LIFESTYLE FACTORS AND HEALTH-RELATED QUALITY OF LIFE IN VIETNAMESE WOMEN AFTER BREAST AND GYNAECOLOGICAL CANCER: WHAT ARE THE RELATIONSHIPS?

Thi Hoa Huyen Nguyen
BNSc, MNSc, MAppSc

Submitted in fulfilment of the requirements for the degree of

Doctor of Philosophy

School of Nursing
Institutions of Health and Biomedical Innovation
Faculty of Health
Queensland University of Technology

2018

Keywords

Breast cancer; gynaecological cancer; health-related quality of life; lifestyles: diet, exercise, smoking, alcohol consumption, and body mass index (BMI); menopause; mental health; physical health; cancer-specific health-related quality of life; self-efficacy; sleep impairment; structural equation modelling; Vietnam.

Abstract

Background

The prevalence of breast and gynaecological cancers (BGC) is increasing worldwide, including in Vietnam. However, these diseases are often not fatal and the survival rates among this population are growing due to improvements in treatment and care for women after cancer. Research supports the positive influences of a healthy lifestyle and health-related quality of life (HRQoL) to survivorship in women after cancer (P. Gupta et al., 2006), and that improvements in a healthy lifestyle result in better HRQoL (D. J. Anderson et al., 2015), and survival (Chlebowski & Blackburn, 2015) for Western women during or after cancer treatment. In contrast, Vietnamese women who have been treated for BGC have experienced shorter survivorship compared to their Western counterparts (Allemani et al., 2015; Lan, Laohasiriwong, & Stewart, 2012). Little is known about lifestyle factors, HRQoL, and its correlates in this Vietnamese population. Social cognitive theory (SCT), developed by Bandura (1986), has been applied in previous cross-sectional and longitudinal studies examining the relationships between lifestyle behaviours and health outcomes (Gase, Glenn, & Kuo, 2016; Haas, 2011; D.-H. Wang et al., 2016), demonstrating the effectiveness of applying this theory to guide research directions. Therefore, SCT was used as the theoretical framework guiding the hypotheses for this study.

Aim:

The overall aim of this study is to provide a comprehensive understanding of the relationships between lifestyle factors and health-related quality life and to identify their determinants among Vietnamese women after breast and gynaecological cancer.

Methods:

A cross-sectional study design collected data from 330 Vietnamese women aged over 18 years old, previously treated for BGC. Data were collected using both online and paper-based methods.

Results

The findings of the study indicate that the majority of the study participants reported lower levels of physical activity, consumed less vegetables than the recommended level, and many were exposed to smoke at home and at their workplace. A small proportion of participants were reported to be current alcohol drinkers; however, they consumed only one standard alcohol drink per day or less. On average, participants' BMI average scores indicated a healthy body weight for the study participants. In regards to quality of life, the health-related quality of life scores indicated a deficit in physical health, mental health, and cancer-specific HRQoL in the study participants compared to normal adult populations.

Analysis using general linear models found significant associations between lifestyle factors and HRQoL. Three predictors were significantly related to self-rated levels of physical activity, including income (β = -.58, p < .05), the number of health problems (β = -.11, p < .05), and exercise self-efficacy (β = .05, p < .05). However, in regards to energy expenditure per week, only exercise self-efficacy (β = 28.56, p < .001) was a predictor of energy expenditure. In regards to fruit and vegetable consumption, significant predictors of years having five servings of vegetables included residence (β = 1.46, p < .05), age (β = .07, p < .05), and exercise self-efficacy (β = .01, p < .01). Diet self-efficacy was the only significant predictor (β = .02, p < .001) of fruit servings consumed per day. There were significant associations between age (β = .07, p < .01) and diet self-efficacy (β = .04, p < .01) to years having two servings of fruit per day. Residence (β = -.59, p < .05), age (β = -.03, p < .05) and sleep impairment (β = -.11, $p < .05$) were significantly associated with BMI. No significant association was found for smoking or alcohol consumption. A number of factors predicting physical health, mental health, and cancer-specific HRQoL were found. Among these significant factors, sleep impairment was the strongest factor influencing physical health, mental health, or cancer-specific HRQoL, highlighting the importance of including this factor in future interventions to improve health-related quality of life for this population.

The results of structural equation modelling found four mediation effects: (1) the average quantity of alcohol consumed in the last seven days partially mediated the relationship between income and physical health (PCS-SF36); (2) exercise self-efficacy mediated the effect of sleep impairment on mental health (MCS-SF36); (3) exercise self-efficacy mediated the effect of sleep impairment on cancer-specific HRQoL, and (4) years having two servings of fruit per day mediated the effect of exercise self-efficacy on cancer-specific HRQoL. The theoretical model testing also demonstrated that the models fit the data well, with relative high variance explained by the models, implying the hypothesised constructs were relevant, though models testing the formations of latent variables from single or manifest variables did not fit and require further exploration.

Conclusion

Despite some limitations, this thesis highlights that there are deficits in the HRQoL of Vietnamese women following BGC, as they had lower than recommended levels of healthy lifestyle for people with cancer, and they also had sleep impairment and low levels of self-efficacy to follow a healthy diet or exercise. These results illustrate the importance of developing intervention programs to support Vietnamese women after breast and gynaecological cancer to improve their health lifestyles and

HRQoL. These programs should focus on improving sleep quality and self-efficacy interventions to facilitate lifestyle changes through the application of social cognitive theory for this population.

