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EFFECTS OF MUSIC AND MEDITATIVE MOVEMENT ON AFFECT AND FLOW: A FEASIBILITY STUDY

by

Lai Yiu Yeung

A thesis submitted to the Graduate College
in partial fulfillment of the requirements
for the degree of Master of Music
School of Music
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EFFECTS OF MUSIC AND MEDITATIVE MOVEMENT ON AFFECT AND FLOW: A FEASIBILITY STUDY

Lai Yiu Yeung, M.M.

Western Michigan University, 2020

This study aims to explore the feasibility and the potential effects of adding music to meditative movement on affect and flow. Fifteen participants were recruited and they were randomly assigned to one of the three groups: (1) Meditative movement only; (2) Recorded music and meditative movement; and (3) Live music and meditative movement. Participants from each group engaged individually in a 45-minute online session, practicing three qigong exercise sets. To determine the feasibility, the acceptability and practicality were investigated through the analysis of anecdotal notes, open-ended questionnaires, and video recordings. Potential effects of music and meditative movement were examined by comparing scores from the Positive and Negative Affect Schedule (PANAS) and Short Flow State Scale (S FSS). Statistical tests were performed to determine pre- and post-session differences, between group differences in affect and flow, as well as the effect sizes. Results indicated that the addition of music to qigong is feasible and has a different impact on affect than meditative movement alone, but similar impact on flow-like experience. The feasibility and preliminary results support the need for further investigations.

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I. INTRODUCTION

Mind-body relationship has been a controversial topic for centuries. During Greek and Roman antiquity, the harmonious relationship between the body, mind, and spirit was advocated (Gohde, 2016). They believed that the human mind and body are closely connected and affect each other. In fact, how they could be related and how they could affect each other were further explored by a French philosopher, René Descartes, in the 17th century. He proposed that the mind and body are two separate entities as they are fundamentally different and could not possibly interact with each other (Cottingham, 2013). However, in recent decades, researchers from various fields hold a different view from Descartes. They are coming together to develop a flourishing body of empirical evidence implicating the interconnectedness of the human mind and body. Results from these studies indicated that body movement is linked to the mind, such as mental attitudes, social stereotypes, emotional experience, feelings of power, personality and leadership styles, and language comprehension (Acolin, 2016).

In light of the interrelationship between mind and body, more investigations have been conducted to explore meditative movement, such as yoga, tai chi, and qigong. It is now defined as a form of physical exercise that focuses on body movement in conjunction with bodily sensation. According to Kachan et al. (2017), there is an increasing trend of using meditative movement in the United States workforce. With a common goal to treat the mind and body as a whole, more healthcare practitioners are using it as one of the treatments provided for various populations as well. These include children with special needs, patients in the hospitals, adults with mental health illnesses, and older adults with dementia.

With the growing popularity of meditative movement, more researchers are starting to investigate its potential benefits. Meditative movement therapies were suggested to improve

health-related quality-of-life in adults with various conditions, such as breast cancer, schizophrenia, low back pain, heart failure, and diabetes (Kelly & Kelly, 2015). Another systematic review and meta-analysis indicated that meditative movement interventions have a moderate effect on improving the sleep quality in the elderly with sleep concerns (Wu, Kwong, Lan, & Jiang, 2015). Also, it could potentially improve the lung function and physical activity in patients with chronic obstructive pulmonary disease (Wu et al., 2018). Pölönen, Lappi, and Tervaniemi (2019) found that meditative movement has an effect on the affect and flow-like experience in healthy adults.

Music is also connected to body movements and the embodied mind. As a highly structured auditory language, it activates the areas accounting for perception, cognition, and motor control in the brain (Koshimori & Thaut, 2019). Thus, different musical elements can be manipulated to match various aspects of meditative movement to enhance its benefits. For instance, rhythm can facilitate movement learning as it enhances the accuracy of the perception of body movements (Effenberg, 2005; Effenberg, Fehse, Schnita, Krueger, & Mechling, 2016). Listener's preferred music can also be a guide for mindfulness practice as it connects to the listeners and increases emotion regulation, as a result, enhances relaxation and mood (Graham, 2010; Hou et al., 2017; Leisuk, 2016; Moore, 2013). In addition, music drives attention. It provides multidimensional stimulation, brings organization, and provides an additional dimension of emotion and motivation, as it activates the frontal lobes and helps facilitate concentration (Thaut & Gardiner, 2014).

To this writer's knowledge, there is only little published research done on the relationship between music and meditative movement. It could be because these mind-body interventions have only been standardized and evaluated by scientific methods not until the recent decades

despite the long history of usage. Nonetheless, more research is needed on this topic to fill this gap between music perception, body movements, and the embodied mind. Within this broad range of research, this paper only focuses on the feasibility and potential effects of music and qigong on affect and flow experience. It aims to serve as a foundation and guide other researchers to further develop a common groundwork of explanation on this interdisciplinary topic.

Statement of the Problem

To date, there has not been sufficient research that examines the interplay between music, meditative movement, and affect and flow. If meditative movement and music do indeed make a difference in affect and flow, it is equally important to comprehend the correlation between these three factors. Although it has been widely accepted the positive effects of meditative movement on its practitioners' well-being, there is not much scientific evidence supporting this phenomenon. On the other hand, it is known that music plays a role in movement acquisition, mood elevation, and attention enhancement, which coincide with the goals of meditative movement. Thus, it could potentially enhance the benefits. Adding one more piece, music, into the puzzle may help build a more comprehensive picture of the relationships between these factors. It would be intriguing to investigate whether meditative movement alone has an effect on affect and flow, whether adding music changes the effect, and whether the modes of presentation in music changes the effect.

Aim and Scope

The specific aim of this research is to investigate the feasibility and the prospective effects of adding music to meditative movement on affect and flow-like experience. Limits to the

research are noted from the start. This study only focuses on the short-term effects of music and meditative movement due to the time and resources constraints. Among all the potential benefits, only affect and flow were measured in the research, which was done by comparing participants' self-reported questionnaires at different points in the study.

The music experience provided in the study only included receptive music pre-composed by the student-investigator based on the guidelines of one of the neurologic music therapy techniques, patterned sensory enhancement (PSE). Instead of matching participants' movements, the music presented in live music condition matched the movements in the video exercise sets because of the anticipation of audio delays.

The meditative movement presented in the project only included qigong and were limited to those selected exercises originated from the study done by Pölönen, Lappi, and Tervaniemi (2019), as this study serves as an extension of their study. This study also narrows down to university students who do not have any hearing impairment and physical limitation that precludes participation in the study, which includes music and light physical exercises.

Significance of the Study

The outcomes of this study will redound to the benefit of the society considering the importance of music perception, human performance, well-being, and the body-mind relationship. The intended outcomes of this study are to determine the feasibility of combining music and meditative movement and provide preliminary scientific evidence of their effects on affect and flow-like experience. The results could contribute to the construction of theory, by guiding other researchers to further develop appropriate hypotheses and a common groundwork of explanation on this emerging area. Comprehending these relationships could perhaps shed new light on the old mind-body problem as well as the interrelationship between music

perception, body movement, and the embodied mind. Furthermore, it may lead to a new way of training and evaluation in performance since music and meditative movement may enhance physical and mental health of its practitioners.

Overview

This thesis consists of four further chapters. Following the introduction to the topic, chapter 2 will situate the current study in relevant literature and guide the enquiry on the interrelationship between music, meditative movement, affect, and flow. In particular, the definitions of terms, background materials, current practices, and related studies will be provided. After that, chapter 3 will provide details on the research methods and establish the validity of the project. The materials and methods will be elaborated including the study design, participants, materials, procedure, and planned data analysis. Chapter 4 will then present the key results of content and data analysis of the feasibility and the potential effects of music and meditative movement on affect and flow-like experience. Based on that, the last chapter will respond to the aim stated above by discussing the crucial findings and developing new insights on the topic. Implications, limitations, and recommendations will also be elaborated to guide future research and establish new ways of understanding the interrelationship between music, meditative movement, and the embodied mind.

II. REVIEW OF RELEVANT LITERATURE

With the aim to explore the relationship between music, meditative movement, affect, and flow-like experience, this chapter provides the background materials needed and the stepping-off point for the project. The terminology used in this study is clarified and related practices as well as research are presented as a guide to the enquiry.

Meditative Movement

Meditative movement has become increasingly popular in health practices and the body of research that theorizes and examines its effects on well-being is growing (Larkey, Jahnke, Etnier, & Gonzalez, 2009). Considering it as a new category of exercise, Larkey et al. (2009) first defined it by (a) a clear state of mind; (b) some form of body movements or positioning; (c) a focus on breathing; and (d) the goal to achieve a deep state of relaxation. Unlike traditional exercise forms that focus on external targets and performance goals, meditative movement focuses on bodily sensations and breathing. Yoga, Tai Chi, and Qigong are some examples of meditative movement.

Qigong

Qigong, also known as Chi Kung or Chi Gong, has a long history as a health and wellness exercise in China. On one hand, Qi indicates the life-energy or energetic essence that flows in channels in the body (Guo et al., 2018; Sawynok & Lynch, 2014). On the other hand, Gong refers to the practice or training of qi (Guo et al., 2018). Guo et al. (2018) pointed out that Qigong is self-directed and is composed of concentration, relaxation, meditation, rhythmic breathing regulation, body posture, and gentle body movement. This coincides with Pölönen, Lappi, and Tervaniemi (2019). They further stated Qigong also includes static poses, cognitive techniques, such as focusing attention, mental imagery, and somatic awareness. The aims of

Qigong are to increase vitality, balance circulation, and to harmonize body-mind relationship (Pölönen, Lappi, & Tervaniemi, 2019), where the adjustment of body, breath, and mind transcend into oneness (Klein, Picard, Baumgarden, & Schneider, 2017).

These practice elements, a focus of mind, movement, breathing, and deep relaxed state of relaxation, are essential in meditative movement. Previous research has suggested the benefits of these elements separately, such as meditation improves inhibition (Gallant, 2016); slow-paced breathing enhances stress management (Laborde, Allen, Göhring, & Dosseville, 2017); and movement improves one's physical and mental health, learning, executive functioning, memory, and academic performance (Savina, Garrity, Kenny, & Doerr, 2016). Other research also stated the beneficial effects of meditative movement, including reducing blood pressure, stress, anxiety, depression, increasing functional balance, improving immune function, and improving health-related quality-of-life (Kelley & Kelly, 2015; Larkey et al., 2009; Zeng et al., 2014). However, there are only a few empirical studies focusing on the effects of the elements in Qigong altogether as well as its effects on affect and flow experience.

