



Music Therapy as a Pathway to Healing in Carceral and High-Trauma Environments:

Enhanced Social Connections, Reduced Stress, and Altered Nervous System Activity

Shivani Dayal¹, Dayne Rayford¹, Dash Watts¹, Cyril Selase Kwaku Akafia¹, Gertrude Asumpaame Alayne¹, Erin Spring³, Jose Claros³, Patrick Tootle¹, James Abednego Delinois¹, Christine Ramirez¹, Abdullah Türk¹, Marik Hazan², AZA Stephen Allsop^{1,2},

*1. Yale School of Medicine, Department of Psychiatry 2. Center for Collective Healing,
Howard University 3. REID Foundation, The Strategy Group Company*

Yale SCHOOL OF MEDICINE

Learning Objectives

- Theme: **Connection over Correction**
- Learning Objectives:
 - Therapeutic interventions for individuals in the carceral system, or other **high stress and trauma environments** may be overlooked for fear of **budget and accessibility**, but **music-based interventions** are an example of effective, low-cost, and **human-centred** intervention possibilities.
 - **Group-based interventions** that emphasise fostering **social connection** may be effective for **decreasing isolation** and uplifting **collective care**, and therefore are effective strategies for **reducing** isolation-related **health risks** in populations with high stress and trauma levels.



Target population: Communities in the Criminal Justice System and Recovery Facilities

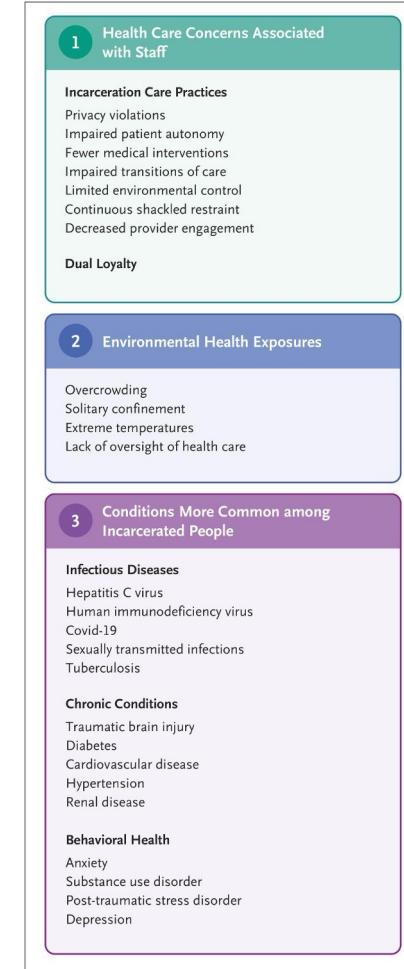
- This population faces a **higher burden of stress and trauma** due to their environment than the average population
 - Research show they face high stress, high trauma, high burden of mental health conditions exacerbated by their environment ^{1, 2, 3}
 - Access issues- why they are often overlooked in human subjects research
- Underserved by therapeutic approaches
 - Accessibility & Cost
 - Logistics of personalised care



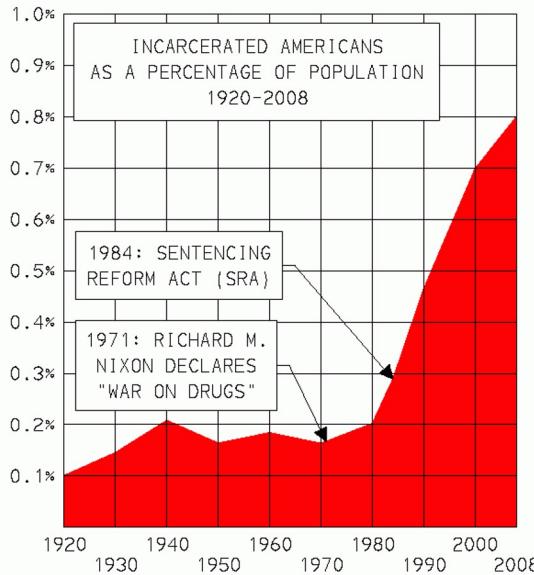
¹ Akyüz, G., Kuğu, N., Sar, V., & Doğan, O. (2007). Nordic Journal of Psychiatry, 61(3), 167-172.