Table of Contents

List of Figures

List of Tables

List of Abbreviations

BGC	Breast and/or Gynaecological Cancer
BMI	Body Mass Index
EM	Expectation-maximisation
HBM	Health Belief Model
HRQoL	Health-related quality of life
IPAQ	International Physical Activity Questionnaire
IARC	International Agency for Research on Cancer
MCAR	Missing Completely at Random
MCS	Mental Component Score
PCS	Physical Component Score
PSQI	Pittsburgh Sleep Quality Index
SCT	Social Cognitive Theory
SEM	Structural Equation Modelling
TTM	Trans-theoretical Model
VIF	Variance Inflation Factor
WHO	World Health Organization
QUT	Queensland University of Technology

Glossary

Gynaecological	Any malignancy of the female reproductive tract (cervix, endometrium fallopian tubes, ovaries, uterus, vagina and vulva).
Survival	Refers to “the probability of being alive for a given amount of time after diagnosis and reflects the severity of the cancer diagnosis” (Australian Institute of Health and Welfare, 2012, p. 5).
Oncology	The study of cancer and its treatments.

Statement of Original Authorship

The work contained in this thesis has not been previously submitted to meet requirements for an award at this or any other higher education institution. To the best of my knowledge and belief, the thesis contains no material previously published or written by another person except where due reference is made.

Signature: QUT Verified Signature

Date: 22 March 2018

Acknowledgements

My deepest gratitude goes to my brilliant supervisors – Professor Patsy Yates, Dr Charrlotte Seib, and Professor Debra Anderson for their encouragement, support, and timely guidance throughout every stage of this research study. I have been inspired to go forward by their endless work, discussion, and research expertise. I also wish to show my deep appreciation for the panel members for providing their comments and suggestions throughout my study.

I would also like to sincerely thank Associate Professor Carol Windsor for her encouragement and support when I was struggling with commencing the doctoral candidature and for her advice with the ethics application for this research project.

Special thanks to Queensland University of Technology and Vietnam International Education Development for providing me with the financial assistance to conduct this study and the field trip to Vietnam. I extend my appreciation to the Hanoi Medical College for granting me leave to undertake this course.

I also wish to thank the cancer networks, nurses, research assistants, and the women with BGC who participated in this study for their participation and providing valuable data for this study.

My thanks also to professional editor, Kylie Morris, who provided copyediting and proofreading services according to the guidelines laid out in the university-endorsed guidelines and the Australian Standards for editing research theses.

My deepest thanks and love go to my husband – Le Hoang Nguyen and son – Dang Tien (Bill) Nguyen for their love, patience, and companionship. Without them, it would have been difficult to overcome some stressful situations in the last three years. My special thanks go to my parents and siblings for their unconditional love, support, and encouragement.

Chapter 1: Introduction

This chapter provides an introduction and overview of this thesis. The first sections of the chapter outline the background, research aim, objectives, and research questions of the thesis. This is followed by the definitions of terms used and significance of the study. The final section includes an outline of the remaining chapters of the thesis.

1.1 BACKGROUND

The prevalence of breast and gynaecological cancers (BGC) is increasing worldwide, including in Vietnam (International Agency for Research on Cancer [IARC], 2008; World Health Organization [WHO], 2015a). Despite the increase in prevalence, these cancers are now not as fatal as in previous years, with survival rates improving due to advances in treatment and care for women during and after cancer (Coleman et al., 2008; Lan et al., 2012; Lowe, Ferrell, & Leong, 2007). In Vietnam, survival rates among women with BGC have similarly increased over the last decade (Lan et al., 2012). Despite these improvements, the health-related quality of life (HRQoL) among women with these cancers is often compromised, as women face a number of health and social challenges during and after cancer treatment (Mols, Vingerhoets, Coebergh, & van de Poll-Franse, 2005; Rozenberg, Antoine, Carly, Pastijn, & Liebens, 2007).

There are a number of factors that influence cancer survivors' health and wellbeing, including genetic predisposition, cancer treatment, lifestyle factors, and social circumstances (Gotay, Farley, Kawamoto, & Mearig, 2008; Holmes, Chen, Feskanich, Kroenke, & Colditz, 2005; Kwan et al., 2013; A. Pollard, Eakin, Vardy, &

Hawkes, 2009; Short, James, Stacey, & Plotnikoff, 2013; Weaver et al., 2013). Unhealthy lifestyle factors such as consuming alcohol (Kwan et al., 2013; Weaver et al., 2013), smoking, overweight/obesity, physical inactivity, and poor diet (Doyle et al., 2006; Holmes et al., 2005) are well-known risk factors for the development of primary and secondary cancers, and some studies have reported these risk factors can also reduce overall survival rates (Beasley et al., 2011; Braithwaite et al., 2012; Chan et al., 2014; McDonald, Williams, Dawkins, & Adams-Campbell, 2002). Studies in this area have shown that increasing physical activity and maintaining a low fat diet combined with moderate weight loss can reduce cancer reoccurrence and potentially extend survival from breast cancer (Holmes et al., 2005; A. Pollard et al., 2009; Short et al., 2013). In addition, a few studies have identified that people with cancer who report higher HRQoL are more likely to have extended survival (Gotay et al., 2008; Huang, 2017).

While both healthy lifestyle factors and HRQoL are increasingly recognised as having positive influences on the survival of people with cancer, engagement in various lifestyle factors can also predict HRQoL in this population (Grimmett, Bridgewater, Steptoe, & Wardle, 2011; J. E. Lee & Loh, 2013). A review of four randomised controlled trials on the influence of physical activity on the quality of life of patients with cancer identified a significant relationship between adherence to physical activity and better quality of life in cancer survivors (J. E. Lee & Loh, 2013). Moreover, a recent study reported that increased physical activity and consuming more than five portions of fruits and vegetables per day were associated with better HRQoL in colorectal cancer survivors (Grimmett et al., 2011). This study also found a positive linear relationship between HRQoL and engagement in other healthy behaviours, including not smoking, following a fruit and vegetable diet, being physically active, and moderate alcohol consumption (Grimmett et al., 2011).

