

**EFFECTS OF A DALCROZE-BASED MUSIC INTERVENTION ON THE MOOD OF OLDER  
ADULTS**

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## **Abstract**

Older adults may experience physical, cognitive, social, and mental health challenges associated with aging, which can affect their daily functioning and overall quality of life. These factors have contributed to increased interest in supportive, non-pharmaceutical interventions that may help address these challenges. The present study used a Dalcroze Eurhythmics program as the non-pharmaceutical intervention.

As part of a large international multi-site project, the study conducted for this thesis builds upon the positive outcomes observed during the feasibility study on Dalcroze Eurhythmics programs for older adults. The feasibility study, which I conducted from May to August 2023 at The Royal Ottawa Mental Health Centre, Geriatrics Outpatient Unit, served as the quality improvement phase of the larger project. Therefore, focusing on the music program's immediate effects on mood represents an appropriate step in advancing understanding of its effects.

The purpose of the present study was to examine the immediate effects of each lesson on participants' mood, measured through pre- and post-lesson scores on the Positive and Negative Affect Schedule (PANAS). Additional measures, including the Warwick-Edinburgh Mental Wellbeing Scale (WEMWBS), the Standardized Mini-Mental State Examination (SMMSE), and the Centre of Excellence Self-Administered Questionnaire (CESAM), provided contextual information for interpreting the findings. Semi-structured interviews were conducted to explore participants' experiences with the music program in more depth and how their perceived effects of the program on mood aligned with questionnaire results. The study also aimed to contribute to

the growing body of knowledge regarding effective non-pharmaceutical interventions for older adults by incorporating evidence-based results.

Using a Single-Case Experimental Design (SCED), the present study examined two participants (ages 85 and 84) who took part in an 18-week study that included a Dalcroze Eurhythmics program. The results showed consistent immediate increases in positive affect after each lesson, alongside smaller but noticeable reductions in negative affect. Participants' interview responses aligned with these findings and offered additional insight into their experiences with the music program and its effects on mood.

*Keywords:* Dalcroze Eurhythmics, music intervention, older adults, mood, single-case experimental design, mixed-methods, music and movement

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## **1. Introduction**

The aging population is a growing concern due to rising life expectancy and the increasing number of older adults, commonly defined as individuals aged 65 and above (Statistics Canada, 2007). As preserving the health, well-being, and quality of life of older adults becomes a primary focus for healthcare providers and policymakers, innovative solutions are becoming essential to address these challenges. Specifically, older adults may experience physical health challenges associated with aging, as well as a decline in cognitive function, social isolation, depression, and anxiety (WHO, 2015). These health challenges significantly impact overall well-being, emphasizing the necessity to explore holistic and innovative non-pharmaceutical approaches to enhance the quality of life for this population.

One such innovative approach is Dalcroze Eurhythmics, referring to Eurhythmics, a component of the Dalcroze method. Although different names are sometimes used by different studies discussed in this thesis, they all refer to Eurhythmics, which integrates movement and music. To maintain consistency throughout the thesis, the term *Dalcroze Eurhythmics* is used, or shortened to *Dalcroze*, in line with prominent authors in the field, such as Habron (2016) and Wahli-Delbos (2010). In this form, participants engage in teacher-guided, musically structured yet improvised movement through which they respond to and express the music (Habron, 2016). As such, Dalcroze Eurhythmics emphasizes movement integrated with music through active listening and interpretive physical expression, rather than memorized or choreographed sequences as in dance.

### **1.1 Background of the Dalcroze Method**

Émile Jaques-Dalcroze (1865-1950) was a versatile artist recognized for his skills as a pianist, composer, conductor, theatre director, and pedagogue. He is credited with developing the Dalcroze method, which consists of three interconnected components: Aural training (solfège), Eurhythmics, and

Improvisation (Hall, 1920). Over time, Émile Jaques-Dalcroze's approach to music education evolved explicitly to encompass therapeutic aims (Habron, 2014).

This holistic approach fosters musical development and nurtures the mind-body connection, promoting self-expression (Hall, 1920). Eurhythmics employs activities using movement, improvisation, and focused listening to explore the shared time-space energy relationships inherent in both movement and music (Habron, 2014). Additionally, Eurhythmics is grounded in the belief that there is a deep connection between rhythm in sound and rhythm in the body, emphasizing the body's potential to embody "beauty and harmony when it vibrates in time with artistic imagination and collaborates with creative thought" (Hall, 1920, p. 143).

According to Seitz (2005), the method emphasizes integrating movement and physical expression with music, recognizing the body as an essential tool for understanding and experiencing music. Through physical movement, musicians develop a deep understanding of rhythm, musical expression, and overall musicality. Moreover, it recognizes the impact of cultural and socialization factors on the development of expressive abilities, as well as the significant role of visual expression in conveying musical dynamics to the audience (Seitz, 2005).

Central to the philosophy of the Dalcroze method is the recognition of the body's contribution to musical expression. Even slight modifications in meter and rhythm can significantly influence the overall melodic structure of a musical composition. The Dalcroze method highlights the role of expressive techniques in shaping timing, timbre, loudness, and other musical components while placing significant importance on the overall musical structure (Seitz, 2005; Sloboda & Davidson, 1996). Consequently, "[Dalcroze] has found its way into various theatrical and operatic performances and...has influenced music education worldwide..." (Seitz, 2005, p. 425).

## 1.2 Dalcroze Method in Music Education

The Dalcroze method places great importance on personal experiences, the harmonization of body and mind, and self-awareness, thus making it an integral part of music education. This method provides students with the opportunity to participate actively and be a part of the creative process (Pretorius & van der Merwe, 2020). Moreover, it integrates physical movement with musical understanding, thereby supporting personal and multisensory experience as central to music learning (Bogdanowicz, 2016).

Through this method, students can develop aural skills by differentiating between high and low pitches and recognizing harmonies in different voice parts. Examples of such exercises for pitch differentiation include using a ‘bubble’ analogy, painting phrases, and the bouncing ball activity (Pretorius & van der Merwe, 2020).<sup>1</sup> These activities holistically engage the students, enhancing their musical sensitivity and improving their emotional well-being.

The Dalcroze method has been incorporated into the education of children and adolescents globally for over a century (Ferguson-Stegall et al., 2017). Moreover, the method provides a unique platform for teaching musical concepts such as dynamics, tempo, and other musical elements through movement and gesture, thereby helping students gain a proper understanding of rhythmic and metering concepts (Anuar & Ismail, 2021).

Eurhythmics promotes rhythmic, expressive, and improvised movement to embody and internalize musical concepts. Research has also demonstrated that Eurhythmics showed potential benefits in enhancing the expressive performance of piano students, particularly in aspects such as dynamics, timing, and articulation, with varying degrees of success (Dalaire & Comeau, 2020). It has

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<sup>1</sup> The *bubble analogy* is an exercise where singers visualize inflating a bubble (growing larger to move higher in pitch) and deflating it (closing to move lower). *Painting phrases* involves students using an imaginary paintbrush to trace the contour of musical phrases while singing. They are encouraged to “put emotion into it,” as if painting the sung words onto an imaginary canvas. The *bouncing ball activity* uses the sensation of bouncing to develop diaphragmatic-intercostal breathing and activate support muscles, thereby enhancing breath flow and singing volume (Pretorius & van der Merwe, 2020).

also been shown to improve the gesture technique in singers, with significant differences noted in those who received movement training compared to those who did not (Liao & Davidson, 2016).

Importantly, the Dalcroze method is not limited to conventional music education alone. It has also been applied in special education and therapeutic contexts with students with disabilities (Bachmann, 1993; Dutoit, 1971, as cited in Anuar & Ismail, 2021), demonstrating the broader scope of its impact on music education.

Emile Jaques-Dalcroze believed that a deep kinesthetic understanding was essential, as he advocated for the long-term study of Eurhythmics. According to Jaques-Dalcroze:

If children are to become musicians, their pianoforte studies should be preceded by at least two or three years' elementary study of music, including singing and exercises for ear, brain, arms, hands, feet, legs, chest, and fingers — in a word, exercises in which both physical and intellectual powers will be directed simultaneously towards the end to be attained, namely, the complete knowledge of music and its elements, and the gaining of an inner musical sense.

(Jaques-Dalcroze, 1930, p. 130)

### **1.3 Core Techniques of Dalcroze Eurhythmics**

Dalcroze sessions are typically structured in three parts: warm-up, main part, and cool-down, with the total session usually lasting 45 minutes, as illustrated in the intervention by Adameczyk and colleagues (2022). These activities, often performed to improvised piano music, require the use of memory, attention, coordination, and balance (Kang et al., 2016).

In addition, the tasks may be designed to gradually increase in complexity, beginning with single tasks and evolving into multi-task activities, some of which involve the handling of objects such as a ball, claves, or a scarf (Fischbacher et al., 2020). For instance, the beach ball breath circle<sup>2</sup> and the

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<sup>2</sup> The *beach ball breath circle* is a breathing exercise that helps singers shape crescendos and decrescendos by engaging their breath support muscles and creating a physical sense of dynamic change (Pretorius & van der Merwe, 2020).

bouncing ball activity, used within the Dalcroze method, require participants to integrate ear training, body movement, and improvisation (Pretorius & van der Merwe, 2020).

Furthermore, in its various forms, touch has a significant role in Dalcroze Eurhythmics, ranging from direct physical contact to self-touch (body percussion) and manipulation of various objects. These techniques facilitate interactions as each activity is built with a social intention, such as making eye contact, leading and following, synchronizing the beat, and celebrating together (van der Merwe et al., 2023).

The rhythmic movements performed by participants synchronize with improvised piano music, allowing them to express music in a nuanced and meaningful way (Ferguson-Stegall et al., 2017). Furthermore, Dalcroze techniques focus on expressing music through purposeful movement, encouraging participants to explore the physical understanding of musical concepts (Butke, 2014). By emphasizing the process rather than the performance result, Dalcroze Eurhythmics supports a deeper kinesthetic understanding of musical concepts (Butke, 2014), which can encourage personal engagement with musical expression. Ultimately, Dalcroze Eurhythmics integrates structured activities, sensory engagement, and social interaction to foster a deep and holistic musical understanding.

#### **1.4 Justification for Using Dalcroze Eurhythmics in this Thesis**

With its emphasis on broad applicability and inclusive nature, Dalcroze Eurhythmics offers significant advantages. These include a) enhanced motivation from group participation, leading to sustained engagement; b) accessibility to all, regardless of musical background; c) availability of trained music educators for group leadership; d) lower maintenance costs compared to one-on-one therapy; e) use of naturalistic, real-life program settings; f) application of internationally recognized music methods incorporating global experiences; and g) opportunities for caregivers and family members to engage in meaningful activities with loved ones.

Dalcroze Eurhythmics is aimed at broad accessibility and participation in music across ages, abilities, and backgrounds. This approach reflects principles in arts-based programs that provide opportunities for marginalized individuals or communities to thrive (Bar & Herron, 2023). Moreover, it has been applied to diverse groups, offering flexibility for individuals with diverse health issues in multiple environments (Juntunen & Sutela, 2023; Habron & Witoszynskyj, 2016; van der Merwe, 2015).

The distinct advantages of Dalcroze Eurhythmics make it a well-justified choice for this thesis, effectively addressing the diverse needs of older adults and offering an innovative non-pharmaceutical intervention.

### **1.5 Previous Studies on Dalcroze Eurhythmics and Health**

Numerous studies<sup>3</sup> have examined the impact of Dalcroze Eurhythmics on health, showing its potential benefits in domains such as cognitive function, movement coordination, social interaction, self-esteem, and well-being (Habron, 2014). Research also emphasizes that participation in music-based activities, such as Dalcroze Eurhythmics, can influence neural plasticity, excitability of neural circuits, and movement-related skills (Altenmüller & Scholz, 2016). Moreover, Greenhead and Habron (2015) noted that Dalcroze, emphasizing movement, improvisation, and intense listening, establishes a deep connection with music and its therapeutic aspects.

Dalcroze Eurhythmics offers a music-based form of multi-task training that simultaneously engages memory, attention, coordination, and social interaction (Kang et al., 2016). Such an integrated approach may serve as a valuable addition to conventional health interventions for older adults.

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<sup>3</sup> For example, according to Habron (2014), Frego (1995, 2010) studied the use of Dalcroze Eurhythmics as a supportive treatment for individuals with HIV/AIDS. These studies found that Dalcroze positively impacted energy levels, expression, and self-esteem. Additionally, Kressig and colleagues (2005) conducted a study using Dalcroze with older adults, finding improvements in gait, while Trombetti and colleagues (2011) found improvements in gait and balance, as well as reduced risk of falls. These studies provide evidence for the therapeutic benefits of Dalcroze Eurhythmics in various populations.

Dalcroze Eurhythmics has been implemented in various institutional and research settings, including the University Hospital of Geneva, as a structured program combining physical movement with improvised live piano music, with the involvement of the Jaques-Dalcroze Institute (Trombetti et al., 2011). Such a program is also offered in the Ottawa area.<sup>4</sup> These studies suggest that Dalcroze Eurhythmics has increasingly been examined for its potential to support health and well-being in older adults.

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<sup>4</sup> [Music and Geriatric Psychiatry, The Royal's partnership with the Vanier Community Service Centre](#), and [Bruyère Music Program](#)

## **2. Review of Literature**

The following literature review examines various factors influencing the overall health and well-being of older adults. Within the four health domains explored, physical factors include aging-related challenges and the increased risk of falls. Cognitive factors focus on age-related cognitive decline and its impact on daily activities. Social factors examine the effects of social isolation on overall health, alongside mental health challenges such as depression. For each domain, strategies that may support older adults' well-being are also considered.

The review further examines music-based activities, including Dalcroze Eurhythmics, and their potential relevance across the four health domains. The term *music and movement programs*, commonly used in the literature, will be used throughout the review to refer broadly to interventions that integrate musical and physical activities to support older adults' health and well-being, including but not limited to Dalcroze Eurhythmics.

The review also presents findings from a ten-week feasibility study of a Dalcroze Eurhythmics program I conducted, which includes implementation, participant feedback, and future considerations. The final section examines the benefits and limitations of music and movement programs for older adults.

### **2.1 Physical Factors Influencing Health and Well-Being of Older Adults**

To better understand the effectiveness of music activities, this section begins by examining the broader physical factors that influence health in later life. Specifically, the focus is on the aging-related health challenges and the risk of falls that accompany these challenges. Additionally, the section explores the effects of physical exercise on the health of older adults, investigating its role in preserving physical function, preventing falls, and promoting overall well-being. This is followed by an

examination of how music, including Dalcroze Eurhythmics, can support physical health in older adults.

### **2.1.1 Aging-Related Health Challenges and Falls**

As recognized by Adamczyk and colleagues (2020), aging is a complex process affecting various aspects of the health and well-being of older adults. One of the most common age-related changes is muscle mass loss combined with an increase in body fat and osteoarthritis. Aging also affects sensory functions, such as vision, which are crucial for maintaining balance and postural stability (Adamczyk et al., 2020). These changes can, in turn, significantly contribute to the risk of falls in older adults, mainly due to diminished postural stability.

Falls are multifactorial, with significant risk factors including older age, gait and balance impairment, with a high prevalence estimated at over 30% in older adults (Fischbacher et al., 2020). These falls can lead to severe consequences, including fractures, loss of autonomy, and diminished quality of life (Fischbacher et al., 2020; Ayoubi et al., 2014). Many falls in older adults occur during walking, especially when performing concurrent tasks, such as walking combined with other motor or cognitive tasks (Trombetti et al., 2011). These effects lead to a higher rate of falls among individuals with dementia, resulting in an increased rate of fractures compared to those with intact cognitive function. (Chen & Pei, 2018; Allan et al., 2009; Morris et al., 1987). Additionally, research indicates that walking speed at an individual's typical pace, which is a practical and reliable indicator of walking ability, is linked to a higher likelihood of survival in older adults (Ferguson-Stegall et al., 2017). Recognizing the multifaceted impact of aging on mobility emphasizes the need for comprehensive strategies to support the physical health and independence of older adults while mitigating the risk of falls.

### **2.1.2 Benefits of Physical Exercise**

Physical exercise has been found to be among the most effective strategies for fall prevention (Sherrington et al., 2020). Additionally, exercise has been shown to postpone or even reduce the age-related decline in physical function, including gait and balance (Howe et al., 2011). These findings suggest that being engaged in physical activities could be vital in preserving an individual's physical capabilities as they age.

The benefits of physical exercise are not only limited to the physical aspect. For example, Qigong, a form of traditional Chinese exercise, has been shown to improve psychological health in individuals with brain injury (Blake & Batson, 2009). As mentioned by Bateman and colleagues (2001), regular aerobic exercise contributes to numerous health benefits, such as improved cardiorespiratory fitness and enhanced well-being, and is associated with lower mortality rates. Furthermore, engaging in regular physical activities, such as Tai Chi, dance, and Dalcroze Eurhythmics, has been found to positively influence the control of movements. As stated in research by Kang and colleagues (2016), such activities may improve postural stability. This view is further confirmed by a more recent study by Adamczyk and colleagues (2022), which also highlights the positive impact of these activities on maintaining balance and stability. Moreover, considering the potential benefits of these activities, it is worth considering their application in environments such as nursing homes, particularly for residents with dementia. As detailed in research by Sterke and colleagues (2012), reduced gait velocity and shorter stride length were recognized as predictors of fall risk in nursing home residents with dementia. This finding shows the potential of physical exercise for reducing fall risk.

Regular physical exercise among older adults contributes to fall prevention and the preservation of physical function while enhancing psychological health and movement control. These benefits emphasize the importance of an active lifestyle for promoting healthy aging.

### **2.1.3 Therapeutic Benefits of Music on Physical Health**

Incorporating music into healthcare and community settings can offer a holistic approach to supporting physical function and general quality of life for older adults (Ma et al., 2023; Habron, 2014). According to Clark and colleagues (2016), when exercising to music, the body's movements tend to synchronize with the rhythmic elements in the music, resulting in improved motor coordination and control. This synchronization promotes improved energy efficiency, exercise performance, and skill acquisition. Each of these factors has an important role in supporting mobility among older adults. Furthermore, the neurophysiological responses to music, such as neurotransmitter release and regulation of the autonomic nervous system, contribute to physiological arousal (Clark et al., 2016). These responses contribute to enhancing exercise intensity, endurance, and overall physical performance.

Listening to music in a community setting improved physical functioning among older adults, along with other aspects of quality of life, as measured by the physical functioning subscale of the SF-36 health survey (Lee et al., 2010). In another example, older adults who participated in choral singing sessions also showed improvements in physical health outcomes, including fewer falls, reduced doctor visits, less medication use, and better self-reported health (Cohen et al., 2006). Integrating music into physical activities can contribute meaningfully to strength, coordination, and task performance in older adults.

### **2.1.4 The Impact of Dalcroze Eurhythmics on Physical Health**

While exploring the effects of Dalcroze Eurhythmics on the physical health of older adults, Kressig and colleagues (2005) found no significant increase in stride-to-stride variability in the Dalcroze group during a dual task, compared to the control group. Similarly, it was noted that long-term interventions with Dalcroze Eurhythmics can improve gait performance and balance, and reduce

the rate and risk of falling in older adults (Bridenbaugh & Kressig, 2011).<sup>5</sup> It has been noted that the “JDE [Jaques-Dalcroze Eurhythmics] training method is similar to Tai-Chi and dance in its use of coordinative elements, which also have a significant influence on the control of movements—thus leading to greater postural stability” (Adamczyk et al., 2022, p.7). The same study investigated the effectiveness of Dalcroze Eurhythmics and its impact on postural stability in older adult women over 65. As a result, the Dalcroze-based exercise program significantly improved postural stability while enhancing muscle strength, flexibility, and reaction time, reducing the risk of falls and enhancing overall postural control. Moreover, the study’s biofeedback trials have revealed that Dalcroze Eurhythmics could enhance the use of vision to maintain stable body positions. Ferguson-Stegall and colleagues (2017) found significant improvements in both single and dual-task gait speed in only nine weeks through the Dalcroze Eurhythmics program. Beaulieu and colleagues (2017) also reported improved mobility, balance, and overall health. The study demonstrated an example of a 94-year-old participant who regained confidence in walking after a fall and noticed positive changes in their movement.

Implementing Dalcroze Eurhythmics has the potential to positively change the physical activity patterns observed in older adults by encouraging sustained engagement in exercising (Trombetti et al., 2011). Consequently, Dalcroze Eurhythmics can be an effective program for improving the physical health of older adults, particularly in enhancing gait control and postural stability and reducing the risk of falls.

*Summary:* Physical factors influencing health and well-being, particularly in older adults, are significant. Aging-related challenges, such as muscle loss and sensory impairments, contribute to an increased risk of falls. However, physical exercise is an effective strategy for fall prevention and

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<sup>5</sup> These findings are significant, as one-third of the population aged 65 years and older experiences at least one fall each year, while half of those fall repeatedly (Trombetti et al., 2011)

maintaining physical function. Regular physical activity promotes healthy aging, improves balance and stability, and enhances overall well-being. Acknowledging the importance of physical exercise is crucial to supporting health and independence of older adults. Furthermore, the positive effects of engaging with music and the specific benefits of Dalcroze Eurhythmics in improving balance, mobility, and postural control, support incorporating such activities into older adult care.

## **2.2 Cognitive Factors Influencing Health and Well-Being of Older Adults**

This section examines the cognitive factors that impact health and well-being, focusing on age-related cognitive decline. It explores the implications of cognitive decline on various cognitive functions, daily living activities, and overall quality of life. Additionally, the section highlights the importance of understanding these factors in order to develop strategies to enhance cognitive health and well-being in older adults. The potential of music-based activities in supporting cognitive functioning is also examined, as well as the role of Dalcroze Eurhythmics within the same context.

### **2.2.1 Age-Related Cognitive Decline and its Impact**

Age-related cognitive decline is a well-documented phenomenon affecting various cognitive functions and is often associated with a common aging process (Harada et al., 2013; Irwin et al., 2018). However, the underlying mechanisms of age-related cognitive decline are complex, with evidence suggesting that age-related reductions in cerebral blood flow may contribute to cognitive decline and increased dementia risk (De la Rosa et al., 2020). As people age, their memory, logical reasoning, spatial imagination, and thought-processing speed tend to decline (Salthouse, 2010). Moreover, cognitive decline is also found in neurological disorders such as dementia, including Alzheimer's disease, which affects mostly older adults (Gallego & García, 2017; Verghese et al., 2003). These disorders worsen the cognitive decline associated with aging, further impairing cognitive functions.

Recent studies suggest that age-related motor and balance impairments can significantly interfere with older adults' capacity to perform activities of daily living, such as managing daily tasks

like self-care and maintaining independence (Adamczyk et al., 2022). Moreover, age-related declines in the efficiency of basic cognitive processes are associated with lower performance on various tests of cognitive ability (Salthouse, 1994; Salthouse & Mitchell, 1990). Ma and colleagues (2018) reported that social frailty in older adults is associated with poorer physical functioning, cognitive impairment, and depression, and that social frailty predicts an increased risk of mortality.

Additionally, cognitive decline has been linked to increased healthcare costs, as older adults may require additional support and resources to manage cognitive challenges (Lenox-Smith et al., 2018). Furthermore, cognitive decline is associated with significant physical implications, including an increased risk of falls, particularly among community-dwelling individuals with dementia, such as Alzheimer's disease (Allan et al., 2009). Understanding these mechanisms is crucial for developing interventions and strategies to decrease the impact of cognitive decline and enhance the overall well-being of older adults.

### **2.2.2 Improving Cognitive Health through Stimulating Activities**

Engaging in stimulating cognitive activities is linked to a positive impact on cognitive reserve, potentially delaying the onset of Alzheimer's disease and other dementias (Gatz et al., 2006). Active engagement in acquiring new skills is associated with improved executive function, which may help counteract cognitive decline associated with aging (Bugos et al., 2007). Furthermore, multisensory and cognitively stimulating activities, such as language and memory exercises, and visual, auditory, and playful stimulation, can support healthy cognitive aging by engaging thinking, concentration, and memory (De Macedo et al., 2015). Consistent, long-term practice and skill repetition are influential elements that can positively impact cognitive performance. Such activities may also be associated with structural changes across different brain areas (Grassi et al., 2017; Boyke et al., 2008).

Furthermore, studies indicate a compelling link between engaging in cognitive activities during later life stages and a diminished risk of dementia (Verghese et al., 2003). Research by Hall and

colleagues (2009) suggests that stimulating cognitive activities can delay the beginning of memory decline in individuals affected by dementia. Treiber and colleagues (2011) contributed to this evidence, highlighting the association between cognitive activities and slowed cognitive decline during the early stages of Alzheimer's disease, along with better functional ability among individuals with longer dementia duration.

Additionally, rhythmic movement interventions have been shown to improve global cognitive function in older adults (Ma et al., 2023). A study by Tesky and colleagues (2011) explored the impact of a group program on enhancing cognitive performance in healthy older adults by engaging in leisure activities. Activities such as reading, playing games, and playing music were incorporated, leading to positive cognitive outcomes for specific subgroups, particularly in subjective memory.