² Kelman, J., Gribble, R., Harvey, J., Palmer, L., & MacManus, D. (2024). Women & criminal justice, 34(3), 171-191.

³ Levin, Y., Bar-Or, R. L., Forer, R., Vaserman, M., Kor, A., & Lev-Ran, S. (2021). Addictive behaviors, 118, 106889. <https://www.nejm.org/doi/full/10.1056/NEJMra2212149>



Broad Context on United States Carceral System



- The **U.S. has the highest incarceration rate** (614 per 100,000) and holds 20-25% of the world's prisoners, despite being only 5% of the global population.
- Policies like the '**War on Drugs**' and '**three strikes law**' have driven mass incarceration.
- "**We could disrupt communities by associating hippies with marijuana and blacks with heroin and criminalizing both.**" - John Ehrlichman, Assistant to the President for Domestic Affairs (on the War on Drugs)
- **The Prison-Industrial Complex** - economic incentive for mass incarceration, cheap captive labor force.



About Music-Based Therapeutic Interventions

- **MBIs (Music-Based Activities)** linked to well-being and recovery
 - Influencing physiological and neurological activity
 - Emotional state
 - Social connectedness
- **Arguments for using MBIs**
 - Cost-effective
 - Accessible
 - Community-based
 - Human-centered
 - Decreasing isolation + uplifting collective care
- ***MBIs potential to address trauma and stress in a biologically-informed manner remains understudied.***



