Psychobiological predictors of exercise behaviour in postmenopausal women.

Thesis submitted by

Fiona Barnett MAppSc(ExSpSc), BAppSc(HM)(Hons)

In November 2007

For the degree of Doctor of Philosophy in

The Institute of Sport and Exercise Science at

James Cook University

Declaration on access

I, the undersigned, the author of this thesis, understand that James Cook University will make it available for use within the University Library and, by microfilm or other photographic means, allow access to users in other apporoved libraries. All users consulting this thesis will have to sign the following statement:

> "In consulting this thesis I agree not to copy or closely paraphrase it in whole or in part without the written consent of the author; and to make proper written acknowledgement for any assistance which I have obtained from it."

Beyond this, I do not wish to place any restriction on access to this thesis.

…… ……..

Fiona Barnett

Statement of sources

I declare that this thesis is my own work and has not been submitted in any form for another degree or diploma at any university or other institution of tertiary education. Information derived from the published or unpublished work of others has been acknowledged in the text and a list of references is given.

I, the undersigned, the author of this work, declare that the electronic copy of this thesis provided to the James Cook University Library is an accurate copy of the print thesis submitted, within the limits of the technology available.

…….. ……

Fiona Barnett

Ethics Statement

The research presented in this thesis was conducted within the guidelines for research ethics outlined in the National Statement on ethics Conduct in Reasearch Involving Humans (1999), the Joint NHMRC/AVCC Statement and Guidelines on Research Practice (1997), the James Cook University Policy on Experimentation Ethics Standard Practices and Guidelines (2001), and the James Cook University Statement and Guidelines on Research Practice (2001). The research methodology received clearance from the James Cook University Human Research Ethics Committee (approval number H1836).

…… ……

Fiona Barnett

Abstract

Weight gain and the associated increased risk of obesity-related diseases are associated with the postmenopausal period. However, moderate intensity exercise may be protective for postmenopausal women through attenuation of weight gain. Despite this evidence, many postmenopausal women do not engage in regular exercise.

As exercise has a positive effect on body composition and the subsequent health of postmenopausal females, an understanding of why exercise levels decline in this population is needed. In particular, understanding the difference in exercise behaviour characteristics of exercising and non-exercising postmenopausal women may encourage more non-exercising postmenopausal women to obtain the health benefits of exercise. An understanding of the exercise behaviour characteristics of exercising and non-exercising postmenopausal women may also provide information for future health promotion policy directions for this population and allow for the formulation of guidelines for exercise professionals. It appears that the life event of menopause can become a barrier or an opportunity for postmenopausal women to exercise, depending on their exercise behaviour characteristics.

Postmenopausal women (N=101) resident in North Queensland volunteered for this study. A self-report questionnaire was utilised to determine the participants' recent exercise history. Participants completed two exercise behaviour scales. The Self-efficacy for Exercise Scale is a barrier-specific, thirteen-item instrument listing common reasons for preventing participation in exercise. The Health Belief Model

(HBM) scale required participants to indicate how much they agreed or disagreed with various statements relating to their individual health beliefs related to exercise and obesity.

Anthropometric assessments ascertained body mass index and waist-to-hip ratio. Resting heart rate and blood pressure were also measured. Participants then performed a six minute graded exercise test (GXT) to determine estimated maximum oxygen uptake ($\dot{V}O_{2max}$). A second visit required participants to perform a twenty minute moderate intensity exercise bout on a cycle ergometer while measures of pre, during and post-exercise affect were obtained using the Subjective Exercise Experience Scale (SEES).

Following data collection, participants were categorised as exercisers (n=53) or non-exercisers (n=48) based on whether they had performed a minimum of 150 minutes of accumulated moderate intensity exercise in the past 7 days. Univariate and multivariate statistical tests including discriminant function analysis (DFA) were utilised to determine whether significant between-group differences existed for the physiological and psychological variables.

The non-exercisers had obtained a lower level of education (U = 971.5, p = .03), were at a lower stage of exercise change (U = 308.0, p = .00), had higher resting diastolic blood pressure ($F_{1,99}$=7.57, p=0.01), BMI ($F_{1,99}$=33.63, p=0.00) and WHR ($F_{1,99}$=5.83, p=0.02) and lower cardiorespiratory fitness ($F_{1,99}$=21.57, p=0.00) and exercise self-efficacy ($F_{1,99}$=39.56, p=0.00) compared to the exercisers. Each of

these variables may therefore represent barriers to exercise adoption for this sample of non-exercising postmenopausal women.

DFA determined that the postmenopausal women with higher exercise self-efficacy, lower BMI and higher cardiorespiratory fitness were more likely to be exercisers. DFA also found that the barrier to exercise items of perceived lack of time, difficulty getting to an exercise location and the weather provided the greatest discrimination between exercisers and non-exercisers.

Further analysis of exercise self-efficacy revealed that participants at different stages of change possessed different levels of exercise self-efficacy. Participants with the lowest exercise self-efficacy were in the precontemplation and contemplation stages of change, while participants with the highest exercise self-efficacy were in the action and maintenance stages.

DFA results for the HBM scale revealed that the non-exercising postmenopausal women had higher perceptions of susceptibility to developing an obesity-related disease, perceived a greater number of consequences from participating in regular exercise and felt they were less health motivated to control an obesity-related disease compared to the exercising women.

Separate mixed design repeated measures ANOVA found that no significant between-group differences occurred for positive well-being (SEESa) and fatigue (SEESc) during twenty minutes of moderate intensity exercise. However, follow-up

univariate contrasts (Bonferroni) found that the acute exercise bout did have a beneficial effect for both groups across time, with higher SEESa scores postexercise compared to pre and during exercise. Additionally, SEESc scores for both groups were lower postexercise compared to during the latter stages of exercise.

Further research on postmenopausal women residing in Australian metropolitan cities is recommended for determining whether the differences found in this study are unique to postmenopausal women residing in regional North Queensland.

Key words: Postmenopausal women, exercise behaviour

Acknowledgements

To my supervisor, Associate Professor Warwick Spinks. Your expertise and guidance were indispensible. Thank you.

To Dr Melissa Crowe, Dr Joann Lukins and Dr Wade Knez. Thank you for your feedback and assistance.

To the Occupational Therapy staff, and in particular Professor Michele Clark. Thank you for your support and encouragement.

To the participants: thank you for your involvement in this study.

To my family and Oscar and Oliver. Thank you for your support and love.

Dedication

This thesis is dedicated to my late grandfather, Dr Arthur McMartin who will always be an inspiration to me.

Table of contents

List of Tables

List of Figures