vs specific musical elements to therapeutic benefit for a given

individual is needed, as are systems that allow patient personalization.

As clinicians, we also recognize the importance of studying musical components that can be integrated into an acceptable intervention for the real-world patients we manage in our clinical practice. While we describe here the mechanistic effects of music on laboratory-based standardized pain stimuli, ultimately these effects must be evaluated among individuals who are experiencing clinical pain, and many previous studies have suggested an analgesic benefit. We have recently published a feasibility study in a clinical environment (emergency department), and we are beginning to understand how and whether and especially for which patients music interventions may be most helpful in clinical practice [4]. In particular, we found that patients with high levels of pain catastrophizing benefitted most. We look forward to other future mechanistic and pragmatic studies that assess the adjunctive integration of music with other pain therapies.

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Retraction

OXFORD

Retraction of "Clinical Efficacy of Ultrasound-Mediated Transdermal Lidocaine and Capsaicin Delivery for the Treatment of Allodynia Caused by Herpes Zoster"

The authors are retracting the article "Clinical Efficacy of Ultrasound-Mediated Transdermal Lidocaine and Capsaicin Delivery for the Treatment of Allodynia Caused by Herpes Zoster" by Yue-e Dai, et al. (*Pain Medicine*, <https://doi.org/10.1093/pm/pnaa137>, published

10 June 2020) after a reader noted data in multiple tables and figures duplicated, without attribution, tables and figures previously published in "The safety and therapeutic efficacy of ultrasound drug infiltration on skin hyperalgesia" by Yue-e Dai, et al. (*International Journal of*