Affect and Flow

This project focuses on the affective and the flow-like experience among practitioners, which aligns with the study done by Pölönen, Lappi, and Tervaniemi (2019). The following passages clarify the concepts of affect and flow.

Affect

Affect is sometimes used interchangeably with words like emotion and mood. Although there is a long history of debates about the distinction between them, it is still important to draw some lines of differentiation in order to make a crystalized decision on which construct to be investigated. Thus, aid the selection of measurement on it.

Scherer (1984) first proposed that affect is a general concept, which inspired researchers to follow his suggestion in later years. They viewed affect as the most general construct or the superordinate category for valanced states among the three concepts (affect, mood, and emotion) (Batson et al., 1992; Fredrickson, 2001; Gross, 1998; Pölönen, Lappi, & Tervaniemi, 2019). In particular, they pointed out that affect refers to the elementary consciously accessible feelings, such as pleasure, displeasure, tension, calmness, energy, and tiredness (Ekkekakis, 2013; Fredrickson, 2001). In addition to that, Russell (2005) stated it is "experienced embedded with other elements of consciousness as one interacts with the world" (p.29). It is commonly defined that there are two dimensions, positive and negative valences, within affect. Positive affect presents when there is a change from a more valued state to a less valued state while negative affect presents when there is a change from a less valued state to a more valued state (Batson et al., 1992).

Compared to affect, both emotion and mood have multiple components and are not always constant. Scherer (2005) defined emotion as an episode of interconnected changes in states of five major systems, including (a) information-processing cognitive component; (b) the neurophysiological component; (c) the executive component; (d) the expressive component; and (e) an experiential component. The duration of emotion is shorter than that of mood and the intensity of emotion is usually higher than that of mood (Nowlis & Nowlis, 1956). Anger, fear, anxiety, and pride are some instances of emotion while dysphoria, euphoria, joyfulness, and cheerfulness are some instances of mood (Ekkekakis, 2013).

Considering the nature of this study is exploratory, the most desirable outcome would be for the measure to register any changes caused by the experimental manipulation, whether that may be the change in emotion, a change in mood, or free-floating affect. Therefore, affect seems

to be the most appropriate construct to be used in this project. Chapter three will provide more elaborations on the measurement of affect.

Flow

Flow is defined as an optimal psychological state, where everything comes together as a whole for the performer (Jackson, Eklund, & Martin, 2010). Individuals have described flow in a consistent manner among various settings, such as in surgery, dancing, and rock climbing. Flow is intrinsically rewarding and commonly occurs when one is thoroughly involved in the activities at hand, no matter the levels of complexity. There are two levels of flow as proposed by Csikszentmihalyi (1975), including micro and macro flow experiences. Micro flow experiences are for everyday tasks while macro flow experiences are for tasks with higher levels of complexity and demand for the participants (Jackson, Eklund, & Martin, 2010).

Understanding the concept of challenge-skill balance is essential to comprehending flow. Csikszentmihalyi (1990) stated only when individuals move beyond their average levels of challenge and skill, they invest psychic energy into a task. The investment of mental energy marks the beginning of flow experience. Other scenarios include having challenges outweigh skills, where anxiety is provoked; having skills outweigh challenges, where relaxation and boredom is predicted; and having low skills and level of challenges, which leads to apathy.

Csikszentmihalyi (1990) further argued that obtaining these flow experiences are crucial as they promote growth and complexity in consciousness. Csikszentmihalyi and LeFevre (1989) pointed out positive affect, creativity and satisfaction are also the effects of flow experience. To obtain this optimal psychological state of flow, he developed the nine-dimensional conceptualization of flow. These dimensions include challenge-skill balance, action-awareness merging, clear goals, unambiguous feedback, total concentration on the task at hand, sense of

control, loss of self-consciousness, transformation of time, and autotelic experience. More information on the dimensions and measurement of flow will be elaborated in chapter three.

Meditative Movement and Affect and Flow

After having a clearer understanding on affect and flow, it is important to point out the relationship between them and meditative movement. As aforementioned, the goals of qigong involve a focus of mind, body movement/posture, breathing, and relaxation, which coincides with the dimensions of flow proposed by Csikszentmihalyi (1990). Bodily movements can also induce changes in core affect (Russell, 2005). There could be a potential connection between meditative movement and affect and flow. Only a little research has been done on meditative movement and affect and flow, and they are presented in the following.

A study done by Zhang, Xv, Luo, Meng, and Ji (2016) investigated the effect of *Qigong Yi Jinjing,* a type of Qigong exercises focusing on tendon-muscle strengthening, on patients with chronic obstructive pulmonary disease (COPD). One hundred and thirty eligible COPD patients participated and were randomly divided into three groups: (1) Qigong yi jinjing group (QYJJ) (n=42); (2) Self-management exercise group (SME) (n=43); and (3) the control group (CG) (n=45). Participants in the QYJJ group completed a 60-minute exercise session every day, with three days of group practice and four days of individual practice. Participants in the SME group completed a 60-minute self-pace walk each day, in addition to diaphragmatic breathing and pursed-lip breathing. Participants in CG were advised to maintain their routine activities without any extra recommended exercise. Pulmonary function, the six-minute walk test, exercise of the COPD Assessment Test, and the Regulation Emotion Self-Efficacy Questionnaire were used to measure their progress. Data were collected and analyzed at baseline and again at one, three, and six months.

Outcomes revealed that QYJJ exercise produced positive effects on pulmonary function, physical activity, health-related quality of life, and emotion regulation self-efficiency, as participants in the QYJJ group demonstrated significant positive changes in expressing positive affect and managing distress.

Pölönen, Lappi, and Tervaniemi (2019) also conducted research on the effects of meditative movement specifically on practitioners' affect and flow. Nineteen participants were recruited from the Finnish Qigong community for the experiment. They participated in four weekly 90-minute group training sessions, with three different Qigong exercises in each session. They were asked to fill out the Flow State Scale (FSS) and Positive And Negative Affect Schedule (PANAS) before, in between, and after all the exercise sets, and an open-ended questionnaire was also given to each participant at the end of each session.

Results showed that there was a substantial and significant increase in positive affect and decrease in negative affect during sessions, indicating the induction of a more positively valenced affective state. Qigong was characterized as restful, relaxed, happy, balanced, and clear. It produced a flow experience 20-minutes into the session which intensified at 40- and 60-minutes. However, since there was no counterbalancing the three Qigong exercise sets, the flow experience may simply be a function of time. The accuracy of the measure may also be an issue as the appropriate methods of studying meditative movement is still in the developmental stages. For example, participants were asked to fill out FSS as a measurement of flow after three 20-minute Qigong exercises. It is questionable about the fluctuation of flow during the exercises. Another limitation is that the majority of the participants had previous Qigong experience with the first author, which may have caused bias. More research is needed to understand the effects of meditative movement on affect and flow in ways such as using both questionnaires and

psychophysiological measurements. Moreover, the effects of meditative movement can be compared to other forms of exercises, meditation, and regular relaxation techniques. Researchers can also add music to the meditative movement to investigate the relationship between music, meditative movement, as well as affect and flow.

From the research presented above, it could be concluded that meditative movement seems to have a positive effect on affect and promote flow experiences.

Music

Music is also closely connected to meditative movement and has an effect on affect and flow. Here music refers to the purposeful use of musical elements, instead of using it as an accompaniment or background to movements. This concept is based on a neurologic music therapy technique, called Patterned Sensory Enhancement (PSE). It views music as a facilitator to movement by manipulating various musical elements to create spatial, temporal, force cues to movements (Thaut, 2014). For instance, using legato notes to present fluid movements; using staccato notes to create jerky movements; using a crescendo (from loud to soft) to convey the increase in muscle force; and using pitch to convey the directions of movement. More information about the music used in the project will be elaborated in chapter three.

Meditative Movement and Music

Similar to music, there are different elements in meditative movement, such as body movement, meditation, breathing, or relaxation. To achieve better health-related results, more research has been done to investigate the relationship between music and meditative movement by pairing some of their elements together.

Body Movements and Music. Growing evidence indicates multimodal stimuli enhance motor perception, motor control, and motor learning (Frassinetti et al., 2002; Sigrist, Rauter,

Riener, & Wolf, 2013; Soto-Faraco, Kingstone, & Spence, 2003). In particular, Effenberg (2005) studied the effects of the feedback from various stimuli on participants' ability to perceive their motor movement. There were two parts in the study focused on movement assessment and movement reproduction. For the first study, forty sports students were prompted to judge the differences of two consecutive countermovement jump (CMJs) heights under three conditions: (1) visual treatment (VT); (2) audiovisual treatment (AVT); and (3) auditory treatment. All participants experienced o all three treatment conditions in a randomized order. In the second study, forty male students were chosen to participate. They were prompted to watch a model athlete's single CMJs of different heights. Both results also indicated that supplementary convergent auditory information can increase the accuracy of sports movements' perception when compared to visual treatment only.

Effenberg et al. (2016) further examined the effects of movement sonification on motor learning in sports. Forty-eight male participated in the experiment twice per week for about 9 weeks. Initial individual technique level and strength data were first collected. Then, the total sample was divided up into three groups, parallelized on initial technique level and age. Each group completed the same 3-week training (indoor rowing techniques) period, but received different kinds of instruction and real-time feedback: (a) Visual condition (video); (b) Natural audiovisual condition (video + natural motion attendant sounds); and (c) Sonified audiovisual condition (video + movement sonification). Strength posttest was conducted one week after the training session and a technique retention test was conducted three weeks after the training session was completed.

Outcomes revealed that all three training modes were efficient on the acquisition of rowing technique. For both audiovisual groups, the approximation to the model's technique was

increased as indicated by a sharper learning curve than the visual group. Future studies could be done on the effectiveness of auditory movement information alone on motor learning.

In addition, embodied approach in music cognition also argues that music listening activates motor-related brain regions, including the basal ganglia, supplementary motor area, premotor cortex and cerebellum (Stupacher, 2019). From the results of the studies presented, the addition of auditory cueing is beneficial to the practitioners as it enhances the motor perception, motor learning, and movement accuracy.

Meditation and Music. Not only does auditory information enhance body movement, but it could also be a guide in meditation. Mindfulness is the practice of being fully aware of the present moment and one's form of thoughts (Baer, 2003). Music, especially listeners' preferred music, could potentially be used as a guide for mindfulness practice because it has a significant impact on the brain connectivity (Graham, 2010; Wilkins, Hodges, Laurienti, Steen & Burdette, 2014). Wilkins et al. (2014) suggested that music activates the brain, especially the area involving internally focused thought, empathy, and self-awareness, which are some goals in meditation.