Although the positive influences of healthy lifestyle factors on HRQoL have been reported in several studies, the impacts of factors such as socio-demographic characteristics and health status on lifestyle factors and HRQoL, and the interactions between these variables in terms of their influence on HRQoL are not fully understood. The majority of previous studies in this area have involved bivariate analysis using correlations or simple regressions (Montazeri, 2010; Yan et al., 2016; Zeng, Ching, & Loke, 2011). These analytic approaches have thus limited the investigation to an examination of the direct influences of specific factors on HRQoL. A comprehensive exploration of the direct and indirect impacts of socio-demographic and lifestyle factors on HRQoL and an examination of factors mediating any observed effects is required.

A second limitation of previous research is that much of the work lacks a strong theoretical base. This means that the rationale for the inclusion of the variables and hypotheses tested has not always had sound justification. There is growing evidence to support more theoretically driven research designs and analytic approaches. For example, an increasing number of studies have emerged in this area that have been informed by social cognitive theory, in particular focusing on the importance of self-efficacy in explaining the relationships between different behavioural factors and health outcomes (D. J. Anderson et al., 2015; Brink, Alsén, Herlitz, Kjellgren, & Cliffordson, 2012; Gase et al., 2016; Kreitler, Peleg, & Ehrenfeld, 2007). Many of these studies have identified that self-efficacy is an influential mediator in disease management, explaining significant variance in engagement in lifestyle behaviours and health outcomes (Brink et al., 2012; Gase et al., 2016; Kreitler et al., 2007). The principles underpinning social cognitive theory and the rationale for its application in the present study to examine the direct and indirect influences of various factors on HRQoL of women after BGC are described in Chapter 3.

Another important gap in the literature on lifestyle factors and HRQoL amongst women with cancer is consideration of the influence of the social and cultural context. Some evidence suggests that cultural beliefs among women with BGC can lead to the decreased likelihood of Asian women attending cancer screening and follow up treatments after cancer diagnosis (Phillipson, Larsen-Truong, Jones, & Pitts, 2012). A range of other studies have similarly reported on the impacts of cultural factors on the health practices of women with cancer (Donnelly, 2006; Kagawa-Singer, Dadia, Yu, & Surbone, 2010). These findings highlight the importance of understanding the influence of specific social and environmental conditions on lifestyle in order to support people with cancer living within their particular sociocultural context. However, no published studies have reported on the association between lifestyle factors and HRQoL, and the direct or indirect contributions of these factors on HRQoL in Vietnamese women after BGC living in Vietnam. This study aims to address these gaps in knowledge regarding HRQoL and the lifestyle factors of Vietnamese cancer survivors. Such data will provide important evidence to inform lifestyle interventions suitable for Vietnamese women after treatment for BGC in order to improve their quality of life and survival.

1.2 RESEARCH AIM, OBJECTIVES AND QUESTIONS

1.2.1 Overall aim

The overall aim of this study is to provide a comprehensive understanding of the relationships between lifestyle factors and HRQoL and to identify the socio-demographic factors, health status, and behavioural determinants of these variables among Vietnamese women after BGC.

1.2.2 Specific objectives:

The specific objectives of this study include:

- Exploring personal factors (socio-demographic factors and health status), self-efficacy levels, lifestyle factors, and the HRQoL of Vietnamese women after BGC.
- Identifying the relationships between personal factors (socio-demographic factors and health status), self-efficacy levels, lifestyle factors, and HRQoL based on the hypothesised model informed by social cognitive theory.
- Identifying the mediating roles of self-efficacy and lifestyle factors in the relationships between personal factors (socio-demographic factors and health status), self-efficacy levels, lifestyle factors, and HRQoL.
- Identifying the direct and indirect contributions of personal factors (socio-demographic factors and health status), self-efficacy levels, and lifestyle factors on the HRQoL of Vietnamese women after BGC, based on the hypothesised model informed by social cognitive theory.

1.2.3 Research questions:

The research questions addressed in the study include:

Research Question 1: What are the personal factors (socio-demographic factors and health status), self-efficacy levels, lifestyle factors, and HRQoL of Vietnamese women after BGC?

Research Question 2: What are the relationships between personal factors (socio-demographic factors and health status), self-efficacy levels, lifestyle factors, and HRQoL?

2-1: How well do personal factors predict self-efficacy levels of Vietnamese women after BGC?

2-2: How well do personal factors and self-efficacy levels predict lifestyle factors of Vietnamese women after BGC?

2-3: How well do personal factors, self-efficacy levels, and lifestyle factors predict HRQoL of Vietnamese women after BGC?

Research Question 3: Do self-efficacy levels and lifestyle factors mediate the relationships between personal factors, self-efficacy levels, lifestyle factors, and HRQoL?

3-1: Do self-efficacy levels mediate the relationships between personal factors and HRQoL of Vietnamese women after BGC?

3-2: Do lifestyle factors mediate the relationships between personal factors, self-efficacy levels, and HRQoL of Vietnamese women after BGC?

Research Question 4: What are the direct and indirect contributions of personal factors, self-efficacy levels, and lifestyle factors on the HRQoL of Vietnamese women after BGC?

1.3 DEFINITION OF TERMS

Cancer survivors: refers to people who have finished active treatment for cancer, such as chemotherapy or radiotherapy (Cancer Council Victoria, 2015). In this study, the term "after cancer" refers to the period after completion of active treatments.

