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Editorial: New advances and novel applications of music technologies for health, well-being, and inclusion

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Editorial on the Research Topic

[New advances and novel applications of music technologies for health, well-being, and inclusion](#)

The field of research dedicated to the design, creation, use, and evaluation of new sound and music technologies supporting health, wellbeing, and inclusion is rapidly expanding. Numerous research efforts are taking place at the intersection of areas such as universal design, accessibility, music therapy, music technology, sonic interaction design, and human-computer interaction (HCI). This Research Topic explores such intersections in music technology research aimed at promoting health, wellbeing, and inclusion, investigating how new methods, technologies, interfaces, and applications can enable everyone to enjoy the benefits of sound and music.

Previous Special Issues exploring similar topics include, for example, work by [Magee \(2011\)](#), [Rickard \(2014\)](#), and [Schroeder and Michon \(2021\)](#). A summary of the state of the art in music technology applied in various health scenarios was presented by [Agres et al. \(2021\)](#). [Falkenberg and Frid \(2021\)](#) also published an overview of methodological considerations for designing and reporting research on sound design and music for health. In addition, an online network called *Musical Care International Network*¹ was recently launched to bring people together to discuss and advocate for *musical care*, defined as the role of music listening and music-making in supporting any aspect of people's developmental or health needs ([Spiro et al., 2023](#)).

The papers published here reflect the diversity in practices and methods in this interdisciplinary research field. Common themes that reoccur are interfaces focused on accessibility of musical expression—in particular, the design and development of Accessible Digital Musical Instruments (ADMIs; see [Frid, 2019](#))—and sound and music listening applications aimed at improving health and wellbeing. The papers demonstrate a richness in the methodological approaches employed, from third-wave HCI practices ([Bødker, 2006](#)) and action research ([Reason and Bradbury, 2001](#)) with emphasis on understanding the importance of the sociocultural context of musical interactions (see [Waters, 2021](#)) and the lived experience of the persons interacting with ecological artifacts ([Bødker, 2006](#)), to quantitative analysis of more traditional listening experiments.

¹ <https://musicalcareresearch.com/musical-care-network/>

The paper by Ward presents the *Modular Accessible Musical Instrument Technology Toolkit (MAMI Tech Toolkit)*, developed over 5 years. It describes each of the tools in the toolkit, the functionality they offer, as well as the accessibility issues they address. In the paper by Lindetorp et al., the authors discuss a novel system consisting of commercially available accessible instruments from *Funki*² which enables students with Profound and Multiple Learning Disabilities (PMLD) to play music together with their assistants and a professional musician. Findings highlight how a system of networked and synchronized ADMIs could be conceptualized to include assistants more actively in collaborative music-making. Moreover, design considerations that support the assistants' roles as facilitators in such a context are discussed. In the work presented by Duarte et al., the authors explore the impact of different disability models in the process of designing inclusive music technology, with a case study focused on categorizing eleven ADMIs targeting d/Deaf people based on the medical, social, and cultural³ disability models. The authors identify a lack of participatory approaches and an overall tendency toward the medical model of disability for the surveyed ADMIs. Finally, McMillan and Morreale describe an autoethnographic study of the lived experience of the first author, a disabled musician, proposing to use conceptual metaphors (Waters, 2021) and cultural probes (Gaver et al., 1999) as tools to account for the subjective experience, ecology, and specificity that contribute to a successful musician-instrument relationship.

The Research Topic also includes two papers in review format (Paisa et al., Lenzi et al.). Paisa et al. reviewed systems for tactile augmentations that provide inclusive musical experiences for persons who are deaf or hard of hearing. Results indicate that the research field is in an early phase, characterized by an exploratory approach and preliminary results, with most of the studies conducted in laboratory settings with small sample sizes, and sometimes low validity, for example due to evaluations not being performed with the intended user group (e.g., system designs intended for persons with cochlear implants evaluated with persons without hearing loss). These findings resonate with what was concluded regarding studies based on the medical model of disability, discussed in the paper by Duarte et al. The second review paper, published by Lenzi et al., presented a semi-systematic review of scientific literature on sound assessment studies in Neonatal Intensive Care Units. The authors emphasize the need for a sound quality assessment solution for indoor environments.