The effects of music on meditation were also elaborated by another study. Lesiuk (2016) described the design and development of a mindfulness-based music therapy (MBMT) program used in a pilot investigation. The pilot study indicated that the music therapy program, which built on core values of meditation, significantly increased attention and decreased negative mood and fatigue in women with breast cancer. Fifteen women with breast cancer were recruited in the study. They attended sessions for one-hour per week mostly alone and a few accompanied by a family member, partner or friend for four weeks. The four attitudes chosen (non-judging, beginner's mind, suspending judgement, acceptance and letting go) were translated into music

exercises and metaphors. Music experience in session included listening, writing, playing instruments, music-assisted relaxation, and deep breathing. Weekly narrative responses were collected from participants.

Results revealed that there was an improvement in mood for most of them. They became more relaxed, had significantly fewer negative mood states, and had increases in energy and attention. Further studies could be done on the role of music and mindfulness in theoretical frameworks within a population-specific model. It would be interesting to look at the effects of music and mindfulness practice on emotions with other measures as well.

Affect and Flow and Music

As suggested by the above studies, music, when used purposefully, could alter mood state, which coincided with Hou et al. (2017). They reviewed the neural correlation of emotion regulation and music-evoked emotions and suggested the possibility of using music on emotion dysregulation. They defined emotion regulation as the abilities to monitor, assess, and change one's implicit and explicit emotional reactions and related behaviors. Moore (2013) also suggested music, when used as an intervention strategy, has an impact on emotion regulation. She stated that is because music stimulates neural activities in regions in both cortical and subcortical systems, as well as across cortical-subcortical networks, which are implicated in effective emotion regulation as well. Listening to music can induce positive feelings and functional changes in subcortical limbic structures and frontal cortical regions, which are related to depression and emotion dysregulation (Moore, 2013).

Considering the link between music and emotions, more investigations are needed to examine possible therapeutic effects of music on emotion dysregulation as well as the specific function of music in it. Thus, a more systematic and effective use of music therapy can be

developed.

Aside from altering mood state, flow is also often considered as a potential automatic experience during music listening, composing, and performing (Wilhelmsen, 2012), which coincides with what Csikszentmihalyi (1990) mentioned

> Music, which is organized auditory information, helps organize the mind that attends to it, and therefore reduces psychic entropy, or the disorder we experience when random information interferes with goals. Listening to music wards off boredom and anxiety, and when seriously attended to, it can induce flow experiences. (p.109).

The relationship between flow and music could also be explained by groove, which is frequently referred to as the drive to move one's body to the rhythm (Stupacher, 2019). Through these groove experiences, the excitability of the motor cortex is increased and more accurate sensorimotor synchronization is achieved (Janata et al., 2012; Stupacher, Hove, Novembre, Schütz-Bosbach, & Keller, 2013). As a result, the experience of groove promotes the highly pleasurable state of being, where individuals become present in both the music and body (Danielsen, 2006). This is similar to one of the flow dimensions, loss of self-consciousness as suggested by Csikszentmihalyi (1975). However, results from previous studies have yet to provide consistent and conclusive evidence for the connection between flow state and music (Stupacher, 2019).

Meditative Movement, Affect and Flow, and Music

The purpose of this study is to fill the gap in knowledge between music perception, body movements, and the embodied mind. Researchers separated meditative movement from traditional forms of exercise because of its focus on bodily sensations and breathing (Larkey, Jahnke, Etnier, & Gonzalez, 2009). The benefits of practicing meditative movement were also

elaborated in different studies, suggesting it could improve health-related quality-of-life, mood, balance, and more (Kelly & Kelly, 2015, Larkey et al, 2009). In particular, Zhang et al. (2016) suggested that qigong produces positive effects on emotion regulation, such as shifting into positive affect and reducing distress. Their results were supported by Pölönen, Lappi, and Tervaniemi (2019) as well. Pölönen and his colleagues added that qigong could promote a flow-like experience, substantially and significantly decrease negative affect, and described the outcomes of practicing it as restful, relaxed, happy, balanced, and clear.

Considering the advantages of practicing meditative movement and the growing evidence of the relationship between music and elements of meditative movement, the effects of adding music to meditative movement warrants further investigations. Research has been done on the relationship between auditory information and the elements of meditative movement, such as body movement, deep breathing, and meditation. Effenberg (2005) pointed out that additional auditory information enhanced participant's perception accuracy of movement compared to visual information only. Effenberg et al. (2016) further examined the effects of movement sonification and motor acquisition and found that the additional auditory information, once again, promoted motor learning. Music could potentially be a guide in mindfulness practice, as Leisuk (2006) outlined the design of a mindfulness-based music therapy and examined its potential benefits through a pilot study. Results showed that MBMT improved mood for the majority of participants. The link between music and emotion regulation was also explored from various studies. It is suggested music has an impact on emotion regulation because music stimulates neural activities in regions which are implicated in effective emotion regulation (Moore, 2013). In addition, flow-like experience is also associated with music according to literature (Csikszentmihalyi, 1975; Danielsen, 2006; Stupacher, 2019).

Music is linked to emotion regulation as well as flow experience. Thus, could potentially be a guide in practicing meditative movement and enhance the benefits on affect and flow. However, to this writer's knowledge, there is currently no research published studying the effects of music and meditative movement on both affect and flow. The project aims to fill the gap in knowledge surrounding the relationship between music, meditative movement, and affect and flow. Understanding these relationships could elucidate the interrelationship between music perception, body movement, and embodied mind. The specific objective of this project is to explore the feasibility and the potential effects of adding music to meditative movement on affect and flow-like experience. The research questions are:

(1) What is the percentage of participants who are willing to consent to the study?

(2) What is the percentage of participants who are able to complete the study?

(3) To what extent can music and meditative movement be successfully delivered to participants?

(4) Does meditative movement have an effect on affect and flow?

(5) Does the addition of music to meditative movement have a different effect on affect and flow?

(6) Are there any differences between the use of live music and recorded music?

III. MATERIALS AND METHODS

To address the research questions, it is essential to determine the appropriate research method and materials needed, including the design, sample, instruments, procedure, and data analysis used in this project. These information help establish the validity of the research and allow future researchers to replicate the study.

Research Design

This study utilized an exploratory design as the study of music perception, mind-body relationship, and well-being is a newly developed area. The goal of the project is to gain insights and familiarity of the subject and guide later investigations. As a result, this study was conducted on a smaller scale so as to determine feasibility and provide initial data on the subject before conducting a full-scale study.

It is more common to collect only qualitative data in an exploratory design because gaining more in-depth understanding is still the primary concern (Moura, 2018). However, since one of the research aims is to obtain preliminary data on the effects of predictor variables (i.e. music and meditative movement) on the outcome variables (i.e. affect and flow), quantitative data from questionnaires is also needed. Thus, a mixed method was adopted in the study. Both quantitative data and qualitative data were collected to better understand the research problem. A between-group comparison design was also employed to observe any difference in effects of the predictor variables.

In order to increase the internal validity (i.e. the change in outcome variables is associated with the predictor variables), several extraneous variables were considered, including participant variables, researcher variables, and situational variables. For instance, recruiting participants with similar educational background, having the same experimenter, giving the same

types of qigong exercise sets, conducting sessions on an individual basis, following the same procedure, and using the same measurement tools. However, it is noted that it is impossible to eliminate all confounding variables, which is further elaborated in chapter 5.

Participants

Participants were university students who were 18 years old or above at a large midwestern university. Exclusion criteria included any hearing impairment that precludes participation in the study (listening to music) and any physical limitation that prevents them from performing light physical exercise (qigong).

This study was approved by the Human Subject Institutional Review Board (HSIRB) at Western Michigan University. Recruitment emails were sent to faculty in relevant departments, including the School of Music, Occupational Therapy, Physical Therapy, Holistic Health, and Psychology. Professors from these departments were provided with the recruitment script and asked to disseminate to students in their courses/programs (see Appendix A for request for dissemination and Appendix B for recruitment script). Potential participants contacted the student-investigator to express their interest through email and the student-investigator emailed them back with more information and arranged for the consent document review (see Appendix C for responding email). This process continued on a first-come, first-served basis until enough participants were enrolled in the study.

During the consent document review, student-investigator explained the research purpose and design to participants through a secured and HIPAA compliance platform. Once they agreed to the consent documents (see Appendix D for audio/photo/video consent form and E for informed consent form) and emailed them back to the student-investigator, they were randomly assigned to one of the three groups: (1) Meditative movement only (MM); (2) Recorded music

and meditative movement (RM); and (3) Live music and meditative movement (LM).

Participants (N=15) aged from 18 years to 25 years, with 14 females and 1 male. They described themselves as Asian (33.33%), Caucasian (60%), and Two or more (6.67%). For academic class standing, they reported they were in sophomore (66.67%), junior (6.67%), senior (20%), and graduate/ professional (6.67%). The academic major reported included criminal justice (13.33%), occupational therapy (13.33%), psychology (40%), speech-language pathology (6.67%), interdisciplinary health services (13.33%), and music therapy (13.33%). Participation in this study was on a voluntary basis. Compensation in the form of extra credit for academic coursework was available for some participants in several specific college courses.

Procedure

Data collection occurred on Cisco WebEx and on an individual basis, that is, participants engaged only with the student-investigator and not in a group setting. Participants and student-investigator only met once online for approximately 45 minutes and the sessions were recorded with participants' consent. The student-investigator was in her home and each participant participated remotely from their homes (or other location of their choosing amenable to study procedures. To ensure privacy and confidentiality of the participants, the student-investigator was in a secured room alone.

Prior to the start of data collection, student-investigator reviewed the consent documents with the participants and they were given the opportunity to ask any questions. Once they consented to participate in the study, they signed the consent forms and emailed them back to the student-investigator. Consent was obtained from each participant.

To reduce the risk of having confounding variables and increase the internal validity, random assignment was administered. ID numbers were randomly assigned to participants and

then were randomly sorted into three groups using an online program RANDOM.org. Therefore, each participant had an equal probability of being assigned to each level of independent variables (i.e. meditative movement only (n=5), recorded music (n=5), and live music (n=5)).