Personal factors: refers to socio-demographic characteristics and health status factors. Socio-demographic factors include residence, age, religion, marital status, number of people in the household, household structure/living arrangement, educational status, employment status, and monthly income levels. Health status refers to years with cancer, type of cancer, treatment therapy, the number of comorbidities, menopausal status, and sleep impairment.

Self-efficacy: refers to confidence in the ability to perform behaviours (Bandura, 1977). In this study, self-efficacy includes diet self-efficacy and exercise self-efficacy.

Lifestyle factors: are the "factors inherent in a person's way of living that may have a significant effect on health" (Borisch, 2009, p. 3). In this study, lifestyle factors include physical activity, diet, body mass index (BMI), smoking, and alcohol consumption.

Health-related quality of life: is "a state of well-being that is a composite of two components: the ability to perform everyday activities; which reflects physical, psychological, and social well-being; and the patient's satisfaction with the level of functioning and the control of disease and/or treatment-related symptoms" (Gotay, Korn, McCabe, Moore, & Cheson, 1992, p.576).

1.4 SIGNIFICANCE OF THE STUDY

This is the first study to focus on identifying the lifestyle factors and HRQoL of Vietnamese women after BGC and the relative contributions of personal factors, self-efficacy, and lifestyle factors on HRQoL. This study seeks to provide evidence of the mediation effects of self-efficacy and lifestyle factors in reducing or increasing the impacts of other factors on HRQoL. Importantly, this study examines the value of a conceptual model underpinned by social cognitive theory in terms of explaining key health outcomes for women with BGC. Thus, the findings of this study aim to provide a comprehensive understanding of the direct and indirect influences of a range of personal and lifestyle factors on HRQoL for women after BGC. Such data can inform the development of programs to improve outcomes for this population by facilitating lifestyle changes while improving self-efficacy for this population. Additionally, this study makes a unique contribution by exploring these important variables amongst Vietnamese women. No published literature currently exists that has examined such questions in this context; thus, filling an important gap as the number of women who survive BGC in this context grows.

1.5 THESIS OUTLINE

This thesis contains nine chapters.

Chapter 1 provides an introduction to the study. This chapter outlines the background and significance, describes the aims, and defines the important terms of the current study.

Chapter 2 provides a critical review of the literature related to the study area. The chapter begins by examining the prevalence of BGC. A review of lifestyle factors and their influences on breast and gynaecological survivors is then presented. Following this, the findings of studies on the HRQoL of BGC survivors and its influencing factors are reviewed. The chapter concludes with a summary of the knowledge gaps that this study addresses.

Chapter 3 begins with a review of the behavioural theories related to the current PhD study. The second part of this chapter addresses how social cognitive theory underpins this study and provides the rationale for choosing social cognitive theory for this study.

Chapter 4 addresses the methodology of the study. It first describes the study design and justification for the design selected, and then provides a brief discussion of the study setting. Information about the methods employed for data collection are then presented. The chapter also provides an explanation of the data analysis and management procedures for the cross-sectional survey.

Chapter 5 presents the results from the univariate analyses. The chapter begins with a description of the study participants' demographic and health characteristics. The participants' self-efficacy levels are then presented. The chapter also provides data relating to how lifestyle factors and HRQoL were reported by Vietnamese women after BGC.

Chapter 6 presents the results from the bivariate and multivariate analyses. The bivariate correlations and multivariate associations between the study variables are presented using the conceptual framework to structure the results.

Chapter 7 reports the results of the structural equation modelling. The chapter provides a summary of the results relating to the latent variables and then provides results relating to the testing of the theoretical assumptions.

Chapter 8 discusses the study's findings by making comparisons with previous study findings and theories. The chapter beings with an overview of the participants' characteristics, as well as their lifestyle factors and HRQoL, and explanations for the results observed. This is followed by a discussion of the relationships between personal factors, self-efficacy, lifestyle factors, and HRQoL. The mediation effects are then discussed in-line with the literature and theoretical perspectives. A reflection on the theoretical framework is then presented while discussing the direct and indirect influences of various factors on HRQoL.

Chapter 9, the final chapter, presents the study's strengths and limitations and provides recommendations and implications for future research, clinical practice, and policy.

Chapter 2: Literature Review

2.1 INTRODUCTION

This chapter provides a review of the literature in regards to lifestyle factors and health-related quality of life (HRQoL) in women after breast and gynaecological cancer (BGC). It begins with an examination of the prevalence of BGC. The chapter then provides a critical review of the literature related to lifestyle factors of HRQoL in the cancer area, and the factors influencing HRQoL are then explored. The chapter concludes with a summary of the gaps in the literature that this study addresses.

2.2 BREAST AND GYNAECOLOGICAL CANCER: PREVALENCE AND INCIDENCE

Globally, BGCs are the leading diagnosed cancers and they pose an increasing health problem among women (IARC, 2008; WHO, 2015a). According to the PDQ Cancer Genetic Editorial Board (2017), BGC can be primary cancers or secondary cancers. The WHO (2008) stated that BGC accounted for 16% and 9% of all females cancers in 2004, respectively. In 2012, the prevalence of BGC increased to 25% and 18% of female cancers worldwide, respectively (WHO, 2014e). It was also estimated that 537,000 women died due to breast cancer and 330,000 women died due to gynaecological cancer in 2012 (WHO, 2015b). According to the World Cancer Report 2014, breast cancer is the most common female cancer in 140 countries and the most frequent cause of cancer mortality in 101 countries, while gynaecological cancer is the fourth most common female cancer (WHO, 2014e). Although BGCs were formerly believed to be diseases of developed countries, they are now common among women in developing nations. In 2008, approximately 50% of breast cancer cases and 58% of deaths from breast cancer occurred in developing regions, including Vietnam (IARC, 2008). In regards to gynaecological cancer, the data in 2012 indicated that approximately 70% of gynaecological cancer occurred in low and developing nations (WHO, 2014e).