As indicated in the literature, active participation in cognitive activities may enhance cognitive performance. Such activities may also be associated with reorganization of brain function and may contribute to delaying the onset or progression of neurodegenerative disorders. Moreover, lifelong cognitive engagement has an important role in promoting healthy aging.

### **2.2.3 Therapeutic Benefits of Music on Cognitive Health**

When examining the long-term effects of music engagement on cognition, Takahashi and Matsushita (2006) demonstrated that cognitive function, as measured by the Revised Hasegawa Dementia Scale (HDS-R), was maintained in older adults with moderate to severe dementia who engaged in weekly music sessions over two years. These sessions consisted of singing familiar songs, sharing reminiscences evoked by the music, and playing percussion instruments such as Japanese drums. In contrast, cognitive function declined in the control group that did not participate in the music sessions.

Lyu and colleagues (2018) investigated the effects of music on memory in patients with Alzheimer's disease. In patients with mild Alzheimer's disease, those who engaged in singing favourite

songs from their twenties and thirties in structured group sessions showed improved performance on immediate and delayed word recall tests. This improvement was greater than in participants who only read the lyrics of the same songs without music or received no intervention. Nevertheless, the impact on memory was not sustained after the intervention, which emphasizes the necessity for continuous engagement in music-based activities.

Research also shows that short-term arts training, such as music and visual arts, can lead to significant neuroplastic changes in brain responses of older adults, affecting neural and behavioural function (Alain et al., 2019). Moreover, research indicates that lifelong engagement in music activities may slow cognitive declines and enhance neural functioning in old age. As such, training in both music and visual arts can improve the functioning of left frontal brain regions that decline with age, supporting cognitive health in older adulthood (Alain et al., 2019).

#### **2.2.4 The Impact of Dalcroze Eurhythmics on Cognitive Health**

The cognitive benefits of Dalcroze Eurhythmics in the older adult population have also been examined. A study by Hars and colleagues (2014b) found that weekly sessions of Dalcroze multitask activities over six months improved overall cognitive function, as indicated by increased Mini-Mental State Examination (MMSE) scores. In addition, dual-task activities involving music, such as walking while playing a percussive instrument or singing, can enhance attention control (Chen & Pei, 2018). Engaging in simultaneous cognitive and physical tasks appears to improve cognitive function more effectively than performing these tasks separately (Tait et al., 2017). Moreover, a study by Beauchet and colleagues (2007) demonstrated that performing rhythmic physical tasks simultaneously with cognitive tasks can increase cognitive task performance, due to a rhythmic synchronization, a phenomenon known as the ‘magnet effect’.

Furthermore, Beaulieu and colleagues (2017) found that while Dalcroze Eurhythmics did not lead to changes in memory abilities, focus group evidence suggested that participants experienced

improved metamemory skills, representing a better understanding of memory processes. For instance, one participant noted: “This class reinforces what I already knew but I didn’t think enough about. I feel more aware of what we’ve got to do to be healthy.” (Beaulieu et al., 2017, p. 287). Dalcroze Eurhythmics activities often involve walking in time to music while responding to rhythmic cues, challenging attention, balance, and coordination, which are the same skills needed for mobility during daily activities (Ferguson-Stegall et al., 2017). Moreover, participants are instructed to react to changes in music, such as varying pitch or dynamics, needing constant focus and appropriate responses (Adamczyk et al., 2022). Another participant in the study by Beaulieu and colleagues (2017) described the increased focus, attention, and memory required by the Dalcroze activities. Based on participants’ focus group responses, Dalcroze Eurhythmics may support greater awareness of memory processes and effective cognitive practices.

*Summary:* Age-related cognitive decline significantly impacts various cognitive functions, daily living activities, and overall quality of life. However, engaging in stimulating cognitive activities is linked to supporting healthy cognitive aging and reducing the impact of cognitive decline. Research suggests that structured music activities can provide meaningful cognitive stimulation for older adults. Within this context, Dalcroze Eurhythmics is considered an engaging activity that may support cognitive functioning, including attention, memory, and awareness of cognitive processes.

### **2.3 Social Factors Influencing Health and Well-Being of Older Adults**

The following section explores factors shaping the social aspect of older adults’ lives, with attention to social isolation and its implications for overall well-being. The section also explores strategies to manage and reduce social isolation within this population. The role of group music activities in promoting social engagement, as well as Dalcroze Eurhythmics, is also examined. In

addition, participant perspectives are included to illustrate their experiences of these activities in a social context.

### **2.3.1 Social Isolation**

Social isolation presents a significant and increasingly prevalent challenge among older adults (Baker et al., 2018). According to Nicholson Jr (2009), social isolation can be defined as “a state where individuals lack a sense of social belonging, engagement with others, have few social contacts, and experience deficiencies in fulfilling and quality relationships” (p. 1346). This concern often arises from significant life transitions such as retirement and the loss of friends or partners, which can lead to reduced social interactions and a diminished sense of social roles (Ferraro, 1984; Weiss, 2005; Heikkinen & Kauppinen, 2004). Moreover, health challenges and mobility limitations further deepen social isolation among older adults, restricting their participation in social activities and reducing opportunities for engagement (Li & Ferraro, 2006).

These circumstances can result in disconnection of older adults from their communities and support networks and increase vulnerability to depression, cognitive decline, and mortality (Cacioppo et al., 2006; Barnes et al., 2004). Loneliness is a significant predictor of depression among older adults, which shows the strong emotional effects of reduced social interactions (Heikkinen & Kauppinen, 2004). Additionally, social isolation has been associated with a worse prognosis in coronary patients due to higher levels of depressive symptoms, particularly affecting the most severely depressed and those with lower income (Barefoot et al., 2000). Social isolation in older adults often results from a combination of life transitions, health challenges, and reduced social interactions. Recognizing these factors can help guide the development of strategies that support the emotional and social needs of older adults.

### **2.3.2 Managing Social Isolation**

Community organizations, such as local associations, older adults centres, and volunteer organizations, provide valuable opportunities for social interaction and meaningful relationships. Additionally, research has shown that group participatory approaches that include social activity and support, compared to one-to-one approaches, are more likely to have positive outcomes (Dickens et al., 2011). A study by Chodzko-Zajko and colleagues (2009) reported that participating in physical and recreational activities, such as group exercise classes, not only promotes physical health but also improves social functioning among the community-dwelling older adults. Moreover, research suggests that group activities with a creative focus reduce feelings of isolation and enhance social support, thus improving quality of life (Cotterell & Phillipson, 2018).

A study by Phinney and colleagues (2014) showed that older adults engaging in weekly group art activities at community centres reported a strong sense of belonging and connection to the group, along with improved social interactions and mood. Furthermore, support groups tailored for older adults, such as those meeting regularly at community centres, provide an opportunity for sharing experiences and offering emotional support. Interventions of this kind show increased social engagement and a decrease in loneliness (Cohen-Mansfield & Perach, 2015). For example, a community-based project by Bartlett and colleagues (2013) involved socially isolated older adults in group fitness and art programs. The study assessed social support with the Duke Social Support Index (DSSI) and loneliness using the Jong Gierveld Scale, with some findings suggesting reduced loneliness and increased social support post-intervention.

Additionally, a study by Greaves and Farbus (2006) further highlights that older adults participating in group creative, exercise and cultural activities reported significant improvements in social connections and reduced feelings of loneliness, assessed through qualitative interviews and standardized loneliness scales. Recognizing the vital role of social connections in maintaining health,

integrating diverse programs such as group art sessions, physical fitness classes, and community-based activities is crucial for supporting the social health of older adults.

### **2.3.3 Therapeutic Benefits of Music on Social Isolation**

Research suggests that music activities can support older adults in forming and maintaining meaningful social connections, which may reduce social isolation. One example demonstrates how older adults who participated in weekly choral singing described the experience as a source of companionship, happiness, and belonging (Joseph & Southcott, 2015). Participants described the importance of being in a group and of "[being] dependent upon each other" as a choir, rather than "just one person singing". One participant expressed the difference between isolation and the sense of community the group offered: "[when] you're living on your own you only see four walls, it's much nicer to come and join in with other people ..." (Joseph & Southcott, 2015, p. 343).

Similarly, MacAulay and colleagues (2019) investigated the effects of twelve weekly recorder group sessions with socioeconomically diverse older adults, including residents of low-income housing. Participants described the sessions as opportunities for camaraderie and valuable socialization. Moreover, they reported social engagement and support as key benefits, along with increased self-confidence and a sense of achievement. Another example is the study by Davidson and Fedele (2011), which explored the effects of a six-week group singing program for older adults with mild to moderate dementia and their caregivers. Participants in the program demonstrated improved social interaction during sessions and expressed both enjoyment and active engagement in singing. This was reflected in statements such as "I made social contacts" (Davidson & Fedele, 2011, p. 409). The studies presented in this section suggest that group music activities can support social connection. Such activities may also help reduce social isolation among older adults with varied life circumstances, including those living alone, those with dementia, and those from low-income communities.

### **2.3.4 The Impact of Dalcroze Eurhythmics on Social Isolation**

Numerous studies have examined the role of Dalcroze Eurhythmics in supporting social interaction, reducing loneliness, and fostering a sense of community among older adults. Dalcroze's musical and social components promote both physical and emotional movement while encouraging awareness of self, others, and the environment (Greenhead & Habron, 2015; Hars, 2014a). By engaging older adults in structured, interactive musical activities, Dalcroze Eurhythmics addresses challenges such as passivity, boredom, loneliness, and isolation (Juntunen & Sutela, 2023). In particular, pair or group activities involving touch, such as hand-holding or linked arms, develop communicative and social skills, clarify ideas and feelings, and offer immediate feedback (Greenhead & Habron, 2015). In addition, improvisational elements enhance self-esteem and social connection by encouraging participants to lead, make decisions, and enhance social interaction through eye contact (Park, 2019).

In a nine-week study, Ferguson and colleagues (2017) implemented weekly one-hour Dalcroze Eurhythmics sessions in which participants moved individually, with partners, or in small groups. These activities increased social interaction through both coordinated and interactive movement. In a qualitative action research study, many older adult participants described Dalcroze Eurhythmics as their most important social activity of the week. One of the participants shared, "This is the most fun I have all week and I look forward to coming [back]" (Beaulieu et al., 2017, p.291). Similarly, participant feedback from the feasibility study I conducted indicated a positive social experience as well. Participants reported feeling good and experiencing unity. One commented, "I love being with others." The literature consistently shows that the social aspect, as an integral component of Dalcroze Eurhythmics, contributes to social connection and reduced isolation in later life.

*Summary:* Addressing social isolation among older adults involves recognizing the impact of life transitions and health challenges that reduce social interactions and ties. Community engagement and

group activities have an important role in supporting social connection and meaningful relationships. Within this context, group music activities represent one way to support social engagement. In addition, Dalcroze Eurhythmics offers opportunities for older adults to engage creatively and socially within their communities.

## **2.4 Mental Factors Influencing Health and Well-Being of Older Adults**

This section investigates the mental health factors impacting the well-being of older adults, specifically addressing impactful challenges such as depression, anxiety, and psychological distress. The section also examines a range of strategies to support mental health within this population, including physical activity, cognitive and social engagement, music-based interventions, and activities such as Dalcroze Eurhythmics.

### **2.4.1 Age-Related Mental Health Challenges**

Mental health challenges among older adults are a significant concern, with depression being particularly prevalent and impactful. Depression in this demographic is closely associated with poorer health outcomes and higher mortality rates, which can cause a decline in physical health, a weakened immune response, and greater susceptibility to illnesses (Alexopoulos, 2005). In addition, chronic diseases, reduced mobility, and decreased independence often worsen depressive symptoms and contribute to a decline in both mental and physical health. Fiske and colleagues (2009) observed that continuous depressive symptoms can greatly impair physical functioning, making it difficult for older adults to perform daily activities, which in turn lowers their quality of life. Depression is not only a common concern among older adults but also a major contributor to chronic disability (Schienle & Eiler, 1984). Additionally, experiences of ageism significantly affect the mental health of older adults. Lyons and colleagues (2018) found that ageism was related to poorer mental health outcomes, including increased levels of depression and anxiety and reduced likelihood of positive mental health or flourishing.

Living circumstances also have a crucial role in the mental well-being of older adults. Compared to those living with a spouse or partner, older adults living alone experience greater psychological distress and a poorer quality of life (Henning-Smith, 2016). Related factors such as social isolation are associated with increased depressive symptoms and psychological distress, which negatively affect mental well-being (Taylor et al., 2018). Older adults requiring home care are particularly vulnerable, with dementia and cumulative mental disorders, such as depression, being the most prevalent conditions in this group (Martens et al., 2007). These findings demonstrate that mental health challenges in older adults, driven by factors such as ageism, social isolation, and chronic health issues, are common and complex. This complexity emphasizes the need for comprehensive mental health support in this demographic.

#### **2.4.2 Improving Mental Health**

Considering the rising costs of healthcare and medications, it is important to focus on modifiable behaviours and lifestyles, such as physical activity, that can influence mental health (Parker et al., 2008). Evidence shows that even unstructured physical activity among older adults is associated with lower levels of depression and anxiety (Teixeira et al., 2013) and higher satisfaction with life, as measured by the Positive and Negative Affect Scale (PANAS) and the Satisfaction With Life Scale (SWL) (Parker et al., 2008).

Furthermore, a study by Winningham and colleagues (2003) examined a program combining cognitive stimulation with social activities three times a week and observed a decrease in depressive symptoms in addition to improved memory. Participants engaged in activities that stimulated various types of memories and expanded social networks by memorizing information about others. These activities led to significant declines in depressive symptoms, as measured by the Geriatric Depression Scale (GDS), over three months, while the control group did not show any change.

Meaningful social activities, such as fitness, music, dancing, cooking, gardening, games, technology, books, and religious organizations, are associated with lower psychological distress in older adults, as measured by the Kessler Psychological Distress Scale (Mackenzie & Abdulrazaq, 2021). This aspect was also supported in a study by Cohen and colleagues (2006), which found that community-based cultural programs, including painting, writing, poetry, jewelry making, and music, maintained higher morale and reduced mental health decline over 12 months. Although both groups demonstrated a slight decline in morale, the intervention group showed a significantly smaller decline compared to the control group.

Additionally, social support softens the effect of stressful events, while meaningful engagement in social activities helps reduce depressive symptoms (Fiske et al., 2009). These findings emphasize the importance of a comprehensive approach to enhancing mental health in older adults, integrating physical, cognitive, social, and cultural activities.

### **2.4.3 Therapeutic Benefits of Music on Mental Health**

While well-established forms of medical care are vital, they may not fully address aspects such as mental health and overall well-being, particularly for those living with dementia. As illustrated by Cohen-Mansfield and colleagues (2007), the standard approach to addressing agitation behaviours in older adults with dementia has involved the use of medication. However, concerns over side effects and the awareness that medication does not address the root causes of agitation, such as social isolation, pain, and boredom, have led to the adoption of non-pharmacological interventions. In addition, there are concerns about excessive prescription of medication among older adults (Fried & Mecca, 2019). It is also noteworthy that, in some instances, medication may require high doses to be effective (Tan et al., 2014). Within this context, music and movement programs have emerged as promising approaches alongside established medical treatments, with a goal to improve the mental health and overall well-being of older adults.

Various studies have examined associations between music-based interventions and agitation, mood, and emotional well-being in older adults, including those living with dementia. In a review of seven studies, Lou (2001) reported beneficial effects of music on agitated behaviour in individuals with dementia. Specifically, playing relaxing background music during mealtime was associated with increased food intake, improved calmness during meals, and enhanced cooperation with feeding. Another example from the review noted that a 30-minute session of individually selected preferred music was associated with reduced agitated behaviours during and after the intervention. Similar findings were reported in a study involving institutionalized older adults with dementia who participated in group music and movement sessions incorporating familiar songs (Sung et al., 2006). The study reported reductions in agitated behaviours following the intervention, which was conducted twice a week for 4 weeks.

Verrusio and colleagues (2014) investigated the effects of the moderately intense exercise combined with music synchronized to different phases of the exercise, including warm-up, general and postural gymnastics, and exercises on stationary bicycles or treadmills. Participants who took part in the sessions showed significant decreases in both depression and anxiety levels after 12 and 24 weeks compared to baseline data. In contrast, the pharmacotherapy group demonstrated minimal changes in mood scores, with a significant reduction in anxiety observed only after 24 weeks. These examples suggest that music, whether implemented independently or integrated within structured multimodal programs, is associated with positive mental health effects among older adults, reflected in reduced agitation, as well as lower depression and anxiety.

#### **2.4.4 The Impact of Dalcroze Eurhythmics on Mental Health**

Several studies have explored the effect of Dalcroze Eurhythmics on mental health in older adults. A study by Hars (2014b) demonstrated a decrease in anxiety levels among older adults who participated in Dalcroze Eurhythmics for six months, as measured by the Hospital Anxiety and

Depression Scale (HADS-D and HADS-A). Beaulieu and colleagues (2017) further supported these findings, noting improved mental well-being in older adults residing in the community. Participants reported feeling better, less tense, and more confident. A study by Treviño and Álvarez-Bermúdez (2016) also revealed that participants displayed excitement, enjoyment, and positive expectations since the beginning of the Dalcroze Eurhythmics six-session intervention, with evident positive emotions of joy throughout the program. These reported effects align with Jaques-Dalcroze's philosophy of promoting feelings of freedom and joy through music.

Furthermore, Treviño and Álvarez-Bermúdez (2018) point out that music and movement may lead to emotional catharsis, further contributing to mental health benefits. From a neuropsychological perspective, Mastnak (2022) noted that Dalcroze Eurhythmics not only induces positive mood but also fosters a positive emotional trait, which can help prevent depressive and negative emotional states. Although the overall quality of life rating showed a decline post-intervention in a study by Treviño and Álvarez-Bermúdez (2018), participants reported better enjoyment and meaning in their lives and higher acceptance of their physical appearance. This month-long Dalcroze Eurhythmics intervention led to a decrease in negative affect indicators, such as nervousness, shame, and irritability. Participants felt comfortable among themselves in a non-judgmental and relaxed atmosphere. These findings were measured using the Quality of Life Scale and the Positive and Negative Affectivity Scale (PANAS). As demonstrated in the research, Dalcroze Eurhythmics can have a positive impact on mental well-being by reducing anxiety and depression and fostering a greater sense of joy and emotional resilience.

*Summary:* Older adults may face a range of mental health challenges that affect well-being, including depression, age-related stressors, social isolation, and ageism. The studies reviewed in this section emphasize the value of holistic approaches that combine physical, cognitive, and social engagement to support mental health. These interventions have been associated with reduced anxiety and depressive

symptoms, as well as enhanced mood, confidence, and emotional resilience. Music-based activities, including Dalcroze Eurhythmics, are an example of this integrated approach, which may help support mental health in older adults.

## **2.5 Feasibility Study Findings**

I conducted a feasibility study on a ten-week Dalcroze Eurhythmics program for older adults at The Royal Ottawa Mental Health Centre (The Royal), which provided valuable insights into its implementation and potential impact. The main objectives of the study were to evaluate the implementation of the music program, gather feedback, and identify adjustments. Data were collected through interviews, questionnaires, and observations, focusing on participant feedback and the feasibility of the music program.

Participant feedback throughout the program was positive, with participants expressing feelings of relaxation, enjoyment, and a sense of togetherness. They also reported improved concentration, increased social connection, and emotional release while participating. The implementation of the program was effective, with the instructor using various props and teaching strategies to engage participants. Moreover, lesson adaptations were minimal, with the instructor making slight adjustments based on the participants' performance. Some activities were made longer or more demanding to provide a slight challenge and enhance participant engagement. Participants commended the instructor's ability to consider their needs and difficulties while providing clear instructions and guidance.

Upon completion of the music program, all participants expressed their enjoyment and willingness to recommend the program to others. They reported positive impacts on their mood, muscles, and ability to focus effectively. Furthermore, the outcomes of the program indicated its potential to enhance the quality of life for older adults by providing an opportunity for meaningful engagement, self-expression, and social connection. The positive feedback from participants and the

successful implementation of the program justified the need for further research to explore its effectiveness.

Additionally, the challenges and considerations of the music program were identified during the feasibility study. Space constraints were noted as a potential obstacle, as some participants reported feeling crowded during the initial lesson. While the program was well-received, questions remained about how such an intervention could be maintained over time, which highlights an important consideration for future implementation and research. However, these challenges can be overcome with appropriate adaptations and strategic planning, ensuring that the program can continue to impact participants' lives positively.

## **2.6 Benefits and Challenges of Music and Movement Programs for Older Adults**

Various music and movement programs indicate significant potential to support the health and well-being of older adults comprehensively, often complementing conventional medical interventions.<sup>6</sup> Additionally, the potential of music to help healthcare professionals provide cost-effective holistic care for older people was noted (Lee et al., 2010). These programs address a range of physical, cognitive, social, and emotional needs, supporting older adults in ways that extend beyond traditional care through activities such as rhythmic movement, simple instrument playing, and group singing (Gallego et al., 2017). Furthermore, music and movement programs are designed to be adaptable and inclusive, and support individuals with various abilities and limitations. As a result, older adults with diverse needs can participate and benefit, which promotes inclusivity and accessibility.

While these programs show benefits in certain aspects, the wide variety of music and movement programs for older adults are not without challenges and limitations. Some studies, for example, by Cheung and colleagues (2018), found no significant effect of the music and movement program on anxiety symptoms, with similar outcomes to other interventions for these symptoms. In addition,

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<sup>6</sup> As an illustration, in improving post-stroke patients' motor functions (Tong et al., 2015).

Sixsmith and Gibson's (2007) study indicated that not all experiences with music were positive, with problems often arising due to difficulties in accessing music and musical activities. Moreover, dementia patients encountered difficulties expressing their musical wishes and preferences, which created an obstacle in their interaction with the environment. Regarding risks, Dalla (2018) pointed out that individuals with reduced cognitive resources may find walking with music challenging due to the dual-task situation. Furthermore, implementing these programs in the healthcare environment presents various challenges, including requirements for staff support and commitment to ensure success (Bungay & Jacobs, 2020).

Regarding sustainability, a study noted that conducting these programs required long-term facility staff to be trained (Matto et al., 2015), which may depend on the institution's willingness to invest resources. Similarly, Sung and colleagues (2006) indicated that despite potential beneficial outcomes, ensuring the sustainability of such programs in long-term care facilities can be challenging due to the need for careful assessment and management of behavioural issues in dementia patients. Moreover, institutional attitudes are a significant factor in this context. The introduction of dance and movement activities in the healthcare setting may disrupt established routines of both staff and patients, which may have adverse effects on their mental well-being (Bungay & Jacobs, 2020). While not the primary focus of this thesis, attention will also be given to any limitations or challenges that emerge in the implementation of the music program, as these represent an important aspect of understanding its application.

The literature identified many benefits of music and movement programs for older adults across physical, cognitive, social, and emotional domains. Considering these findings, the present study examines the effects of one such program.

### **3. Research Question and Justification**

While four domains of health examined in the literature may be interconnected across the lifespan, older adults may also face age-related changes such as mobility limitations, cognitive decline, and reduced social networks. These changes can contribute to the broader challenges in overall health and well-being in later life. Within this context, the literature suggests that strategies supporting physical, cognitive, social, and emotional health holistically are especially valuable. Music-based activities emerge as a non-pharmacological, cost-effective strategy that supports multiple domains of health through physical, cognitive, social, and emotional engagement. Dalcroze Eurhythmics aligns closely with this holistic perspective, as it integrates movement, attention, interaction, and expression, suggesting its potential to support health and well-being across all four domains in later life. This evidence from the literature supports the selection of Dalcroze Eurhythmics as the focus of this thesis.

Despite the generally positive findings reported for music-based and Dalcroze Eurhythmics interventions, the literature also suggests that their effects may not be consistent. In particular, mood-related outcomes are described with varying strength and clarity, which suggests the need for more focused exploration within the context of Dalcroze Eurhythmics in later life.

The feasibility study I conducted revealed that, among other experiences, participants reported enjoyment, relaxation, emotional release, and positive impacts on their mood during the Dalcroze Eurhythmics program, which further indicates that mood is a relevant outcome to explore further.

While previous studies have considered mood and related well-being outcomes among older adults, these aspects have not been explored using Single-Case Experimental Designs (SCEDs), which the present study applies. In addition to the Positive and Negative Affect Schedule (PANAS), which serves as the primary outcome measure for mood in the present study, several supporting questionnaires are administered: the Warwick-Edinburgh Mental Well-being Scale (WEMWBS), the

Standardized Mini-Mental State Examination (SMMSE), and the Centre of Excellence Self-Administered Questionnaire (CESAM). These supporting questionnaires are not intended to assess the effects of the program; rather, they provide contextual information for each participant, including background on well-being, cognitive status, and daily functioning. A detailed description of these measures is provided in the Methodology section. Moreover, semi-structured interviews are conducted to explore participants' experiences and perceptions of the intervention and its effects on their mood. Although qualitative elements have been used only to a limited extent within SCEDs, they have been used to provide a richer understanding of participants' experiences and to complement quantitative findings (Caneiro et al., 2024; Hearn et al., 2024; Hitchcock et al., 2010; Hulbert-Williams et al., 2021; Onghena et al., 2019).