With the aim to providing the same order of exercises and duration of session, participants followed the same steps during each data collection period:

(1) Received an email regarding an invitation link to Qualtrics questionnaire
(2) Filled out the first Positive And Negative Affect Schedule (PANAS)
(3) Practiced the first qigong exercise: Body opening and relaxing exercises
(4) Filled out the first Short Flow State Scale (S FSS)
(5) Practiced the second qigong exercise: A crane spreads its wings
(6) Filled out the second S FSS
(7) Practiced the third qigong exercise: Joining heaven and earth
(8) Filled out the third S FSS, second PANAS, open-ended questionnaire, and demographic questionnaire

Participants were prompted to watch three qigong exercise video sets and mirror the movements as soon as comfortable. According to Pölönen, Lappi, & Tervaniemi (2019), the exercise sets were designed following the typical training methods in qigong, which was moving from extended, external, and large-scale movements to subtler, inner, and small-scale movements. The first exercise was “opening and relaxing the body”, second was “a crane spreads its wings”, and the third was “joining heaven and earth” (Pölönen, Lappi, & Tervaniemi, 2019, p.4-5). Each of the exercise sets included a variety of movements, a meditative focus, and breathing.

The method of delivering and/or the audio of the qigong exercise sets varied across conditions with the intention to provide a better quality of intervention. Considering the issue of

internet connection and potential audio delay problems, the more desirable way of delivery would be having participants open up the video on their own electronic devices. For MM, the qigong exercise sets were the exact video sets from Pölönen, Lappi, & Tervaniemi (2019). Participants received YouTube links to these exercise sets through Cisco WebEx. For RM, the qigong exercise sets were paired with original music composed by the student-investigator. Participants received the YouTube links to these exercise sets through Cisco WebEx. For LM, the qigong exercise sets used were the same as the ones in MM. However, the student-investigator provided live piano music while sharing the screen of exercise sets on YouTube with the participants on WebEx. The music provided matched the video's movements, as opposed to matching participants' movements, so substantial audio delay problems were prevented.

Materials

Materials used in the study are outlined as follows: The measurements for feasibility, the measurements for potential effects, the demographic questionnaire, and independent variables.

Measurements for Feasibility

There are eight general areas of focus for feasibility studies: acceptability, demand, implementation, practicality, adaptation, integration, expansion, limited-efficacy test (Bowen et al., 2009). For this project, acceptability and practicality of intervention were chosen to determine the feasibility. On one hand, acceptability refers to the perception of intended individuals (Bowen et al., 2009), such as their reaction to the proposed interventions (qigong, music). In this study, consent rate and completion rate were calculated and responses from open-ended questionnaires were also used to examine their perceptions on the study's procedure. Questions included (1) Did you feel questionnaire-filling was disruptive to the maintenance of a meditative focus? and (2) Do you have additional comments/ questions/ concerns you would like

to share? On the other hand, practicality refers to the extent in which the interventions can be carried out using existing resources (Bowen et al., 2009). Session recordings, anecdotal notes from the student-investigator and open-ended questions were used to examine the practicality.

Measurements for Potential Effects

The participants were contacted on a secured and HIPAA compliance platform, Cisco Webex, individually for each 1:1 data collection period. There were four types of questions in the questionnaire, including the Positive and Negative Affect Schedule (PANAS), Short Flow State Scale (S FSS), open-ended questions, and demographic questions. At different points in the session, participants were prompted to complete questionnaires on Qualtrics, which were later transferred directly into SPSS v. 27 for data analysis.

Affect. For the selection of a measure of affect, Ekkekakis (2013) recommended to follow the three steps: (1) consider the definition of the three constructs (affect, mood, and emotion); (2) consider the structure, dimensionality, and polarity; (3) consider the validity and reliability of the chosen conceptual model. In line with the aim of the study, affect was selectively targeted as one of the dependent variables because it is the most general construct among the three. Therefore, any changes in affect elicited by the interventions could be registered, whether that may be the change in emotion, a change in mood, or free-floating affect.

On this basis of conceptual framework, the Positive and Negative Affect Schedule (PANAS) was administered in this investigation (see Appendix G for PANAS). The scale consisted of twenty descriptors, with ten for positive affect and ten for negative affect. Participants were prompted to rate each descriptor on a 5-point likert scale (1=Very slightly or not at all, 2 = a little, 3 = moderately, 4 = quite a bit, 5= extremely) before and after the session. Positive affect score was calculated by summing all scores from positive items. The range of

scores was from 10 to 50, with higher scores indicating higher levels of positive affect. Negative affect score was calculated by summing all scores from negative items. The range was from 10-50, with higher scores indicating higher levels of negative affect. Total PANAS score was calculated by subtracting the negative affect score from positive affect score, where the sign of deviation from zero indicated positive valence. The change in affect was calculated by subtracting the pre-session total PANAS score from post-session PANAS score.

According to Watson, Clark, and Tellegen (1988), the alpha reliabilities of PANAS were relatively high, with 0.88 for positive affect and 0.87 for negative affect in general. Their preliminary results indicated that PANAS demonstrated a significant high level of internal consistency and suggested a high test-retest reliability (Watson, Clark, & Tellegen, 1988). Compared to other mood scales, PANAS demonstrated the clearest convergent/discriminant pattern, with convergent correlations ranging from 0.89 to 0.95, while the discriminant correlations ranging from -0.02 to -0.18 (Watson, Clark, & Tellegen, 1988). Therefore, it was suggested that the PANAS scale was a reliable and valid measure of affect.

Flow. Jackson, Eklund, and Martin (2010) developed several scales to measure flow, including the long and short versions of dispositional flow scales (physical and general), long and short version of flow state scales, and core dispositional flow scale. Similar to the study done by Pölönen, Lappi, and Tervaniemi (2019), state flow was chosen to be measured as one of the outcome variables because of its focus on the holistic concept of flow as one coherent experience. Therefore, a post-event assessment of flow, such as Long Flow State Scale (FSS-2) and Short Flow State Scale (S FSS), would be more appropriate compared to other dispositional flow scales. Although the FSS-2 provided the most comprehensive assessment of flow and had a higher internal consistency than S FSS, S FSS was administered in this project because of

practical considerations: the willingness to complete scales and the disturbance to flow (see Appendix H for S FSS).

In S FSS, there was one item for each of the nine flow dimensions, including the challenge-skill balance, action-awareness merging, clear goals, unambiguous feedback, total concentration on the task at hand, sense of control, loss of self-consciousness, transformation of time, and autotelic experience (LeFevre, 1989). Participants were prompted to rate each item with a 5-point likert scale (1 = strongly disagree, 2 = disagree, 3 = neither agree or disagree, 4 = agree, 5 = strongly agree) after each qigong exercise. The score from each item was used to represent each flow dimension and the total flow score was calculated by summing the 9 items together and then dividing them by 9. The range of flow scores was from 1 to 5, with lower scores indicating a lower level of flow-like experience and higher scores indicating a higher level of flow-like experience.

The internal consistency of S FSS was considered to be high (alpha = 0.82) according to a research conducted by Martin, Tipler, Marsh, Richards, & Williams (2006). Jackson, Eklund, and Martin (2010) also supported the correlation between the FSS-2 and S FSS was high (0.89), indicating the short scale captured the essence of its corresponding long scale. The internal and external validity were reported by Martin and Jackson (2008). The S FSS was found to be reliable and music scale fit the data the best compared to work and sport flow.

Demographic Questionnaire

Participants were asked to provide demographic information by the end of the session. The questions included: (1) What is your age?; (2) What gender do you identify as?; (3) Please specify your ethnicity.; (4) Major; (5) What is your academic class standing? Demographic information was collected to investigate whether they were confounded with the independent

variables, contributing to the differences in the dependent variables.

Independent Variables

Participants were prompted to watch three different qigong exercises and follow the movement as soon as comfortable. The original exercise videos from the study of Pölönen, Lappi, & Tervaniemi (2019) were downloaded from YouTube (links were available on their published study). The videos were uploaded onto YouTube again for MM and with the addition of music for RM and LM. (Video links: 1: https://youtu.be/H-PvqEkExTs; 2: https://youtu.be/pA0nV8wPpSM; 3: https://youtu.be/TXdU6fWGiyM) YouTube links were sent via Cisco WebEx chat for MM and RM.

Creation of Auditory Stimuli. The music compositions used in RM and LM were identical. They were several original pieces composed by the student-investigator according to the guidelines of PSE, one of the neurologic music therapy techniques. The subsequent principles guided the composition process: (1) Pitch variation guides the position, direction and the range of motion; (2) sound duration, tempo, meter, and rhythmic patterns reflect the velocity and timing of movement; (3) dynamics and harmony indicate the force needed behind the movement (Thaut, 2014). For instance, auditory cues were composed without using meters because the movements were not rhythmic in naturel; ascending scales and higher pitches were used to direct upward movement, such as raising arms; thicker chords were used to cue the muscle contractions necessary for squatting positions; and faster tempo was used when faster movements were indicated. Music was recorded using Pro Tools 2018.4 and then added to the videos using iMovie. Participants in the LM group watched the videos via the shared screen on Cisco WebEx from the student-investigator's laptop.

Data Analysis

Demographic questionnaire was evaluated by measures of frequency to reveal the prevalence of responses. Group comparison analysis were also performed with each demographic item against PANAS and S FSS scores to determine their relationships.

Measurements for Feasibility

The acceptability was examined through calculating the consent rate, completion rate, and analysis of the open-ended responses from questionnaires while the practicality was investigated through analysis of session video recordings, anecdotal notes from the student-investigator and open-ended questionnaires on Qualtrics. Consent rate was calculated by dividing the number of participants who were willing to consent to the study by the number of people contacted the student-investigator. The completion rate was calculated by dividing the number of participants who finished practicing all exercises and filled out all questionnaires by the number of participants who consented to the study. Content-analysis of video recordings, anecdotal notes and open-ended responses from questionnaire were also conducted in order to determine the feasibility of the study.

Measurements for Potential Effects

The statistical data was then collected via Qualtrics and then loaded to SPSS v.27 for analysis. Although it is typically not appropriate to report inferential statistics in a feasibility study, a well-designed and well-executed feasibility study with sufficient power may assist in the priori sample size analysis for a larger study (LaGasse, 2013). Therefore, several statistics tests were used in the study. Since the difference between the adjacent scale values in both scales (PANAS and S FSS) could not be assumed as equal, the level of measurement was ordinal. Participants were grouped by the assigned condition (MM, RM, and LM).

The Wilcoxon paired signed-rank test was used to examine the change in PANAS scores before and after the session. Friedman's 2-way ANOVA by ranks was used to test difference in flow among the three exercise sets. The Kruskal-Wallis H test was then used to examine differences in affect and flow between three groups. Post-hoc analysis was conducted to obtain the effect sizes and determine where the difference occurred if appropriate. The Spearman's rank correlation was used to examine relationships between PANAS and S FSS. For all the tests, results with p values less than 0.05 were considered significant.

