

**Research Proposal for Movement-Based Mindfulness Exercises  
for Improving Heart Rate Variability**

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## **Research Proposal for Movement-Based Mindfulness Exercises for Improving Heart Rate Variability**

Mental illness is among the top four mostly costly conditions in Australian healthcare. A recent report by Australian Institute of Health and Welfare (2019) indicated that mental health disorders accounted for 12% of the total healthcare burden, with cancer-related illnesses, the most prolific health concern in Australia, accounting for 18% of the healthcare burden. Although mental illness accounts for 12% of healthcare burden which equates to \$10.6 billion in Australian mental health costs each year, research into cost-effective interventions is somewhat lacking (Australian Institute of Health and Welfare, 2019). The most common mental illnesses that place the largest amount of pressure on the Australian healthcare system include anxiety disorders, affective disorders such as major depressive disorder, and substance use disorders. To-date, the gold standard treatment for these disorders has been cognitive behavioural therapy (CBT). However, recent research posits that therapy which increases individuals heart rate variability (HRV), can have a significant impact on their wellbeing, and subsequently improve mental health outcomes.

HRV is a measure of not only physical fitness, but also an individual's resilience when under stress (Hunt et al., 2018). That is how much control they have over their body's parasympathetic nervous system in response to stress, anxiety, or threat (Hunt et al., 2018). Biologically, HRV is simply the space between heartbeats (Shaffer & Ginsberg, 2017). Individuals with high HRV (more variability between heart beats) usually have a more adaptive stress response, whereas those with low HRV tend to have a maladaptive, or lowered ability to cope with stress, anxiety, or threat (Shaffer & Ginsberg, 2017). It is this variation between the heart's beats that is the physiological indicator of mental health (Mather & Thayer, 2018). Recent research suggests that low HRV (or consistent heartbeats) is associated with increased anxiety disorders and affective disorders such as major depressive disorder, as well as an increased risk of cardiovascular disease and death (Mather & Thayer, 2018). Whereas, high HRV (or inconsistent heartbeats) is correlated with the capacity to self-regulate one's emotions, behaviour, and attention

(Mather & Thayer, 2018). Therefore, those with high HRV are more likely to cope with stress, and are therefore more resilient to the physical and psychological effects of stress.

For decades cognitive-behavioural therapy (CBT) has been the ‘gold standard’ treatment for many mental disorders. Mindfulness can be defined as the active attentiveness to, and awareness of one’s experience in the present moment (Creswell, 2017). Mindfulness can be achieved through techniques such as meditation, breath-work, yoga, tai chi etc, making it a therapy option that is both cost effective and easily administered to a wide population. Since the development of Jon Kabat Zinn’s Mindfulness-based Stress Reduction (MBSR) in the late 1970’s, mindfulness has become integrated as an addition to other therapeutic techniques, such as mindfulness-based cognitive therapy (MBCT). Research indicates that although MBCT achieves similar results to CBT, MBCT results in improved relapse prevention outcomes (Schanche et al., 2020). Thus, mindfulness-based interventions (MBI’s) have gained popularity over the last three decades and are often prescribed as a stand-alone treatment to manage the psychological and physiological symptoms of stress, anxiety, and depression.

### **Literature Review**

As mindfulness practices increase, so does the literature surrounding the efficacy of these practices as therapeutic interventions. There are currently several systematic-reviews and meta-analyses investigating the impact of mindfulness interventions on various health conditions (Goldberg et al., 2018; Rådmark et al., 2019). One paper by Goldberg et al. (2018) investigated the impact of mindfulness interventions in a clinical population. Findings suggested that mindfulness interventions were effective in treating depression, chronic pain, and smoking and other addictive disorders (Goldberg et al., 2018). Another investigated the impact of stillness-based mindfulness interventions such as meditation and MBSR on HRV, yielding inconclusive results (Rådmark et al., 2019). However, some individuals, such as those with trauma, find that stillness-based mindfulness interventions can induce a sense of anxiety, panic, tension, boredom, pain, disorientation, depression, and negativity (Dobkin et al., 2012).

In contrast, movement-based mindfulness interventions provide individuals with an alternative mindfulness practice. Movement-based mindfulness interventions consist of any form of physical

movement that encourages the participant to focus their attention to their movement, and the present moment (Yang & Conroy, 2018). A recent study by Hunt et al. (2018) suggests that yoga, one style of mindfulness based intervention, resulted in higher HRV compared to a no-treatment control condition. The same study indicated that yoga, when compared to stillness-based mindfulness, resulted in similar improvements in HRV. Corroborating this finding, another study suggests that movement-based mindfulness therapies helped reduce stress and anxiety levels in a population of university students (Caldwell et al., 2010). Although this study was purely observational it provides preliminary evidence to how different movement-based mindfulness interventions can improve physical well being and decrease symptoms of anxiety, depression, and stress (Caldwell et al., 2010).

The mind-body connection, also known as Cartesian Dualism, has gained a significant amount of empirical evidence supporting the influential nature of mental events on our physiological health (Kim et al., 2013). For example, when an individual experiences a stressful event, their hypothalamus-pituitary-adrenal (HPA) axis is activated, flooding the body with cortisol (the stress hormone) (García-León et al., 2019). Although there is no physical threat or contamination of this individual's body, their brain perceives the threat and activates a physical response. We can also see this phenomenon occurring when we consider HRV. As previously discussed, those with poor mental health often have low HRV, whereas those with good mental health often have high HRV (Shaffer & Ginsberg, 2017). Thus, it is clear that mental events such as stress have a huge impact on the human body.

