5-1-2020

Music and Six-Minute Walk-Distance- One Step at a Time: Commentary on “Rhythmic auditory stimulation increases 6-minute walk distance in individuals with COPD: A repeated measures study

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The article by Hernandez and colleagues published in this edition of *Heart & Lung*, reports on original research exploring the use of rhythmic auditory stimulation (RAS) to increase the 6-minute distance walk with individuals diagnosed with chronic obstructive pulmonary disease (COPD). The authors provide clear rationale regarding the use of music to stimulate movement, increase exercise tolerance, and to distract participants from the perception of dyspnea. Through this report, we offer further insights specifically focused on the RAS process, including vital considerations when implementing a music-based intervention in clinical practice settings.

Understanding music as a multisensory experience that can serve multiple functions

The authors provide review of how rhythm and tempo motivate and activate the body for movement. These elements signal the central nervous system (CNS) to stimulate the muscles to engage in movement. The authors also report that music can serve as a means of distraction, overriding the conscious awareness of negative symptoms or discomfort. These are important foundational aspects to understand how music influences the body simultaneously in these various ways. The ability of music to serve these multiple functions is what contributes to it being a valuable therapeutic tool. It is therefore important to understand that music contains other elements also experienced by the patient.

Rhythmic elements (rhythm, tempo, pulse, accents, etc.) are an expression of movement and energy in time. The human body entrains and moves with these rhythms. The consistency and steadiness of rhythm helps the listener to know what to expect (predictability), provides stability and security. The authors utilized rhythmically enhanced music to increase the bass, the deep, lower tones in the music. This helps to provide clear rhythmic signal to the CNS, making it a salient element which captures and holds attention.

While the authors do not explore tonal elements, they engaged the use of tone by enhancing the deep, bass tones to enhance the music for the intervention. Tonal elements (melody, harmony, modality) are an expression of feelings. Deep, low tones function like a gravitation force that helps to ground the body. Using deep, bass tones that are accented on a down beat, helps to pull the leg/foot movement to ground. The integration of the musical elements and how they are organized impact the patient's experience of them. For example, having a consistent tempo, that includes a descending melody with an emphasis on the bass tone just as the patient is to step down, provides the patient stability in their experience, a clear sense of the direction of movement, and means of holding their focus and attention. The musical elements if incorporated precisely during patients' activities have the potential to impact function, which needs to be considered when designing future RAS focused research in COPD patients.

Music selection in music interventions

The authors report providing patients with a list of selections from six different music genres. While it is not explicit how the authors selected the music and what factors informed the selection of these music genres, providing multiple genres does offer patients with some opportunity to choose and exercise their power of choice. Empowering patients with choice help to foster their sense of control, which is vitally important when aspects of their life feel out of their control. Engaging preferred music in a music intervention can enhance the impact of the

music, helping to provide familiarity, increase level of comfort, increase their focus on the music for distraction, and positively impact mood.

Integrating expert knowledge

The authors provided a clear review of the literature on RAS, one of the standardized techniques of Neurological Music Therapy (NMT) (http://nmtacademy.co/training-opportunities/nmt-training-institute/). They clearly describe the NMT prescribed process for calculating patients walking cadence and how this was utilized to determine tempo for the rhythmically enhanced music. The authors clearly bring their knowledge and expertise in their respective areas, there appears to be no involvement of a music therapist in this music intervention study. Interdisciplinary research draws upon the expert skills of various disciplines and ensures that the expert knowledge is integrated to address the complex issues patients face. There is no indication that a music therapist served as a member of the research team.

Implementing a specialized protocol like music warrants engaging a researcher or clinicians that possess the specialized knowledge. Music therapists are trained to understand the impact of music and all its elements on the body. This includes how it impacts the physical body, emotions, and our experiences. While a study intervention may incorporate music and its impact on walking distance, a patient's experience of the music is not limited to how it is impacting gait. Music is not isolated to a physical experience just because that is what is being measured or evaluated in the research study.

Summary and conclusions

It is worth noting is that although the RAS improved the six-minute walk distance, the effects on downstream endurance and other health related outcomes are unclear. The RAS did provide a meaningful distractor during the six-minute testing activity, which resulted in improved distance and cadence, but not in perceived dyspnea, a patient-centered outcome. The lack of difference in perceived dyspnea despite a clinically meaningful improvement in walk distance may be due to the fact that patients in the study had already completed pulmonary rehabilitation, building up endurance and exercise capacity. Patients may have been able to utilize this exercise capacity better due to RAS. The innovative intervention and the promising results should spur the scientific community to foster future multi- disciplinary research incorporating music with movement-one step at a time.