The study design, sampling, instruments, procedure, and data analysis were chosen to systematically collect relevant data, with the goal to answer the research questions stated in chapter two. During the process, random group assignment was adopted to reduce bias and various extraneous variables were considered to increase internal validity. Reliable and valid measures were chosen to capture the potential effects of intervention. These detailed descriptions of method assist further studies in the field.

IV. RESULTS

The specific objective of this project is to examine the feasibility and obtain preliminary data on the effects of adding music to meditative movement on affect and flow-like experience. Employing the methods proposed in the last chapter, data was gathered and analyzed. The core findings of the study are now presented and explanations of how they are linked to the research questions are provided in this chapter. This knowledge is the basis for the interpretation and transformation to novel insights, which will be elaborated in the discussion chapter. This chapter is organized into demographic variables, feasibility, and potential effects.

Demographic Variables

Group comparison analysis was conducted to determine any correlation between demographic variables (i.e. age, gender, ethnicity, major, and academic class standing) and the dependent variables (affect and flow). No statistically significant effects were found. Therefore, all participants were treated only as group members to their randomly assigned conditions.

Feasibility

The feasibility of the study procedure and interventions were determined by the acceptability and practicality and is presented in the following.

Acceptability

The acceptability was investigated through calculating the consent rate and completion rate. The consent rate was obtained by dividing the number of participants who were willing to consent to the study by the number of people expressed initial interest in participation. Twenty-five individuals contacted the student-investigator initially and expressed interest in participation. Seventeen out of 25 individuals further agreed to consent to the study. Two out of

17 individuals did not participate in the study eventually, as one did not meet the inclusion criteria and one did not show up during the assigned time slot. The remaining fifteen participants consented to participate and completed the study. Thus, the consent rate was 68% and the completion rate was 100%.

Participants were asked if they felt the questionnaire-filling were disruptive to the maintenance of a meditative focus. Among fifteen participants, one reported disruption (6.67%), two reported slight disruptions but understandable (13.33%), and the majority did not feel disruptions (80%) during those periods of time. For those who did not feel disrupted, some reported that the questions were easy where not a lot of mental energy was needed, some reported the questions allowed some rests in between, and some reported that the questions gave them time to reflect and notice their feelings changed.

Practicality

All participants were able to follow all the qigong exercise sets and completed all the evaluation instruments. There was no internet connection and delay problems reported by participants and observed by the student-investigator. This was also supported by the open-ended responses in the questionnaire, with none reporting technical issues during the session. The time for completion was adequate (i.e. approximately 45 minutes/ session). However, according to the video recordings of the sessions, the quality of music delivered to participants in live music condition was not ideal. For instance, some music notes were missing, and some notes were not clear if played softly.

Potential Effects

As stated above, inferential information could be used in creating priori sample size analysis for further studies and indicate any potential relationship between variables. Thus, the

results from statistical analysis and content analysis are presented in the following section.

Statistical Analysis

Affect. At the beginning and the end of the session, each participant's affect was measured by PANAS to observe any effects of meditative movement. Total affect, positive, and negative affect changes before and after the session (whether that may be MM, RM, or LM) reached significance on the Wilcoxon paired signed-rank test (see Table 1). Post-hoc analysis indicated the effect sizes of changes were large, $r > 0.5$. The difference between pre-session and post-session median PANAS scores is presented in Table 2.

Table 1
Pre- to Post-session Difference in PANAS Scores

	Z	Asymp. Syg. (2-tailed) (*p*)	*r*
Negative Affect	-3.19	0.001*	0.82[a]
Positive Affect	-2.09	0.037*	0.54[a]
Total Affect	-3.07	0.002*	0.79[a]

Note. Z= Wilcoxon paired signed-rank test Z statistic.

*Statistically significant ($p \leq 0.05$) difference before and after the session.

R = Standard value *r* effect size, where small = 0.1, medium = 0.3, and large = 0.5[a].

Table 2
Pre- to Post-session Median PANAS Scores

	Pre-session	Post-session	Difference
Negative Affect	15	10	-5*
Positive Affect	30	31	+1*
Total Affect	15	20	+5*

Note. Difference was calculated by subtracting post-session PANAS scores from pre-session PANAS scores, with negative value indicated a decrease in score and positive indicated an increase in score.

*$p \leq 0.05$

To examine if there was a difference between the effects of meditative movement only and music (research question #5 and #6), the changes in PANAS scores for each group were computed. For changes in positive affect and negative affect, Kruskal-Wallis H test was used to observe any difference between groups, but there were no significant results found. The change in total affect between groups reached significance on the Kruskal-Wallis H test ($H(2) = 8.252$, $p = 0.016$) and the effect size of changes was large ($\varepsilon^2 = 0.589$). The median rank was 8.90, 11.50, and 3.60 for MM, RM, and LM respectively.

In order to determine where the difference occurred, post-hoc Dunn's pairwise tests were performed to compare all pairs of groups (see Table 3). There was strong evidence of a difference between RM and LM. The difference in total PANAS scores between MM and LM was almost statistically significant ($p = 0.059$ as opposed to 0.05) and the difference in total PANAS scores between MM and RM was not significant.

Table 3
Between Group Differences in Median Rank of Total PANAS Scores

Group	Group	Difference	Sig.	Adj. Sig.
MM = 8.9	RM = 11.5	2.60	0.35	1.00
MM = 8.9	LM = 3.6	5.30	0.059	0.18
RM = 11.5	LM = 3.6	7.90	0.005*	0.014*

Note. Post-hoc Dunn's Pairwise Tests were used:

MM = Meditative movement,

RM = Recorded music with meditative movement, and

LM = Live music with meditative movement.

Adj. Sig. = Significance adjusted by the Bonferroni correction for multiple tests.

*$p \leq 0.05$

The results indicated that meditative movement, no matter if it was with music or not, had an effect on negative affect, positive affect, and affect in general. Meditative movement

could decrease negative affect, increase positive affect, and increase the total affect. The addition of live music to meditative movement had a lesser effect on affect than recorded music with meditative movement. The live music condition almost had a significantly lesser effect on affect than meditative movement only. But there was no significant difference between meditative movement only and recorded music with meditative movement.

Flow. To reflect on their flow-like experience, participants were prompted to fill out the S FSS questionnaire after practicing each qigong exercise set. The S FSS scores of each exercise set is presented in Table 4. Friedman's 2-way ANOVA by ranks was used to test any difference between exercise sets and significance results were found ($\chi^2(2) = 11.81$, $p = 0.003$). The effect size (Kendall's W value) was 0.39, which was considered as a moderate effect. In order to determine where the difference occurred, post-hoc analysis with Wilcoxon signed-rank tests was conducted with a Bonferroni correction applied (see Table 5). There was strong evidence of a difference between qigong exercise 1 and 3 with a medium effect ($r = 0.37$) and statistically significant difference between exercise 2 and 3 with a small effect size (before the adjustment) ($r = 0.23$).

Table 4
S FSS Scores for Each Qigong Exercise Set from All Samples

	N	Minimum	Median	Maximum	Std. Deviation
Exercise 1	15	2.33	3.89	4.33	0.59
Exercise 2	15	2.89	3.78	4.78	0.59
Exercise 3	15	3.11	4.22	5.00	0.64

Note. The range of S FSS scores is from 1 to 5, with lower scores indicating a lower level of flow-like experience and higher scores indicating a higher level of flow-like experience.

Table 5
Between Group Differences in Median Rank of S FSS Scores

Group 1 – Group 2	Difference	Sig.	Adj. Sig.
FS1<FS2	0.43	0.24	0.71
FS2<FS3	0.73	0.045*	0.134
FS1<FS3	1.17	0.001*	0.004*

Note. Post-hoc Wilcoxon Signed-rank Tests were used:

FS1= Flow score after exercise 1

FS2= Flow score after exercise 2

FS3= Flow score after exercise 3.

Adj. Sig. = Significance adjusted by the Bonferroni correction for multiple tests.

*$p \leq 0.05$

For the difference of flow scores between groups, a Kruskal-Wallis H test was used. However, there were no significant differences in average flow scores, flow scores of each qigong exercise set, and the rating of challenge-skill balance between groups.

The results indicated that participants experienced flow at different levels after three exercise sets. In particular, they experienced a higher level of flow experience after exercise set 3. There were no significant differences in flow-like experience across groups (MM, RM, and LM).

Correlation between affect and flow. A Spearman's rank-order correlation was run to examine the relationship between participants' total PANAS scores and S FSS scores. There was no statistically significant correlation between PANAS and S FSS scores, i.e. there was no correlation found between affect and flow.

Content Analysis

Participants were asked whether they had additional comments/ questions/ concerns they would like to share at the end of the session. Among fifteen answers, six participants (40%)

expressed a positive attitude towards the experience. They described the experience to be novel, helping them feel more relaxed, energetic and focused. In particular, one participant reported finding the melody of music helpful in guiding the movement.

The key findings of this project, including demographic variables, feasibility, and potential effects were presented. These findings assisted in answering the research questions proposed earlier in the paper regarding the feasibility and potential effects of music and meditative movement. This information is now ready to be transformed into new insights.

V. DISCUSSION

The aim of this research is to fill in the knowledge gap regarding the relationship between music, meditative movement, and affect and flow. Within this broad range of research, this project specifically focuses on the feasibility and the potential effects of incorporating music into qigong on affect and flow. Drawing from the results presented in the last chapter, the addition of music to qigong is feasible and has a different impact on affect than meditative movement alone, but similar impact on flow-like experience. The following section provides more discussions on the crucial findings and points out how they could contribute to the existing knowledge base. Therefore, a conclusion could be reached.

Feasibility

Prior to establishing any larger studies on the topic, feasibility studies are needed to obtain fundamental information, such as the acceptability and practicality of study procedures and interventions. Thus, avoiding unanticipated complications as much as possible in the future.

Acceptability

The study procedure and interventions were acceptable to the participants, which was supported by the good consent rate (68%), the good completion rate (100%), and open-ended responses in the project. A good consent rate may be because of the fact that some participants could obtain extra credit for academic coursework in several specific college courses. Another reason may be the participants were interested in this newly developed topic, which was implied by the open-ended responses. Having a good consent rate indicates there is a high probability of successful participant recruitment in the future.

The good completion rate meant all participants practiced all qigong exercises and finished all the measurement tools, which is another indicator for acceptability of the study. It

could be because the exercise sets were short and consisted of simple movements only. Another explanation could be the questionnaires included in the study were relatively short and concise, such as using a short version of the flow state scale.

Open-ended responses also reflected that the procedural protocol was reasonable. In particular, the addition of questionnaire-filling periods in the study was accepted by the majority of participants. They reported feeling undisturbed by those periods of time and some even stated those periods of time helped them rest and reflect the experience. It might be because the questionnaires were short (i.e. only 9 items for the S FSS) and relatable to what the participants were doing during the exercises, so that they did not feel interrupted.

