

The Effect of a Hatha Yoga Practice on Factors Related to Chronic Stress

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by

Kaitlin Nicole Harkess

Bachelor Health Science (Hons), Bachelor of Humanities

School of Psychology

The University of Adelaide

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ABSTRACT

This thesis investigated the efficacy of an eight-week randomised waitlist controlled yoga intervention for middle-aged Australian women reporting chronic stress and psychological distress ($N = 116$). The research included two primary components. The first was a process evaluation of the implementation and quality of a standardised yoga protocol in a chronically stressed female population. The second component involved three outcome evaluation studies conducted to explore the longitudinal effects of yoga practice on psychological mental health variables and physiological variables, including a pilot study that explored biochemical markers of stress (i.e., inflammation proteins and deoxyribonucleic acid [DNA] methylation).

Paper 1 reports on a process evaluation that includes discussion regarding the development of an eight week secular yoga intervention and the underpinning theory, evaluation of fidelity and quality of its implementation, and examination of causal mechanisms and contextual factors associated with clinically significant improvement in distress (reported by 43% of women in the yoga intervention). These reported improvements in distress were comparable to psychotherapy, and participation in yoga classes was associated with improved positive and negative affect. It was concluded that yoga intervention was feasible for treatment of distress and was positively received by participants.

Paper 2 presents an evaluation of psychophysiological indicators of health following completion of the yoga intervention. Compared to a control group, practicing yoga was found to be associated with increased positive affect, and decreased levels of distress and stress. Additionally, decreased waist circumference and increased flexibility were demonstrated. These findings indicate that an eight-

week yoga intervention is associated with psychological and physiological benefits that exceed those attributable to the effects of time.

Paper 3 presents results of a longitudinal study that explored mental health variables at baseline, post-test and follow-up (one month) time-points. A strong effect of time was indicated as distress was found to decrease in both the yoga and control group, although positive affect was only benefited in the yoga group. Improvements reported at post-test were not robustly seen at follow-up indicating the benefits did not persist without continued regular yoga practice.

Paper 4 reports on a small pilot study ($N = 28$) that investigated the effect of yoga on biochemical variables associated with stress. Compared with the control group, women in the yoga group exhibited moderately higher levels of serum interleukin-6 (IL-6) and expressed less methylation in the tumor necrosis factor (*TNF*) region. Mental health variables were found to be moderately associated with C-reactive protein (CRP) and the methylation of *IL-6* (region 1), *CRP* and *LINE-1* (global methylation). Although the findings indicated some early methylation changes, the methodological constraints of the study only allow for preliminary insights and need to be further explored using larger samples.

In conclusion, this thesis demonstrated that an eight-week secular yoga intervention was associated with some short-term mental health benefits in distressed women and is a feasible treatment option. However, it did not appear that the benefits were robustly maintained beyond engagement with the yoga classes. Some evidence for molecular effects were indicated by tests involving specific biochemical markers of immunity. This thesis provides support for the potential value of larger scale trials examining efficacy of yoga practice in treating stress-related illness.

DECLARATION

I, Kaitlin Harkess, certify that this work contains no material which has been accepted for the award of any other degree or diploma in my name, in any university or other tertiary institution and, to the best of my knowledge and belief, contains no material previously published or written by another person, except where due reference has been made in the text. In addition, I certify that no part of this work will, in the future, be used in a submission in my name, for any other degree or diploma in any university or other tertiary institution without the prior approval of the University of Adelaide and where applicable, any partner institution responsible for the joint-award of this degree.

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DEDICATION

For my mum, who herself wished for the opportunity to undertake Doctoral studies and whose influence has no doubt inspired my own path. I love you forever.

For all my family, friends, and fellow yogis who seek their breath on the yoga mat.

OVERVIEW

Introduction

The prevalence of mental health disorders is increasing and ‘The Global Burden of Disease’ report by the World Health Organisation estimates that by 2020 mental diseases, including stress-related disorders, will be the second leading cause of disease (Kalia, 2002; Kessler et al., 2009). These observations have been borne out in prevalence statistics which show that the general population is reporting increased levels of stress and distress, and decreased levels of well-being (Cassey & Ling, 2014; Australian Bureau of Statistics, 2015). Chronic stress is also known to have physiological impacts as it can negatively affect multiple systems of the body, including the gastrointestinal, cardio-respiratory and immune systems (Chrousos, 2009; Cohen, Janicki-Deverts, & Miller, 2007).