#### Research Questions:

What are the immediate effects of participation in a Dalcroze Eurhythmics program on the mood of older adults?

How do interview findings align with questionnaire results in assessing the immediate effects of the Dalcroze Eurhythmics program on participants' mood?

## **4. Methodology**

This section presents relevant prior methodologies and applications, followed by the justification of the research design used in the present study, with further details on the design, recruitment, and setting. Moreover, the section outlines the measures selected for the present study, description of the intervention, phase-specific procedures and methodological considerations, as well as data analysis approaches and ethical considerations, including data management.

### **4.1 Prior Methodologies and Applications**

As previously reviewed, studies on Dalcroze Eurhythmics have used various methodologies to explore its effects on the health and well-being of older adults. The following subsections present these studies grouped by their primary outcome focus to inform the methodological decisions of the present study.

#### **4.1.1 Gait, Balance and Fall Risk**

Kressig and colleagues (2005) measured gait and stride-to-stride variability in healthy older adult women using a spatiotemporal gait analysis system (GAITRite). The study compared participants with over 40 years of regular Dalcroze Eurhythmics practice to those without any exercise routine.

Hars and colleagues (2014a) conducted a 3-year follow-up extension of a 1-year randomized controlled trial. They assessed physical function through standardized functional tests, gait function using a spatiotemporal gait analysis system (GAITRite), and fall risk through self-reported fall history in community-dwelling older adults at risk of falls. These assessments were conducted three years after participants completed a one-year Dalcroze Eurhythmics program.

Furthermore, Trombetti and colleagues (2011) conducted a randomized controlled trial with community-dwelling older adults at risk of falling. They assessed gait variability under dual-task conditions using the GAITRite system; balance using both the Tinetti Balance Scale and SwayStar

trunk sway analysis; and functional performance through the Timed Up and Go test. Measurements were taken before and after the six-month Dalcroze Eurhythmics program, with a six-month follow-up.

A study by Ferguson-Stegall and colleagues (2017) investigated dual-task gait speed in a 9-week Dalcroze Eurhythmics program for community-dwelling older adults in good cognitive and physical health. Gait speed was measured before and after the intervention using timed walk tests under single- and dual-task conditions.

#### **4.1.2 Postural Stability**

In a 12-week randomized controlled trial, Adamczyk and colleagues (2022) examined postural stability in older adult women, assessed using a posturography platform (AMTI AccuSway Plus) that recorded centre of pressure displacement. Measurements were taken before and immediately after a 12-week Dalcroze Eurhythmics program.

#### **4.1.3 Cognitive Function and Mood**

Hars and colleagues (2014b) conducted a randomized controlled trial examining cognitive function and mood in community-dwelling older adults at risk of falls. Cognitive function was assessed using the Mini-Mental State Examination, the Clock-Drawing Test, and the Frontal Assessment Battery, while mood was evaluated through the Hospital Anxiety and Depression Scale. Measurements were taken before and after the six-month Dalcroze Eurhythmics program.

#### **4.1.4 Psychological and Social Aspects**

Treviño and Álvarez-Bermúdez (2018) used an exploratory design with an eight-session Dalcroze Eurhythmics program. They examined the effects of the program on psychological health, social relationships, affectivity, and flow. Measurements were taken before and after the program using the WHOQOL-BREF, the Positive and Negative Affect Schedule (PANAS), and the Short Flow State Scale (SFSS-2).

#### **4.1.5 Participant Perceptions and Qualitative Insights**

A study by Beaulieu and colleagues (2017) used a qualitative action research approach over two years. The study included focus group interviews with older adults to explore perceived physical, cognitive, mental, social, and overall health benefits of a community-based Dalcroze Eurhythmics program.

#### **4.1.6 Feasibility and Safety**

Fischbacher and colleagues (2020) conducted a three-arm, single-blind, 12-month randomized controlled pilot trial with community-dwelling older adults with mild cognitive impairment or early dementia. The main objective was to assess the feasibility of recruitment and the safety of the interventions. Additional outcomes included fall rate, gait performance, and cognitive function. Gait was assessed using the GAITRite system, fall rate was tracked through self-reported diaries and bi-monthly phone calls, and cognitive function was evaluated using the Montreal Cognitive Assessment. However, adherence to the program was low, with a small sample size, and no significant differences were found between the Dalcroze Eurhythmics and control groups.

#### **4.2 Justification of the Research Design**

The reviewed studies demonstrate that Dalcroze Eurhythmics can positively affect multiple aspects of older adults' health and well-being. However, the majority of these studies relied on commonly used group-based study designs, including randomized controlled trials, follow-up extensions, qualitative action research, and exploratory designs. Measurements were typically conducted only before and after the intervention. Moreover, participants were often community-dwelling older adults in relatively good health. In other words, many studies had specific inclusion criteria that often excluded those experiencing multiple health challenges.

In contrast, the present study includes participants with diverse health challenges. This approach addresses a broader and more representative population of older adults. To support this aim, this study uses a Single-Case Experimental Design (SCED).

Unlike group-based designs, SCED involves repeated assessments of individual outcomes over time, typically for a single participant or a small group treated as one unit (Ottenbacher, 1997). This approach also includes creating a baseline phase for comparison with later phases (Smith, 2012). SCED is considered experimental research since it aims to establish causal relationships between the independent (intervention) and dependent (outcome) variables (Kratochwill & Levin, 2010).

Since SCED allows a thorough assessment of individual progress and change over time, it is suitable for studies involving a small number of participants. It is particularly valuable for small, diverse populations, especially in clinical settings.

Moreover, since SCED does not include a control group, each participant serves as their own control. This is achieved by comparing outcomes during the intervention to each participant's baseline phase, supporting a link between the intervention and measured changes (Ottenbacher, 1997; Krasny-Pacini & Evans, 2018). While randomized designs aim to demonstrate statistical effects at the group level, SCED focuses on meaningful change at the individual level. Given these factors, SCED offers an appropriate and rigorous design for the aims of the present study.

### **4.3 Research Design**

The present study used a Single-Case Experimental Design (SCED) with an ABA structure. The protocol included three baseline sessions (A), ten intervention lessons (B), and three follow-up sessions (A). PANAS was administered once during each baseline session, immediately before and after each of the ten lessons, and once during each follow-up session. Additional questionnaires were administered at specific time points: WEMWBS during each baseline session, before Lessons 3, 6, and 9, and at each follow-up session. WEMWBS was conducted before the lessons to assess participants' general well-

being without the immediate influence of the intervention, since the scale was not intended to measure cumulative effects. SMMSE was administered once during Baseline 1, and CESAM during Baseline 1 and Follow-up 1. In addition, semi-structured interviews were conducted after Lessons 3, 7, and 10. An overview is presented in Table 1.

**Table 1**

*Study Protocol*

Domains	Measures	Time Points											
		Baseline				Intervention					Follow-up		
		BL1	BL2	BL3	W	L3	L6	L7	L9	L10	F1	F2	F3
Cognition	SMMSE	x											
Frailty	CESAM	x									x		
Mood	PANAS	x	x	x	x						x	x	x
Well-being	WEMWBS	x	x	x		x	x		x		x	x	x
Interviews						x		x		x			

*Note.* W = Weekly; L = Lesson; x = measure administered at this time point.

**4.4 Recruitment**

Participants were recruited through the program manager at Riverpath Retirement Community (Riverpath), Ottawa, Ontario, Canada. Recruitment involved a sign-up sheet, a demonstration class to introduce the Dalcroze Eurhythmics program, and an invitation to residents to participate in the study. Interested residents received consent forms to review in their rooms over the following week. Moreover, they were encouraged to ask any questions before deciding to participate.

Eligibility criteria included being an older adult residing at Riverpath, the ability to communicate in English, and the capacity to provide informed consent. Six participants enrolled in the study. Four withdrew after Baseline 1: one due to depression and medication changes; two were non-verbal, so their spouses completed the baseline questionnaires for them, but they withdrew; and one decided to attend the classes only without participating in the research activities.

Three participants attended the music program. Of these, two took part and completed the research study.

#### **4.5 Setting and Context**

The study was conducted from January 10 to May 20, 2025. Group lessons were held weekly in the Riverpath's dining room, which the instructor and two student volunteers prepared before each lesson and returned to its original layout afterward. The volunteers also provided support to participants during the lessons. A piano was available in the room for live musical accompaniment.

All testing sessions were conducted in a small leisure room on the same floor. The room was private, quiet, and free of through traffic, with convenient access near the elevators. This setting minimized movement within the residence and enabled testing under consistent, suitable conditions.

#### **4.6 Measures**

This section presents the measures used and their specific purpose in the present study. It describes both the questionnaires used to collect quantitative data and the approach taken for collecting qualitative data.

##### **4.6.1 Quantitative Measures**

###### **4.6.1.1 Positive and Negative Affect Schedule (PANAS)**

The PANAS was administered with the "present moment" time instruction, asking participants to rate how they felt "right now," to capture immediate mood states in line with the study's focus on comparing pre- and post-lesson affect. The instruction can be adapted to different time frames (e.g., "today," "past few days," or "past few weeks"), depending on the purpose of the study (Watson et al., 1988). The PANAS includes 20 items, divided into two sets of ten words that describe feelings; one for Positive Affect (PA; e.g., interested, excited) and one for Negative Affect (NA; e.g., distressed, upset). Each item is rated on a Likert scale, from 1 ("very slightly or not at all") to 5 ("extremely"). Each

subscale is scored by combining its 10 items, creating a total score that ranges from 10 to 50 for both PA and NA; higher scores indicate higher levels of the affective state (Watson et al., 1988).

The PANAS has shown good reliability in measuring mood, and good internal consistency within both the PA and NA subscales, with Cronbach's alpha values ranging from .86 to .90 for PA and .84 to .87 for NA (Watson et al., 1988). It has also been used successfully with older adults living in the community (von Humboldt et al., 2017). Given that it is short and easy to administer, PANAS is also well-suited for SCEDs, in which repeated administration is required without causing practice effects (Krasny-Pacini & Evans, 2018). The questionnaire is included in Appendix A.

#### **4.6.1.2 Warwick-Edinburgh Mental Well-being Scale (WEMWBS)**

The WEMWBS was included to describe participants' overall well-being and was not treated as an outcome measure in the present study. Although the scale can assess changes over time, its sensitivity to short-term effects has not been established, so it is less suitable for detecting session-by-session changes (Tennant et al., 2007).

The WEMWBS consists of 14 positively worded items related to different aspects of well-being, each rated on a Likert scale from 1 ("none of the time") to 5 ("all of the time"). All items are combined in a total score ranging from 14 to 70; higher scores reflect higher levels of well-being (Tennant et al., 2007). For each participant in this study, scores were presented as an overall range and a mean to provide a general understanding of well-being and a possible context for any study effects. This descriptive approach is consistent with the questionnaire's user guide, which notes that WEMWBS may be used to report mean scores across time points (NHS Health Scotland, 2015).

Furthermore, the WEMWBS has demonstrated good reliability and construct validity in studies including older adults (Tennant et al., 2007; Stewart-Brown et al., 2009). Based on feedback from earlier groups in the larger project, the scale layout was modified to improve readability and prevent

missing answers or other response errors. The wording of all items was not changed. The version of the WEMWBS used in the present study is included in Appendix B.

#### **4.6.1.3 Centre of Excellence Self-Administered Questionnaire (CESAM)**

The CESAM was included to provide context about participants' overall health and frailty status and was not treated as an outcome measure in this study. The CESAM was developed by the McGill Centre of Excellence on Longevity to screen multiple aspects relevant to aging. These include nutrition, medication use, memory, mood, social support, functional abilities, physical activity, sensory impairments, and falls. Items are presented in a closed-ended yes/no or specific-answer format (Lee et al., 2022). Responses are combined into an overall score (0–18), which can be interpreted as vigorous (0–3), mild frailty (4–7), moderate frailty (8–12), or severe frailty ( $\geq 13$ ) (Beauchet et al., 2020).

The CESAM has demonstrated good reliability and diagnostic accuracy in community-dwelling older adults, and strong correspondence with established frailty measures such as the Frailty Index and the Clinical Frailty Scale (Lee et al., 2022). It also showed moderate correlations with functional, cognitive, and mood measures (Lee et al., 2022). The questionnaire is provided in Appendix C.

#### **4.6.1.4 Standardized Mini-Mental State Examination (SMMSE)**

The SMMSE was included to assess participants' cognitive status and to provide additional context about their general health. It is an adaptation of the original Mini-Mental State Examination (MMSE) with added detailed instructions and scoring guidelines to improve consistency and reduce variability between administrators (Molloy & Standish, 1997).

The SMMSE is widely used as a screening tool for cognitive impairment and includes tasks assessing orientation, memory, attention, language, and visuospatial ability. The highest possible score is 30 points (Folstein et al., 1975). Furthermore, the SMMSE has been extensively used and validated with community-dwelling older adults, showing good reliability and diagnostic accuracy (Iverson, 1998; Pezzotti et al., 2008). Scores below commonly used cut-off points (typically  $< 24$ ) may indicate

possible cognitive impairment, although interpretation can vary depending on education level and clinical context (Patten & Fick, 1993). The questionnaire is included in Appendix D.

#### **4.6.2 Qualitative Measures**

Semi-structured interviews were conducted to explore participants' experiences with the music program and to gather an in-depth understanding of the lessons' effects on their mood, including whether perceived effects aligned with questionnaire findings. Interview questions were open-ended and exploratory, designed to invite reflection. Preparation for conducting the interviews was guided by McGrath and colleagues (2019) and in consultation with the larger project's qualitative lead expert. Interviews were conducted after Lessons 3, 7, and 10 to capture participants' reflections at different points in the program and to support recall. Some questions were repeated to explore whether perceptions changed over time, with the final interview as the most comprehensive, which also included questions about the overall music program (e.g., duration, continuation, and general feedback). The interview guide is provided in Appendix E.

In addition, lesson observation notes were made to provide additional context, mainly noting attendance and brief reflections. No structured observation was conducted apart from these notes.

#### **4.7 Description of the Intervention**

The Dalcroze Eurhythmics program was delivered weekly over ten 45-minute lessons by an experienced, certified Dalcroze instructor. Each lesson plan was prepared in advance by the instructor and shared with me beforehand. The lessons followed a consistent design that included a warm-up, several structured and creative activities, and a closing segment. The instructor provided clear instructions for each activity and accompanied them with live piano playing, recorded music, or singing, often encouraging participants to join in the singing.

Warm-ups typically involved muscle stretching, seated or standing, gentle movements of the arms, shoulders, feet, and ankles, and rhythmic activities. Early lessons emphasized slow movement

and simple coordination between the upper and lower body. The following activities included walking to the beat, clapping rhythmic patterns, and passing objects to the music, such as balls, bean bags, or scarves. In addition, participants responded to rhythmic changes, accents, or stops in the music (“reaction”), with later incorporated canon or call-and-response sequences. As the program progressed, activities became more varied and interactive, combining individual and group tasks. Mid-program lessons introduced improvisation, expressive movement, and collaborative activities requiring eye contact and turn-taking.

Moreover, materials such as coloured bands, sticks, and small percussion instruments were occasionally used. Participants also engaged in free movement and expressive interpretation of music. Each lesson ended with a short relaxation or closing activity. Activities were adapted to the participants’ mobility levels, with both seated and standing options. A detailed example of a lesson plan prepared by the instructor is provided in Appendix F.

#### **4.8 Procedure and Methodological Considerations**

This section outlines the steps followed during each phase of the study, along with methodological considerations related to the data collection process.

##### **4.8.1 Baseline Phase**

After participants provided informed consent, three baseline testing sessions were completed before the lessons began. Scheduling followed the guidelines established for the larger project, which specified that baseline sessions are conducted over one or two weeks, with a minimum of two days between sessions. Participants’ availability was also considered when planning the sessions.

Baseline 1 took place on January 10, Baseline 2 on January 13, and Baseline 3 on January 31. The delay before the third session was due to a COVID-19 outbreak in the residence. During Baseline 1, staff suggested the dining room for data collection, where the lessons would also be held. However, due to high levels of noise and foot traffic in the dining room, a small leisure room on the same floor

was used instead. Clipboards were provided for participants, since there were no tables available in the leisure room. Moreover, the doors were closed during testing, and a sign was posted during interviews to avoid interruptions.

#### **4.8.2 Intervention Phase**

The lessons began on February 7, 2025, and were scheduled weekly on Fridays. Participants typically arrived about 15 minutes before each lesson to complete the questionnaires. To minimize social influence on mood ratings, I was cautious not to arrive too early to the testing room and limited casual interaction with participants prior to testing. This approach was intended to capture participants' genuine mood states without potential influence from pre-lesson conversation.

Furthermore, while observing the lessons, I took care not to distract or appear evaluative, remaining seated at a distance and being mindful of my presence. Following each lesson, participants moved to the testing room to complete the post-lesson questionnaires. Occasionally, one participant would forget and return to her apartment; in those cases, I would invite her to join. To support attendance while preserving participants' autonomy, I accompanied them to the testing room but kept a respectful distance to allow for conversation among themselves. In order to minimize further social influence just before questionnaire completion, I prepared clipboards in advance so participants could begin the testing immediately. These strategies helped ensure that the questionnaires captured participants' mood and experience as immediately and directly related to the lesson as possible.

On days when interviews were scheduled, participants were informed in advance during the pre-lesson testing period to help them plan their time and avoid feeling pressured. Interviews were conducted after all post-lesson questionnaires were completed, ensuring that the interview discussion did not influence questionnaire responses. Participants were offered the option to be interviewed together or separately, and they chose to be interviewed together. Audio recordings were made using

the Voice Memos application on an iPhone. Additional details on the interview process and the practical strategies used throughout the study are provided in Appendix G.

The intervention timeline was as follows: Lessons 1 to 5 were held weekly, as planned, from February 7 to March 7.

No lesson was held on March 14 since the instructor was on spring break, and on March 21 due to an outbreak in the residence. Lesson 6 was held on March 28, but no data were collected due to my illness.

Lesson 7 was not held on April 4 due to the instructor's unavailability. Instead, I visited the residence to show video excerpts of the music program and invite residents to join. Subsequently, Lesson 7 took place on April 11, followed by Lesson 8 on April 18.

There was no lesson on April 25 due to the instructor's illness. Lesson 9 was held on May 2, and Lesson 10 on May 9.

#### **4.8.3 Follow-Up Phase**

Follow-up testing sessions mirrored the procedures used at Baseline 1, except that the SMMSE administered at Baseline 1 was not repeated, as specified in the study protocol. The follow-up sessions were completed on May 12, May 15, and May 20. I was solely responsible for data collection throughout the study.

No questionnaires were lost or incomplete, and there were no missed items. Questionnaires were administered in consistent layouts each week and stapled together by week for organization. Testing sessions typically lasted 10–15 minutes, with interviews requiring an additional 15–20 minutes.

#### **4.9 Data Analysis Procedures**

This section outlines the procedures used to analyze the quantitative and qualitative data collected in the present study, including details on the analysis of PANAS scores and the process used for preparing and analyzing the interview data.

### 4.9.1 Quantitative Analysis

The PANAS scores for Positive Affect (PA) and Negative Affect (NA) were presented in graphs showing the baseline, intervention, and follow-up phases. Following SCED norms, time was shown on the x-axis and scores on the y-axis, with data points connected and phases separated by vertical lines (Byiers, 2019; Yang et al., 2023). Graphs were generated in Plotly, a web-based data visualization tool, with each participant's data presented individually. Visual analysis, which is commonly applied in SCED research (Barlow & Hersen, 1984; Kazdin, 2019; Lane & Gast, 2014), was used in the present study to examine patterns of change, with a focus on individual rather than group results (Ottenbacher, 1997).

Based on a review of SCED literature focused on commonly examined analysis aspects, and in consideration of the present study's focus, the following aspects were assessed:

1. *Baseline stability* – the presence or absence of a trend before the intervention (Smith, 2012). A stable baseline helps ensure that any observed changes during the intervention phase can be attributed to the intervention itself, rather than to a pre-existing trend or instability (Morgan & Morgan, 2009; Kratochwill & Levin, 2010).
2. *Change in level* – the shift in scores from the end of baseline to the start of the intervention (Kazdin & Tuma, 1982; Morgan & Morgan, 2009). A noticeable shift between phases can indicate that the intervention had an immediate impact (Kazdin & Tuma, 1982; Kazdin, 2019; Kratochwill & Levin, 2010; Lane & Gast, 2014).
3. *Change in trend (slope)* – the direction and rate of change over time, and whether intervention data deviate from the baseline trend (Kratochwill & Levin, 2010; Lane & Gast, 2014; Morgan & Morgan, 2009). However, for PANAS, the main focus was on immediate pre- and post-lesson changes rather than changes over time.

4. *Change in mean* – the difference in mean scores between baseline and intervention (post-lesson) phases (Barlow & Hersen, 1984; Kratochwill & Levin, 2010; Kazdin & Tuma, 1982).
5. *Latency of change* – whether changes occurred immediately after the intervention began or with some delay (Kazdin & Tuma, 1982).
6. *Consistency of effects* – whether similar patterns of change were observed each time the intervention was implemented (Horner et al., 2005; Kratochwill & Levin, 2010; Byiers, 2019; Singh et al., 2021; Heapy, 2022). For PANAS, the emphasis was on whether immediate pre- and post-lesson differences were consistent across lessons.
7. *Data overlap between phases* – the extent to which data points from adjacent phases (e.g., baseline and intervention) overlap (Horner et al., 2005; Byiers, 2019; Smith, 2012). Less overlap supports a clearer difference between phases and strengthens the evidence that observed changes are due to the intervention.

Statistical procedures such as Tau-U<sup>7</sup> (Parker et al., 2011) were not used in the present study since the analysis focused on immediate pre- and post-lesson changes, rather than trends across phases. Instead, descriptive statistics, such as ranges and means, were combined with visual analysis, as recommended for SCED studies (Tate & Perdices, 2019; Tanious & Onghena, 2021). This approach aligns with the findings of Tanious and Onghena (2021), who reported that almost half of the SCED studies they reviewed (48.9%, N = 207) used a combination of visual and descriptive analyses.

Although visual analysis is central to SCED, it has been noted that it can be subjective, and there is ongoing discussion about the use of complementary statistical methods (Kazdin, 2019; Morgan & Morgan, 2009; Barlow & Hersen, 1984; Krasny-Pacini & Evans, 2018; Smith, 2012).

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<sup>7</sup> *Tau-U* is an effect size measure commonly used in SCED. It combines the percentage of non-overlapping data between phases (e.g., baseline and intervention) with trend correction when needed (Parker et al., 2011).

## 4.9.2 Qualitative Analysis

Semi-structured interviews were transcribed manually using clean verbatim transcription.<sup>8</sup> The small number of interviews made manual transcription feasible. NVivo software was then used to manage the interview data, including coding and creating categories (NVivo User Guide, 2022). Guidance on coding rigour and NVivo use was informed by Maher and colleagues (2018), Mortelmans (2019), Rubin and Rubin (2012), and the NVivo User Guide (2022). In addition, thematic analysis followed Saldaña's (2016) recommendations, using an inductive approach in which codes and themes were developed directly from participants' responses rather than predefined categories.

Coding was conducted in two cycles. During the first coding cycle, a combination of descriptive, in vivo, value, process, and emotion codes was created to reflect participants' feedback. Each code was labelled to indicate which participant it originated from, consistent with the SCED emphasis on individual-level analysis. In the second cycle, related codes were grouped into categories through pattern coding, forming parent codes. These categories were then examined to identify themes, which were reported starting from the most prominent ones.

## 4.10 Ethical Considerations and Data Management

The present study received ethics approval from the University of Ottawa Research Ethics Board (file number S-06-23-9358) on October 22, 2023. All participants provided written informed consent before joining the study. The consent form is included in Appendix H. Participants were reminded that enrolling in the study was voluntary, that they could withdraw at any time, and that withdrawal would not affect their ability to continue with the music program. An additional reason for emphasizing this clarification was that, in earlier phases of the larger project conducted at other locations, occasional misunderstandings occurred when local staff introduced the program. As a result,

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<sup>8</sup> *Clean verbatim* transcription of interviews involves capturing all words spoken by participants as they were said, while omitting only filler words (such as “um” and “uh”), stutters, and similar. This approach produces a cleaner, more readable transcript while preserving the full content (Hecker & Kalpokas, 2025).

some participants understood that participation in the research was required to be included in the music program. The consent form also covered the recording of interviews, including access permissions and confidentiality measures. Before each interview, participants verbally reconfirmed consent.

Furthermore, participants were assigned unique identification codes, which were listed separately on a document to which only I had access. Each week, completed questionnaires were temporarily stored in a locked on-site drawer before being transferred to the Music and Health Research Institute (MHRI). In addition, the interview recordings and transcripts were stored in a password-protected folder on my personal computer. Transcripts referred to participants only by their assigned codes. I was the only person with access to all data. Finally, safety was monitored throughout the lessons by the instructor and volunteers, and no adverse events occurred. No compensation was offered for participation in the research.

