Dysregulation in the stress response system, culturally enhanced mindfulness and adverse childhood experiences among Māori women

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Introduction

This article presents an overview of my PhD research and the methods used to collect data. As the data is currently being analyzed, only preliminary results are presented. The foundation for this project was laid twenty years ago when my father was diagnosed with Cushing's Disease (CD). CD is a disorder characterized by excess levels of cortisol in the bloodstream, whose symptoms typically include weight gain (particularly around the middle of the body), type 2 diabetes, hypertension, mood and personality alterations, fatigue, concentration and memory difficulties, weakness in the bones and joints, as well as thinning skin (Newell-Price et al., 2006; Starkman, 2003). The physical and psychological changes observed in my father as a result of CD sparked a curiosity to understand the role(s) that stress hormones (especially cortisol) play in regulating almost every bodily system. To that end, the focus of this project has been upon measuring dysregulation in the stress response system, which typically presents as either hyper or hypo cortisolism and often follows adverse experiences in childhood and/or exposure to chronic stress (Fries et al., 2005).

Understanding the stress response

Cortisol is released by the adrenal glands following instruction from the hypothalamus and pituitary gland, which together comprise the hypothalamic pituitary adrenal (HPA) axis (Starkman, 2003). In healthy individuals, cortisol is released throughout the day in a pulsatile rhythm that consists of a steep rise immediately after waking, reaching a daily peak approximately 30-40 minutes later. This is known as the cortisol awakening response (CAR) (Steptoe & Serwinski, 2016). Cortisol levels then steadily decrease throughout the day, reaching their nadir around bedtime. This is known as the cortisol diurnal slope (Starkman, 2003). Cortisol levels also increase following exposure to an acute stressor and return to baseline levels when the stress has resolved (Rothschild, 2003). However, when an individual has been exposed to adverse childhood experiences and/or has been exposed to chronic stress (such as living with an abusive partner), the HPA axis can become dysregulated and chronically produce too much or too little cortisol (Panter-Brick & Worthman, 1999).

Cortisol exerts a profound influence over many of the body's functions, including blood pressure, cardiovascular functioning, inflammatory responses, the metabolism of proteins, and the balancing of insulin. Even slightly dysregulated cortisol levels are known to influence fat deposition (Dallman et al., 2003), eating behavior (Tomiyama et al., 2011), and levels of psychopathology (Newell-Price et al., 2003).

While the symptoms of extreme hyper-cortisolism (too much cortisol) are noted in the description of my father's illness, dysregulation in the form of extreme hypo-cortisolism (too little cortisol in the bloodstream), presents as Addison's Disease (AD) and is characterized by chronic fatigue, muscle weakness, nausea, vomiting and weight loss (Michels & Michels, 2014). Between those two extremes however, emerging research suggests that individuals exposed to adversity in childhood and/or

chronic stress can develop symptoms associated with sub-threshold CD or AD, characterized by weight gain around the middle (truncal obesity), psychopathology (especially mood, anxiety and trauma-related disorders), blunted cortisol awakening responses, flattening of the diurnal curve and a blunted response to acute stress (Fries et al., 2005).

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My research

Given that cortisol dysregulation often follows exposure to adverse childhood events and that Māori women experience high levels of childhood trauma (Hirini et al., 2005), high levels of truncal obesity (Ministry of Health, 2015) and high levels of psychopathology (Oakley-Browne et al., 2006), the present research investigates the impact of Māori women's adverse childhood experiences on cortisol, obesity and psychopathology.

I developed a three-pronged investigation:

1. The first investigation examined whether a group of Māori women who had experienced adverse events in childhood, would also show HPA axis dysregulation, psychopathology, chronic stress and truncal obesity.
2. The second investigation sought to test whether a culturally enhanced Mindfulness Based Stress Reduction Course (MBSR) would have any effect on their baseline scores.
3. The third investigation aimed to explore their individual reactions and responses to the course using interview data.

Method

Investigation One

To obtain accurate data regarding HPA axis functioning, eight Māori women with Adverse Childhood Experience scores ranging from 4-8 (indicative of significant childhood adversity) (see Felliti et al., 1998) were recruited using word of mouth and posters. To collect baseline data, each participant agreed to provide saliva samples at specified times, for three consecutive days, for two weeks. The mean measurement for each of those times was then calculated to provide an indication of their average cortisol awakening response and cortisol diurnal slope. To obtain their cortisol response to acute stress, each participant agreed to take part in a social stress test in which they were asked to present a small speech and answer math questions in front of two strangers. Each participant provided saliva samples throughout the test to give an indication of their overall cortisol output to an acute stressor. To measure psychopathology, the Depression, Anxiety, and Stress Scale (DASS; Lovibond, 1995) was used, as was the Post-Traumatic Stress Disorder Scale – Civilian Version (Weather et al., 1993). Both measures have adequate psychometric properties and are quick to administer. To measure chronic stress, the Perceived Stress Scale (Cohen, 1988) was used. To provide an indication of chronic stress, the Social Readjustment Rating Scale was administered (Holmes & Rahe, 1967). Waist-to-hip ratio (W-H-R) was calculated as an indicator of metabolic health. Each person also completed an emotional eating scale (Dutch Eating Behaviour Questionnaire; Van Strien, 1986).

Investigation Two

To test the effects of a culturally enhanced MBSR course, several enhancements were made to the standardized 8-week MBSR programme developed by Kabat-Zinn (1979). By request of the developer, no changes were made to the content or overall structure of the course. However, cultural enhancements were added, including tikanga Māori protocols such as opening and closing each session with karakia; stopping to share kai and say karakia halfway through the session; beginning the course with mihimihi and whakapapa sharing; using reo Māori to explain certain concepts and relating the theme of each week to concepts already embedded in Te Ao Māori – such as compassion (which in the Māori world is known as atawhai). The course was also delivered in a bi-cultural manner, which involved having a Māori female clinical psychologist co-facilitate with a highly experienced mindfulness practitioner, who was a Pākehā male. The Māori female oversaw the cultural additions and ensured the cultural safety of the participants. The Pākehā male oversaw the delivery of the mindfulness content and led the practice components.