The statistics related to Vietnamese female cancers show that breast cancer is the most common cancer and gynaecological cancer is the third most common cancer, accounting for 20.3% and 14.2% of Vietnamese female cancers in 2012, respectively (IARC, 2012b). The number of Vietnamese women diagnosed with BGC has increased dramatically over the last 12 years, from 5,540 in 2000 to 11,060 in 2012 for breast cancer, and from 5,200 in 2000 to 7,810 in 2012 for gynaecological cancer (Vietnam Nation Cancer Prevention Project , 2002; IARC, 2012b). In 2012, approximately 4,600 Vietnamese women died due to breast cancer and 2,400 due to gynaecological cancer (IARC, 2012a).

Although the incidence of BGC has increased over the last few decades (IARC, 2008; WHO, 2015a), the risk and incidence peak of these diseases are different between Asian and Western countries, for example, the incidence rates of breast cancer in China and the USA were 24/100,000 and 131/100,000, respectively (Leong et al., 2010a). Western women tend to have a higher risk of breast cancer compared with Asian women; however, the survival rates in Asian women are lower than those of their Western counterparts (Coleman et al., 2008; WHO, 2015a). The peak incidence age is between 40 and 50 years in Asian countries, and between 60 and 70 years in Western countries (Leong et al., 2010a). The variation in risk, incidence, and survival rates of these cancers is due to a number of factors, including socio-demographic factors, comorbidities or health history, and lifestyle factors. Lifestyles, which emanate from social circumstances, cultural beliefs, values, and practices, are considered to have the most influence (Bao et al., 2013; Chan et al., 2014; Norat et al., 2013; World

Cancer Research Fund, 2010). For instance, when Asian women, including Vietnamese women, immigrate to the United States and change their lifestyles, their breast cancer risks increase to be similar to those of American women, while their cancer mortality rates decrease (Clegg, Li, Hankey, Chu, & Edwards, 2002; Le, Gomez, Clarke, Glaser, & West, 2002).

Despite the increase in the prevalence of BGC, five year survival rates have grown globally, making women with BGC two of largest groups of cancer survivors (Allemani et al., 2015; American Cancer Society, 2011). These survival rates vary greatly throughout the world, ranging from 80% or over in North America, Sweden, Australia, and Japan, to around 60% in middle-income countries, and below 40% in low-income countries (Allemani et al., 2015; Coleman et al., 2008). In Vietnam, a study in Hue City showed the survival rates one, three, and five years after diagnosis for breast cancer were 94%, 83%, and 74%, respectively (Lan et al., 2012).

The growth in survival rates is largely due to the improvement in early detection programs and treatment processes. However, the long-term effects of cancers and cancer treatments, such as comorbidities (Fu et al., 2015; A. Pollard et al., 2009), and fatigue, stress, and sleep disorders (Haas, 2011), are having negative impacts on survivors' health. Previous research findings have found linear relationships between healthy lifestyle behaviours and better health and HRQoL (D. J. Anderson & Yoshizawa, 2007; Haas, 2011). Although experience with cancer can lead survivors to positive changes in their behaviours, some survivors do not adhere to guidelines for healthy lifestyle behaviours (Mohammadi, Sulaiman, Koon, Amani, & Hosseini, 2013). For example, a study indicated that Iranian women tend to be less likely to engage in physical activity and healthy eating after breast cancer, as only 29% of cancer survivors reported healthy eating practices and 65% of the study participants had low intensity physical activity (Mohammadi et al., 2013). Therefore, it is important to improve long-term health and quality of life by decreasing unhealthy lifestyle factors and improving healthy lifestyle practices in women after BGC.

It is also recommended that women who are at risk of either breast or gynaecological cancer should be screened for BGC (PDQ Cancer Genetics Editorial Board, 2017), and if women are diagnosed with BGC, they should follow the lifestyle recommendations that would support reducing the risk of secondary cancer or cancer reoccurrence from occurring (World Cancer Research Fund, 2013). Moreover, sociocultural influences play an important role in beliefs, health-seeking behaviour, disease coping strategies, and the changing lifestyles of people with cancer. These factors therefore need to be examined to provide evidence to support people with cancer living in sociocultural contexts. The following sections provide a review of the literature relating to lifestyle factors and HRQoL in women after BGC.

2.3 LIFESTYLE FACTORS AND THEIR INFLUENCES ON BREAST AND GYNAECOLOGICAL CANCER SURVIVORS

Lifestyle factors are defined as "factors inherent in a person's way of living that may have a significant effect on health" (Borisch, 2009, p.3). As shown in the definition, lifestyle factors is a broad term with a variety of factors positively or negatively influencing a person's health (Farhud, 2015). In the area of disease prevention and management, the Australian Institute of Health and Welfare (2013) divided lifestyle factors into two groups: (1) healthy lifestyle factors, including exercise, a well-balanced diet, and healthy body weight, and (2) unhealthy lifestyle factors, including smoking and misusing alcohol.