## **5. Results and Discussion**

This section includes the results of the present study along with a discussion of the findings for each participant individually, following Single-Case Experimental Design (SCED) standards. For both participants, quantitative and qualitative results are reported separately, followed by an interpretation of each type of data and an integrated interpretation.

### **5.1 Participant 1**

#### **5.1.1 Quantitative Findings**

##### **5.1.1.1 Demographic and Background Information**

Participant 1 (P1) was an 85 year old married woman of European background, living independently in a retirement residence. She held a bachelor's degree and had previously worked as a homemaker and in physical therapy. Her primary language was English. In terms of health, she reported mild bilateral hearing loss, arthritis, and high blood pressure, and used a walking aid. She had no diagnosis of dementia, exercised twice weekly, and reported no smoking or alcohol use.

Regarding her musical background, she had studied piano for 8 years, played the pipe organ for a longer period, and studied ballet for 14 years. She also had choral experience and had served as a church organist for many years, but no longer played instruments. The Demographic Questionnaire used to collect this information is included in Appendix I.

##### **5.1.1.2 Attendance**

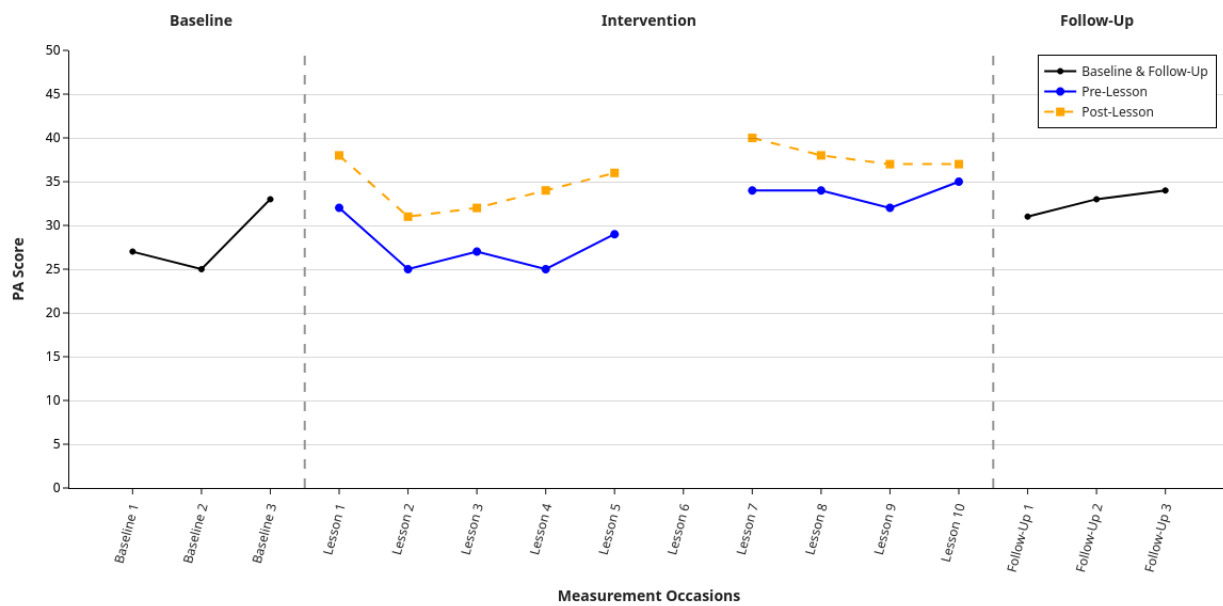
P1 completed all three baseline testing sessions and all three follow-up testing sessions. She attended all ten lessons and completed nine pre- and post-lesson testing sessions. No data were collected for Lesson 6 due to my absence.

### 5.1.1.3 PANAS Positive Affect (PA) Findings

Results are shown in Figure 1.

**Figure 1**

*PA findings for P1*



#### 1. Baseline Stability

PA scores during baseline showed slight variability and a modest upward shift before the intervention (from 27 and 25 to 33), which suggests limited stability across the three baseline sessions.

#### 2. Change in Level

A positive change in level was observed at the start of the intervention phase, as the first post-lesson intervention score (38) was higher than the final baseline score (33).

### *3. Change in Trend (Slope)*

Although change over time was not the primary focus in this study, it is worth noting that post-lesson scores showed a slight upward trend beginning with Lesson 2 toward the end of the music program. However, this observation should be interpreted with caution.

### *4. Change in Mean*

The mean PA score during the baseline phase was 28.3, compared to 35.9 for the post-lesson scores during the intervention phase. This difference indicates an overall increase in positive affect during the intervention phase.

### *5. Latency of Change*

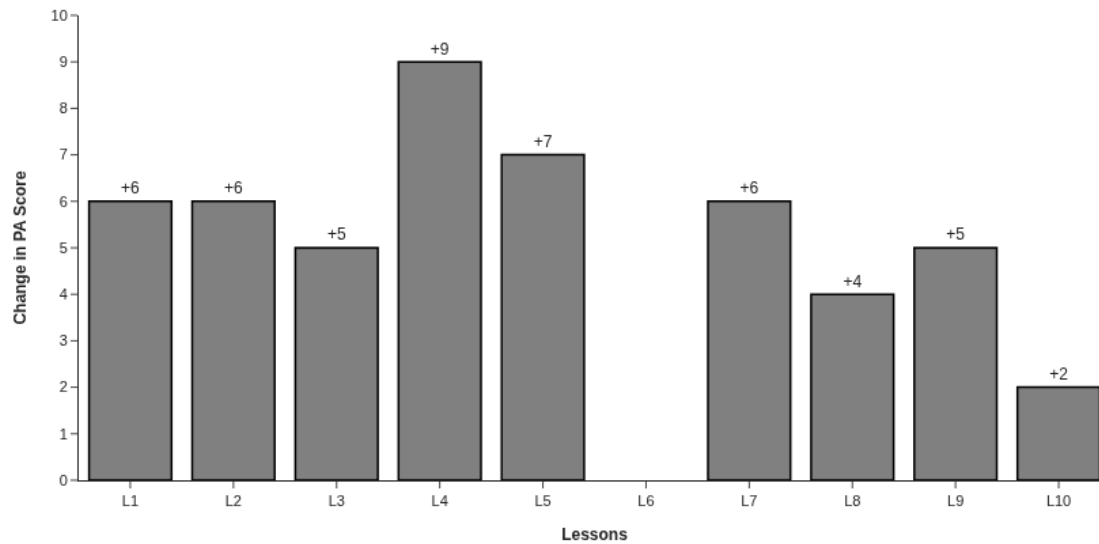
Since change over time was not the primary focus, the pre- and post-lesson changes were examined instead. An increase in PA from pre- to post-lesson scores was observed from the first lesson, which indicates that mood improvement after each lesson occurred immediately once the intervention started, without delay.

### *6. Consistency of Effects*

Across the intervention phase, all post-lesson PA scores were consistently higher than corresponding pre-lesson scores. Although the magnitude of change varied across lessons, the direction of change was consistent. The mean difference between pre- and post-lesson scores across all lessons was +5.6 points. The largest difference occurred at Lesson 4, from which the size of the pre- to post-lesson difference gradually declined through to Lesson 10. Pre- to post-lesson differences are illustrated in Figure 2.

**Figure 2**

*Difference between pre- and post-lesson PA scores across lessons for P1*



*7. Data overlap between phases*

Although this aspect is more appropriate in studies examining change over time, it is included to support the findings. Only two out of nine post-lesson PA scores (31 and 32) fell within the baseline range (25–33), which suggests limited overlap, with most intervention scores being higher than baseline scores.

*8. Follow-up scores*

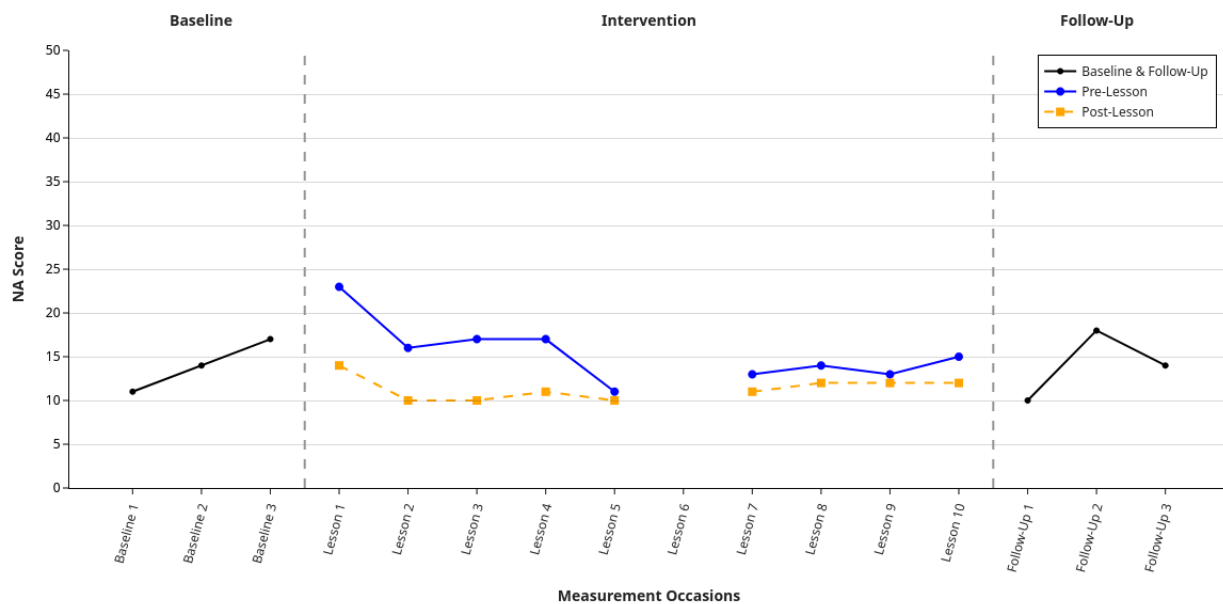
Follow-up PA scores showed a decline compared to the final post-lesson value, decreasing from 37 to 31 in the first follow-up. Subsequent follow-ups showed a slight increase to 33 and 34, but overall level remained below the final intervention score. While change over time was not the main focus of analysis, this comparison provides additional context.

### 5.1.1.4 PANAS Negative Affect (NA) Findings

Results are shown in Figure 3.

**Figure 3**

*NA findings for P1*



#### 1. Baseline stability

NA baseline scores (11, 14, 17) showed a gradual upward trend before the intervention, suggesting some instability across baseline sessions. However, as this score increase is a shift toward higher negative affect rather than improvement, it does not indicate a positive pre-intervention trend.

#### 2. Change in level

A decrease in NA was observed from the final baseline score (17) to the first post-lesson score (14), which indicates an immediate reduction in negative affect at the start of the intervention phase.

### 3. *Change in trend (slope)*

Although change over time was not the primary focus in the present study, it is worth noting that post-lesson scores remained within a lower, more stable range than the baseline scores. However, this observation should be interpreted with caution.

### 4. *Change in mean*

The mean NA score during the baseline phase was 14.0, compared to 11.3 during the intervention phase. This change indicates an overall decrease in negative affect during the intervention.

### 5. *Latency of change*

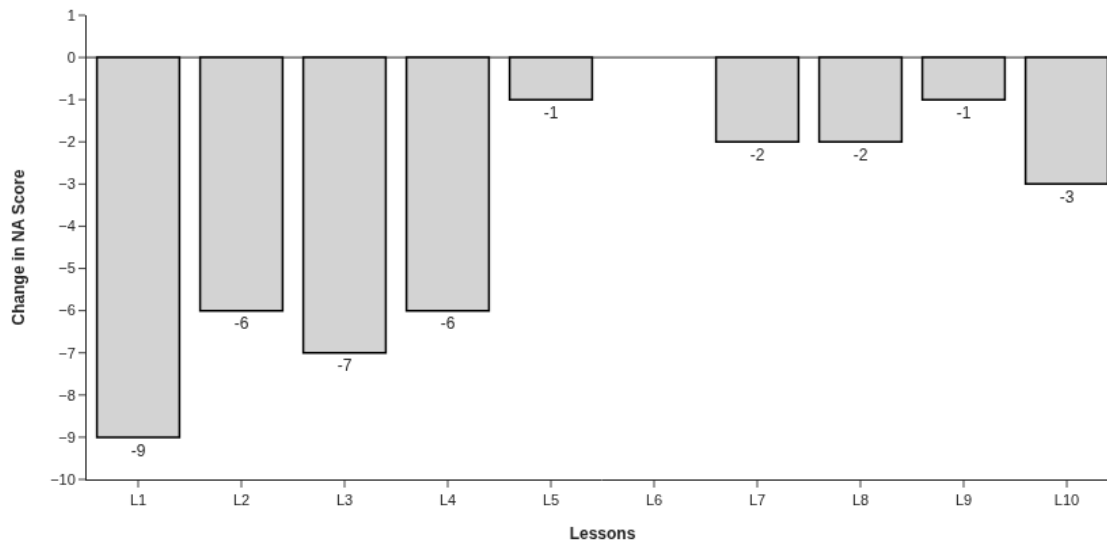
Since change over time was not the primary focus, the latency of pre- and post-lesson changes was examined instead. A decrease from pre- to post-lesson in NA scores was evident from the first lesson. This observation suggests that a decrease in negative affect after each lesson occurred without delay.

### 6. *Consistency of effects*

Across all lessons, post-lesson NA scores were consistently lower than the corresponding pre-lesson scores. While the magnitude of change varied between lessons, the direction of change remained constant. The mean difference between pre- and post-lesson scores across all lessons was  $-3.0$  points. Pre- to post-lesson differences are illustrated Figure 4.

**Figure 4**

*Difference between pre- and post-lesson NA scores across lessons for P1*



### 7. Data overlap between phases

Although this aspect is more relevant in studies examining change over time, it is included to support the findings. Six out of nine post-lesson NA scores fell within the baseline range (11–17). This observation shows significant overlap between phases and suggests that the post-lesson scores were not significantly different from baseline levels.

### 8. Follow-up scores

Follow-up NA scores fluctuated after the music program ended. The first follow-up score (10) remained similar to the lowest levels reached during the intervention, but the second follow-up rose to 18 before decreasing slightly to 14 in the final follow-up. While change over time was not the main focus of analysis, the follow-up comparison is nonetheless worth noting.

#### **5.1.1.5 Warwick-Edinburgh Mental Well-being Scale (WEMWBS) Findings**

For P1, WEMWBS scores ranged from 35 to 43, with a mean of about 38. The highest score appeared during the second baseline (43), while the other scores stayed within a similar range throughout the study. The follow-up scores (40, 37, 37) were close to earlier results. These observations suggest that the participant's overall well-being was stable throughout the study.

#### **5.1.1.6 Centre of Excellence Self-Administered Questionnaire (CESAM) Findings**

CESAM score was 10 at baseline and 11 at follow-up, and, similar to the well-being, this participant's frailty status was stable over the study period.

#### **5.1.1.7 Standardized Mini-Mental State Examination (SMMSE) Findings**

The SMMSE score for P1 was 30 out of a possible 30, indicating no cognitive impairment.

### **5.1.2 Qualitative Findings**

#### *1. Commitment to the music program*

The participant described being committed to attending the lessons and mentioned looking forward to each lesson. She expressed disappointment when a class was cancelled, saying, "I could have done with that lift."

#### *2. Cognitive engagement*

The participant noted that the program required mental effort. She explained that it "requires more thinking than normal exercise". She emphasized the importance of having to "think ahead" during the activities, which also "kept [her] calmer," adding that "thinking reduces worrying." She also highlighted on many occasions the importance of following sequences during lessons, which, she stated, stimulates thinking, as well as "using sequences [again]" in older age. In addition, she described the lessons as helping her be in a "better state of mind," "exercise the brain," and "using your head."

### *3. Social bonding*

The participant highlighted the importance of participating in a small group and described developing a sense of connection through the shared activities.

### *4. Challenging age-related doubts*

The participant described how the program challenged her age-related self-doubt. She illustrated: “You’re old, but you can resolve what you’re dealing with.”

### *5. Emotional and psychological impact*

The participant also shared that the program helped her cope with external distress and reduced feelings of discouragement. She reported feeling uplifted, happy, and more positive after lessons, and noted that they made her feel “young again.” She also emphasized the pleasure she found in movement and music. She further described the atmosphere in the lessons as “playful” and “nonjudgmental,” and stated that she and others could “giggle at ourselves”, while also describing lessons as fun.

### *6. Music program perception and appreciation*

The participant shared her appreciation for diverse aspects of the program. She mentioned “liking the approach” and “appreciating the variety,” and described the program as “very valuable at this time.” She also noted that it helped her to rediscover movements from her youth.

### *7. Empowerment and effort*

The participant stated, “I can tackle the next thing.” She also commented on the sense of effort she felt during the program.

### *8. Physical outcomes*

The participant also reported improvements in balance and coordination.

### *9. Nature of activities*

The participant described the activities as feeling “natural” and “integrated.”

### 5.1.3 Interpretation of Quantitative Findings

Quantitative findings for P1 show consistent short-term mood improvements during the intervention phase. Specifically, her positive emotions increased across lessons, which indicates immediate mood improvement linked to her participation in the music program. Moreover, her negative emotions decreased after each lesson, adding to mood improvement after each lesson. The mean change between pre- and post-lesson scores was greater for positive emotions (+5.6 in PA) than for negative emotions (-3.0 in NA). This difference suggests that the lessons had a relatively stronger effect on increasing positive emotions than on reducing negative ones.

After the intervention, the participant's mood fluctuated without a consistent direction, which suggested some return toward baseline but not a stable pattern. In addition, other indicators, such as higher average post-lesson scores throughout the intervention compared with baseline, the immediate mood improvement observed from the first lesson onward, and the limited overlap between baseline and intervention PA scores, further support the observation of immediate mood improvement. However, these supporting findings should be interpreted with caution, as the study focused primarily on immediate pre- to post-lesson effects.

Furthermore, even though the participant's well-being and frailty remained relatively stable throughout the study, her overall well-being was lower than population averages. Compared with the standards, adults aged 75 and older typically have a score around 51 on the WEMWBS, whereas this participant's mean score was 38, which is lower than described for this age group (Tennant et al., 2007). Nevertheless, since WEMWBS scores vary across demographic and contextual factors, they should be interpreted with caution. In contrast, her cognitive functioning was intact, as indicated by her SMMSE score.

#### **5.1.4 Interpretation of Qualitative Findings**

For P1, the lessons provided cognitive engagement and positive emotional impact, experienced after each lesson, and as she mentioned in interviews and informal conversations, throughout the period of the program.

The most prominent theme in her responses was cognitive engagement. She repeatedly described the lessons as mentally stimulating, explaining that they required more thinking than typical exercise, with having to think ahead, and that this kept her calmer and reduced worrying. She described this kind of mental effort as valuable to her, with the mentioned aspects of thinking ahead and more thinking bringing some emotional benefit as well.

Beyond the cognitive aspect, the emotional impact emerged as the second prominent theme in her qualitative data. The participant reported positive effects, describing feeling younger and referring to the lessons as very valuable at this time, in the context of stress related to her husband's illness. She also described the lessons as fun, adding that they provided a lift she missed when a class was cancelled, which shows that she saw the music program as a source of support.

This emotional impact was reinforced by the social aspect of the lessons, since she appreciated the playful, nonjudgmental atmosphere in the small group, where participants could "giggle" at themselves. Physical aspects mentioned, such as improved balance, were less prominent in this participant's reflections compared to the cognitive and emotional aspects.

#### **5.1.5 Integrated Interpretation**

The PANAS consistently showed immediate mood improvement after each lesson, through increased positive and reduced negative emotions. These changes align with the participant's descriptions of the experience with lessons as mentally engaging, enjoyable, and emotionally supportive, while feeling calmer and more uplifted after participating. Similarly, her comments about

reduced worry and the sense of “lift” she experienced after participating are consistent with the quantitative decreases in negative affect.

Although the participant’s overall well-being was lower than population standards, the short-term changes shown by PANAS correspond well with her own views of the lessons as valuable, stimulating, and emotionally supportive during a personally stressful period. In an interview, the participant also noted that her lower well-being was related to stress connected to her husband’s illness, which helps contextualize the well-being aspect.

Both the quantitative and qualitative findings point to music program-related mood benefits for this participant.

## **5.2 Participant 2**

### **5.2.1 Quantitative Findings**

#### **5.2.1.1 Demographic and Background Information**

Participant 2 (P2) was an 84-year-old woman of European background, divorced, and living in a retirement residence. She held a master’s degree and had previously worked as an executive director. Her primary language was English. In terms of health, she had been diagnosed with dementia less than five years earlier (type unspecified) and reported mild bilateral hearing loss. She exercised daily, had previous experience with Tai Chi, had never smoked, and drank less than two alcoholic beverages per day.

Regarding her musical background, she had no prior experience with music and movement programs, group music classes, or choirs. However, she had played the flute, beginning at age 30 for approximately five years, but was no longer musically active.

#### **5.2.1.2 Attendance**

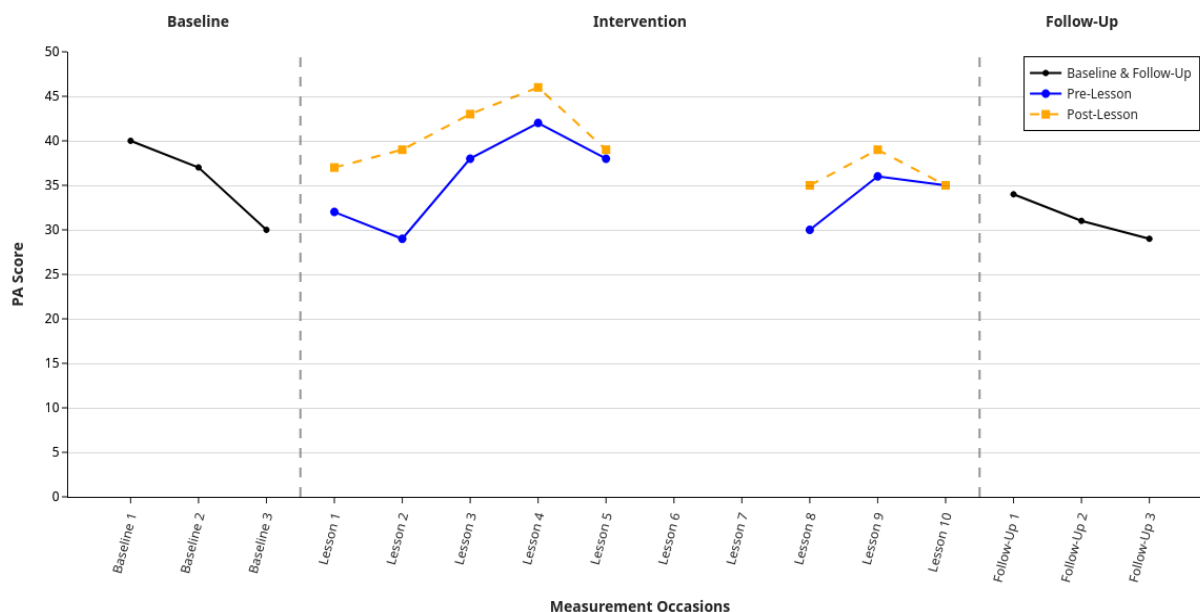
P2 completed all three baseline testing sessions and all three follow-up testing sessions. She attended eight lessons and completed eight pre- and post-lesson testing sessions.

### 5.2.1.3 PANAS Positive Affect (PA) Findings

Results are shown in Figure 5.

**Figure 5**

*PA findings for P2*



#### 1. *Baseline stability*

Baseline PA scores (40, 37, 30) showed a steady downward trend, which indicates limited stability during the baseline phase.

#### 2. *Change in level*

A positive change in level was observed, with the final baseline score (30) followed by a higher first post-lesson score (37).

#### 3. *Change in trend (slope)*

Although change over time was not the primary focus, post-lesson scores showed an upward trend at the beginning of the intervention, opposite to the downward trend observed in the baseline.

However, this upward shift did not continue. In addition, scores for Lessons 6 and 7 are missing, which limits the observation of the trend. For these reasons, this overall observation should be interpreted with caution.

#### 4. *Change in mean*

The mean PA score during the baseline phase was 35.7, compared to 39.1 during the intervention. This difference indicates an overall slight increase in positive affect during the music program.