As expected, notable improvements in psychopathology, metabolic measures, self-reported stress scores and cortisol markers were found at post-treatment.

Investigation Three

Interviews were conducted before and after the course, to provide a comparison for how views of mindfulness changed for each woman as a function of attending the course.

The interviews were semi-structured and up to thirty-five minutes long.

The findings from the research are currently being analyzed and will be submitted for publication in an academic journal in early 2019. Overall, the results indicate that the culturally enhanced MBSR course was well received by the women in the study. Additionally, baseline measurements showed that most of the women had dysregulated CAR measurements, high W-H-R measurements and either underactive or overactive diurnal cortisol slopes. As expected, notable improvements in psychopathology, metabolic measures, self-reported stress scores and cortisol markers were found at post-treatment. More detailed findings will follow.

References

Cohen, S., Kamarck, T., & Mermelstein, R. (1983). A global measure of perceived stress. *Journal of Health and Social Behaviour, 24*, 386-396.

Dallman, M. F., Pecoraro, N., Akana, S. F., la Fleur, S. E., Gomez, F., Houshyar, H., Bell, M. E., Bhatnagar, S., Laugero, K. D., & Manalo, S. (2003). Chronic stress and obesity: A new view of 'comfort food'. *Proceedings of the National Academy of the Sciences of the United States of America, 100*(20), 11696-11701.

Felitti, V. J., Anda, R. F., Nordenberg, D., Williamson, D. F., Spitz, A. M., Edwards, V., Koss, M. P., Marks, J. S. (1998). Relationship of Childhood Abuse and Household Dysfunction to Many of the Leading Causes of Death in Adults: The Adverse Childhood Experiences (ACE) Study. *American Journal of Preventive Medicine, 14*, 245-258.

Fries, E., Hesse, J., Hellhammer, J., & Hellhammer, D.H. (2005). A new view on hypocortisolism. *Psychoneuroendocrinology, 30(*10), 1010-6.

Holmes, T. H., & Rahe, R. H. (1967). The Social Readjustment Rating Scale. *Journal of Psychosomatic Research, 11*(2), 213-218.

Kabat-Zinn, J. (1990). *Full Catastrophe Living: Using the Wisdom of Your Body and Mind to Face Stress, Pain, and Illness.* New York, NY: Random House Inc.

Lovibond, S. H. & Lovibond, P. F. (1995). *Manual for the Depression, Anxiety, Stress Scales.* (2nd Ed.) Sydney, Australia: Psychology Foundation.

Maniam, J., Antoniadis, C., & Morris, M. J. (2014). Early-life stress, HPA axis adaptation, and mechanisms contributing to later health outcomes. *Frontiers in Endocrinology, 5*(73), https://doi.org/10.3389/fendo.2014.00073

Michels, A., & Michels, N. (2014). Addison disease: early detection and treatment principles. *American Family Physician, 89*(7), 563-568.

Ministry of Health. (2015). *Understanding Excess Body Weight: New Zealand Health Survey*. Wellington, New Zealand: Ministry of Health.

Newell-Price, J., Bertagna, X., Grossman, A. B., & Nieman, L.K. (2006). Cushing's syndrome. *The Lancet, 13*(367), 1605-17.

Oakley-Browne, M. A., Wells, J. E., Scott, K. M. (2006). *Te Rau Hinengaro: The New Zealand Mental Health Survey.* Wellington, New Zealand: Ministry of Health.

Panter-Brick, C., & Worthman, C. M. (1999). *Hormones, Health and Behavior: A socio-ecological and lifespan perspective*. Cambridge, United Kingdom: Cambridge University Press.

Rothschild, A. J. (2003). The hypothalamic-pituitary-adrenal axis and psychiatric illness. In O. M.Wolkowitz & A. J. Rothschild (Eds.), *Psychoneuroendocrinology* (165-188). Arlington, VA: American Psychiatric Publishing, Inc.

Starkman, M. N. (2003). Psychiatric manifestations of hyperadrenocorticism and hypoadrenocorticism (Cushing's and Addison's Diseases). In O. M.Wolkowitz & A. J. Rothschild (Eds.), *Psychoneuroendocrinology* (165-188). Arlington, VA: American Psychiatric Publishing, Inc.

Steptoe, A., & Serwinski, B. (2016). Cortisol Awakening Response. In G. Fink (Ed.), *Stress: Concepts, cognition, Emotion, and Behaviour: Handbook of stress series Volume 1*, (pp. 277-283). London, United Kingdom: Academic Press.

Tomiyama, A. J., Dallman, M.F., & Epel, E. S. (2011). Comfort food is comforting to those most stressed: evidence of the chronic stress response network in high stress women. *Psychoneuroendocrinology, 36*(10), 1513-1519.

Van Strien, T., Friiters, J. E. R., Bergers, G. P. A., & Defares, P. B. (1986). The Dutch Eating Behaviour Questionnaire (DEBQ) for assessment of restrained, emotional and external eating behavior. *International Journal of Eating Disorders, 5*(2), 295-315.

Weather, F., Litz, B., Herman, D., Huska, J., & Keane, T. (October, 1993). *The PTSD Checklist (PCL): Reliability, Validity, and Diagnostic Utility*. Paper presented at the Annual Convention of the International Society for Traumatic Stress Studies, San Antonio, TX.