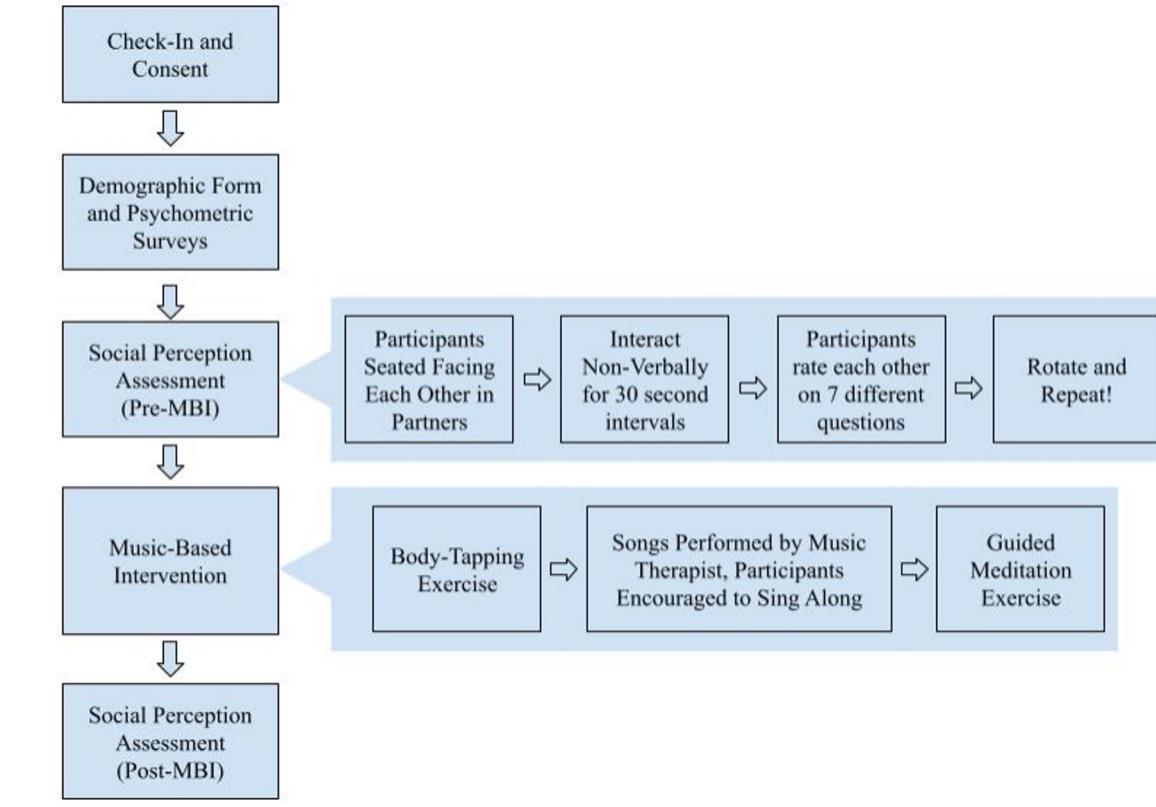
Our Study

- Participants in 3 different carceral centers, a rehabilitation center, and a residential treatment center [N=66, Ages 21-76]
- Investigated how MBIs impact
 - Psychometric measures
 - (such as) **self-reported anxiety, levels of distress**
 - **Biological markers of stress**
 - **Electrical brain activity**
 - **Perceived social connectedness**