#### 5. *Latency of change*

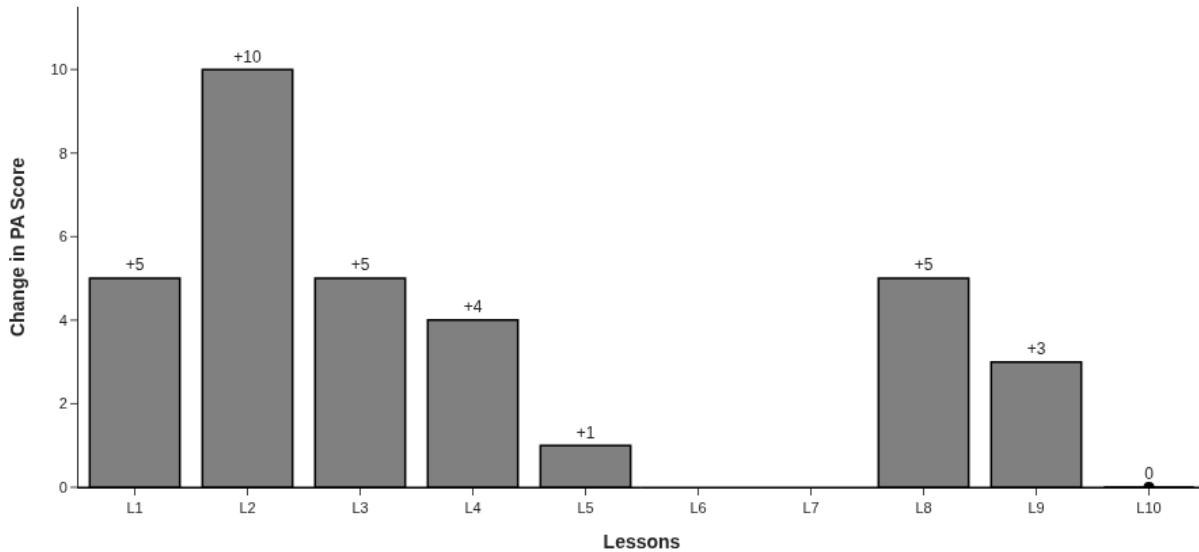
As noted earlier, since change over time was not the primary focus in this study, the pre- and post-lesson changes were examined instead. For this participant, an increase in PA from pre- to post-lesson scores was observed from the first lesson, which indicates that immediate mood improvements occurred without latency.

#### 6. *Consistency of effects*

Across all lessons, post-lesson PA scores were higher than pre-lesson scores in seven out of eight cases. The only exception was Lesson 10, where pre- and post-lesson scores were equal. Despite this example, the overall direction of change was consistent. The mean difference between pre- and post-lesson scores across lessons was +3.4 points. These differences are illustrated in Figure 6.

**Figure 6**

*Differences between pre- and post-lesson PA scores across lessons for P2*



*7. Data overlap between phases*

As mentioned earlier, this aspect is more appropriate in studies examining change over time. Nevertheless, it was examined in this study to support the findings. Only two out of eight post-lesson PA scores (37 and 35) fell within the baseline range (30–40), which indicates limited overlap and shows that most post-lesson scores were higher than baseline scores.

*8. Follow-up scores*

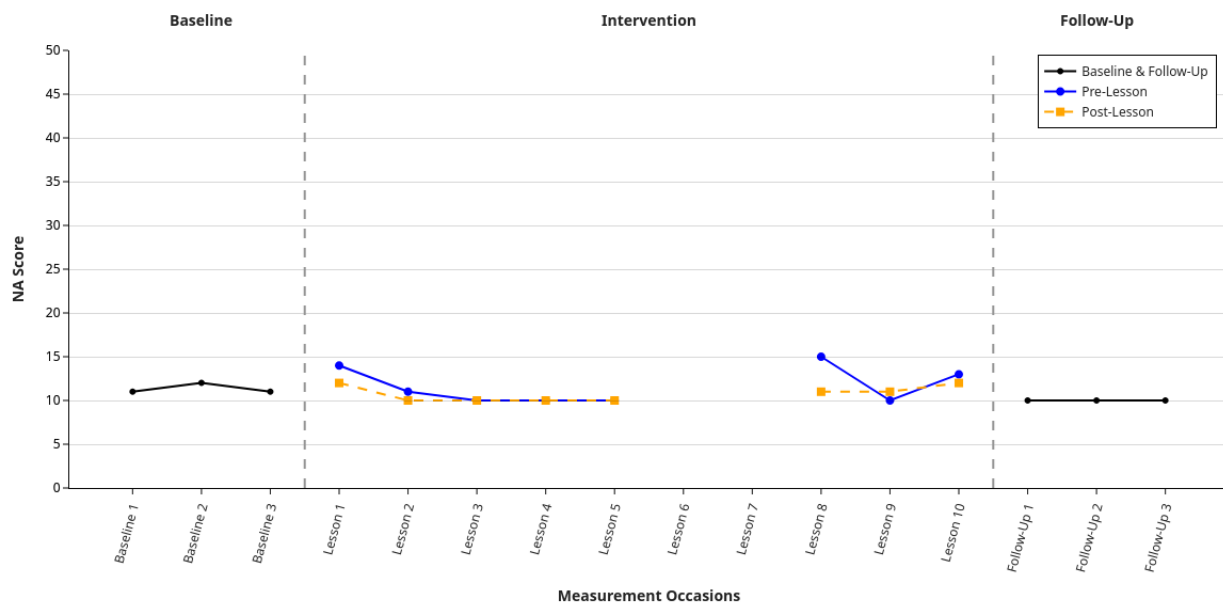
Follow-up PA scores showed a gradual decline from the final post-lesson score of 35 to 34, 31, and 29 across the three follow-up sessions. Although change over time was not the focus of analysis, it is worth examining the follow-up scores to provide additional context.

### 5.2.1.4 PANAS Negative Affect (NA) Findings

Results are shown in Figure 7.

**Figure 7**

*NA Findings for P2*



#### 1. Baseline stability

NA scores during the baseline showed minimal fluctuation across the three sessions (11, 12, and 11), which indicates a stable baseline.

#### 2. Change in level

No clear change in NA was observed from the final baseline score (11) to the first post-lesson score (12). This minimal difference does not indicate an immediate reduction in negative affect at the start of the intervention. In addition, the first post-lesson score follows the pattern of fluctuation observed in the baseline scores (11, 12, 11).

### 3. *Change in trend (slope)*

Although change over time was not the primary focus, it is worth noting that the post-lesson scores showed no clear trend. As with PA, the missing scores for two lessons limit the observation of the trend. Similarly, these observations should be interpreted with caution.

### 4. *Change in mean*

The mean NA score during the baseline phase was 11.3, compared to 11.9 during the intervention, which indicates no change across the two phases.

### 5. *Latency of change*

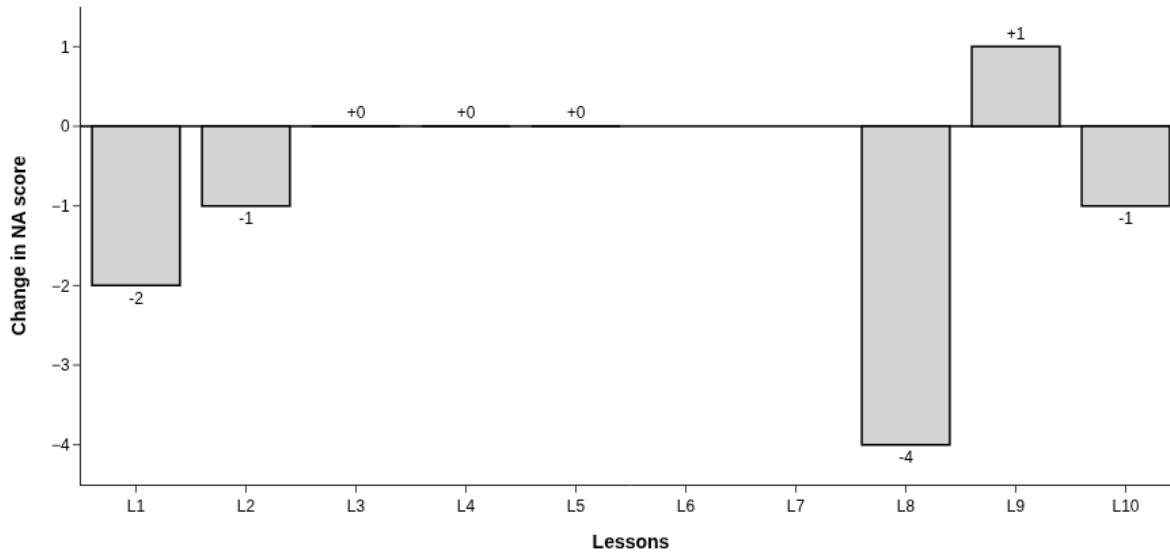
As noted earlier, since change over time was not the primary focus, the pre- and post changes were examined instead. A lower post-lesson NA score than pre-lesson score was observed at the first lesson, which may suggest no delay in change. However, this pre- to post-lesson decrease in NA was not consistent across all lessons.

### 6. *Consistency of effects*

Across the intervention phase, post-lesson NA scores were mostly slightly lower than, or equal to, their corresponding pre-lesson scores, with one lesson showing a minimal increase. This pattern suggests no consistent immediate reduction in negative affect. The mean difference between pre- and post-lesson scores across all lessons was -0.88. These differences are illustrated in Figure 8.

**Figure 8**

*Difference between pre- and post-lesson NA scores across lessons for P2*



### 7. Data overlap between phases

As noted earlier, although this aspect is more appropriate in studies examining change over time, it is included to support the findings. Four out of eight post-lesson NA scores fell within the baseline range, which suggests moderate overlap between phases, with post-lesson scores not consistently different from baseline levels.

### 8. Follow-up scores

Follow-up NA scores showed a minimal change compared to the final post-lesson score, decreasing from 12 to 10, and remaining stable at 10 across all three sessions. While change over time was not the main focus of analysis, the follow-up comparison is nonetheless worth noting.

#### 5.2.1.5 Warwick-Edinburgh Mental Well-being Scale (WEMWBS)

For P2, WEMWBS scores ranged from 50 to 56, with a mean of about 53.8. The highest score was at Follow-up 2 (56), with the other scores staying within a similar range throughout the study. The

follow-up scores (52, 56, 54) were similar to earlier results. These observations suggest that the participant's overall well-being remained stable throughout the study.

#### **5.2.1.6 Centre of Excellence Self-Administered Questionnaire (CESAM) Findings**

CESAM score was 5 at baseline and 8 at follow-up, suggesting a shift toward increased frailty over time.

#### **5.2.1.7 Standardized Mini-Mental State Examination (SMMSE) Findings**

The SMMSE score for P2 was 20 out of a possible 30, indicating cognitive impairment.

### **5.2.2 Qualitative Findings**

#### *1. Emotional and psychological impact*

The participant described several emotional and psychological benefits of participating in the music program. She said that the experience was “wonderful” and shared that she felt “more energetic” and “more interested” following the lessons. She also expressed that the program was “encouraging” and “positive,” and noted that participating made her feel good. Referring to living alone, she stated that she was less prone to “feel down” while participating in the program.

#### *2. Social engagement*

The participant described the social aspect of the music program as meaningful. She expressed that she enjoyed interacting with others and felt comfortable in the small group setting. She also stated, “It was with other people and it was fun.”

#### *3. Cognitive engagement*

The participant described the music program as “good for my brain” and said it “got me thinking.” She also spoke of her experience in a way that suggested a general sense of mental engagement during the lessons.

#### *4. Motivation and participation*

The participant spoke about staying engaged with the group and participating in the lessons, even when she occasionally forgot some aspects. She shared that being active with others encouraged her involvement.

#### *5. Music program perception and appreciation*

The participant stated that she “liked the variety” of the activities in the program. She also described it as “fun,” and referred to aspects of it as “funny and silly.” At the beginning, she felt some uncertainties about the nature of the program, but as she noted, this changed as the lessons progressed.

### **5.2.3 Interpretation of Quantitative Findings**

Quantitative results for P2 show short-term mood improvements during the intervention phase, although with smaller and less consistent changes than with P1. Positive emotions increased across most lessons, which indicates immediate mood improvement after participating in the lessons. Negative emotions remained stable across lessons, however, with only minor differences between pre- and post-lessons. In addition, the mean change between pre- and post-lesson scores was slightly higher for positive emotions (+3.4 in PA) than for negative (-3.0 in NA), which suggests that the lessons had a slightly stronger influence on increasing positive than on reducing negative emotions. This was similar to P1, but the increase in positive emotions was smaller for P2, which may suggest a more moderate response to the music program.

Other indicators, such as a slightly higher average post-lesson scores compared with baseline, the immediate mood improvements observed from the first lesson, and the limited overlap between baseline and intervention PA scores, further support the observation of short-term mood improvement. However, these supporting findings should be interpreted with caution, as the study focused primarily on immediate pre- to post-lesson effects.

Furthermore, P2's well-being was stable over the study period. Her mean well-being score of 53.8 falls within the typical range for adults aged 75 and older (Tennant et al., 2007). However, the participant's frailty slightly increased from baseline to follow-up, from the mild to the moderate range. It is worth mentioning that this increase was not observed or reflected during the lessons.

In addition, her SMMSE score of 20 is lower than what is reported for community-dwelling older adults of similar age, who typically have a score around 29 (Kistler-Fischbacher et al., 2025). This lower score aligns with her report on dementia diagnosis and provides helpful context.

#### **5.2.4 Interpretation of Qualitative Findings**

For P2, the lessons provided emotional and social benefits, which she described with enthusiasm. The most prominent theme in her reflections was the emotional impact of the music program. She spoke about feeling more energetic and interested and described feeling more positive while living alone. In addition, the program made her feel more encouraged.

Social engagement emerged as the second strong theme. The participant appreciated being with others, describing the small-group setting as fun and comfortable, and enjoyed doing the activities with others. She also mentioned that she would not participate in the music program if the group were too large.

A third theme, less prominent than the emotional and social aspects, was cognitive engagement. The participant described the program as "good for my brain" and it "got me thinking," suggesting that the lessons also provided mental stimulation. She also noted that, even if she occasionally forgot details, being with others encouraged her. In addition, both participants appreciated the variety of activities in the music program, which P2 also found to be "funny and silly."

#### **5.2.5 Integrated Interpretation**

Both the quantitative and qualitative findings indicate that P2 experienced a positive effect on her mood from the lessons, with the qualitative findings suggesting that she also found them socially

rewarding. Quantitative results demonstrated consistent immediate increases in PA after most lessons, aligning with her descriptions of feeling more energetic, interested, and encouraged following participation. The interviews add depth to this pattern by showing that the emotional benefits were reinforced by the small-group setting, where interaction and shared enjoyment supported her positive mood.

Although these mood improvements were moderate compared with P1, they were nonetheless meaningful, particularly given her experience of living alone and being diagnosed with dementia. Her comments about the music program being “good for my brain” and “funny and silly” suggest that both mental engagement and playfulness may have contributed to motivation and enjoyment.

Both the quantitative and qualitative findings point to music program-related mood benefits for this participant.

## **6. Conclusion and Further Considerations**

### **6.1 Summary of Key Findings**

The present study examined the immediate effects of a Dalcroze Eurhythmics program on older adults' mood and explored how qualitative interviews aligned with questionnaire data in assessing these effects. The PANAS questionnaire showed increases in positive affect following each lesson. These findings aligned with the interview data, which helped contextualize participants' quantitative responses. The inclusion of interviews was valuable, as they provided insight into perspectives that could not be captured through questionnaires alone.

In addition, interview data showed that participants described benefits across physical, cognitive, social, and mental health domains. These findings align with the studies reviewed earlier, which reported positive effects of Dalcroze Eurhythmics across the same health domains.

### **6.2 Music Program Inclusivity**

The present study included two older adults with different health profiles, specifically within physical and cognitive domains. Despite these differences, both were able to participate in the music program fully.

Moreover, one participant, who used a walking aid, noted that she particularly enjoyed the activity involving walking backwards. She noted that she rarely had the opportunity to practice this type of movement in her daily life. These examples illustrate the unique and inclusive nature of the program.

### **6.3 Implications for Future Research**

Participant reflections suggested that different aspects of the music program may resonate more strongly depending on individual cognitive profiles. The participant with intact cognition frequently spoke about the mental engagement required by the program and described this as a source of

emotional benefit. In contrast, the participant diagnosed with dementia placed greater emphasis on the social and emotional aspects of the experience. Future research could examine whether cognitive status influences which program elements participants find most meaningful. Such knowledge could inform tailored approaches that may strengthen engagement and program benefits for diverse cognitive profiles.

The data in the present study suggested that increases in positive affect were greater in magnitude than decreases in negative affect. This asymmetry has been noted in the literature (Fredrickson, 2001; Larsen, 2000). A similar finding was reported in a study with older adults participating in a Dalcroze-based program, where positive affect increased more than negative affect decreased (Treviño & Álvarez-Bermúdez, 2018). Future studies could further examine whether this pattern is specific to Dalcroze Eurhythmics interventions with older adults. This aspect may be relevant when considering how such programs are evaluated, especially when used with participants experiencing depression, anxiety, or distress.

Participant feedback suggested that the positive effects on the mood from the music program may have extended into daily life during the study period. While these reflections were captured in the interviews, the PANAS was used in the present study with a focus on immediate mood changes before and after each lesson. Future studies could explore whether the mood changes are sustained over time, using quantitative measures designed to assess longer-term emotional well-being.

It is worth noting that, in most study sites, participants have the option to continue attending the music program at the same location, supported by longer-term project funding. In the case of the present study, the music program did not continue on-site; instead, participants were offered the option

to join the program at a nearby location.<sup>9</sup> Opportunities for ongoing participation may be valuable for future studies that consider examining longer-term effects.

## **6.4 Study Limitations**

### **6.4.1 Methodological Considerations**

The present study included data from two participants. However, the initial objective was to complete data collection with three to five participants, with three being the commonly recommended minimum in SCED research (Smith, 2012; Lane & Gast, 2014; Horner et al., 2005; Epstein & Dallery, 2022).

Additionally, the present study focused on examining the immediate pre- and post-lesson changes during the intervention phase. Although certain indicators of change over time were briefly considered to support the findings, the study did not examine gradual change or long-term effects of the intervention.

These methodological choices reflect the study's design focus and practical considerations, including participant availability, and should be taken into account when interpreting the findings.

### **6.4.2 Limitations Noted During Implementation**

As described in Section 4.8 (Procedure and Methodological Considerations), several challenges occurred during the study. These included COVID-19 outbreak and a second, unspecified outbreak at the residence, as well as the instructor's and my own illnesses. Recruitment was also challenging, despite ongoing collaboration with the residence staff throughout the study. In addition to presenting short video clips in the lobby to inform and invite residents, a poster for the music program was later displayed to help attract additional interest. This poster is included in Appendix J. The goal was to recruit research participants as well as those who might wish to attend lessons only. The lesson group

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<sup>9</sup> The music program did not continue at this location due to site-specific factors, including a wide range of activities already offered and limited interest in research-based programs. The larger project prioritizes sites where older adults have fewer opportunities to participate in regular programs.

remained small throughout the study, typically consisting of three participants and one or two volunteers.

Both participants who completed the research study noted that the music program was listed on the weekly residence schedule only under its research acronym (“COMM”), which they found unclear. They added that other residents might have had similar difficulty understanding that it referred to a music and movement program. They also noted that some residents might have been hesitant to attend group activities due to ongoing COVID-19 and other outbreaks in the residence. Although these challenges extended the overall study timeline, the lessons and testing sessions were both completed as planned.

## References

- Adamczyk, J., Celka, R., Stemplewski, R., Ceynowa, K., & Maciaszek, J. (2022). Effects of Jaques-Dalcroze eurhythmics program on postural stability in elderly women. *Scientific Reports*, 12(1), 7073–7073. <https://doi.org/10.1038/s41598-022-11095-x>
- Adamczyk, J., Celka, R., Stemplewski, R., Ceynowa, K., Kamińska, P., & Maciaszek, J. (2020). The Impact of 12-Week Jaques-Dalcroze Eurhythmics Programme on the Dynamic Agility in Single-Dual-Task Conditions in Older Women: A Randomized Controlled Trial. *BioMed Research International*, 2020, 9080697–6. <https://doi.org/10.1155/2020/9080697>
- Alain, C., Moussard, A., Singer, J., Lee, Y., Bidelman, G. M., & Moreno, S. (2019). Music and Visual Art Training Modulate Brain Activity in Older Adults. *Frontiers in Neuroscience*, 13, 182–182. <https://doi.org/10.3389/fnins.2019.00182>
- Alexopoulos, G. S. (2005). Depression in the elderly. *Lancet*, 365(9475), 1961–1970. [https://doi.org/10.1016/S0140-6736\(05\)66665-2](https://doi.org/10.1016/S0140-6736(05)66665-2)
- Allan, L. M., Ballard, C. G., Rowan, E. N., & Kenny, R. A. (2009). Incidence and prediction of falls in dementia: a prospective study in older people. *PloS One*, 4(5), e5521–e5521. <https://doi.org/10.1371/journal.pone.0005521>
- Altenmüller, E., & Scholz, D. S. (2016). Émile Jaques-Dalcroze as a visionary pioneer of Neurologic Music Therapy. *Approaches: Mousikotherapeia Kai Eidikī Mousikī Paidagōgikī*, 8(2), 112-. <https://doi.org/10.56883/ajjmt.2016.332>
- Anuar, A. F., & Ismail, M. J. (2021). Infusing Dalcroze Eurhythmics in improving singing skills among primary school students. *Quantum Journal of Social Sciences and Humanities*, 2(1), 24-38. <https://doi.org/10.55197/qjssh.v2i1.27>

- Ayoubi, F., Launay, C. P., Kabeshova, A., Fantino, B., Annweiler, C., & Beauchet, O. (2014). The influence of fear of falling on gait variability: results from a large elderly population-based cross-sectional study. *Journal of Neuroengineering and Rehabilitation*, 11(1), 128–128. <https://doi.org/10.1186/1743-0003-11-128>
- Baker, S., Warburton, J., Waycott, J., Batchelor, F., Hoang, T., Dow, B., Ozanne, E., & Vetere, F. (2018). Combatting social isolation and increasing social participation of older adults through the use of technology: A systematic review of existing evidence. *Australasian Journal on Ageing*, 37(3), 184–193. <https://doi.org/10.1111/ajag.12572>
- Barefoot, J. C., Brummett, B. H., Clapp-Channing, N. E., Siegler, I. C., Vitaliano, P. P., Williams, R. B., & Mark, D. B. (2000). Moderators of the effect of social support on depressive symptoms in cardiac patients. *The American Journal of Cardiology*, 86(4), 438–442. [https://doi.org/10.1016/S0002-9149\(00\)00961-9](https://doi.org/10.1016/S0002-9149(00)00961-9)
- Bar, R., & Herron, R. (2023). Future directions for collaborative arts-based ageing research. In *Dance, Ageing and Collaborative Arts-Based Research* (1st ed., Vol. 1, pp. 144–156). Routledge. <https://doi.org/10.4324/9781003260691-10>
- Barlow, D. H., & Hersen, M. (1984). *Single case experimental designs : strategies for studying behavior change* (2nd ed.--) Pergamon Press.
- Bartlett, H., Warburton, J., Lui, C.-W., Peach, L., & Carroll, M. (2013). Preventing social isolation in later life: Findings and insights from a pilot Queensland intervention study. *Ageing and Society*, 33(7), 1167–1189. <https://doi.org/10.1017/S0144686X12000463>
- Barnes, L. L., Mendes de Leon, C. F., Wilson, R. S., Bienias, J. L., & Evans, D. A. (2004). Social resources and cognitive decline in a population of older African Americans and Whites. *Neurology*, 63(12), 2322–2326. <https://doi.org/10.1212/01.wnl.0000147473.04043.b3>

- Bateman, A., Culpan, F. J., Pickering, A. D., Powell, J. H., Scott, O. M., & Greenwood, R. J. (2001). The effect of aerobic training on rehabilitation outcomes after recent severe brain injury: a randomized controlled evaluation. *Archives of physical medicine and rehabilitation*, 82(2), 174-182. <https://doi.org/10.1053/apmr.2001.19744>
- Beaulieu, R., Kang, H. G., & Hino, S. (2017). An action research approach to introduce Dalcroze Eurhythmics Method in a community of older adults as a promising strategy for fall prevention, injury recovery and socialization. *International Journal of Action Research*, 13(3), 276–299. <https://doi.org/10.3224/ijar.v13i3.06>
- Beauchet, O., Dubost, V., Allali, G., Gonthier, R., Hermann, F. R., & Kressig, R. W. (2007). ‘Faster counting while walking’ as a predictor of falls in older adults. *Age and Ageing*, 36(4), 418–423. <https://doi.org/10.1093/ageing/afm011>
- Beauchet, O., Bastien, T., Mittelman, M., Hayashi, Y., & Hau Yan Ho, A. (2020). Participatory art-based activity, community-dwelling older adults and changes in health condition: Results from a pre–post intervention, single-arm, prospective and longitudinal study. *Maturitas*, 134, 8–14. <https://doi.org/10.1016/j.maturitas.2020.01.006>
- Blake, H., & Batson, M. (2009). Exercise intervention in brain injury: a pilot randomized study of Tai Chi Qigong. *Clinical Rehabilitation*, 23(7), 589-598. <https://doi.org/10.1177/0269215508101736>
- Bogdanowicz, E. (2016). Dalcroze eurhythmics in therapy for children with attention deficit hyperactivity disorder (ADHD) symptoms. *Approaches*, 8(2), 134-46. <https://doi.org/10.56883/ajjmt.2016.334>
- Boyke, J., Driemeyer, J., Gaser, C., Büchel, C., & May, A. (2008). Training-induced brain structure changes in the elderly. *Journal of Neuroscience*, 28(28), 7031-7035. <https://doi.org/10.1523/JNEUROSCI.0742-08.2008>

- Bridenbaugh, S. A., & Kressig, R. W. (2011). Laboratory Review: The Role of Gait Analysis in Seniors' Mobility and Fall Prevention. *Gerontology (Basel)*, 57(3), 256–264.  
<https://doi.org/10.1159/000322194>
- Bugos, J. A., Perlstein, W. M., McCrae, C. S., Brophy, T. S., & Bedenbaugh, P. H. (2007). Individualized piano instruction enhances executive functioning and working memory in older adults. *Aging and mental health*, 11(4), 464-471.  
<https://doi.org/10.1080/13607860601086504>
- Bungay, H., & Jacobs, C. (2020). Dance for health: the perceptions of healthcare professionals of the impact of music and movement sessions for older people in acute hospital settings. *International Journal of Older People Nursing*, 15(4), e12342.  
<https://doi.org/10.1111/opn.12342>
- Butke, M. A. (2014). Assessing expressive movement: Measuring student learning outcomes in the general music classroom. *General music today*, 27(3), 23-27.  
<https://doi.org/10.1177/1048371314525782>
- Byiers, B. (2019). Single-Case Designs. In P. Liamputtong (Ed.), *Handbook of Research Methods in Health Social Sciences* (pp. 581–602). Springer Singapore.  
[https://doi.org/10.1007/978-981-10-5251-4\\_92](https://doi.org/10.1007/978-981-10-5251-4_92)
- Cacioppo, J. T., Hughes, M. E., Waite, L. J., Hawkey, L. C., & Thisted, R. A. (2006). Loneliness as a specific risk factor for depressive symptoms: Cross-sectional and longitudinal analyses. *Psychology and Aging*, 21(1), 140–151. <https://doi.org/10.1037/0882-7974.21.1.140>
- Caneiro, J. P., O'Sullivan, P., Tan, J.-S., Klem, N.-R., de Oliveira, B. I. R., Choong, P. F., Dowsey, M., Bunzli, S., & Smith, A. (2024). Process of change for people with knee osteoarthritis undergoing cognitive functional therapy: a replicated single-case experimental

design study. *Disability and Rehabilitation*, 46(11), 2348–2364.