Investigating interventions that are suitable for a wider population, including those with trauma or anxiety disorders will provide these populations with the opportunity to improve their mental health using a simple and cost-effective intervention. Further, understanding how HRV affects mental disorders such as anxiety and depression may give us a measure that can allow us to see progression of the participant's recovery. Previous research suggests that movement-based mindfulness interventions have similar outcomes to stillness-based mindfulness interventions, however they may be more accessible to a wider population (Hunt et al., 2018).

To-date there have been no systematic reviews published using a transdiagnostic model to assess movement-based mindfulness interventions. Therefore, this paper intends to fill the gap in the existing literature and provide a summary of the evidence regarding the efficacy of movement-based mindfulness interventions in both healthy and clinical samples. The field of research investigating mindfulness is still incredibly new compared to other areas of psychological research, and the investigation into the efficacy of movement-based mindfulness interventions is both promising and under explored. In order to expand upon the existing literature, this research project aims to explore the impact of movement-based mindfulness interventions on HRV.

### **Rationale**

The field of MBI's is relatively new to the psychological field. With research forms such as MCBT helping to improve relapse prevention outcomes it is important to explore other effects the MBI's may have (Schanche et al., 2020). Recent research has shown how stillness based mindfulness therapies are able to increase HRV within patients but whether this effect flows onto movement based therapies has been underexplored. HRV has been shown to reduce in patients with anxiety or depressive disorders, and high HRV has been shown to have a correlation between an individual's capacity to self-regulate emotions & behaviour. Therefore, determining outcomes of movement-based mindfulness therapies and their effect on HRV will be a step towards measuring and being able to assess a patient's progress on their recovery from various mental health issues such as anxiety and depression. The research question that will be addressed within the systematic review will be: Do movement-based mindfulness interventions affect heart-rate variability scores?

## **Method**

### **Search Terms and Inclusion/Exclusion Criteria**

#### ***Participants***

As this a relatively new area of study we shall include all adult participants. An adult is defined as a person over the age of 18 years old. Participants must be undergoing movement-based mindfulness interventions to be included within the collated sample. Participants under the age of 18 years old shall be excluded from the search criteria as this study is focusing on the effects on Adults.

#### ***Interventions***

Included studies will include Movement-based mindfulness interventions. Upon a preliminary search of the literature, movement-based mindfulness interventions will include: yoga, mindful walking, tai chi, taiji quan, gyrokinesis, mindful movement, walking meditation, kum nye, qigong, or gentle stretching.

#### ***Comparators***

Any treatment as usual or non-exposed control groups will be considered as the comparator/control. Also within subject comparison of pre-post interventions. Examples include: patients already undergoing Cognitive Based Therapy (CBT) or best practice approaches and their effects on HRV.

#### ***Outcomes***

HRV which includes specific measures such as: cardiac vagal, RSA, HF-HRV and RMSSD.

#### ***Report Characteristics***

All years will be considered when compiling data as research as there has been limited research conducted on the efficacy of solely movement-based mindfulness therapy and its effects on stress reduction.

#### ***Language***

Studies that have been published in English or that have been translated into English will be included within the sample of studies used.

#### ***Publication Status***

A complete copy of the article needs to be available.

### ***Procedure***

The following electronic databases will be used to conduct searches: PsychINFO, WebOfScience, CINAHL, Scopus, PubMed. Attempts will be made to contact authors for any missing data. Grey literature will be hand searched.

### ***Search Strategy***

Free text or index terms will be searched for within titles and abstracts of each article. When conducting research the key word search will focus around two areas: The Intervention and the outcome. Search terms will be separated with OR to indicate subjects with the same intervention or outcome and AND to link the two search terms together. The search terms used for this review is as follows: TITLE-ABS-KEY ( ( yoga OR "mindful walking" OR "tai chi" OR "taiji quan" OR gyrokinesis OR "mindful movement" OR "walking meditation" OR "kum nye" OR qigong OR "gentle stretching" ) AND ( "heart rate variab\*" OR "heart rate vary\*" OR "cardiac vagal" OR "respiratory sinus arrhythmia" ) ). Each database will be searched with the key terms present in the title, abstract, or article keywords. Depending on the database, the exact search phrase may vary slightly. In addition to keyword searches, articles may be added or excluded by hand searching to increase the accuracy of each search.

### ***Analysis Plan***

Two independent reviewers will assess article eligibility, followed by another two reviewers who will check for inconsistencies in the screening process. Further, we will use the Cochrane risk of bias tool to evaluate the quality of the research studies. This tool is used to assess the research used on their methodological quality according to their study design (e.g. RCT's) (Higgins & Green, 2011). Following the first screening using title and abstract, the second screening with focus on a full text screening. We will use Zotero and Covidence to assist in the screening process. We will extract information on the specific MBI employed, the HRV outcome variable that has been used, the study design (RCT pre-post, or comparison group), and general demographics of the size of the sample. Synthesise as overall MBI impact on HRV, however, if there are discrepancies we will synthesise using individual MBI interventions and/or

HRV outcomes. Subgroups of overall MBI impact on HRV, however if there are discrepancies we will investigate differences using individual MBI interventions and/or HRV outcomes. If there are discrepancies we will assess effects within clinical populations compared to non-clinical populations. Studies that have met the inclusion criteria will be included within the sample and will not be excluded based on their assessed quality. Data relating to the quality ratings will be presented within the paper. After the initial search it is estimated that approximately 15 papers will meet the inclusion criteria stated previously.

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