Research indicates that physical activity buffers the negative effects of stress on mental and physical health (Zschucke, Renneberg, Dimeo, Wüstenberg, & Ströhle, 2015), and is associated with increased well-being (Hassmen, Koivula, & Uutela, 2000). Mindfulness/meditation is also associated with enhanced psychological well-being (Brown & Ryan, 2003). Although a number of individual activities are capable of reducing stress and promoting mental and physical health, increasing attention has been directed toward examining the practice of yoga due to its integration of physical activity and mental focus to help individuals achieve overall feelings of well-being. More broadly, activities such as yoga are consistent with current theoretical interest in biopsychosocial models of public health and a move away from traditional mind-body dichotomy emphasised in Western societies for many decades. A focus on physical and mental health is also reflected in the growing influence of multidisciplinary fields, such as psychoneuroimmunology, which have emerged in recognition of empirical

evidence for bidirectional communication between the brain and immune system, as well as epigenetics which proposes that environmental experiences may influence activation of underlying genetic structures.

Despite recent interest in physical and mental health, relatively few studies have examined the efficacy of yoga as a clinical intervention and most have been plagued with methodological limitations, such as lack of standardised protocols, control groups, and biological measures, which are considered to be the objective ‘gold-standard’ of Western science (Field, 2011). These problems, in particular a lack of standardised protocols, make it difficult to replicate interventions and compare different interventions. Thus, an important motivation for this research was to develop a standardised approach for examining the psychotherapeutic potential of yoga.

Outline of Thesis and Aims of the Project

This research evaluated the effectiveness of yoga as a psychotherapeutic intervention for mental health in a chronically stressed population. As stress and distress are known to have both psychological and biophysiological effects, a multidisciplinary approach was taken in designing the series of papers used in this research, specifically a psychoneuroimmunological perspective was considered. The project had several aims:

- First, to evaluate the efficacy of yoga as a mind-body psychotherapeutic intervention, focusing on a chronically stressed female population. At present, many yoga interventions have not benefitted from the use of a standardised protocol, so the first aim of this investigation was to design a standardised protocol for a yoga intervention and to evaluate its implementation.

- Second, as the practice of yoga combines physical exercise and meditation, both of which are linked to enhanced psychological well-being, this study examined the psychotherapeutic benefit of a yoga practice itself. The focus was on its potential to decrease psychological distress in a chronically stressed population, along with an exploration of other changes related to health and broader indices of quality of life.
- Third, this study evaluated whether regular yoga practice is associated with changes in physiological and/or biochemical parameters (related to immunity), which have been linked to maladaptive psychological states, such as stress, anxiety and depression.

This research is one of the first attempts to address current limitations in the literature and evaluate yoga from a mental health perspective in various formats (process, psychological, biophysiological). This research presents the first process evaluation conducted of a yoga intervention conducted in a community population, and results of a registered clinical trial (ACTRN12616000612415), which include the first exploration of yoga and epigenetic modifications. Findings from one process evaluation, and one clinical trial (which utilised psychological, physiological, and biochemical outcome measures) were reported in four papers, presented here as separate chapters.

Chapter 1 provides an introduction to the psychological and biophysiological impacts of stress, the field of mind-body communication, and literature on yoga and its relationship with mental health. The aims of the thesis are then detailed. Chapters 2 to 4 present the four papers of this thesis which include opening and closing statements connecting each study and interpret them in the context of the broader research aims of this thesis. Chapter 5 summarises the findings of each study and

presents a discussion of broader research implications. The limitations of the research are presented along with potential future directions.

Each chapter includes tables and figures numbered consecutively; however the references for all chapters are located at the end of this thesis. A copy of the demographics questionnaire used is included as Appendix A, and a copy of the standardised yoga intervention is included as Appendix B.

Conventions

The nature of this project is multi-disciplinary, but was designed from a psychotherapeutic perspective. The dissertation was written presuming the reader is familiar with the field of clinical psychology, and less familiar with biologically based fields. Accordingly, where it is reasoned appropriate by the writer, a superficial overview is provided to assist reader comprehension.

Outline of Candidate

This research project was undertaken to fulfil requirements of Doctor of Philosophy/Master of Psychology (Clinical). The candidature program (*4 years full-time study*) combined the Master of Psychology (Clinical) course-load (*2 years full-time study*) and Doctor of Philosophy research program (*3 years full-time study*). The four papers that form this body of work, the PhD ‘Structured Program’, six compulsory Master of Psychology (Clinical) courses, and three Master of Psychology (Clinical) placements (representing a total of 2011 hours of clinical work), were successfully completed within four years of equivalent full-time study. This thesis fulfils the requirement of the Doctor of Philosophy degree.