Practicality

With the available resources and limited time, the delivery of intervention (qigong and music) was considered successful in general, which was demonstrated by the anecdotal notes, the open-ended responses, and the session recordings. All participants were able to watch and follow the selected qigong exercise sets online, completed all online questionnaires, no technical problems were reported, and the overall completion time was within expectation (i.e. approximately 45 minutes/ session). These indicate that the difficulty levels of intervention and measurement tools were appropriate and manageable to participants. Having similar duration in each session could be credited to prior tests to the online meeting platform, survey platform, and the whole procedure.

It is worth noting that there are still rooms for improvements regarding the delivery of live music. Although all participants were able to finish mirroring the movements in the videos, the quality of music presented in live music was not ideal according to the video recordings. Participants were able to listen to the live piano music but some notes were missing or unclear. It

could be because only the laptop's built-in microphone was used and it was not adequate for registering all the changes in musical elements.

Potential Effects

Despite the fact that inferential statistics in feasibility studies are commonly not used to draw conclusions, some crucial findings with sufficient power are still presented in this project with the goal to obtain preliminary results on the topic. As a result, help determine whether a larger trial is warranted.

Affect

Qigong exercises have a positively valanced effect on participants' affect, which supports the findings from Pölönen, Lappi, & Tervaniemi (2019) and Zhang et al. (2016). The significant changes in pre-session and post-session median PANAS scores indicate that these exercises could decrease participants' negative affect, increase positive affect, and increase the total affect. Open-ended responses from the participants reported feeling more relaxed, energetic, and focused after the experience, which may explain the changes in the PANAS scores.

In terms of the difference in effect between conditions, live music seemed to have a lesser effect on total affect when compared to qigong exercises only. This might be due to the fact that the quality of live piano music presented was not ideal that participants' affect was influenced. The significant difference between live music and recorded music conditions may support this speculation since the music content was the same and the only difference was the mode of presentation. If the music indeed had a different effect on participants' affect, there should be a significant difference between recorded music and meditative movement condition as well. However, that observation was not made in this study. The difference between recorded music and meditative movement was not significant. Therefore, it is still inconclusive whether the

difference between live music condition and meditative movement condition could be attributed to the addition of music, or whether there was a difference in effect between music and meditative movement. The lesser effect of live music and similar effect of recorded music were unexpected and contradicted to previous studies, where positive changes in affect were observed with the purposeful use of music (Hou et al., 2017; Lesiuk, 2016; Moore, 2013).

It is also noted that the pre- to post-session difference in affect according to the PANAS had a large effect size.

Flow

Participants experienced flow at different levels after three qigong exercise sets, which supports the results from Pölönen, Lappi, & Tervaniemi (2019). The higher median flow score indicates a higher level of flow-like experience in participants. However, the reason behind this observation is not definite. The difference may be due to the cumulative time, learning effect, the different content among exercises, participants' perception, and more. But it could indicate that there was a significant change in flow-like experience between exercise sets 1 and 3, meaning there seemed to be an increasing trend of flow-like experience throughout the experience. It also indicates that flow experience seems to be related to time, rather than music, and it takes at least 15 minutes to begin flow-like experience.

The addition of music did not induce a different effect on flow as there were no significant differences between groups in flow-like experiences. This finding is contradictory to what Csikszentmihalyi (1990), Janata et al. (2012), Stupacher et al. (2013) stated. It was believed that music could help organize the mind and induce flow experiences.

Implications

This study investigated the effects of qigong and treated it as a pathway to

comprehending meditative movement. The results support that the incorporation of music into meditative movement is feasible and could potentially produce a different effect than meditative movement alone. The preliminary results also suggest that meditative movement has a positive effect on practitioner's affect and flow-like experiences. This effect could already be observed even if the practitioners only involved in practice for one 45-minute session. This information could contribute to the beginning stage of theory development as it guides to formulating a hypothesis. For instance, music, when used purposefully and paired with meditative movement, will positively shift affect toward positive valence. There are indeed still more questions to be answered before reaching a common groundwork of explanation and a better understanding of the relationship surrounding music, meditative movement, and affect and flow.

The findings of this research demonstrate the acceptability and feasibility of using online resources as a means to enhance affect and flow-like experience. Because of Coronavirus Disease 2019 (COVID-2019), plenty of people stay home more often than ever, leading to isolation, loss of income, bereavement, and fear of triggering or exacerbating mental health conditions (Brunier & Drysdale, 2020). It could be argued that these accessible digital resources are particularly valuable to the majority of people, such as students, adults, and older adults with no hearing and physical impairments that prevent them from practicing these exercises. They could practice these exercises and potentially improve their affect instantly. For health-care professionals, such as nurses and music therapists, meditative movement could also be utilized together with music to enhance the benefits in practitioners.

Limitations

Limitations are essential in research as they put research into context by stating the validity and establishing the credibility of the project. The limits of this project were noted from

the beginning. Since the study of the relationship between music, meditative movement, and affect and flow is a relatively novel area, there was limited previous research and information on the topic. As a result, the nature of this project was set to be exploratory. The primary focus was to determine the feasibility and potential effects of music and meditative movement on affect and flow. This information could assist in determining the need for larger trials in the future.

The nature of this project as well as the time and resources constraints limited the selection of study method and design. Selection bias could be a threat to external validity. Convenience sampling was used and the effects observed in the project may not represent the general population. The reactive effects of experimental arrangements and reactive effects of testing shall be considered as well. Participants' behaviors may be affected by knowing the session was being recorded, the student-investigator was observing them, and the pre-test. In particular, there are no definite explanations to the observed changes in affect and flow. It could be due to the increase in practice time, the fact that they were instructed to focus on certain tasks, or the effects of music and meditative movement.

The background of participants influences the internal validity of the study. Although only university students were included in the study, their experience in practicing meditative movement was not considered. It could potentially be the confounding variable accounting for the changes observed. Despite the fact that participants were not told explicitly about which condition they were in; it was implied when they began participation (noticing whether the music was present). This might be a threat to internal validity as well because this might affect their behaviors or response to the intervention.

There were several limitations in the instrumentation of the study. The standardized scales (PANAS and S FSS) were used to obtain quantitative data while open-ended questions,

anecdotal notes, and session recordings were used to obtain qualitative data. However, there were only two open-ended questions and unstructured anecdotal notes, which were insufficient to capture the overall quality of experience among participants. Future researchers could include questions such as (1) How would participants describe their affective state? (2) How would participants describe their flow experience during the exercise? (3) How would participants describe the whole experience? Nonetheless, the limited content-analysis from these sources were still relevant and valid for answering the research questions regarding the feasibility and potential effects. Pölönen, Lappi, & Tervaniemi (2019) argued that there is still a need to search for the most appropriate measurement instruments for affect and flow. In particular, the limit of using an after-experience and self-reported questionnaire would be the inability to capture the in-the-moment experience.

As aforementioned, the scope of this project was limited by the time and resources constraints. Therefore, only one session was conducted and short-term effects were measured. Previous related research indicated that the benefits of music and/ or meditative movement on affect and flow-like experience. However, those studies were conducted across multiple sessions and lasted longer for each session. These limitations might explain the difference in the project's findings. Among all the possible effects of meditative movement, this project only focused on affect and flow. It may be that there are distinct effects between music and meditative movement on practitioners, but could not be captured and recognized in this project.

Since the study was conducted via an online platform, potential internet connection and audio delay problems were anticipated. As a result, the live music played by the student-investigator matched the movements in the video instead of the participants. This way the only difference between live music and recorded music conditions was having a live performer with

the participants online, as opposed to movement sonification as indicated in the literature review chapter. In other words, the live music provided did not reflect and provide feedback on participants' movement.

For the purpose of this study, only three qigong exercise sets were utilized to engage participants in the experience. Although qigong is considered an instance of meditative movement, there are still a variety of the types of qigong exercises, not to mention the broader range of meditative movement (could be yoga and taichi as well). Thus, considerations need to be taken into account when translating the results from this project.

Recommendations for Future Research

Leading by the limitations of the project, there are several recommendations made for future research. The interplay between music, meditative movement, and affect and flow-like experience is still a progressing field of study, which warrants more research to be conducted.

The acceptability and practicality of this project determine the feasibility of adding music to meditative movement. Therefore, a larger-scale trial (with a larger sample size) could be conducted in order to obtain adequate power and draw valid conclusions on the topic. For the study design, researchers could use a repeated-measure design instead of a between-group design. This way individuals could serve as their own control and individual differences might not be considered as a confounding variable. The order of exercise sets presented should also be counterbalanced. The reliability of the study shall be considered in further investigations as well, such as following a strict study protocol, determining the intervention fidelity, getting different researchers to interpret results, and calculation of the level of inter-rater agreement. Future studies could use a recording microphone, instead of the built-in microphone from the laptop, to deliver better quality of live music.

Expanding upon the current study, researchers could explore the difference in using movement sonification, as opposed to the recorded music and live music condition in this project. Matching participants' movement and giving instant audio feedback might induce a distinct effect on affect and flow experience. Although not the purpose of the current investigation, comparing participant's preferred music with movement sonification would also be another factor to be investigated. Researchers could also compare the difference between participants who are musicians and those who are non-musicians. Other measurements on affect and flow-like experience could be used in future investigations as well, such as psychophysiological measurements (i.e. electroencephalography, electrodermal activity, and heart rate variability). Longitudinal research could be conducted to study the long-term effects of meditative movement and music. Other effects of the intervention could also be investigated, such as movement accuracy, physical well-being, and relaxation. Added to that, the results could be compared with other types of meditative movement, traditional physical exercises, and other forms of creative arts. Because this project was conducted during the COVID-19, there were a few modifications made. One of the biggest changes was to convert the session into online session. Although the ecological validity was given up, but it did remove some social stigma. In the future, researchers could consider conducting the study on in-person practice sessions and potentially group sessions as done in the study by Pölönen, Lappi, & Tervaniemi (2019).

Since pairing music with meditative movement is a relatively newly developed field of study, more scientific evidence gathered from research would be needed in order to progress to formation of theory. On one hand, more qualitative research, such as observations, field studies, and structured interviews, could be done to further explore the quality of experience (meditative movement and music) and determine if the scales used in the study are adequate to capture the

effects or not. On the other hand, quantitative research is also needed to obtain initial data on the potential effects of music and meditative movement. Research with a mixed method could also contribute to the knowledge base. Based on the findings from the research, reasonable hypotheses could be formed and be tested. Researchers could then study the mechanisms behind and formulate a common groundwork of explanation. Thus, advancing the knowledge surrounding the connections among music perception, body movement, and the embodied mind.