...in individuals in high stress, isolating environments



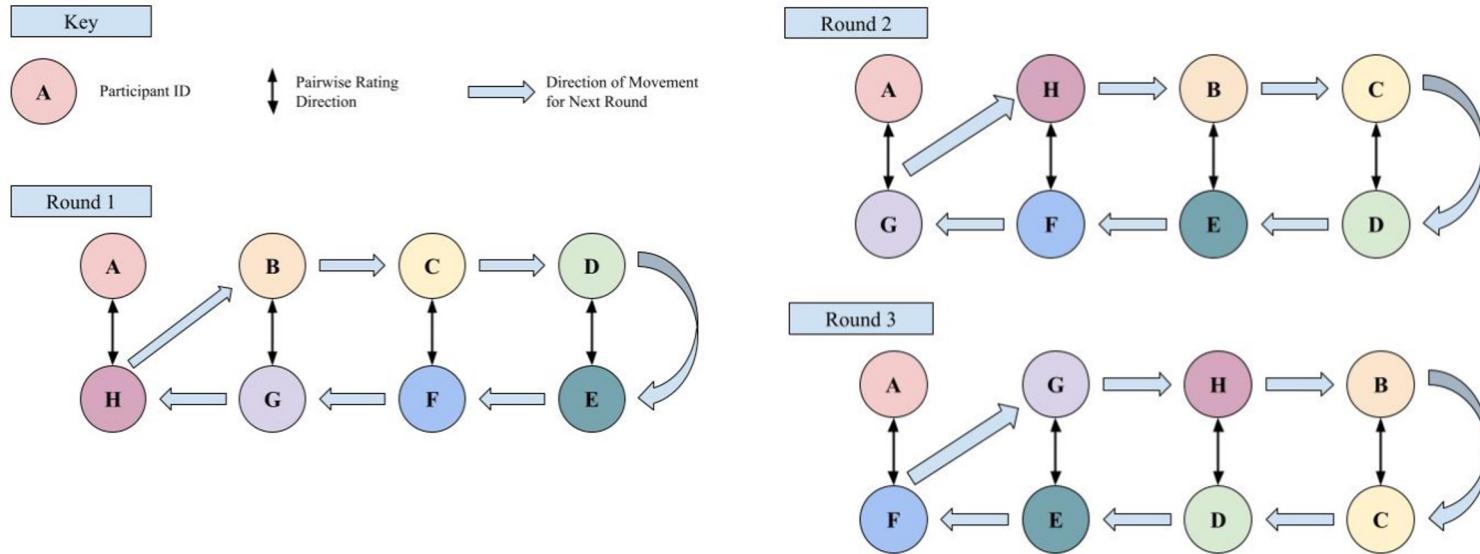
Methods - Study Overview



Methods

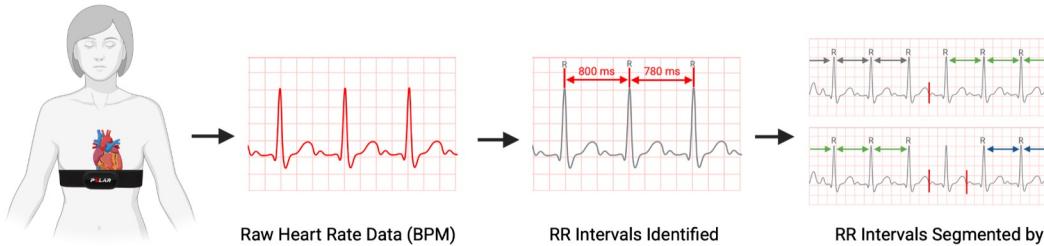
- Used a **Social Perception Assessment (SPA)** to assess the impact of the MBI on participants' perceptions of social connectedness
- Used wearable technology to record **electroencephalography (EEG) signals and heart rate variability data (HRV)** from participants during a group-MBI.
- Collected participants' self-reported scores on **5 different psychometric scales** such as the Beck Anxiety Inventory (BAI), the State Motivation to Foster Social Connectedness Scale (SMFSC), the Watts Connectedness Scale (WCS), and the Absorption in Music Scale (AIMS).

Methods - Social Perception Assessment



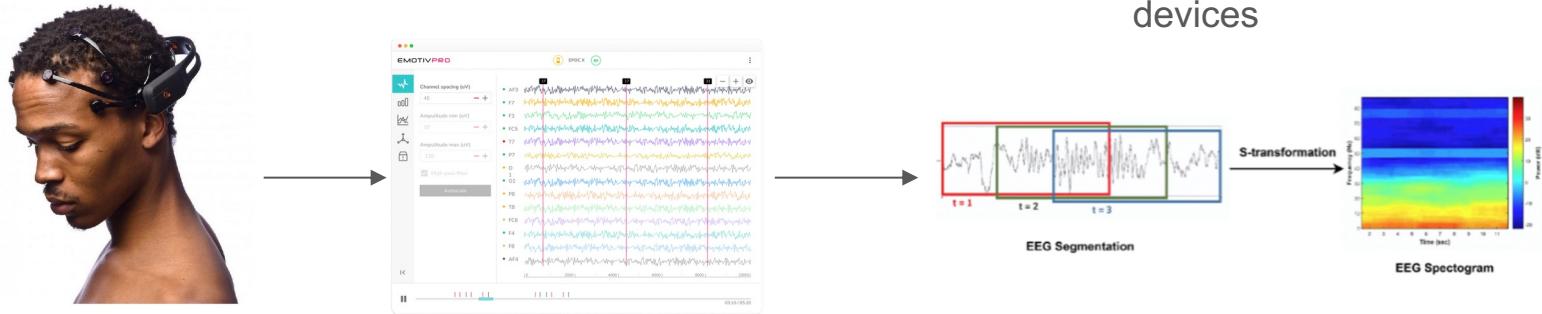
Methods: EEG and HRV Data Collection

A



A. Heart Rate Variability (HRV) data collection through Polar H10 devices

B

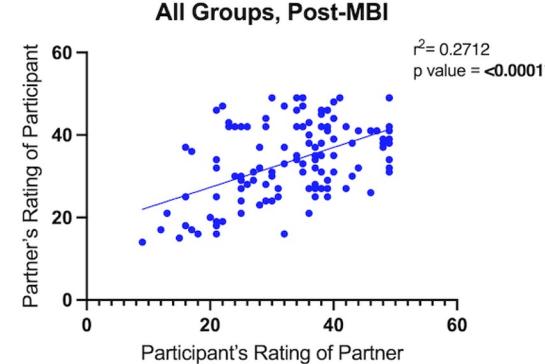
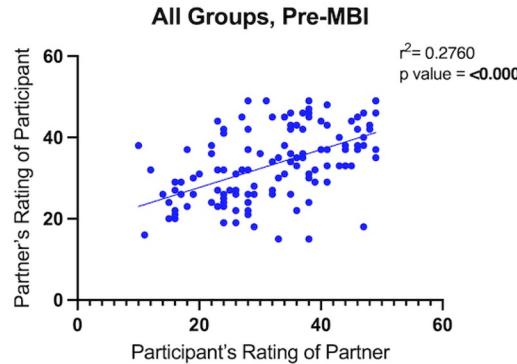
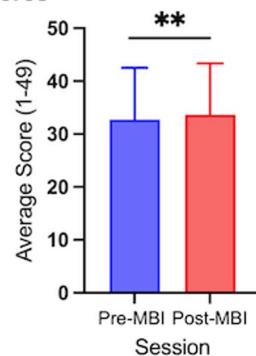
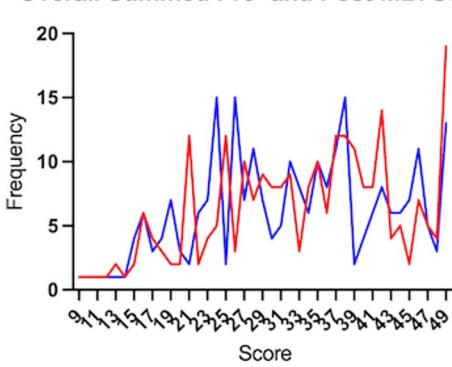