<https://doi.org/10.1080/09638288.2023.2221459>

Chen, Y. L., & Pei, Y. C. (2018). Musical dual-task training in patients with mild-to-moderate dementia: a randomized controlled trial. *Neuropsychiatric Disease and Treatment*, 1381-1393.

<https://doi.org/10.2147/NDT.S159174>

Cheung, D. S. K., Lai, C. K. Y., Wong, F. K. Y., & Leung, M. C. P. (2018). The effects of the music-with-movement intervention on the cognitive functions of people with moderate dementia: a randomized controlled trial. *Aging & mental health*, 22(3), 306-315.

<https://doi.org/10.1080/13607863.2016.1251571>

Chodzko-Zajko, W. J., Proctor, D. N., Fiatarone Singh, M. A., Minson, C. T., Nigg, C. R., Salem, G. J., & Skinner, J. S. (2009). Exercise and physical activity for older adults. *Medicine & Science in Sports & Exercise*, 41(7), 1510–1530.

<https://doi.org/10.1249/MSS.0b013e3181a0c95c>

Clark, I. N., Baker, F. A., & Taylor, N. F. (2016). The modulating effects of music listening on health-related exercise and physical activity in adults: a systematic review and narrative synthesis. *Nordic Journal of Music Therapy*, 25(1), 76-104.

<https://doi.org/10.1080/08098131.2015.1008558>

Cohen, G. D., Perlstein, S., Chapline, J., Kelly, J., Firth, K. M., & Simmens, S. (2006). The Impact of Professionally Conducted Cultural Programs on the Physical Health, Mental Health, and Social Functioning of Older Adults. *The Gerontologist*, 46(6), 726–734.

<https://doi.org/10.1093/geront/46.6.726>

Cohen-Mansfield, J., Libin, A., & Marx, M. S. (2007). Nonpharmacological treatment of agitation: A controlled trial of systematic individualized intervention. *The Journals of*

Gerontology. Series A, Biological Sciences and Medical Sciences, 62(8), 908–916.

<https://doi.org/10.1093/gerona/62.8.908>

Cohen-Mansfield, J., & Perach, R. (2015). Interventions for alleviating loneliness among older persons: A critical review. *American Journal of Health Promotion*, 29(3), e109–e125.

<https://doi.org/10.4278/ajhp.130418-LIT-182> *Paidagōgikī*, 14(1).

<https://doi.org/10.56883/aijmt.2022.129>

Cotterell, N., Buffel, T., & Phillipson, C. (2018). Preventing social isolation in older people.

*Maturitas*, 113, 80–84. <https://doi.org/10.1016/j.maturitas.2018.04.014>

Dalairé, M., & Comeau, G. (2020). Investigating the link between Dalcroze eurhythmics and musical expressivity in novice piano students. *Université d'Ottawa / University of Ottawa*.

Dalla Bella, S. (2018). Music and movement: Towards a translational approach. *Neurophysiologie Clinique*, 48(6), 377–386. <https://doi.org/10.1016/j.neucli.2018.10.067>

Davidson, J. W., & Fedele, J. (2011). Investigating group singing activity with people with dementia and their caregivers: Problems and positive prospects. *Musicae Scientiae*, 15(3), 402–422. <https://doi.org/10.1177/1029864911410954>

De la Rosa, A., Olaso-Gonzalez, G., Arc-Chagnaud, C., Millan, F., Salvador-Pascual, A., García-Lucerga, C., Blasco-Lafarga, C., García-Dominguez, E., Carretero, A., Correias, A. G., Viña, J., & Gomez-Cabrera, M. C. (2020). Physical exercise in the prevention and treatment of Alzheimer's disease. *Journal of Sport and Health Science*, 9(5), 394–404.

<https://doi.org/10.1016/j.jshs.2020.01.004>

De Macedo, L. D. E. D., De Oliveira, T. C. G., Soares, F. C., Bento-Torres, J., Bento-Torres, N. V. O., Anthony, D. C., & Picanço-Diniz, C. W. (2015). Beneficial effects of multisensory and cognitive stimulation in institutionalized elderly: 12-months follow-up. *Clinical Interventions in Aging*, 10, 1351–1359. <https://doi.org/10.2147/CIA.S80997>

- Dickens, A. P., Richards, S. H., Greaves, C. J., & Campbell, J. L. (2011). Interventions targeting social isolation in older people: A systematic review. *BMC Public Health*, 11(1), 647. <https://doi.org/10.1186/1471-2458-11-647>
- Epstein, L. H., & Dallery, J. (2022). The Family of Single-Case Experimental Designs. *Harvard Data Science Review*, 4(SI3). <https://doi.org/10.1162/99608f92.ff9300a8>
- Ferguson-Stegall, L., Vang, M., Wolfe, A. S., & Thomsen, K. M. (2017). A 9-week Jaques-Dalcroze eurhythmics intervention improves single and dual-task gait speed in community-dwelling older people. *Journal of physical activity and health*, 14(9), 740-744. <https://doi.org/10.1123/jpah.2017-0416>
- Ferraro, K. F. (1984). Widowhood and social participation in later life: Isolation or compensation? *Research on Aging*, 6(4), 451–468. <https://doi.org/10.1177/0164027584006004001>
- Fischbacher, M., Chocano-Bedoya, P. O., Meyer, U., Bopp, I., Mattle, M., Kressig, R. W., ... & Bischoff-Ferrari, H. A. (2020). Safety and feasibility of a Dalcroze eurhythmics and a simple home exercise program among older adults with mild cognitive impairment (MCI) or mild dementia: the MOVE for your MIND pilot trial. *Pilot and feasibility studies*, 6(1), 101–101. <https://doi.org/10.1186/s40814-020-00645-7>
- Fiske, A., Wetherell, J. L., & Gatz, M. (2009). Depression in older adults. *Annual Review of Clinical Psychology*, 5(1), 363–389. <https://doi.org/10.1146/annurev.clinpsy.032408.153621>
- Folstein, M. F., Folstein, S. E., & McHugh, P. R. (1975). “Mini-mental state”: A practical method for grading the cognitive state of patients for the clinician. *Journal of Psychiatric Research*, 12(3), 189–198. [https://doi.org/10.1016/0022-3956\(75\)90026-6](https://doi.org/10.1016/0022-3956(75)90026-6)
- Fredrickson, B. L. (2001). The Role of Positive Emotions in Positive Psychology: The Broaden-and-Build Theory of Positive Emotions. *The American Psychologist*, 56(3), 218–226. <https://doi.org/10.1037/0003-066X.56.3.218>

- Frego, R. J. D. (1995) 'Music Movement Therapy for People with AIDS: The Use of Music Movement Therapy as a Form of Palliative Care for People with AIDS'. *International Journal of Arts Medicine* 4 (2), 21-25
- Frego, R. J. D. (2010). Dancing inside: Dalcroze Eurhythmics in a therapeutic setting. In J. Kerchner & C. Abril (Eds.), *Musical experience in our lives: things we learn and meanings we make* (pp. 313-330). Maryland: R & L Education.
- Fried, T. R., & Mecca, M. C. (2019). Medication Appropriateness in Vulnerable Older Adults: Healthy Skepticism of Appropriate Polypharmacy. *Journal of the American Geriatrics Society (JAGS)*, 67(6), 1123–1127. <https://doi.org/10.1111/jgs.15798>
- Gallego, M. G., & García, J. G. (2017). Music therapy and Alzheimer's disease: Cognitive, psychological, and behavioural effects. *Neurologia (English Edition)*, 32(5), 300-308. <https://doi.org/10.1016/j.nrleng.2015.12.001>
- Gatz, M., Prescott, C. A., & Pedersen, N. L. (2006). Lifestyle risk and delaying factors. *Alzheimer Disease and Associated Disorders*, 20(3), S84–S88. <https://doi.org/10.1097/00002093-200607001-00013>
- Grassi, M., Meneghetti, C., Toffalini, E., & Borella, E. (2017). Auditory and cognitive performance in elderly musicians and nonmusicians. *PLoS One*, 12(11), e0187881. <https://doi.org/10.1371/journal.pone.0187881>
- Greaves, C. J., & Farbus, L. (2006). Effects of creative and social activity on the health and well-being of socially isolated older people: Outcomes from a multi-method observational study. *Journal of the Royal Society for the Promotion of Health*, 126(3), 134–142. <https://doi.org/10.1177/1466424006064303>

- Greenhead, K., & Habron, J. (2015). The touch of sound: Dalcroze Eurhythmics as a somatic practice. *Journal of Dance & Somatic Practices*, 7(1), 93–112.  
[https://doi.org/10.1386/jdsp.7.1.93\\_1](https://doi.org/10.1386/jdsp.7.1.93_1)
- Guidelines & Protocols Advisory Committee. (2014). Cognitive Impairment – Recognition, Diagnosis and Management in Primary Care: Standardized Mini-Mental State Examination.
- Habron, J. (2014). Through music and into music, through music and into well-being: Dalcroze eurhythmics as music therapy. *TD: The Journal for Transdisciplinary Research in Southern Africa*, 10(2), 90-110. <https://doi.org/10.4102/td.v10i2.101>
- Habron, J. (2016). Dalcroze Eurhythmics in music therapy and special music education. *Approaches: An Interdisciplinary Journal of Music Therapy, Special Issue*, 8(2), 100-104.  
<https://doi.org/10.56883/ajjmt.2016.331>
- Habron, J., & Witoszynskyj, E. (2016). Memories of Mimi Scheiblauber and the development of Dalcroze Eurhythmics as a therapeutic practice: An interview with Eleonore Witoszynskyj. *Approaches: Mousikotherapeia Kai Eidiki Mousiki Paidagōgiki*, 8(2), 202-.  
<https://doi.org/10.56883/ajjmt.2016.342>
- Hall, L. D. (1920). Dalcroze Eurhythmics. *Francis W. Parker School Studies in Education*, 6, 141-150.  
<http://www.jstor.org/stable/41102708>
- Hall, C. B., Lipton, R. B., Sliwinski, M., Katz, M. J., Derby, C. A., & Verghese, J. (2009). Cognitive activities delay onset of memory decline in persons who develop dementia. *Neurology*, 73(5), 356–361. <https://doi.org/10.1212/wnl.0b013e3181b04ae3>
- Harada, C. N., Natelson Love, M. C., & Triebel, K. L. (2013). Normal cognitive aging. *Clinics in Geriatric Medicine*, 29(4), 737–752. <https://doi.org/10.1016/j.cger.2013.07.002>

- Hars, M., Herrmann, F. R., Fielding, R. A., Reid, K. F., Rizzoli, R., & Trombetti, A. (2014a). Long-term exercise in older adults: 4-year outcomes of music-based multitask training. *Calcified tissue international*, 95, 393-404. <https://doi.org/10.1007/s00223-014-9907-y>
- Hars, M., Herrmann, F. R., Gold, G., Rizzoli, R., & Trombetti, A. (2014b). Effect of music-based multitask training on cognition and mood in older adults. *Age and ageing*, 43(2), 196-200. <https://doi.org/10.1093/ageing/aft163>
- Heapy, C., Norman, P., Emerson, L.-M., Murphy, R., Bögels, S., & Thompson, A. R. (2022). Mindful parenting intervention for parents of children with skin conditions: a single group experimental cases series. *Behavioural and Cognitive Psychotherapy*, 50(5), 462–480. <https://doi.org/10.1017/S1352465822000170>
- Hearn, R., Selfe, J., Cordero, M. I., & Dobbin, N. (2024). The effects of person-centred active rehabilitation on symptoms of suspected Chronic Traumatic Encephalopathy: A mixed-methods single case design. *PloS One*, 19(5), e0302260. <https://doi.org/10.1371/journal.pone.0302260>
- Hecker, J., & Kalpokas, N. (2025). *The Ultimate Guide to Qualitative Research - Part 2: Handling Qualitative Data*. ATLAS.ti
- Heikkinen, R.-L., & Kauppinen, M. (2004). Depressive symptoms in late life: a 10-year follow-up. *Archives of Gerontology and Geriatrics*, 38(3), 239–250. <https://doi.org/10.1016/j.archger.2003.10.004>
- Henning-Smith, C. (2016). Quality of Life and Psychological Distress Among Older Adults: The Role of Living Arrangements. *Journal of Applied Gerontology*, 35(1), 39–61. <https://doi.org/10.1177/0733464814530805>

- Hitchcock, J. H., Nastasi, B. K., & Summerville, M. (2010). Single-Case Designs and Qualitative Methods: Applying a Mixed Methods Research Perspective. *Mid-Western Educational Researcher* (Akron, Ohio : 1991), 23(2), 49.
- Horner, R. H., Carr, E. G., Halle, J., McGee, G., Odom, S., & Wolery, M. (2005). The use of single-subject research to identify evidence-based practice in special education: Criteria for evidence-based practice in special education. *Exceptional Children*, 71(2), 165–179.
- Howe, T. E., Rochester, L., Neil, F., Skelton, D. A., Ballinger, C., & Howe, T. E. (2011). Exercise for improving balance in older people. *Cochrane Database of Systematic Reviews*, 2012(5), CD004963–CD004963. <https://doi.org/10.1002/14651858.CD004963.pub3>
- Hulbert-Williams, N. J., Norwood, S. F., Gillanders, D., Finucane, A. M., Spiller, J., Strachan, J., Millington, S., Kreft, J., & Swash, B. (2021). Brief Engagement and Acceptance Coaching for Hospice Settings (the BEACHEs study): results from a Phase I study of acceptability and initial effectiveness in people with non-curative cancer. *BMC Palliative Care*, 20(1), Article 96. <https://doi.org/10.1186/s12904-021-00801-7>
- Humboldt, S. von, Monteiro, A., & Leal, I. (2017). Validation of the PANAS: A Measure of Positive and Negative Affect for Use with Cross-National Older Adults. *Review of European Studies*, 9(2), 10. <https://doi.org/10.5539/res.v9n2p10>
- Irwin, K., Sexton, C., Daniel, T., Lawlor, B., & Naci, L. (2018). Healthy Aging and Dementia: Two Roads Diverging in Midlife? *Frontiers in Aging Neuroscience*, 10, 275. <https://doi.org/10.3389/fnagi.2018.00275>
- Iverson, G. L. (1998). Interpretation of mini-mental state examination scores in community-dwelling elderly and geriatric neuropsychiatry patients. *International Journal of Geriatric Psychiatry*, 13(10), 661–666. [https://doi.org/10.1002/\(SICI\)1099-1166\(199810\)13:10<661::AID-GPS838>3.0.CO;2-0](https://doi.org/10.1002/(SICI)1099-1166(199810)13:10<661::AID-GPS838>3.0.CO;2-0)

- Jaques-Dalcroze, E. (1930). *Eurhythmics, art and education*. (C. Cox, Ed.; F. Rothwell, Tran.). Chatto & Windus.
- Joseph, D., & Southcott, J. (2015). Singing and companionship in the Hawthorn University of the Third-Age Choir, Australia. *International Journal of Lifelong Education*, 34(3), 334–347. <https://doi.org/10.1080/02601370.2014.991951>
- Juntunen, M.-L., & Sutela, K. (2023). The effectiveness of music–movement integration for vulnerable groups: a systematic literature review. *Frontiers in Psychology*, 14, 1127654–1127654. <https://doi.org/10.3389/fpsyg.2023.1127654>
- Kang, H. G., Velazquez, V., Hino, S., & Rosario, E. R. (2016). Dalcroze Eurhythmics-based music and movement training in transitional care brain injury patients: A feasibility study. *Approaches*. <https://doi.org/10.56883/aijmt.2016.335>
- Kazdin, A. E., & Tuma, A. H. (1982). *Single-case research designs*. Jossey-Bass.
- Kazdin, A. E. (2019). Single-case experimental designs. Evaluating interventions in research and clinical practice. *Behaviour Research and Therapy*, 117, 3–17. <https://doi.org/10.1016/j.brat.2018.11.015>
- Kistler-Fischbacher, M., Gohar, G., de Godoi Rezende Costa Molino, C., Geiling, K., Meyer-Heim, T., Kressig, R. W., Orav, E. J., Vellas, B., Guyonnet, S., da Sliva, J. A. P., Rizzoli, R., Armbrecht, G., Steinhagen-Thiessen, E., Egli, A., & Bischoff-Ferrari, H. A. (2025). Cognitive function in generally healthy adults age 70 years and older in the 5-country DO-HEALTH study: MMSE and MoCA scores by sex, education and country. *Aging Clinical and Experimental Research*, 37(1), Article 88. <https://doi.org/10.1007/s40520-025-02946-4>
- Krasny-Pacini, A., & Evans, J. (2018). Single-case experimental designs to assess intervention effectiveness in rehabilitation: A practical guide. *Annals of physical and rehabilitation medicine*, 61(3), 164–179. <https://doi.org/10.1016/j.rehab.2017.12.002>

- Kratochwill, T. R., & Levin, J. R. (2010). Enhancing the Scientific Credibility of Single-Case Intervention Research: Randomization to the Rescue. *Psychological Methods*, 15(2), 124–144.  
<https://doi.org/10.1037/a0017736>
- Kressig, R. W., Allali, G., & Beauchet, O. (2005). Long-term practice of Jaques-Dalcroze eurhythmics prevents age-related increase of gait variability under a dual task. *Journal of the American Geriatrics Society*, 53(4), 728-729.  
[https://doi.org/10.1111/j.1532-5415.2005.53228\\_2.x](https://doi.org/10.1111/j.1532-5415.2005.53228_2.x)
- Lane, J. D., & Gast, D. L. (2014). Visual analysis in single case experimental design studies: Brief review and guidelines. *Neuropsychological Rehabilitation*, 24(3–4), 445–463.  
<https://doi.org/10.1080/09602011.2013.815636>
- Larsen, R. J. (2000). Toward a Science of Mood Regulation. *Psychological Inquiry*, 11(3), 129–141.  
[https://doi.org/10.1207/S15327965PLI1103\\_01](https://doi.org/10.1207/S15327965PLI1103_01)
- Lee, J. S., Chew, J., Lim, Y. R., Ng, W. K. G., Yeo, A. J. P., Ong, L. T. J., Chan, M. P. C., Lim, W. S., & Beauchet, O. (2022). Validating the Centre of Excellence on Longevity Self-Administered (CESAM) questionnaire: An online self-reported tool for frailty assessment of older adults.
- Lee, Y. Y., Chan, M. F., & Mok, E. (2010). Effectiveness of music intervention on the quality of life of older people. *Journal of advanced nursing*, 66(12), 2677-2687.  
<https://doi.org/10.1111/j.1365-2648.2010.05445.x>
- Lenox-Smith, A., Reed, C., Lebec, J., Belger, M., & Jones, R. W. (2018). Potential cost savings to be made by slowing cognitive decline in mild Alzheimer’s disease dementia using a model derived from the UK GERAS observational study. *BMC Geriatrics*, 18(1), 57–57.  
<https://doi.org/10.1186/s12877-018-0748-9>

- Liao, M. Y., & Davidson, J. W. (2016). Enhancing gesture quality in young singers. *Music Education Research*, 18(3), 283-294. <https://doi.org/10.1080/14613808.2015.1060953>
- Li, Y., & Ferraro, K. F. (2006). Volunteering in middle and later life: Is health a benefit, barrier, or both? *Social Forces*, 85(1), 497–519. <https://doi.org/10.1353/sof.2006.0132>
- Lou, M. F. (2001). The use of music to decrease agitated behaviour of the demented elderly: the state of the science. *Scandinavian journal of caring sciences*, 15(2), 165-173.  
<https://doi.org/10.1046/j.1471-6712.2001.00021.x>
- Lyons, A., Alba, B., Heywood, W., Fileborn, B., Minichiello, V., Barrett, C., Hinchliff, S., Malta, S., & Dow, B. (2018). Experiences of ageism and the mental health of older adults. *Aging & Mental Health*, 22(11), 1456–1464. <https://doi.org/10.1080/13607863.2017.1364347>
- Lyu, J., Zhang, J., Mu, H., Li, W., Champ, M., Xiong, Q., ... & Li, M. O. (2018). The effects of music therapy on cognition, psychiatric symptoms, and activities of daily living in patients with Alzheimer's disease. *Journal of Alzheimer's disease*, 64(4), 1347-1358.  
<https://doi.org/10.3233/JAD-180183>
- Ma, C., Li, M., Li, R., & Wu, C. (2023). The effect of rhythmic movement on physical and cognitive functions among cognitively healthy older adults: A systematic review and meta-analysis. *Archives of Gerontology and Geriatrics*, 104, 104837–104837.  
<https://doi.org/10.1016/j.archger.2022.104837>
- Ma, L., Sun, F., & Tang, Z. (2018). Social Frailty is Associated with Physical Functioning, Cognition, and Depression, and Predicts Mortality. *The Journal of Nutrition, Health & Aging*, 22(8), 989–995. <https://doi.org/10.1007/s12603-018-1054-0>
- MacAulay, R. K., Edelman, P., Boeve, A., Sprangers, N., & Halpin, A. (2019). Group Music Training as a Multimodal Cognitive Intervention for Older Adults. *Psychomusicology*, 29(4), 180–187. <https://doi.org/10.1037/pmu0000239>

- Mackenzie, C. S., & Abdulrazaq, S. (2021). Social engagement mediates the relationship between participation in social activities and psychological distress among older adults. *Aging & Mental Health, 25*(2), 299–305. <https://doi.org/10.1080/13607863.2019.1697200>
- Maher, C., Hadfield, M., Hutchings, M., & de Eyto, A. (2018). Ensuring Rigor in Qualitative Data Analysis: A Design Research Approach to Coding Combining NVivo With Traditional Material Methods. *International Journal of Qualitative Methods, 17*(1). <https://doi.org/10.1177/1609406918786362>
- Martens, P. J., Fransoo, R., Burland, E., Burchill, C., Prior, H. J., & Ekuma, O. (2007). Prevalence of Mental Illness and its Impact on the Use of Home Care and Nursing Homes: A Population-Based Study of Older Adults in Manitoba. *Canadian Journal of Psychiatry, 52*(9), 581–590. <https://doi.org/10.1177/070674370705200906>
- Mastnak, W. (2022). Eurhythmics and the brain: A neuroscientific perspective. <https://doi.org/10.13140/RG.2.2.31095.29601>
- Matto, H. C., Tompkins, C. J., Ihara, E. S., Inoue, M., & Byrd, A. (2015). Results from a music, imagery, and movement treatment intervention in a long-term care facility. *Families in Society, 96*(4), 277-283. <https://doi.org/10.1606/1044-3894.2015.96.32>
- McGrath, C., Palmgren, P. J., & Liljedahl, M. (2019). Twelve tips for conducting qualitative research interviews. *Medical Teacher, 41*(9), 1002–1006. <https://doi.org/10.1080/0142159X.2018.1497149>
- Molloy, D. W., & Standish, T. I. M. (1997). A Guide to the Standardized Mini-Mental State Examination. *International Psychogeriatrics, 9*(S1), 87–94. <https://doi.org/10.1017/S1041610297004754>
- Morgan, D. L., & Morgan, R. K. (2009). *Single-case research methods for the behavioral and health sciences* (1st ed.). SAGE. <https://doi.org/10.4135/9781483329697>