As the prevalence of cancers and cancer survivors increase globally, different aspects of lifestyle factors and their impacts on the development of cancers and cancer survivors' health have been attracting the attention of researchers. A systematic review of nine behavioural and environmental factors among people with cancers found that smoking, alcohol use, low fruit and vegetable intake, and physical inactivity were the most important causes of cancer and were also the leading risk factors for deaths from cancers (Danaei et al., 2005). Specifically focussing on breast and ovarian cancer survivors, systematic reviews on diet, nutrition (including alcohol and fat intake), and physical activity confirmed the impacts of these factors on increasing or reducing the risks of mobility and mortality (Norat et al., 2013; Norat et al., 2014). In addition to these factors, the association between BMI and mortality risk after breast cancer diagnosis was demonstrated in a systematic review and meta-analysis of 82 follow-up studies (Chan et al., 2014). This paper reported the relative risk ratios, which demonstrated that being overweight is related to a higher risk of mortality (Chan et al., 2014).

The Continuous Update Project is a program belonging to the World Cancer Research Fund (2010, 2013, 2014), which continuously updates information from global research studies. This project has conducted a number of systematic reviews on the influences of diet, physical activity, and weight on cancer risk and cancer survival, including BGC (Norat et al., 2013; Norat et al., 2014; World Cancer Research Fund, 2010). Based on the findings from numerous systematic reviews conducted by the Continuous Update Project, the World Cancer Research Fund (2013) provided eight recommendations related to body fatness, physical activity, foods and drinks for preventing cancer, and for optimising health among cancer survivors. These recommendations are promoting weight management, plant foods, animal foods, alcoholic drinks, and dietary supplements (World Cancer Research Fund, 2013). A recent study illustrated that meeting the World Cancer Research Fund recommendations, specifically those related to alcohol, body fatness, and plant food intake, is correlated with a reduced risk of postmenopausal breast cancer (Hastert, Beresford, Patterson, Kristal, & White, 2013).

The same benefits of healthy lifestyle factors have been found in studies undertaken in different countries, and healthy lifestyle practices differ from country to country or between different cultural contexts. The research reveals that when women migrate to other countries, their lifestyle can change accordingly (Hirooka, Takedai, & D'Amico, 2012; Lim, Gonzalez, Wang-Letzkus, & Ashing-Giwa, 2009). A study comparing the lifestyle of Japanese people who have migrated into the US and who are living in their country of origin found that Japanese women living in the US perform less physical activities in daily life, have more stress, and are less likely to reach their goals in weight management and sleep quality compared with Japanese women living in Japan (Hirooka, Takedai, & D'Amico, 2012). Another study also indicated that sociocultural factors significantly influenced stress management in Asian American women (Lim, Gonzalez, Wang-Letzkus, & Ashing-Giwa, 2009).

In addition to the changing lifestyles of migrant Asian women, cultural factors can influence patients' beliefs and care after cancer treatment, including how Asian women react to their cancer and perceive their health. A review of forty five articles and reports identified a number of cultural factors that influence the participation of Asian women, including Vietnamese women, in cervical or breast cancer screening (Phillipson et al., 2012). This review found that many Vietnamese women believed that their cancers are due to fate, or an imbalance of energy and forces within the body, and they believed that they did not need to check their health in the absence of physical symptoms. The report identified that some Asian women tended to use herbs at home instead of following recommended treatments after cancer diagnosis (Phillipson et al., 2012). Additionally, some studies have reported that Vietnamese women can be reluctant to talk about their breasts and gynaecological systems with others, even when they have BGC (Kagawa-Singer et al., 2010). Embarrassment and hesitation possibly contributes to a lack of knowledge about care options and suitable lifestyle behaviours after BGC. A qualitative study that involved interviews with fifteen Vietnamese-Canadian women to understand how cultural knowledge and beliefs contributed to the women's health care practices found that Vietnamese women often followed dietary practices informed by cultural beliefs when experiencing an illness (Donnelly, 2006). For example, they believed that if someone had a cough, they should not eat chicken as it could cause the illness to be more serious (Donnelly, 2006). Although there is evidence of the cultural influences on lifestyles for Vietnamese women after cancer, these practices have not been reported in any detail. The reported findings mostly focus on Vietnamese women who have migrated to other countries; thus, information about lifestyles among Vietnamese women who are living in their country of origin is very limited. Failure to take cultural factors into consideration in the provision of the lifestyle intervention programs can adversely impact on outcomes and be ineffective in modifying lifestyle behaviours among patients (Kagawa-Singer et al., 2010). Therefore, a better understanding of lifestyle factors and the social context of Vietnamese women after BGC is crucial. Given the strong evidence and information gained from previous studies and from the World Cancer Research Fund database (2013, 2017), physical activity, diet, BMI, smoking, and alcohol consumptions are the lifestyle factors that make up the focus of this study. The following sections provide a review of the literature on physical activity, diet, BMI, smoking, and alcohol consumption among women after BGC.

2.3.1 Physical activity

The WHO (2014d) defined physical activity as "any bodily movement produced by skeletal muscles that requires energy expenditure". This includes sports, exercise, and other daily living activities, such as playing, walking, doing housework, gardening, and dancing. Evidence from epidemiological studies and clinical trials have demonstrated that physical activity reduces the risk of developing cardiac disease, diabetes, hypertension (Wattana, Srisuphan, Pothiban, & Upchurch, 2007; Wong, Beth Dixon, Gilbride, Chin, & Kwan, 2011; Zhang, Li-Qiang, Ai-Ping, & Pei-Yu, 2010), and cancer (Hastert et al., 2013; Holmes et al., 2005; A. Pollard et al., 2009). Regarding breast cancer survivors, research has identified that regular physical activity can have a positive impact on survival, as findings have shown that breast cancer survivors who are physically active after initial cancer treatment have a lower risk of cancer reoccurrence, co-morbidities, and death from all causes compared with those who are physically inactive, regardless of the stage of cancer (Bao et al., 2013; Holick et al., 2008; Holmes et al., 2005). In addition to increasing the survival time for women with cancer, exercise has been found to be a factor that improves overall survival and disease-free survival after breast cancer diagnoses in Chinese women (X. Chen et al., 2011).