B. Electroencephalogram (EEG) data collection through portable EmotivPro devices

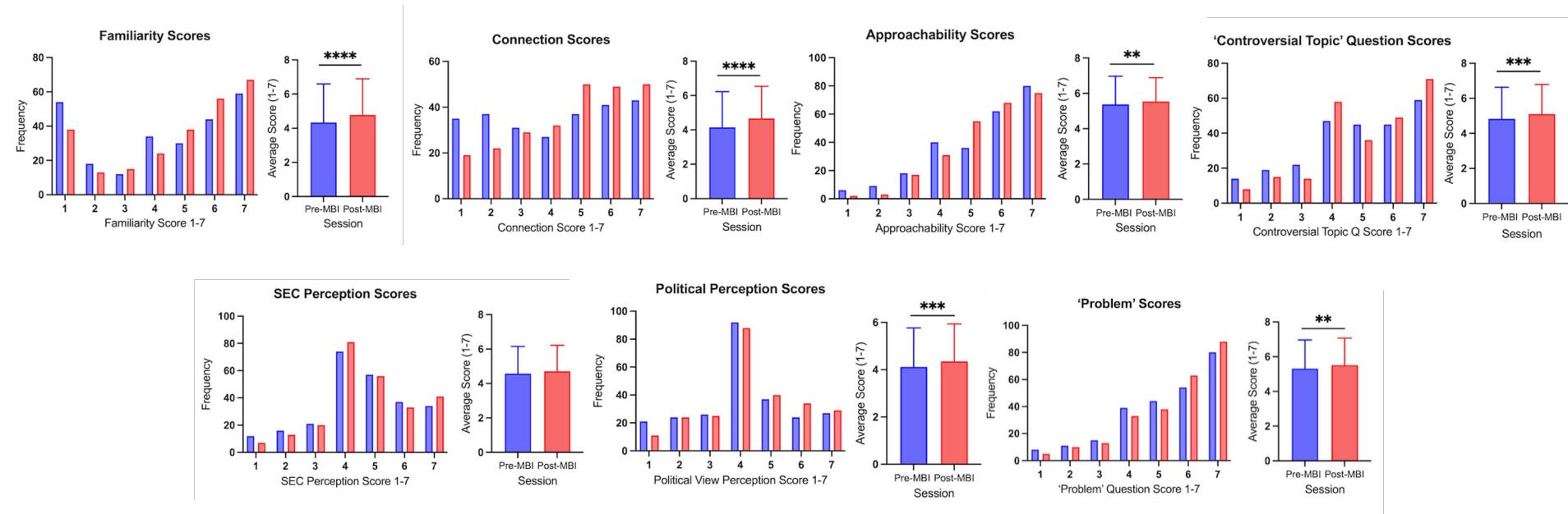
Results: Social Perception Assessment

- Participants' overall self-reported post-MBI connectedness scores (across the 7 questions) significantly increased when compared to pre-MBI scores.