Conclusion

At present, the relationship between music, meditative movement, and affect and flow has only been investigated by little published research. Despite the long history of utilization, it has only been standardized and evaluated by scientific methods not until the recent decades. Therefore, more scientific evidence is warranted to prove the perceived benefits of practicing meditative movement. Previous research indicates that music is related to movement acquisition, mood elevation, and attention enhancement, which aligns with the meditative movement's objectives. This connection between music and body movements as well as the embodied mind warrants further investigations. Within this broad range of study, this project focused on the feasibility and potential effects of music and qigong on affect and flow. Relevant literature guided the enquiry by providing the context to the topic and served as a stepping-off point for this project. Music is linked to body movements, deep breathing, meditation, emotion regulation as well as flow experience. Thus, could potentially be paired with meditative movement and enhance the effects on affect and flow.

To fill in the knowledge gap surrounding these factors, the study was designed to systematically collect relevant data. Considerations were made to increase the validity of the study, such as randomization, revision on extraneous variables, the selection of reliable and valid

measures on the dependent variables. The gathered data was analyzed and summaries of findings were presented to address the research aim. Results indicated that the addition of music to qigong exercises is feasible as it was acceptable and practical to the participants. Also, incorporating music into meditative movement has a different effect on participants' affect than meditative movement alone, and similar effect on flow. There was a difference in the effects on affect between the use of live music and recorded music. These preliminary findings support the need for conducting a larger-scale research. They could also lead the formulation of new hypotheses, for instance, music, when used purposefully and paired with meditative movement, will positively shift affect toward positive valence. This hypothesis needs to be tested by future research and possibly guides the development of new theory on the topic. Comprehending these relationships could perhaps shed new light on the interrelationship between music perception, body movement, and the embodied mind.

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APPENDICES

A. Request for Dissemination of Recruitment Script

B. Recruitment Script (Email)

C. Responding Email

D. Audio/Photo/Video Consent Form

E. Informed Consent Form

F. Master List of Participants

G. Positive and Negative Affect Schedule (PANAS)

H. Short Flow State Scale (S FSS)

I. HSIRB Approval Letter

J. HSIRB Post Approval Letter

Appendix A: Request for Dissemination of Recruitment Script

Dear Prof. _____,

I am Lai Yiu, a graduate music therapy student at Western Michigan University. I am currently recruiting WMU students to learn more about my thesis study that will investigate the effects of music and meditative movement (Qigong) on affect and flow. The overall completion time will be about 1 hour which includes time to review the consent document, complete the study activities, and complete the post-activity questionnaires. The goal is to observe if any changes in affect and sense of flow before and after the exercise.

If you would, please consider disseminating to students in your courses/programs. The recruitment script is attached to this email. Should you have any questions, you can contact me at laiyiu.yeung@wmich.edu, or my advisor, Prof. Edward Roth at edward.roth@wmich.edu. I appreciate your time and help.

Have a wonderful day,

Lai Yiu Yeung, MT-BC

Graduate Music Therapy student

Western Michigan University

Recruitment script:

Hello, students,

A graduate student in Music Therapy is conducting a study that will investigate the effects of music and meditative movement (Qigong) on affect and flow. If you are interested in participating or finding out more about the study, her contact information is in the message below and you are invited to email her at your earliest convenience.

Hello, fellow students,

I am Lai Yiu, a graduate music therapy student at Western Michigan University. I am recruiting WMU students to be part of a research study to explore the effects of music and meditative movement (Qigong) on affect and flow experience.

The overall completion time will be about 1 hour which includes time to review the consent document, complete the study activities, and complete the post-activity questionnaires. I am trying to observe if there are any changes in affect and sense of flow before and after the exercise.

Your data will be kept confidential. Only me and my advisor, Prof. Ed Roth will be able to access the information collected as needed. If the results of the study are presented at a conference or published in any form, any identified information will be kept confidential. Sessions will be recorded for future research purposes only if we have your consent.

There is no compensation for participating in this study. However, your participation will be a valuable addition to my research, and findings could lead to a better understanding of interrelationship between music perception, body movement, and embodied mind.

If you are interested in learning more about the study, feel free to contact me at laiyiu.yeung@wmich.edu (email), or my advisor, Prof. Edward Roth at edward.roth@wmich.edu.

Thank you in advance,

Lai Yiu Yeung, MT-BC

Graduate Music Therapy student

Western Michigan University

Appendix B: Recruitment Scripts (Email)

Hello, students,

A graduate student in Music Therapy is conducting a study that will investigate the effects of music and meditative movement (Qigong) on affect and flow. If you are interested in participating or finding out more about the study, her contact information is in the message below and you are invited to email her at your earliest convenience.

Hello, fellow students,

I am Lai Yiu, a graduate music therapy student at Western Michigan University. I am recruiting WMU students to be part of a research study to explore the effects of music and meditative movement (Qigong) on affect and flow experience.

The overall completion time will be about 1 hour which includes time to review the consent document, complete the study activities, and complete the post-activity questionnaires. I am trying to observe if there are any changes in affect and sense of flow before and after the exercise.

Your data will be kept confidential. Only me and my advisor, Prof. Ed Roth will be able to access the information collected as needed. If the results of the study are presented at a conference or published in any form, any identified information will be kept confidential. Sessions will be recorded for future research purposes only if we have your consent.

There is no compensation for participating in this study. However, your participation will be a valuable addition to my research, and findings could lead to a better understanding of interrelationship between music perception, body movement, and embodied mind.

If you are interested in learning more about the study, feel free to contact me at laiyiu.yeung@wmich.edu (email), or my advisor, Prof. Edward Roth at edward.roth@wmich.edu.

Thank you in advance,

Lai Yiu Yeung, MT-BC

Graduate Music Therapy student

Western Michigan University

Appendix C: Responding Email

Hello,

Thanks for getting in touch with me and letting me know that you're interested in learning more about participating in the study - The effects of music and meditative movement (Qigong) on affect on flow experience.

As a remainder, the overall completion time will be about 1 hour and it will be conducted via videoconferencing. During that time, you will be prompted to watch three Qigong exercise video sets, and as soon as comfortable begin to mirror the various exercises demonstrated in each video, which include body movement, breathing, and physical posturing. You will also be asked to fill out questionnaires before the experience, in between the three exercise sets, and after the experience which will be made available to them online, via Qualtrics with a link sent to your email. The goal is to observe if there are any changes in affect and flow before and after the exercise.

Your data will be kept confidential. Only my advisor, Prof. Ed Roth, and I will be able to access the information collected as needed. You will be assigned a random participant number and all data will be associated with that number, not your name, and as such will be immediately de-identified. If the results of the study are presented at a conference or published in any form, all information will be kept confidential. Sessions will be recorded for future research purposes only if we have your consent.

Your participation will be a valuable addition to my research, and findings could lead to a better understanding of interrelationship between music perception, body movement, and embodied mind contributing to improved individual wellness.

If you would like to participate in my study, please fill out the availability form attached to this email. I will do my best to be available during those times. After reviewing the consent document on Qualtrics, you may choose to proceed and participate in the study. Should you have any more questions, feel free to contact me at laiyiu.yeung@wmich.edu, or my advisor, Prof. Edward Roth at edward.roth@wmich.edu.

Thank you,

Lai Yiu Yeung, MT-BC

Graduate Music Therapy student

Western Michigan University

Attachment: Availability form

Dates	Yes	No

Appendix D: Audio/Photo/Video Consent Form

Research Subject

Audio/ Photo/Video Consent Form:

Title of Study:	Effects of music and meditative movement on affect and flow: A feasibility study
Principal and Student Investigators:	Edward A. Roth, MM, MT-BC (Principle Investigator) Lai Yiu Yeung, MT-BC (Student Investigator)

Use of Study Audio/Video Recordings:

Each session will include audio/video recordings (A/V recordings). These recordings will be labeled only with a code number, which will be kept in the Investigators' files. The recordings will be only be used for future research.

If you agree to participate in this study, your signature on this consent form gives the researchers permission to make and retain the audio/video recordings for this study. You have the right to review the recordings and to request that all or any portion of the recording be erased.

When you sign this form, you are agreeing to consent for the use of the A/V recordings as described above. This means that you have read the consent form, your questions have been answered, and you have decided to volunteer.

Name of Subject (Print)	Signature of Subject	Date
Name of Person Obtaining Consent (Print)	Signature of Person Obtaining Consent	Date

Appendix E: Informed Consent Form

WESTERN MICHIGAN UNIVERSITY
IRB Approved
Approved for use for one year from this date:
AUG 18 2020
Amy Naugle
WMU IRB Office

Western Michigan University
School of Music

Principal Investigator: Prof. Edward Roth
Student Investigator: Lai Yiu Yeung
Title of Study: Effects of music and meditative movement on affect and flow: A feasibility study

You are invited to participate in this research project titled "*Effects of music and meditative movement on affect and flow*"

STUDY SUMMARY: This consent form is part of an informed consent process for a research study and it will provide information that will help you decide whether you want to take part in this study. Participation in this study is completely voluntary. The purpose of the research is to: fill the gap in knowledge surrounding the relationship between music, meditative movement, and affect and flow and will serve as Lai Yiu Yeung's thesis for the requirements of the degree of Master of Music. If you take part in the research, you will be asked to perform light physical exercise and fill out questionnaires. Your time in the study will take approximately 60 minutes. Possible risk and costs to you for taking part in the study may be time to complete questionnaires and overstretching and potential benefits of taking part may be improving mood and increasing flow, temporarily reducing stress, and achieving relaxation. Your alternative to taking part in the research study is not to take part in it.

The following information in this consent form will provide more detail about the research study. Please ask any questions if you need more clarification and to assist you in deciding if you wish to participate in the research study. You are not giving up any of your legal rights by agreeing to take part in this research or by signing this consent form. After all of your questions have been answered and the consent document reviewed, if you decide to participate in this study, you will be asked to sign this consent form.

What are we trying to find out in this study?
This project explores the effects of music and meditative movement (Qigong) on affect and flow experience. The information to be gained is important to shed light on the interrelationship between music perception, body movement, and embodied mind. This study aims to fill the gap in knowledge surrounding the relationship between music, meditative movement, and affect and flow, through observing any changes after the music and meditative movement experience. Importantly, we are also trying to understand any differences that may exist in affect and flow as a result of live and recorded music.