- Morris, J. C., Rubin, E. H., Morris, E. J., & Mandel, S. A. (1987). Senile dementia of the Alzheimer's type: an important risk factor for serious falls. *Journal of gerontology*, 42(4), 412-417. <https://doi.org/10.1093/geronj/42.4.412>
- Mortelmans, D. (2019). Analyzing Qualitative Data Using NVivo. In K. Donders, H. Van den Bulck, M. Puppis, & L. Van Audenhove (Eds.), *The Palgrave Handbook of Methods for Media Policy Research* (pp. 435–450). Springer International Publishing AG. [https://doi.org/10.1007/978-3-030-16065-4\\_25](https://doi.org/10.1007/978-3-030-16065-4_25)
- Music and Health Research Institute, University of Ottawa. (2022). Investigating the effects of music-based interventions on the health and well-being of older adults: Demographic Questionnaire.
- Nicholson Jr, N. R. (2009). Social isolation in older adults: an evolutionary concept analysis. *Journal of Advanced Nursing*, 65(6), 1342–1352. <https://doi.org/10.1111/j.1365-2648.2008.04959.x>
- Onghena, P., Maes, B., & Heyvaert, M. (2019). Mixed Methods Single Case Research: State of the Art and Future Directions. *Journal of Mixed Methods Research*, 13(4), 461–480. <https://doi.org/10.1177/1558689818789530>
- Ottenbacher, K. J. (1997). Introduction to Single System Designs for Neurorehabilitation Research. *Journal of Neurologic Rehabilitation*, 11(4), 199-206. <https://doi.org/10.1177/154596839701100401>
- Park, H. S. (2019). *Music Therapy Program for Geriatric Patients Diagnosed with Serious Mental Illness: A Dalcroze and Wellness Approach*. ProQuest Dissertations & Theses.
- Parker, R. I., Vannest, K. J., Davis, J. L., & Sauber, S. B. (2011). Combining Nonoverlap and Trend for Single-Case Research: Tau-U. *Behavior Therapy*, 42(2), 284–299. <https://doi.org/10.1016/j.beth.2010.08.006>

- Parker, S. J., Strath, S. J., & Swartz, A. M. (2008). Physical activity measurement in older adults: relationships with mental health. *Journal of Aging and Physical Activity*, 16(4), 369–380.  
<https://doi.org/10.1123/japa.16.4.369>
- Patten, S. B., & Fick, G. H. (1993). Clinical interpretation of the mini-mental state. *General Hospital Psychiatry*, 15(4), 254–259. [https://doi.org/10.1016/0163-8343\(93\)90040-U](https://doi.org/10.1016/0163-8343(93)90040-U)
- Pezzotti, P., Scalmana, S., Mastromattei, A., & Di Lallo, D. (2008). The accuracy of the MMSE in detecting cognitive impairment when administered by general practitioners: A prospective observational study. *BMC Family Practice*, 9(1), Article 29. <https://doi.org/10.1186/1471-2296-9-29>
- Phinney, A., Moody, E. M., & Small, J. A. (2014). The effect of a community-engaged arts program on older adults' well-being. *Canadian Journal on Aging*, 33(3), 336–345.  
<https://doi.org/10.1017/S071498081400018X>
- Pretorius, M., & van der Merwe, L. (2020). Learning Collectively in a South African High School Choir Community of Musical Practice through Dalcroze-Inspired Activities. *Muziki*, 17(1), 109-130.  
<https://doi.org/10.1080/18125980.2020.1810109>
- QSR International. (2022). NVivo user guide. QSR International.  
<https://www.qsrinternational.com/nvivo-qualitative-data-analysis-software/support-services/nvivo-downloads>
- Rubin, H. J., & Rubin, I. (2012). *Qualitative interviewing : the art of hearing data* (3rd ed.). SAGE.
- Saldaña, J. (2016). *The coding manual for qualitative researchers* (Third edition.). SAGE.
- Salthouse, T. A., & Mitchell, D. R. D. (1990). Effects of Age and Naturally Occurring Experience on Spatial Visualization Performance. *Developmental Psychology*, 26(5), 845–854.  
<https://doi.org/10.1037/0012-1649.26.5.845>

- Salthouse, T. A. (1994). Age-related differences in basic cognitive processes: Implications for work. *Experimental Aging Research*, 20, 249–255
- Salthouse, T. A. (2010). Selective review of cognitive aging. *Journal of the International Neuropsychological Society*, 16(5), 754–760. doi:10.1017/S1355617710000706
- Schienze, D. R., & Eiler, J. M. (1984). Clinical intervention with older adults. In M. G. Eisenberg, L.C. Sutkin, & M. A. Jansen (Eds.), *Chronic illness and disability through the life span: Effects on self and family* (pp. 245-268). New York: Springer.
- Seitz, J. A. (2005). Dalcroze, the body, movement and musicality. *Psychology of music*, 33(4), 419-435. <https://doi.org/10.1177/0305735605056155>
- Sherrington, C., Fairhall, N., Wallbank, G., Tiedemann, A., Michaleff, Z. A., Howard, K., Clemson, L., Hopewell, S., & Lamb, S. (2020). Exercise for preventing falls in older people living in the community: an abridged Cochrane systematic review. *British Journal of Sports Medicine*, 54(15), 885–891. <https://doi.org/10.1136/bjsports-2019-101512>
- Singh, B. D., Moore, D. W., Furlonger, B. E., Anderson, A., Fall, R., & Howorth, S. (2021). Reading Comprehension and Autism Spectrum Disorder: a Systematic Review of Interventions Involving Single-Case Experimental Designs. *Review Journal of Autism and Developmental Disorders*, 8(1), 3–21. <https://doi.org/10.1007/s40489-020-00200-3>
- Sixsmith, A., & Gibson, G. (2007). Music and the wellbeing of people with dementia. *Ageing & Society*, 27(1), 127-145. <https://doi.org/10.1017/S0144686X06005228>
- Sloboda, J., & Davidson, J. (1996). The young performing musician. In *Musical Beginnings*. Oxford University Press. <https://doi.org/10.1093/acprof:oso/9780198523321.003.0007>
- Smith, J. D. (2012). Single-case experimental designs: A systematic review of published research and current standards. *Psychological Methods*, 17(4), 510–550. <https://doi.org/10.1037/a0029312>

- Statistics Canada. (2007). A portrait of seniors in Canada (Catalogue No. 89-519-XIE). By M. Turcotte & G. Schellenberg. Minister of Industry. <https://www150.statcan.gc.ca/n1/pub/89-519-x/89-519-x2006001-eng.pdf>
- Sterke, C. S., van Beeck, E. F., Looman, C. W., Kressig, R. W., & van der Cammen, T. J. (2012). An electronic walkway can predict short-term fall risk in nursing home residents with dementia. *Gait & posture*, 36(1), 95-101. <https://doi.org/10.1016/j.gaitpost.2012.01.012>
- Stewart-Brown, S., Tennant, A., Tennant, R., Platt, S., Parkinson, J., & Weich, S. (2009). Internal construct validity of the Warwick-Edinburgh Mental Well-being Scale (WEMWBS): a Rasch analysis using data from the Scottish Health Education Population Survey. *Health and Quality of Life Outcomes*, 7(1), Article 15. <https://doi.org/10.1186/1477-7525-7-15>
- Sung, H. C., Chang, S. M., Lee, W. L., & Lee, M. S. (2006). The effects of group music with movement intervention on agitated behaviours of institutionalized elders with dementia in Taiwan. *Complementary therapies in medicine*, 14(2), 113-119. <https://doi.org/10.1016/j.ctim.2006.03.002>
- Taggart, F., Stewart-Brown, S., & Parkinson, J. (2016). Warwick-Edinburgh Mental Well-being Scale (WEMWBS) user guide: Version 2. NHS Health Scotland.
- Tait, J. L., Duckham, R. L., Milte, C. M., Main, L. C., & Daly, R. M. (2017). Influence of Sequential vs. Simultaneous Dual-Task Exercise Training on Cognitive Function in Older Adults. *Frontiers in Aging Neuroscience*, 9, 368–368. <https://doi.org/10.3389/fnagi.2017.00368>
- Takahashi, T., & Matsushita, H. (2006). Long-Term Effects of Music Therapy on Elderly with Moderate/Severe Dementia. *The Journal of Music Therapy*, 43(4), 317–333. <https://doi.org/10.1093/jmt/43.4.317>
- Tan, C. C., Yu, J. T., Wang, H. F., Tan, M. S., Meng, X. F., Wang, C., Jiang, T., Zhu, X. C., & Tan, L. (2014). Efficacy and safety of donepezil, galantamine, rivastigmine, and memantine for the

treatment of Alzheimer's disease: a systematic review and meta-analysis. *Journal of Alzheimer's disease* : JAD, 41(2), 615–631. <https://doi.org/10.3233/JAD-132690>

- Tanious, R., & Onghena, P. (2021). A systematic review of applied single-case research published between 2016 and 2018: Study designs, randomization, data aspects, and data analysis. *Behavior Research Methods*, 53(4), 1371–1384. <https://doi.org/10.3758/s13428-020-01502-4>
- Tate, R. L., & Perdices, M. (2019). *Single-case experimental designs for clinical research and neurorehabilitation settings: Planning, conduct, analysis, and reporting*. Routledge.
- Taylor, H. O., Taylor, R. J., Nguyen, A. W., & Chatters, L. (2018). Social Isolation, Depression, and Psychological Distress Among Older Adults. *Journal of Aging and Health*, 30(2), 229–246. <https://doi.org/10.1177/0898264316673511>
- Teixeira, C. M., Vasconcelos-Raposo, J., Fernandes, H. M., & Brustad, R. J. (2013). Physical Activity, Depression and Anxiety Among the Elderly. *Social Indicators Research*, 113(1), 307–318. <https://doi.org/10.1007/s11205-012-0094-9>
- Tennant, R., Hiller, L., Fishwick, R., Platt, S., Joseph, S., Weich, S., Parkinson, J., Secker, J., & Stewart-Brown, S. (2007). The Warwick-Edinburgh Mental Well-being Scale (WEMWBS): development and UK validation. *Health and Quality of Life Outcomes*, 5(1), Article 63. <https://doi.org/10.1186/1477-7525-5-63>
- Tesky, V. A., Thiel, C., Banzer, W., & Pantel, J. (2011). Effects of a Group Program to Increase Cognitive Performance Through Cognitively Stimulating Leisure Activities in Healthy Older Subjects: The AKTIVA Study. *GeroPsych*, 24(2), 83–92. <https://doi.org/10.1024/1662-9647/a000035>
- Tong, Y., Forreider, B., Sun, X., Geng, X., Zhang, W., Du, H., ... & Ding, Y. (2015). Music-supported therapy (MST) in improving post-stroke patients' upper-limb motor function: a

randomized controlled pilot study. *Neurological research*, 37(5), 434-440.

<https://doi.org/10.1179/1743132815Y.00000000034>

Treiber, K. A., Carlson, M. C., Frye, A., Lyketsos, C. G., Tschanz, J. T., Corcoran, C., Norton, M. C., Breitner, J. C. S., Piercy, K. W., Dederard, M. S., Stein, D., Foley, B., & Welsh-Bohmer, K. A. (2011). Cognitive Stimulation and Cognitive and Functional Decline in Alzheimer's Disease: The Cache County Dementia Progression Study. *The Journals of Gerontology. Series B, Psychological Sciences and Social Sciences*, 66(4), 416–425.

<https://doi.org/10.1093/geronb/gbr023>

Treviño, E. N., & Álvarez-Bermúdez, J. (2016). An exploratory study of flow and enjoyment in a Dalcroze Eurhythmics-based intervention for seniors in Mexico. *Approaches*, 8(2), 159- 168.

<https://doi.org/10.56883/aijmt.2016.337>

Treviño, E. N., & Álvarez-Bermúdez, J. (2018). Older adults and flow through music and movement. *Journal of Nursing and Health Science*, 7(2), 54-60. DOI: 10.9790/1959-

0702035460

Trombetti, A., Hars, M., Herrmann, F. R., Kressig, R. W., Ferrari, S., & Rizzoli, R. (2011). Effect of music-based multitask training on gait, balance, and fall risk in elderly people: a randomized controlled trial. *Archives of internal medicine*, 171(6), 525-533.

<https://doi.org/10.1001/archinternmed.2010.446>

van der Merwe, L. (2015). The first experiences of music students with Dalcroze-inspired activities: A phenomenological study. *Psychology of Music*, 43(3), 390-406.

<https://doi.org/10.1177/0305735613513485>

van der Merwe, L., Joubert, D., & Tempelhoff, J. W. (2023). From suffering towards communal well-being: experiences of a Dalcroze-inspired workshop for a community in crisis. *Frontiers in Psychology*, 14. <https://doi.org/10.3389/fpsyg.2023.1176691>

<https://doi.org/10.3389/fpsyg.2023.1176691>

- Vergheze, J., Lipton, R. B., Katz, M. J., Hall, C. B., Derby, C. A., Kuslansky, G., Ambrose, A. F., Sliwinski, M., & Buschke, H. (2003). Leisure Activities and the Risk of Dementia in the Elderly. *The New England Journal of Medicine*, 348(25), 2508–2516.  
<https://doi.org/10.1056/NEJMoa022252>
- Verrusio, W., Andreozzi, P., Marigliano, B., Renzi, A., Gianturco, V., Pecci, M. T., Ettore, E., Cacciafesta, M., & Gueli, N. (2014). Exercise training and music therapy in elderly with depressive syndrome: A pilot study. *Complementary Therapies in Medicine*, 22(4), 614–620.  
<https://doi.org/10.1016/j.ctim.2014.05.012>
- Wahli-Delbos, M. (2010). *La Rythmique Jaques-Dalcroze, un atout pour les seniors: Rester jeune plus longtemps par le mouvement et la musique*. Genève: Éditions Papillon.
- Watson, D., Clark, L. A., & Tellegen, A. (1988). Development and Validation of Brief Measures of Positive and Negative Affect: The PANAS Scales. *Journal of Personality and Social Psychology*, 54(6), 1063–1070. <https://doi.org/10.1037/0022-3514.54.6.1063>
- Weiss, R. S. (2005). Retirement, Marriage, and Social Isolation. *Illness, Crisis, and Loss*, 13(1), 75–84. <https://doi.org/10.1177/105413730501300107>
- World Health Organization. (2015). *World report on ageing and health*. World Health Organization.  
<https://www.who.int/publications/i/item/9789241565042>
- Winningham, R. G., Anunsen, R., Hanson, L. M., Laux, L., Kaus, K. D., & Reifers, A. (2003). MemAerobics: A cognitive intervention to improve memory ability and reduce depression in older adults. *Journal of Mental Health and Aging*, 9(3), 183-192.
- Yang, L., Armijo-Olivo, S., & Gross, D. P. (2023). Single-Case Experimental Design in Rehabilitation: Basic Concepts, Advantages, and Challenges. *American Journal of Physical Medicine & Rehabilitation*, 102(5), 454–460. <https://doi.org/10.1097/PHM.0000000000002215>

## Appendix A

### Positive and Negative Affect Schedule (PANAS)

Participant Name or ID#	
Date	

#### Positive and Negative Affect Scale

This scale consists of a number of words that describe different feelings and emotions.

Read each item and then mark the appropriate answer in the space next to that word.

Indicate to what extent you feel this way **right now, that is, at the present moment**.

Use the following scale to record your answers.

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>very slightly or not at all</b>	<b>a little</b>	<b>moderately</b>	<b>quite a bit</b>	<b>extremely</b>

\_\_\_\_\_ interested  
\_\_\_\_\_ distressed  
\_\_\_\_\_ excited  
\_\_\_\_\_ upset  
\_\_\_\_\_ strong  
\_\_\_\_\_ guilty  
\_\_\_\_\_ scared  
\_\_\_\_\_ hostile  
\_\_\_\_\_ enthusiastic  
\_\_\_\_\_ proud

\_\_\_\_\_ irritable  
\_\_\_\_\_ alert  
\_\_\_\_\_ ashamed  
\_\_\_\_\_ inspired  
\_\_\_\_\_ nervous  
\_\_\_\_\_ determined  
\_\_\_\_\_ attentive  
\_\_\_\_\_ jittery  
\_\_\_\_\_ active  
\_\_\_\_\_ afraid

## Appendix B

### Warwick-Edinburgh Well-being Scale (WEMWBS)

**The Warwick – Edinburgh Mental Well-being Scale (WEMWBS)**

Below are some statements about feelings and thoughts.

Please tick the box that best describes your experience of each over the last 2 weeks

I've been feeling optimistic about the future:

**None of the time**     **Rarely**     **Some of the time**     **Often**     **All of the time**

I've been feeling useful:

**None of the time**     **Rarely**     **Some of the time**     **Often**     **All of the time**

I've been feeling relaxed:

**None of the time**     **Rarely**     **Some of the time**     **Often**     **All of the time**

I've been feeling interested in other people:

**None of the time**     **Rarely**     **Some of the time**     **Often**     **All of the time**

I've had energy to spare:

**None of the time**     **Rarely**     **Some of the time**     **Often**     **All of the time**

I've been dealing with problems well:

**None of the time**     **Rarely**     **Some of the time**     **Often**     **All of the time**

I've been thinking clearly:

**None of the time**     **Rarely**     **Some of the time**     **Often**     **All of the time**

I've been feeling good about myself:

**None of the time**     **Rarely**     **Some of the time**     **Often**     **All of the time**

I've been feeling close to other people:

**None of the time**     **Rarely**     **Some of the time**     **Often**     **All of the time**

I've been feeling confident:

**None of the time**     **Rarely**     **Some of the time**     **Often**     **All of the time**

I've been able to make up my own mind about things:

**None of the time**     **Rarely**     **Some of the time**     **Often**     **All of the time**

I've been feeling loved:

**None of the time**     **Rarely**     **Some of the time**     **Often**     **All of the time**

I've been interested in new things:

**None of the time**     **Rarely**     **Some of the time**     **Often**     **All of the time**

I've been feeling cheerful:

**None of the time**     **Rarely**     **Some of the time**     **Often**     **All of the time**

## Appendix C

### The Centre of Excellence Self-Administered Questionnaire (CESAM)

#### **CESAM**

**(The Centre of Excellence Self-Administered questionnaire)**

Participant Name or ID#	
Date	

PLEASE CHECK THE BOX NEXT TO YOUR RESPONSE TO THE QUESTIONS PRESENTED BELOW.

	QUESTIONS	RESPONSES
1	Have you unwillingly lost weight in the past year?	<input type="checkbox"/> Yes <input type="checkbox"/> No
1.1	If yes, was the loss of weight above 3 kg (6lbs)?	<input type="checkbox"/> Yes <input type="checkbox"/> No
2	How many different types of drugs do you take on a daily basis?	<input type="checkbox"/> 0 <input type="checkbox"/> 1 to 4 <input type="checkbox"/> 5 to 9 <input type="checkbox"/> 10 or more
3	Do you have vision problems?	<input type="checkbox"/> Yes <input type="checkbox"/> No
4	Do you have hearing problems?	<input type="checkbox"/> Yes <input type="checkbox"/> No
5	Has someone close to you expressed concern about your memory?	<input type="checkbox"/> Yes <input type="checkbox"/> No
6	Do you receive home care support?	<input type="checkbox"/> Yes <input type="checkbox"/> No
6.1	If yes, from whom?	<input type="checkbox"/> Family <input type="checkbox"/> Friends <input type="checkbox"/> Professional
7	Do you need help with your grooming (brushing teeth, hair, shaving, applying make up)?	<input type="checkbox"/> Yes <input type="checkbox"/> No
8	Do you need help with bathing or taking a shower?	<input type="checkbox"/> Yes <input type="checkbox"/> No
9	Do you need assistance when getting dressed?	<input type="checkbox"/> Yes <input type="checkbox"/> No
10	Do you use mobility aides for walking or transferring (cane, walker, wheelchair)?	<input type="checkbox"/> Yes <input type="checkbox"/> No
11	Do you need help with your meals: Shopping for food, meal preparation, assistance in eating	<input type="checkbox"/> Yes <input type="checkbox"/> No

	<b>QUESTIONS</b>	<b>RESPONSES</b>
12	Do you need help when using the telephone?	<input type="checkbox"/> Yes <input type="checkbox"/> No
13	Do you need assistance when taking public transportation?	<input type="checkbox"/> Yes <input type="checkbox"/> No
14	Do you need help for managing medications on your own?	<input type="checkbox"/> Yes <input type="checkbox"/> No
15	Do you need help to pay your bills and manage your finances?	<input type="checkbox"/> Yes <input type="checkbox"/> No
16	Are you incontinent (urine and/or stool)?	<input type="checkbox"/> Yes <input type="checkbox"/> No
17	How do you feel today?	<input type="checkbox"/> Happy <input type="checkbox"/> Unhappy <input type="checkbox"/> Neither one nor the other
18	Do you feel energetic?	<input type="checkbox"/> Yes <input type="checkbox"/> No
19	Do you do regular physical activity (walking, swimming, cycling, etc.) at least one hour per week in the past month?	<input type="checkbox"/> Yes <input type="checkbox"/> No
20	Have you fallen in the past year (at least one fall)?	<input type="checkbox"/> Yes <input type="checkbox"/> No
21	Have you received help to complete this questionnaire?	<input type="checkbox"/> Yes <input type="checkbox"/> No
21.1	If yes, who helped you?	<input type="checkbox"/> Family <input type="checkbox"/> Friends <input type="checkbox"/> Professional
21.2	Which family member helped you?	<input type="checkbox"/> Spouse <input type="checkbox"/> Partner <input type="checkbox"/> Child <input type="checkbox"/> Other
22	Did you answer this questionnaire for yourself or for someone else?	<input type="checkbox"/> Myself <input type="checkbox"/> Another person
23	Are you the caregiver to an individual who is suffering from a chronic illness?	<input type="checkbox"/> Yes <input type="checkbox"/> No
23.1	What is his/her condition?	<input type="checkbox"/> Alzheimer's disease <input type="checkbox"/> Other

**THANK YOU FOR TAKING THE TIME TO FILL OUT THIS FORM**

## Appendix D

### Standardized Mini-Mental State Examination (SMMSE)



#### STANDARDIZED MINI-MENTAL STATE EXAMINATION (SMMSE)

NAME OF PATIENT	DATE
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<p><b>Directions for administration of the SSMSE:</b></p> <ol style="list-style-type: none"> <li>1. Before the questionnaire is administered, try to get the person to sit down facing you. Assess the person's ability to hear and understand very simple conversation, e.g. <i>What is your name?</i> If the person uses hearing or visual aids, provide these before starting.</li> <li>2. Introduce yourself and try to get the person's confidence. Before you begin, get the person's permission to ask questions, e.g. <i>Would it be alright to ask you the same questions about your memory?</i> This helps to avoid catastrophic reactions.</li> <li>3. Ask each question a maximum of three times. If the subject does not respond, score 0.</li> </ol>	<ol style="list-style-type: none"> <li>4. If the person answers incorrectly, score 0. Accept that answer and do not ask the question again, hint, or provide any physical clues such as head shaking, etc.</li> <li>5. The following equipment is required to administer the instrument: A watch, a pencil, Page 3 of this SMMSE with <b>CLOSE YOUR EYES</b> written in large letters and two five-sided figures intersecting to make a four-sided figure, and Page 4, a blank piece of paper.</li> <li>6. If the person answers: <i>What did you say?</i>, do not explain or engage in conversation. Merely repeat the same directions a maximum of three times.</li> <li>7. If the person interrupts (e.g. <i>What is this for?</i>), reply: <i>I will explain in a few minutes, when we are finished. Now if we could proceed please... we are almost finished.</i></li> </ol>
--	---

I am going to ask you some questions and give you some problems to solve. Please try to answer as best as you can.