Overall Summed Pre- and Post-MBI Scores

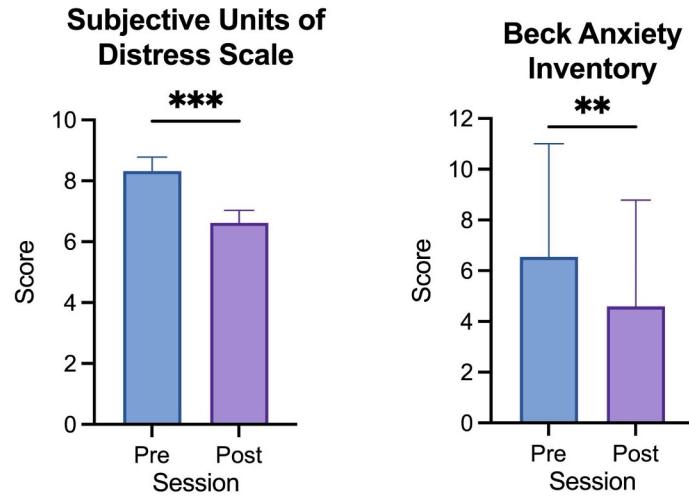


Results: Social Perception Assessment

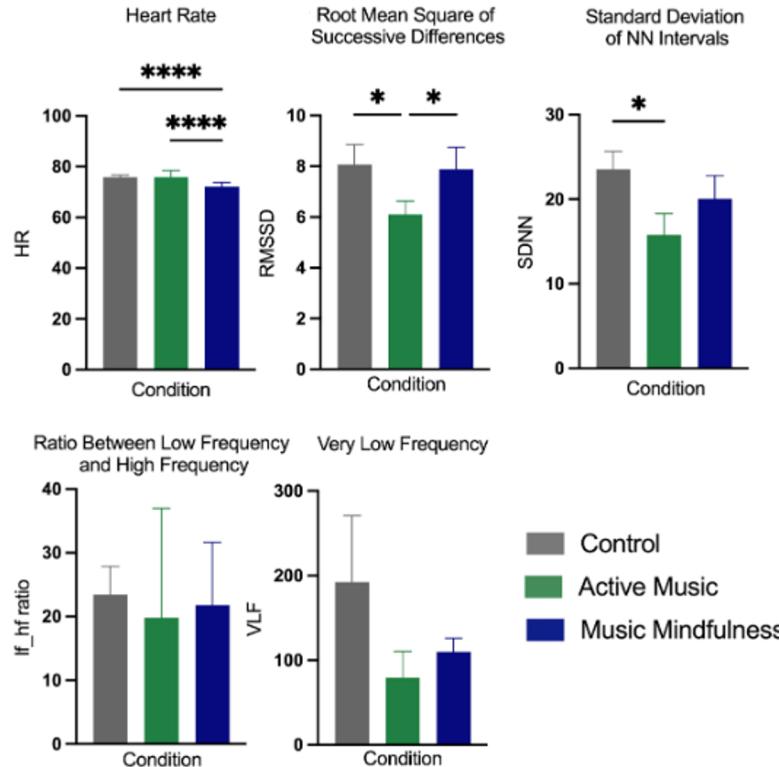


Results: Psychometrics

- An analysis of Psychometric Scores across all groups revealed a significant decrease in Beck Anxiety Inventory (BAI) and Subjective Units of Distress Scale scores after the MBI.



Results: Heart Rate Variability

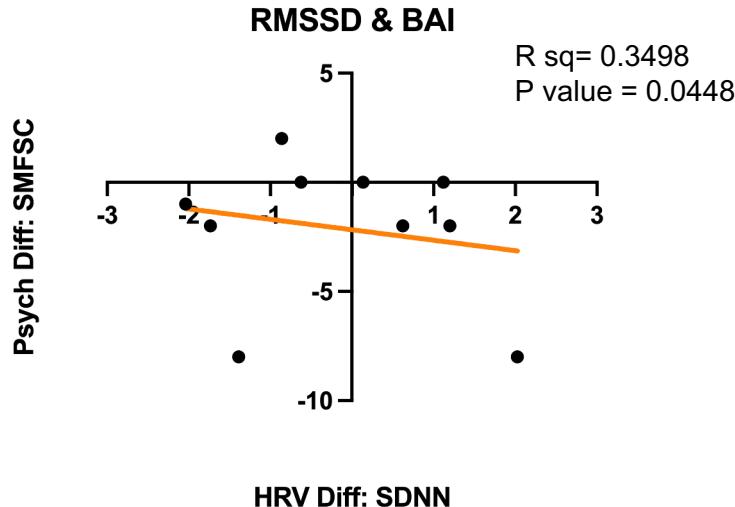


- Heart Rate as well as RMSSD and SDNN (two measures of heart rate variability) were significantly different
- This suggests changes in autonomic nervous system activity while participants were doing music mindfulness as opposed to when they were just engaged socially