To maximise the benefit of physical activity to health, intensity or exercise dose needs to be taken into consideration. According to the WHO (2014d), individuals should have at least a total activity level of 600 metabolic equivalent (MET) minutes to achieve health benefits. This would be equivalent to about 150 minutes per week of brisk walking or 75 minutes per week of running (WHO, 2014d). A systematic review that examined dose-response associations between physical activity and chronic disease found that the corresponding risk reduction for breast cancer was 1% for an increase in total physical activity from 0 to 600 MET minutes per week, an additional 4% reduction in risk for an increase from 600 to 3600 MET minutes per week, and a 2% reduction in risk for an increase in total activity from 9,000 to 12,000 MET minutes per week (Kyu et al., 2016). Although dose of exercise to reduce risk of chronic disease, including breast cancer, has been recommended, the dose recommendation to improve health status in people with cancer has not been widely agreed upon. Additionally, the impact of different exercise types has not been widely researched. Such understandings are important in order to tailor physical activity recommendations. This is especially important in different cultural contexts. For example, while Western people perceive exercise as aerobic activity, jogging, running, or gym sessions, Asian people are more likely to engage in exercise such as Tai Chi and Qigong. More evidence regarding exercise frequency, type, and intensity for people after cancer is needed to provide information for a future synthesis of evidence to improve health and HRQoL.

While the benefits of being physically active have been confirmed by research findings, many people continue to perform these healthy lifestyle behaviours at low levels. Globally, one in three adults is not active enough (WHO, 2014d). In developed nations, 41% of males and 48% of females were insufficiently physically active as compared to 18% of males and 21% of females in developing nations (WHO, 2014d). In contrast, a study that compared physical activity among midlife Australian and Japanese women found that Australian women reported being more physically active than Japanese women, 82% and 63.7%, respectively (D. J. Anderson & Yoshizawa, 2007).

In women after BGC, a longitudinal study in Taiwan among 196 breast cancer survivors found that 39% of participants regularly engaged in light to moderate exercise for approximately 15 minutes per day throughout the six months of the study (Hsu et al., 2012). This study also indicated that breast cancer survivors tended to increase the frequency, duration, and intensity of exercise during the six-month study; however, these levels did not reach the recommend exercise levels for women with breast cancer (Hsu et al., 2012). Although there are inconsistences across research findings, these data show the differences in percentages of people involved in physical activity between developed and developing regions. Additionally, the levels of physical activity, types of daily activities, and exercise among citizens of high and low income countries, particularly among women after BGC, remain unclear.

2.3.2 Diet and eating behaviours

According to the WHO (2014b), a healthy diet should include the following: (1) achieve energy balance and a healthy weight, (2) limit energy intake from total fats and shift fat consumption away from saturated fats to unsaturated fats and towards the elimination of trans-fatty acids, (3) increase consumption of fruit and vegetables, legumes, whole grains, and nuts, (4) limit the intake of free sugar, and (5) limit salt (sodium) consumption from all sources, and ensure that salt is iodised.

The relationship between a healthy diet and HRQoL in women after BGC has long been discussed. A systematic review of breast cancer survivors demonstrated that women who reported eating five or more servings of fruit and vegetables per day, with high levels of physical activity, experienced longer survival than women with lower intakes of fruit and vegetables and lower levels of physical activity (Norat et al., 2014). A meta-analysis of a number of prospective cohort studies provided evidence of a significant inverse dose-response association between dietary fibre intake and breast cancer risk. This study demonstrated that every 10g per day increment in dietary fibre intake was associated with a significant 7% reduction in breast cancer risk (Dong, He, Wang, & Qin, 2011). Moreover, a number of studies have found the benefits of reducing saturated fat and sugar intake for the health of BGC survivors (Beasley et al., 2011; Makarem, Chandran, Bandera, & Parekh, 2013).

In addition to normal fruit and vegetables, soy, mushroom, and seaweed consumption have been found to be a good diet for patients with cancer or cancer survivors. While a study in China found that increasing soy isoflavone consumption was associated with reducing the risk of breast cancer and increasing the survival in women with breast cancer (Kang, Zhang, Yang, & Lu, 2012), another study in South Korean suggested a high intake of seaweed was associated with a reduction in the risk of breast cancer (Yang, Nam, Kong, & Kim, 2010). These research findings in both Western and Asian populations suggest that the positive effect of fibre intake to cancer survivors' health in Asian women is more likely related to soy, mushroom, and seaweed consumption compared to normal fruit and vegetables in Western populations. However, there is a lack of large scale population based studies to confirm these relationships.

Although the recommendations regarding a healthy diet for women after BGC have been outlined and recommended (World Cancer Research Fund, 2013), these suggestions need to be considered when being applied in different countries and when preparing dietary guidelines, as sociocultural factors influence some food preferences. Therefore, a better understanding of food consumption and dietary patterns in a specific social and environmental context would provide useful information to develop specific guidelines and recommendations for BGC survivors. Moreover, research has indicated that high vegetable and fruit intake and physical activity together are associated with a better survival after breast cancer regardless of obesity (Norat et al., 2014; Pierce et al., 2007; World Cancer Research Fund, 2010), and the examination of all lifestyle factors contributing to patients' health outcomes, rather than a single factor, is recommended. The following sections discuss other lifestyle factors that could potentially influence patients' survival and health outcomes.

2.3.3 Body mass index (BMI)

Body mass index is strongly correlated with total body fat content and reflects one's overall body fat distribution (WHO, 2014c). The classification of overweight and obesity by BMI has been conducted and used globally. According to the WHO (2014c), a BMI greater than or equal to 25 is overweight and a BMI greater than or equal to 30 constitutes obesity.

