Towards Capturing the Therapeutic Effects of Music in Everyday Life: Building The BEATS Dataset

Benjamin Gutierrez Serafin*, Tanaya Guha*, and Fahim Kawsar*†
* University of Glasgow.
† Nokia Bell Labs.

I. Introduction

The role of music in supporting health and well-being is steadily gaining strong research attention. Unlike traditional health practices, music as a health intervention offers unique advantages such as being non-intrusive, cost-effective and no reported adverse side effects. Despite its promise, replicating results across studies remains a central challenge, preventing a unified understanding of which musical features consistently elicit specific physiological responses [1].

Recognising valence and arousal levels via physiological indicators, and regulating them through targeted interventions, could drive innovation in healthcare [2]. Therefore, a reliable and reproducible taxonomy of therapeutic audio features with corresponding physiological correlates could guide the design of more effective music-based health interventions. A potential source for the lack of consensus may stem from methodological biases, as constrained lab environments dominate research and these settings may suppress natural responses to music.

Fortunately, recent advancements in wearable technology and music streaming platforms offer new opportunities to capture realistic physiological responses to acoustic stimuli, enabling in-the-wild data collection at an unprecedented scale [3]. With these tools now at our disposal, is it now possible to move beyond the lab and discover how particular musical features truly influence our physiology?

II. System Description

This study presents a platform that is being used to collect a dataset of authentic responses to music in real-world environments through continuous physiological monitoring [1] alongside real-time music tracking [2]. Figure 1 illustrates the system architecture, outlining the methodology, core components, and data collected [3].

Stimuli Selection: Therapeutic tracks were systematically selected using keywords linked to functions of music to support well-being identified in music psychology research. A semantic ranking algorithm [4] was developed to align keywords with Spotify editorial playlists and select the most relevant entries based on description, popularity, and other pertinent attributes to facilitate acoustic analysis.

API & Study Portal: The infrastructure includes an API that manages participants, devices, and Spotify credentials while interfacing with a custom-built web portal for study enrolment, presenting validated questionnaires and monitoring engagement with the study playlists. The system also features scripts for real-time playback tracking, alignment of physiological data with music, and scheduled survey distribution.

In-the-Wild Data Collection: Thirty participants will engage in their everyday activities for three weeks while using a pre-configured Spotify account and wearing a device at all times. They are encouraged to engage with the playlists when they believe the intended effects are relevant to their current state. Participants are expected to listen to each playlist at least once, and will be prompted to submit brief self-reports evaluating their listening experience.

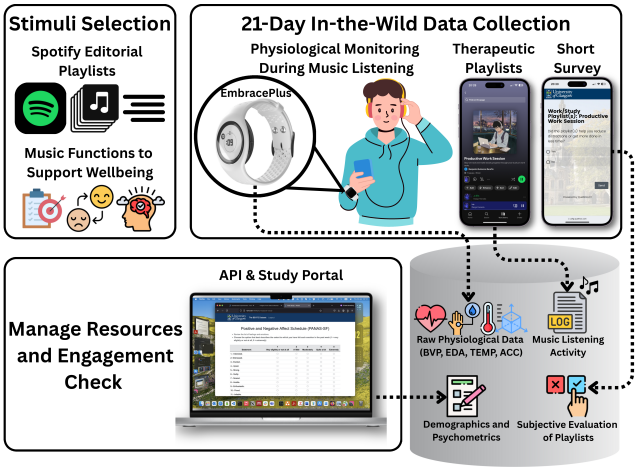

Fig. 1. Overview of platform key elements enabling data collection from music listeners in free-moving environments over an extended period of time.

Data Records: All participant data is anonymised and stored in dedicated directories, with records including demographic (e.g., gender, age), individual differences (e.g., personality traits, music preferences), and pre/post-experiment wellbeing measures (e.g., stress, depression). It also includes music listening activity, raw physiological data (BVP and EDA indexing affective states), and self-reports evaluating whether the playlists produced the intended effect.

III. Discussion & Future Work

This study presents a unique opportunity to generate a first-of-its-kind dataset to study how music influences our physiology in everyday life. Following data acquisition, the dataset will be analysed to identify consistent physiological patterns across individuals and map them to therapeutic acoustic features for intervention design. Particular focus will be placed on generating adaptive auditory patterns to moderate arousal levels. Additionally, the resulting dataset will be made publicly available to support research in well-being, music psychology, affective computing, and signal processing.

[1] Raw physiological data collected with EmbracePlus.
[2] Enabled via the Spotify Web API.
[3] Some icons sourced from Flaticon.
[4] Embeddings extracted using all-mpnet-base-v2.

References

[1] D. A. Hodges, "Psychophysiological measures," *Handbook of music and emotion: Theory, research, applications*, pp. 279–311, 2010.
[2] S. Saganowski, B. Perz, A. G. Polak, and P. Kazienko, "Emotion recognition for everyday life using physiological signals from wearables: A systematic literature review," *IEEE Transactions on Affective Computing*, vol. 14, no. 3, pp. 1876–1897, 2022.
[3] D. M. Greenberg and P. J. Rentfrow, "Music and big data: a new frontier," *Current opinion in behavioral sciences*, vol. 18, pp. 50–56, 2017.