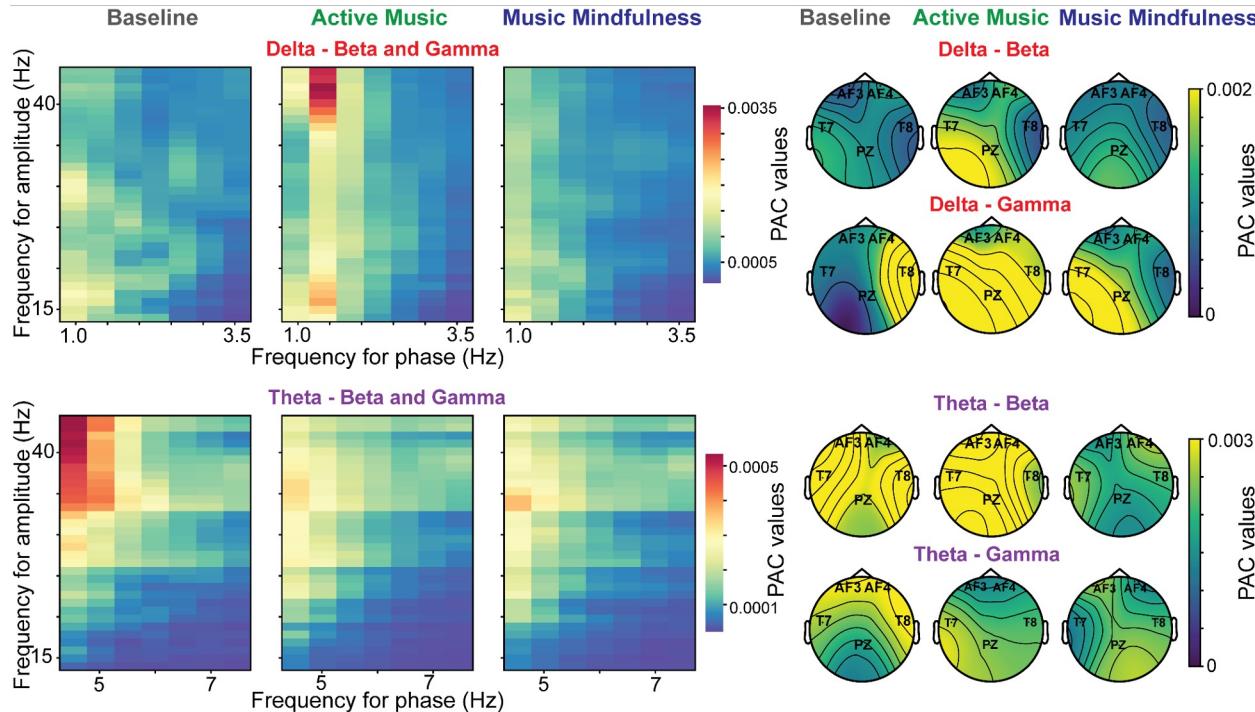


Results: Heart Rate Variability (HRV) and Psychometrics

- HRV data supports that BAI decreased, which points to the fact that participant's self-reported psychometric results were valid.



Results: Electroencephalogram Data



The EEG results:

- Statistically significant coupling occurred between Delta and Gamma frequencies in participants' brain activity!
- This was significantly different when comparing Active Music and Music Mindfulness

Conclusion & Further Research

These findings suggest that music-based interventions decrease anxiety and increase perceived social connections in populations within high trauma environments through mechanisms involving central and autonomic nervous system modulation!

We found interesting differences in heart rate and brain activity between different sections of the music-based intervention, suggesting a combination of methods of analysis such as subjective experience and biological markers of autonomic nervous system activity might be most informative when it comes to music-based therapy approaches.

Participants' Experiences

- We heard and with permission recorded participants' thoughts and voices in our post-study focus groups
- Participants spoke about their experience of the sessions, and about what music means to them
- These audios are used with participants' permission, with messages they wanted to share with people outside their facility



Thank you for your time!!!

Q&A Section