In the paper by Krause and Fletcher, the authors explore—through semi-structured interviews with radio personnel and focus groups with older adults—how radio personnel and listeners regard the purpose of radio, and how engaging with radio is perceived to influence wellbeing. Findings indicate that there are implicit and explicit ways in which radio facilitates wellbeing. The authors conclude that these findings may have implications for both broadcasting practices and future work on how radio might be used as an accessible tool for promoting quality of life in seniors.

² <https://www.funki.se/>

³ Also referred to as the *social identity or cultural affiliation model*.

The paper by Ramadas et al. also focused on a user group of older adults. The authors describe a pilot experiment using

Carnatic Classical music as an intervention for improving auditory processing and cognitive skills. The intervention protocol resulted in improvements in auditory temporal processing skills and better speech perception in noise.

The paper by Agres et al. introduces *AffectMachine-Classical*, a music generation system capable of generating affective Classical music in real-time. *AffectMachine-Classical* was designed to be embedded into interactive interfaces or biofeedback systems (such as brain-computer-interfaces) to help users become aware of, and ultimately mediate, their own dynamic affective states, in support of real-time emotion self-regulation. Findings from a listening experiment indicated that the system is effective in communicating various levels of arousal via music, and is also quite convincing in terms of valence.

The editors are excited to share this Research Topic with the wider research community, and in doing so contribute to the growing body of knowledge surrounding music technology for health, wellbeing, and inclusion.

Author contributions

EF: Writing – original draft, Writing – review & editing. KF: Writing – review & editing. KA: Writing – review & editing. AL: Writing – review & editing.

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References

- Agres, K. R., Schaefer, R. S., Volk, A., van Hooren, S., Holzapfel, A., Dalla Bella, S., et al. (2021). Music, computing, and health: A roadmap for the current and future roles of music technology for health care and well-being. *Music Sci.* 4:2059204321997709. doi: 10.1177/2059204321997709
- Bødker, S. (2006). "When second wave HCI meets third wave challenges," in *Proceedings of the Nordic Conference on Human-Computer Interaction: Changing Roles, NordiCHI '06* (New York, NY: Association for Computing Machinery), 1–8.
- Falkenberg, K., and Frid, E. (2021). "Designing and reporting research on sound design and music for health: Methods and frameworks for impact," in *Doing Research in Sound Design* (Waltham, MA: Focal Press), 125–150.
- Frid, E. (2019). Accessible Digital Musical Instruments—A review of musical interfaces in inclusive music practice. *Multi. Technol. Interact.* 3, 57. doi: 10.3390/mti3030057
- Gaver, B., Dunne, T., and Pacenti, E. (1999). Design: Cultural probes. *Interactions* 6, 21–29.
- Magee, W. L. (2011). Music technology for health and well-being: The bridge between the arts and science. *Music Med.* 3, 131–133. doi: 10.1177/1943862111411719
- Reason, P., and Bradbury, H. (2001). *Handbook of Action Research: Participative Inquiry and Practice*. Newcastle upon Tyne: Sage.
- Rickard, N. S. (2014). Editorial: "Music and well-being" Special issue of psychology of well-being. *Psychol Well-Being* 4, 1–3. doi: 10.1186/s13612-014-0026-3
- Schroeder, F., and Michon, R. (2021). Editorial: Accessibility of musical expression: Co-edited journal with selected papers of NIME2020. A special issue commissioned by MIT. *Comput. Music J.* 44, 180.
- Spiro, N., Sanfilippo, K. R. M., McConnell, B. B., Pike-Rowney, G., Bonini Baraldi, F., Brabec, B., et al. (2023). Perspectives on musical care throughout the life course: Introducing the musical care international network. *Music Sci.* 6. doi: 10.1177/20592043231200553
- Waters, S. (2021). The entanglements which make instruments musical: Rediscovering sociality. *J. N. Music Res.* 50, 133–146. doi: 10.1080/09298215.2021.1899247