1. Time: 10 seconds for each reply:
- |  |    |
|--|----|
| a) <i>What year is this?</i> (accept exact answer only).   | /1 |
| b) <i>What season is this?</i> (accept either: last week of the old season or first week of a new season).         | /1 |
| c) <i>What month is this?</i> (accept either: the first day of a new month or the last day of the previous month). | /1 |
| d) <i>What is today's date?</i> (accept previous or next date).  | /1 |
| e) <i>What day of the week is this?</i> (accept exact answer only).  | /1 |

2. Time: 10 seconds for each reply:
- |   |    |
|---|----|
| a) <i>What country are we in?</i> (accept exact answer only).   | /1 |
| b) <i>What province are we in?</i> (accept exact answer only).  | /1 |
| c) <i>What city/town are we in?</i> (accept exact answer only).   | /1 |
| d) (In home) <i>What is the street address of this house?</i> (accept street name and house number or equivalent in rural areas). |    |
| (In facility) <i>What is the name of this building?</i> (accept exact name of institution only).                                  | /1 |
| e) (In home) <i>What room are we in?</i> (accept exact answer only).  |    |
| (In facility) <i>What floor of the building are we on?</i> (accept exact answer only).  | /1 |

3. Time: 20 seconds
- Say: *I am going to name three objects. When I am finished, I want you to repeat them. Remember what they are because I am going to ask you to name them again in a few minutes.* (Say the following words slowly at approximately one-second intervals): *Ball / Car / Man.*
- For repeated use: Bell, jar, fan; Bill, tar, can; Bull, bar, pan.
- Please repeat the three items for me.* (score one point for each correct reply on the first attempt.) If the person did not repeat all three, repeat until they are learned or up to a maximum of five times (but only score first attempt).
- |  |    |
|--|----|
|  | /3 |
|--|----|

N.B. You may check WORLD reversal scores at: [www.attentionMMSE.com](http://www.attentionMMSE.com)

4. Time: 30 seconds Spell the word WORLD. (you may help the person to spell the word correctly) Say: <i>Now spell it backwards please.</i> If the subject cannot spell world even with assistance, score 0. Refer to Page 3 for scoring instructions.	/5
5. Time: 10 seconds Say: <i>Now what were the three objects I asked you to remember?</i> (score one point for each correct answer regardless of order)	/3
6. Time: 10 seconds Show wristwatch. Ask: <i>What is this called?</i> (score one point for correct response: accept "wristwatch" or "watch"; do not accept "clock" or "time", etc.).	/1
7. Time: 10 seconds Show pencil. Ask: <i>What is this called?</i> (score one point for correct response; accept "pencil" only; score 0 for pen)	/1
8. Time: 10 seconds Say: <i>I would like you to repeat a phrase after me: No ifs, ands or buts</i> Score one point for a correct repetition. Must be exact, e.g. no ifs or buts, score 0).	/1
9. Time: 10 seconds Say: <i>Read the words on this page and then do what it says.</i> Then, hand the person the sheet with CLOSE YOUR EYES on it. If the subject just reads and does not close eyes, you may repeat: <i>Read the words on this page and then do what it says,</i> (a maximum of three times. Score one point only if the subject closes eyes. The subject does not have to read aloud.	/1
10. Time: 30 seconds Hand the person a pencil and paper (Page 3). Say: <i>Write any complete sentence on that piece of paper.</i> Score one point. The sentence must make sense. Ignore spelling errors.	/1
11. Time: 1 minute maximum Place design, eraser and pencil in front of the person. Say: <i>Copy this design please.</i> Allow multiple tries. Wait until the person is finished and hands it back. Score one point for a correctly copied diagram. The person must have drawn a four-sided figure between two five-sided figures.	/1
12. Time: 30 seconds Ask the person if he is right or left handed. Take a piece of paper, hold it up in front of the person and say: <i>Take this paper in your right/left hand (whichever is non-dominant), fold the paper in half once with both hands and put the paper down on the floor.</i> Score one point for each instruction executed correctly.	
Takes paper in correct hand	/1
Folds it in half	/1
Puts it on the floor	/1
Total Test Score:	/30
Adjusted Score	/

Please note: This tool is provided for use in British Columbia with permission by Dr. D. William Molloy. This questionnaire should not be further modified or reproduced without the written consent of Dr. D. William Molloy. Molloy DW, Alemayehu E, Roberts R. Reliability of a standardized Mini-Mental State Examination compared with the traditional Mini-Mental State Examination. *American Journal of Psychiatry*, 1991; 148(1): 102-105.

Scoring WORLD backwards (instructions for item #4)

Write the person's response below the correct response.

Draw lines matching the same letters in the correct response and the response given.

These lines MUST NOT cross each other.

The person's score is the maximum number of lines that can be drawn without crossing any.

Examples:

D	L	R	O	W
D	L	R	O	W

= Score 5

D	L	R	O	W
	/	/	/	/
D	R	W	O	D

= Score 3

D	L	R	O	W
	/	/	/	/
L	O	W	R	O

= Score 3

D	L	R	O	W
	/			
L				

= Score 1

D	L	R	O	W
	/	/	/	/
L	R	R	W	O

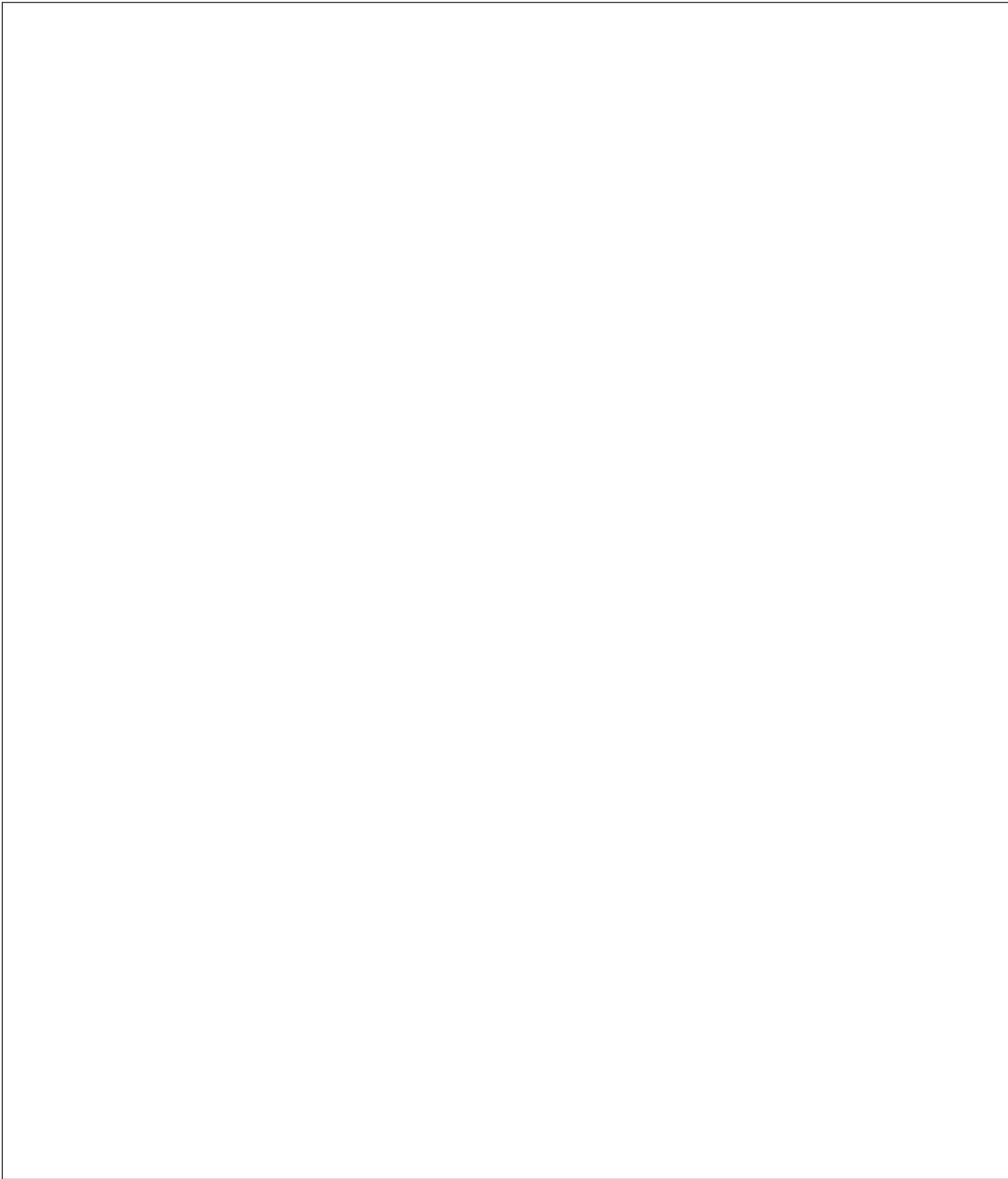
= Score 3

D	L	R	O	W

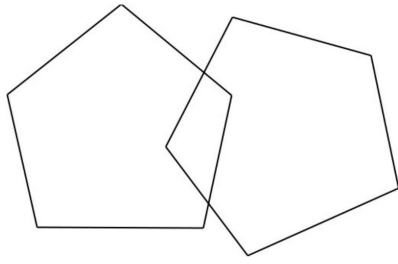
= \_\_\_\_\_

Close your eyes

Item 10: **Sentence Writing**



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## Appendix E

### Interview Questions and Timing Overview

All three interviews were conducted after a lesson and only after participants had completed the written questionnaires.

The first two interviews were intentionally kept brief to minimize participant fatigue and to avoid repeating questions planned for the final interview.

**Interview 1: Conducted After Lesson 3**, to capture participants' impressions after a few lessons in the program. This interview also aimed to support participants' recall while the experience was fresh.

1. What has your experience with the program been so far?
2. How have you been feeling during and after the lessons?
3. Is there anything you would like to share that I did not ask?

**Interview 2: Conducted After Lesson 7**, conducted mid-way through the program to support participant recall and allow for reflection on recent experiences. This interview was conducted with only one participant present.

1. How would you describe your mood right after each lesson?
2. Is there anything that happened during any of the lessons that stood out to you or had an impact on you?
3. Have you noticed any effects on your mood from interacting or spending time with others in the class?

4. Last time, you mentioned dealing with external life events or stressors. Has continuing to attend the classes had any effect on how you have felt about these events since then?<sup>10</sup>

### **Interview 3: Conducted After Lesson 10**

1. Please describe how did you become involved in the program.
2. Please describe your overall experience with the program.
3. How well did the program align with your expectations? Please describe.
4. What benefits, if any, did you experience through the program?
5. [Follow-up question, conducted a few days later] Were there any specific activities in the lessons that you particularly enjoyed or found challenging?
6. Since the start of the program, have there been any notable events or changes in your life or daily routines that you feel might have influenced your mental or physical health, mood, or sense of well-being?
7. Is there anything you did not like about the program? Please describe.
8. Do you plan to continue with the classes as long as they are offered at this location?
9. Is there anything else you would like to tell me about the program that we have not talked about?
10. Do you have any questions for me?

---

<sup>10</sup>This question was context [participant]-related, but it can be adapted for other groups.

## Appendix F

### Instructor-Prepared Lesson Plan Example

*Note:* The following lesson plan was prepared and formatted by the program instructor and is included in its original form.

### **Class\_1\_80\_Landry Independent\_residents February\_7\_2025**

#### Bilingual Clientele

This class is part of a research project: Aleksandra

**Goal:** to create a human connection with the participants. To observe what they can do.

-most activities are sitting today, but the final dance will be to observe how they move

-Mostly modeling today

\*Describe and explain what and why we are doing some of the activities

-use of more than usual recorded music to be in the space with the participants today

#### **Introductions:**

My name, who I am, what we will be doing.

-feeling music

-exercise

-enjoying music together

-sometimes we use balls, scarves, ribbons, sticks, drums

**Warm-up:** stretching upper body and feet/ankles

**Goal:** experience movements slowly with a slow return and a quick release

Step 1: Placement des mains et des bras (say hello hello, everyone as you want to)

Step 2: Les bras: sans musique: squish the shoulder blades (slow), different movement in the follow-through

1. Show the gesture counting 1+2+3+4+: work on slow back and forth

2. Do a second gesture:

3. Do a 3<sup>rd</sup> gesture, with feet

4. With music improvised (Falling 5ths)

#### **Balancing together standing**

**Goal:** finding balance with or without support on either side of the body, creativity and improvisational work

Music: drum (buffalo drum)

- Step 1: standing up at your spot
- Step 2: finding your balance from one foot to the next
- Step 3: use the arm
- Step 4: counting 4 beats on each foot, then 3 beats, then 2 beats, then 1 beat
- Step 5: with the music in g major 4-4-3-3-2-2
- Step 6: two rows of people (as partners) WITH DRUMS-one person does the strong beat and the other follows with the softer beats
- Step 7: add music (music improv in F Major)

### **Balancing together sitting**

**Goal:** cooperation and coordination. Quick reaction and feeling the long phrase in various ways

*Will experience this over the weeks in many ways*

- Step 1: scarves or stretchy bands (bring both)
- Step 2: warm-up moving in the same direction, everyone (like a mirror because we are sitting in front of each other)
- Step 3: second movement with feet (like stars with our feet, bingo dabbing with arms)
- Step 4: with recorded music: Passacaglia  
[https://www.youtube.com/watch?v=0s60\\_AoMHM0](https://www.youtube.com/watch?v=0s60_AoMHM0)

If time permits:

### **Mirror exercise**

**Goal:** communication, creativity, improvisational work

- Step 1: Chairs two by two and do a follow with your partner
- Step 2: same activity but with a scarf and follow the music (Moon river-very slow and rubato in C)

### **Freestyle Dance**

**Goal:** for participants to enjoy music in a free, unguided way. To observe how they move with the entrainment of music as a social “dance.”

Today’s selection: the Nitty Gritty (Shirley Ellis, 1963)

<https://www.youtube.com/watch?v=P2v8IgJdsm4&list=PPSV>

**Cool down:** a few minutes of breathing to calm down the heartrate and nervous system.

## **Appendix G**

### **Practical Field Strategies and Observations from the Study**

The following strategies and observations reflect my experience conducting this study. The content was previously adapted to be included in a broader guide used across sites. The same format is included here, as its structure may also help inform future studies.

#### **1. Supporting Participants During Baseline and Questionnaire Sessions**

In general, participants may have questions about the research process at various points. However, we found they often ask more questions during the baseline period than during the initial group invitation.

- It is important to acknowledge all questions and comments respectfully.
- It is fine not to have all the answers in the moment; thanking participants for raising the question and letting them know you will follow up (or check with the supervisor) helps build trust. It is better to take time to follow up than to give an answer you are unsure of.
- When responding, we found it is good to keep explanations focused and relevant. While we want participants to be informed, it is also important to protect the atmosphere of real-life participation and engagement in the music program; they do not need to know every detail of the study protocol.

#### **2. Working with Participants with Cognitive or Sensory Challenges**

Participants with mild to moderate dementia may need some support to complete the questionnaires.

- Frequent explanations may be needed with each questionnaire and may often need to be repeated.

- Some participants may require complete silence while filling out the questionnaires – even a short conversation nearby might interrupt their focus.
- Research assistants should always follow closely; otherwise, participants might miss answering certain questions.
- If a participant is simply looking at the questionnaire without writing, the research assistant should respectfully ask how they could help.

### **3. Conducting Interviews with Older Adults**

When conducting interviews, there are several elements to consider:

- Deciding when and how to probe during interviews
- How to support participants who feel nervous or unsure, or who have cognitive decline or hearing difficulties
- How to avoid the suggestive tone of voice or body language
- What to do if a participant is hesitant to be recorded during the interview

It is important to remind participants, especially those who are nervous, that you are there to learn from their experience, and that whatever they have to share is valuable.

During interviews, it can be helpful to listen actively and to show genuine interest in what participants share. Even if a response seems obvious, it can be valuable to keep listening, then to ask follow-up questions such as “Can you tell me more about that?” to understand better what the experience means to the participant.

### **4. Exploring Responses in Greater Depth**

It is helpful not to rely only on the questions in the interview guide, but to actively listen and explore participants’ responses more deeply when the opportunity arises.

- For example, in one site, when asking participants if there was anything they did not like about the program, two of them said they would like to have a few more participants. That might

seem self-explanatory (as the group was very small), but when asked what difference that would make, one participant said they would not participate if the group were too large, but that a slightly larger group would help them meet more people.

# Appendix H

## Consent Form



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Faculté des arts  
École de musique

University of Ottawa  
Faculty of Arts  
School of Music

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www.uOttawa.ca

### Consent Form

#### Title of the Study: Investigating the Effects of Music-Based Interventions on Health and Well-Being of Older Adults

##### Principal Researcher

Professor Gilles Comeau  
School of Music  
Faculty of Arts  
University of Ottawa  
613-xxx-xxxx ext. xxxx  
xxxxx@uottawa.ca

##### Research Coordinator

Mikael Swirp  
xxxxx@uottawa.ca

##### Research Assistant

Aleksandra Olejar  
xxxxx@uottawa.ca

##### Invitation to Participate

I am invited to participate in this research study. It is led by Professor Gilles Comeau and funded by the Public Health Agency of Canada.

##### Purpose of the Study

The purpose is to evaluate the effects of group music-based program on emotional state and well-being of older adults.

##### Participation

My participation will include the following:

1. Baseline Testing (Before the Program):
  - I will complete short surveys on emotional state and well-being once per week for 3 weeks (5 to 10 minutes per session).
  - I will also complete one-time surveys on basic personal information, cognition, and frailty (about 20 to 30 minutes total).
2. Music Classes (During the Program):
  - I will complete emotional state survey before and after each of the 10 weekly classes (about 5 minutes per session).
  - After the third, sixth, and ninth music class, I will also complete a well-being survey (about 5 minutes).
3. Post-Program Testing (After the 10-week Music Program):
  - I will complete repeated surveys on emotional state and well-being once per week for 3 weeks (5 to 10 minutes per session).
  - I will also complete one-time survey on frailty and an audio-recorder interview (about 15 to 30 minutes).



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The times for surveys before and after the music program will be set up with a researcher. Weekly surveys - before and after each music class will be at the same time and place.

### **Risks**

I may feel tired during the music classes. There is also a risk of falling and/or muscle pain due to physical activity. I can take breaks as I wish during the music classes. There is also a risk of emotional discomfort when completing surveys. Some questions may be sensitive in nature, such as those about emotions or well-being. If I feel uncomfortable about the questions I can discuss this with the researcher. I have the option to stop the task if need be. I will also be provided with information on available support services if I wish.

### **Benefits**

Community-based music programs have been shown to directly benefit participants in several ways.

This includes:

- Feeling better and having a happier life
- Improved mental health
- Interacting more with others
- Keeping the brain active and healthy
- Being active and mobile
- Feeling a sense of achievement and confidence
- Improved relationships with caregivers.

This study also contributes to the community and society by providing valuable information for creating effective interventions in the future.

### **Confidentiality and anonymity**

In this research study, my identity and personal information will be kept completely private. Only approved team members who are directly involved in the study will have access to the data that is collected. To protect my privacy, I will be given a random number code for identification purposes. My name or any other identifying details will not be linked to the data gathered in this research. Throughout the study, my participant code will be used to protect my privacy and keep my information secure. Finally, audio recordings of the in-person interviews will only be reviewed by the research team. The recordings will not be used in presentations or any other form of reporting.

### **Conservation of data**

The data collected will be kept in a secure manner. In the case of hard copies, data will be kept locked in a cabinet in a locked room on the uOttawa campus. Electronic data will be saved on a password-protected research network drive hosted at uOttawa. Data will be kept for 5 years after the completion of the study.

### **Voluntary participation**



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University of Ottawa  
Faculty of Arts  
School of Music

I am not required to participate in this study. If I choose to participate, I can withdraw from the study at any time. I can refuse to answer any questions without suffering any negative consequences. If I decide to withdraw from the study at any time, all data collected from me will be destroyed and/or deleted.

If I have any questions about the study, I may contact the researchers. If I have any questions about the ethical conduct of this study, I may contact the Protocol Officer for Ethics in Research (University of Ottawa, Tabaret Hall, 550 Cumberland Street, Room 154, Ottawa, ON K1N 6N5, Tel.: (613) 562-5387, Email: [ethics@uottawa.ca](mailto:ethics@uottawa.ca)).

**Consent**

By signing below, I agree to participate in this research study.

Participant's name: \_\_\_\_\_ Date: \_\_\_\_\_

Participant's signature: \_\_\_\_\_ Date: \_\_\_\_\_

Researcher's signature: \_\_\_\_\_ Date: \_\_\_\_\_

I will receive a copy of this document to keep.

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**Appendix I**  
Demographic Questionnaire

**Investigating the effects of music-based  
interventions on the health and well-being**

**Demographic Questionnaire**

**Music and Health Research Institute  
University of Ottawa**

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## GENERAL INFORMATION

Participant Name or ID#	
Email address	
Phone number	
Date	

PLEASE CHECK THE BOX NEXT TO, OR ENTER YOUR RESPONSES TO THE QUESTIONS PRESENTED BELOW.

### SECTION 1: DEMOGRAPHIC INFORMATION

	QUESTIONS	YOUR RESPONSES
1.1	Gender	
1.2	Age	
1.3	Height (cm or feet/inches)	
1.4	Weight (kg or lbs)	
1.5	What is the highest level of education you have completed/	<input type="checkbox"/> No formal education <input type="checkbox"/> High school diploma or equivalent <input type="checkbox"/> College or Trade school <input type="checkbox"/> Bachelor's degree <input type="checkbox"/> Master's degree <input type="checkbox"/> Doctoral degree <input type="checkbox"/> Other: _____

1.6	What is your employment status?	<input type="checkbox"/> Employed full-time <input type="checkbox"/> Employed part-time <input type="checkbox"/> Retired <input type="checkbox"/> Unemployed <input type="checkbox"/> Other: _____
1.7	What type of work do you do (or did you do before retirement)?	
1.8	Do you live alone or with others?	<input type="checkbox"/> Alone <input type="checkbox"/> With spouse / partner <input type="checkbox"/> With family members <input type="checkbox"/> With caregivers <input type="checkbox"/> In assisted living facility <input type="checkbox"/> Other: _____
1.9	What is your primary language(s)?	
1.10	Are there any language or communication challenges you have?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> If yes, please specify:
1.11	What is your ethnic background (you may select more than one)	<input type="checkbox"/> European (e.g., white) <input type="checkbox"/> Asian (e.g., Chinese, Japanese, Korean, South-east Asian) <input type="checkbox"/> East Indian, Pakistani <input type="checkbox"/> African-American/Black/Caribbean <input type="checkbox"/> Hispanic <input type="checkbox"/> Middle-Eastern <input type="checkbox"/> First Nations, Métis, Inuit <input type="checkbox"/> Other: _____

1.12	What is your marital status?	<input type="checkbox"/> Single <input type="checkbox"/> Married <input type="checkbox"/> Divorced <input type="checkbox"/> Widowed <input type="checkbox"/> Other (please specify): _____
1.13	What is your annual household income?	<input type="checkbox"/> Less than \$20,000 <input type="checkbox"/> \$20,000 - \$40,000 <input type="checkbox"/> \$40,001 - \$60,000 <input type="checkbox"/> \$60,001 - \$80,000 <input type="checkbox"/> \$80,001 - \$100,000 <input type="checkbox"/> Above \$100,000

**SECTION 2: MEDICAL INFORMATION**

2.1	Have you received a diagnosis of dementia or cognitive decline?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not sure
2.2	If yes, how long ago were you diagnosed?	
2.3	If yes, what type of dementia (or cognitive decline), if known?	
2.4	Do you have hearing loss?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not sure <input type="checkbox"/> If yes: <ul style="list-style-type: none"> <li><input type="checkbox"/> Bilateral</li> <li><input type="checkbox"/> Unilateral</li> <li><input type="checkbox"/> Not sure</li> </ul> Level of hearing loss: <ul style="list-style-type: none"> <li><input type="checkbox"/> Mild</li> <li><input type="checkbox"/> Moderate</li> <li><input type="checkbox"/> Severe</li> <li><input type="checkbox"/> Not sure</li> </ul>



**SECTION 4: MUSIC EXPERIENCE**

4.1	Have you engaged in music and movement classes before?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> If yes, please describe your previous experience (what type of class and for how long):
4.2	Have you participated in group music classes before?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> If yes, please describe your previous experience (what type of class and for how long):
4.3	Have you been in a choir before?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> If yes, please describe your previous experience (what type of choir, and for how long):
4.4	Do you have any other music experience (i.e. have you played a musical instrument at any time in your life on a regular basis)?	<input type="checkbox"/> Yes <input type="checkbox"/> No
4.5	If yes, please answer the following:	Which instrument(s):  At what age did you start?  For how long did you play this instrument (years)?  Do you still play it?

**SECTION 5: ADDITIONAL COMMENTS**

5.1	Do you have any additional comments or information that you think might be relevant to this study and/or music classes?	
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**THANK YOU FOR TAKING THE TIME TO FILL OUT THIS FORM**

Appendix J  
Program Poster

# Music and Movement

Learn, feel and express music through playful and dynamic movement activities

In a typical session, participants move to the music, synchronize body actions with musical rhythms, follow their partner's movements, react quickly to random signals, echo movement sequences, interact with other people and objects, and follow verbal instructions and musical cues in order to complete activities. Some activities are structured and oriented, while some activities are improvised with creativity.

**Program:** 45 minutes of group music activities once a week for 10 weeks

**Participants:** Open to all, with the option to participate in a research study.

**Location:** 80 Landry Street, [REDACTED]

**Time/Day:** Fridays at 10:45 am

**To register:** Join us directly at the program or contact [REDACTED]