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AUG 18 2020
Amy Naugle
WMU IRB Office

Who can participate in this study?
Any WMU student will be invited to participate in this project, except those with hearing impairment that precludes participation in the study (the study procedures involve music so participants need to have the ability to hear adequately) or with physical limitation that prevents them from performing light physical exercise.

Where will this study take place?
You can complete the study procedures anywhere that has a good internet connection including your home or other location where you would feel comfortable exercising to a video. The questionnaire data will be collected via Qualtrics.

What is the time commitment for participating in this study?
The entire time commitment will last for approximately 60 minutes. Each exercise video, and there are three of them, last approximately 6 minutes. The rest of the time you will spend reading this document and completing the questionnaires.

What will you be asked to do if you choose to participate in this study?
During the time, you will be prompted to watch three Qigong exercise video sets, and as soon as comfortable begin to mirror the various exercises demonstrated in each video:

(1) "Body opening and relaxing exercises", including various slowly performed waving, shaking, stretching and circling movements.
(2) "A crane spreads its wings", including body movement, breathing, and directing attention to harmonization.
(3) "Joining heaven and earth", including body movement, breathing, and different mental images, such as imagining warmth or light flowing through the body.

If you are assigned to music conditions, either live or recorded instrumental music will be provided along with the video to facilitate the exercises. You will be asked to complete the Positive and Negative Affect Schedule (PANAS) and Flow State Scale-2 (FSS-2) before the experience, in between the three exercise sets, and after the experience online to observe any changes occurring before and after each movement exercise. By the end of session, you will be given open-ended questionnaires as well to further study the quality of experience. All questionnaires will be delivered online via Qualtrics, which is private and secured. All sessions will be recorded and stored securely for future research purpose only if we have your consent.

What information is being measured during the study?
Emotion and experience of flow will be measured through the use of questionnaires.

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WMU IRB Office

What are the risks of participating in this study and how will these risks be minimized?
No compensation or additional treatment will be made available to you except as otherwise stated in this consent form. There is also a minimal risk of injury due to overstretching. The student researcher will be engaged with you online during the exercise sessions and will encourage you to keep the exercise light and help you avoid injury by observing your movement and providing suggestions as needed.

What are the benefits of participating in this study?
It is possible that you will experience some short-term benefits such as improving mood and increasing flow, temporarily reducing stress, and achieving relaxation. Your participation will be a valuable addition to my research, and findings could lead to a better understanding of interrelationship between music perception, body movement, and embodied mind contributing to improved individual wellness.

Are there any costs associated with participating in this study?
There are no costs associated with participating in this study.

Is there any compensation for participating in this study?
There is no compensation for participating in this study.

Who will have access to the information collected during this study?
Only the principal investigator and student investigator will be able access the information collected. If the results of the study are presented at a conference or published in any form, all information will be kept confidential.

What will happen to my information or biospecimens collected for this research project after the study is over?
Video recordings may be used in future studies regarding flow experience. Multiple raters may be trained to watch the videos and observe any indications of flow, and compare the results to the outcomes of their questionnaires collected in this study. Any other data we collected from you, such as the results from questionnaires will be kept confidential. Only my advisor, Prof. Ed Roth, and I will be able to access the information collected as needed. You will be assigned a random participant number and all data will be associated with that number, not your name, and as such will be immediately de-identified. If the results of the study are presented at a conference or published in any form, all information will be kept confidential.

What if you want to stop participating in this study?
You can choose to stop participating in the study at anytime for any reason. You will not suffer any prejudice or penalty by your decision to stop your participation. You will experience NO consequences either academically or personally if you choose to withdraw from this study. The investigator can also decide to stop your participation in the study without your consent. Any data collected will be de-identified and destroyed.

WESTERN MICHIGAN UNIVERSITY

IRB Approved

Approved for use for one year from this date:

AUG 18 2020

Amy Naugle

WMU IRB Office

Should you have any questions prior to or during the study, you can contact the principal investigator, Prof. Ed Roth at edward.roth@wmich.edu, or the student investigator, Lai Yiu Yeung at laiyiu.yeung@wmich.edu. You may also contact the Chair, Human Subjects Institutional Review Board at 269-387-8293 or the Vice President for Research at 269-387-8298 if questions arise during the course of the study.

This consent document has been approved for use for one year by the Western Michigan University Institutional Review Board (WMU IRB) as indicated by the stamped date and signature of the board chair in the upper right corner. Do not participate in this study if the stamped date is older than one year.

I have read this informed consent document. The risks and benefits have been explained to me. I agree to take part in this study.

_____

Please Print Your Name

_____ _____

Participant's signature Date

Appendix F: Master List of Participants

Name	ID
	001
	002
	003
	004
	005
	006
	007
	008
	009
	010
	011
	012
	013
	014

	015

Appendix G: Positive and Negative Affect Schedule (PANAS)

Worksheet 3.1 The Positive and Negative Affect Schedule (PANAS; Watson et al., 1988)

PANAS Questionnaire

This scale consists of a number of words that describe different feelings and emotions. Read each item and then list the number from the scale below next to each word. **Indicate to what extent you feel this way right now, that is, at the present moment *OR* indicate the extent you have felt this way over the past week (circle the instructions you followed when taking this measure)**

1	2	3	4	5
Very Slightly or Not at All	A Little	Moderately	Quite a Bit	Extremely

_____ 1. Interested	_____ 11. Irritable
_____ 2. Distressed	_____ 12. Alert
_____ 3. Excited	_____ 13. Ashamed
_____ 4. Upset	_____ 14. Inspired
_____ 5. Strong	_____ 15. Nervous
_____ 6. Guilty	_____ 16. Determined
_____ 7. Scared	_____ 17. Attentive
_____ 8. Hostile	_____ 18. Jittery
_____ 9. Enthusiastic	_____ 19. Active
_____ 10. Proud	_____ 20. Afraid

Scoring Instructions:

Positive Affect Score: Add the scores on items 1, 3, 5, 9, 10, 12, 14, 16, 17, and 19. Scores can range from 10 – 50, with higher scores representing higher levels of positive affect. Mean Scores: Momentary = 29.7 (*SD* = 7.9); Weekly = 33.3 (*SD = 7.2)*

Negative Affect Score: Add the scores on items 2, 4, 6, 7, 8, 11, 13, 15, 18, and 20. Scores can range from 10 – 50, with lower scores representing lower levels of negative affect. Mean Score: Momentary = 14.8 (*SD* = 5.4); Weekly = 17.4 (*SD* = 6.2)

Copyright © 1988 by the American Psychological Association. Reproduced with permission. The official citation that should be used in referencing this material is Watson, D., Clark, L. A., & Tellegan, 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.

Appendix H: Short Flow State Scale (S FSS)

For use by Edward Roth only. Received from Mind Garden, Inc. on August 11, 2020

SHORT Flow State Scale (S FSS)

Please answer the following questions in relation to your experience in the event or activity you have just completed. These questions relate to the thoughts and feelings you may have experienced while taking part. There are no right or wrong answers. Think about how you felt during the event/activity, then answer the questions using the rating scale below. For each question, circle the number that best matches your experience.

During the event of *(name event)*:_____

		Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
1	I felt I was competent enough to meet the demands of the situation	1	2	3	4	5
2	I did things spontaneously and automatically without having to think	1	2	3	4	5
3	I had a strong sense of what I wanted to do	1	2	3	4	5
4	I had a good idea about how well I was doing while I was involved in the task/activity	1	2	3	4	5
5	I was completely focused on the task at hand	1	2	3	4	5
6	I had a feeling of total control over what I was doing	1	2	3	4	5
7	I was not worried about what others may have been thinking of me	1	2	3	4	5
8	The way time passed seemed to be different from normal	1	2	3	4	5
9	I found the experience extremely rewarding	1	2	3	4	5

Sample

(S FSS-2) © 2002, 2009 Susan A. Jackson. All Rights Reserved. Published by Mind Garden, Inc., www.mindgarden.com

Appendix I: HSIRB Approval Letter

WESTERN MICHIGAN UNIVERSITY

Human Subjects Institutional Review Board

Date: August 18, 2020

To: Ed Roth, Principal Investigator
Lai Yiu Yeung, Student Investigator for thesis

Amy Naugle

From: Amy Naugle, Ph.D., Chair

Re: IRB Project Number 20-07-19

This letter will serve as confirmation that your research project titled "Effects of music and meditative movement on affect and flow: A feasibility study" has been **approved** under the **expedited** category of review by the Western Michigan University Institutional Review Board (IRB). The conditions and duration of this approval are specified in the policies of Western Michigan University. You may now begin to implement the research as described in the application.

Please note: This research may **only** be conducted exactly in the form it was approved.
You must seek specific board approval for any changes to this project (e.g., ***add an investigator, increase number of subjects beyond the number stated in your application, etc.***). Failure to obtain approval for changes will result in a protocol deviation.

In addition, if there are any unanticipated adverse reactions or unanticipated events associated with the conduct of this research, you should immediately suspend the project and contact the Chair of the IRB for consultation.

The Board wishes you success in the pursuit of your research goals.

A status report is required on or prior to (no more than 30 days) August 17, 2021 and each year thereafter until closing of the study.

When this study closes, submit the required Final Report found at https://wmich.edu/research/forms.

Note: All research data must be kept in a secure location on the WMU campus for at least three (3) years after the study closes.

251 W. Walwood Hall, Kalamazoo, MI 49008-5456
PHONE: (269) 387-8293, FAX: (269) 387-8276

Appendix J: HSIRB Post Approval Letter

WESTERN MICHIGAN UNIVERSITY

Human Subjects Institutional Review Board

Date: October 6, 2020

To: Ed Roth, Principal Investigator
Lai Yiu Yeung, Student Investigator for thesis
Genevieve Kim, Student Collaborator

From: Amy Naugle, Ph.D., Chair

Re: WMU IRB Project Number 20-07-19

This letter will serve as confirmation that the changes to your research project titled "Effects of Music and Meditative Movement on Affect and Flow: A Feasibility Study" requested in your memo received October 5, 2020 (to add student collaborator Genevieve Kim) have been approved by the Human Subjects Institutional Review Board.

The conditions and the duration of this approval are specified in the Policies of Western Michigan University.

Please note that you may only conduct this research exactly in the form it was approved. You must seek specific board approval for any changes in this project. You must also seek reapproval if the project extends beyond the termination date noted below. In addition, if there are any unanticipated adverse reactions or unanticipated events associated with the conduct of this research, you should immediately suspend the project and contact the Chair of the HSIRB for consultation.

The Board wishes you success in the pursuit of your research goals.

Approval Termination: **August 17, 2021**

251 W. Walwood Hall, Kalamazoo, MI 49008-5456
PHONE: (269) 387-8293, FAX: (269) 387-8276