The literature has consistently shown that being overweight and obesity are risk factors for cardiovascular disease, diabetes mellitus, kidney disease (Kahn, Hull, & Utzschneider, 2006; Wong et al., 2011), and certain types of cancer, including breast cancer (Danaei et al., 2005; Hastert et al., 2013). These factors also have a negative impact on cancer survivorship (Schmitz et al., 2013). Some research has indicated that being overweight and obesity are linked to a greater risk of breast cancer recurrence and poorer survival in women after breast cancer (Rose & Vona-Davis, 2010; World Cancer Research Fund, 2013) and women after gynaecological cancer (Protani, Nagle, & Webb, 2012). Additionally, a review of intervention studies has identified that women who gain weight after breast cancer might be at increased risk of poor outcomes (Ligibel, 2011). Results from randomised control trials have demonstrated that improvements in biomarkers, such as lean mass, body fat, insulin levels, and insulin growth factors, can be correlated with a reduced risk of BGC progression and overall survival (Pekmezi & Demark-Wahnefried, 2011). Among the Asian population, it has been confirmed that breast cancer stage and cancer related mortality are significantly associated with increased BMI in Indian women (Singh et al., 2011).

There is good evidence that being overweight and obese negatively affect the health outcomes of BGC survivors (Pekmezi & Demark-Wahnefried, 2011; Singh et al., 2011). However, available studies have not always controlled for important confounders. Moreover, the WHO (2014c) recommended that when using BMI to measure body fat, it should be considered that the measurement may not correspond to the same degree of fatness in different individuals, especially individuals from different cultural backgrounds. For example, a study comparing the percentage of body fat and BMI between Caucasian and Asian people found that with the same percentages of body fat, Asian people's BMI was 3-4 units lower than that of Caucasians (Deurenberg, Deurenberg-Yap, & Guricci, 2002). In 2004, the WHO indicated that Asian people had a higher risk of weight related disease at lower BMIs. In this publication, the WHO (2004) suggested the cut-off points for BMI public health action for Asian populations including equal or greater than 23 kg/m^2, which showed an increased risk (compared to 25kg/m^2 for the white European population) and equal or greater than 27.5kg/m^2, which showed a high risk (compared to 30kg/m^2 for the white European population). However, the cut-off point for BMI in Asian people still remains controversial. Therefore, a further examination of BMI among women after BGC in different sociocultural contexts would be useful, including measurements such as self-reflection of body fatness.

2.3.4 Smoking

Smoking is widely known to be a strong factor associated with morbidities and mortality, and known as a preventable cause of death worldwide. Although the harmful effects of smoking have been widely reported, a high prevalence of smoking still remains in a number of countries, including Vietnam. A recent large survey conducted in Vietnam showed that the overall prevalence of tobacco smokers among Vietnamese adults was 23.8% (15.3 million adults), with 47.4% of men (WHO, 2010). Although smoking by women is not generally accepted in the Vietnamese tradition, and smoking rates among Vietnamese women are not as high as among men, the smoking rate in Vietnamese young females has increased over the last few decades from 1.2% in 2007 to 1.4% in 2010 (WHO, 2010; Xuan et al., 2013). This prevalence in Vietnam is different to that in Australia where women were almost equally likely to smoke. The prevalence of smokers in Australia in 2012 was 20.4% in males and 16.3% in females (Australian Bureau of Statistics, 2013). Therefore, reducing smoking should always be a focus in preventing non-communicable diseases among women, including cancers.

Evidence from research findings has indicated a strong linkage between smoking and poor health outcomes for individuals after BGC (Braithwaite et al., 2012; Holmes et al., 2007; Irwin et al., 2008; Sternfeld et al., 2009). Smoking after BGC diagnosis has been shown to affect overall survival (Braithwaite et al., 2012; Holmes et al., 2007). Results from a prospective observational study and systematic review have illustrated that women who are current smokers have a twofold higher rate of dying from breast cancer and a fourfold higher rate of dying from non-breast cancer causes (Braithwaite et al., 2012). Smoking is associated with several factors that lead to poorer outcomes among women with breast and gynaecological cancer, including decreased physical activity (Irwin et al., 2008; Sternfeld et al., 2009), lower socioeconomic status, and higher comorbidity (Pruitt, McQueen, Deshpande, Jeffe, & Schootman, 2012; Sarfati et al., 2013).

While a clear influence of active smoking on the health of women after BGC has been found, the effect of second-hand-smoke on this population is still a question that needs to be researched, as it has been found that passive smoking can increase the risk of breast cancer. Previous research findings have indicated a significant positive relationship between breast cancer risk and the degree of husbands' smoking (Gao et al., 2013; Wada et al., 2015). Additionally, recent data has indicated that the rate of Vietnamese female smokers is low (Xuan et al., 2013); however, Vietnamese women face a polluted environment, with many smokers around them. It has been reported that 41.4% of female workers are exposed to second-hand-smoke at indoor workplaces, and 68.8% of females are exposed to passive smoking at home (WHO, 2010). Additionally, the IARC (2004) reported that second-hand-smoke contains higher cancer-toxicity-levels. This result was then confirmed by a later study indicating that women who were currently exposed to passive smoking had higher risk of breast cancer, compared to those who were not exposed to passive smoking (Dossus et al., 2014). Hence, further research about the effects of smoking and second-hand-smoke on health and HRQoL in BGC is important.

2.3.5 Alcohol consumption

Drinking alcohol is a common feature of cultures and social gatherings in many countries. However, alcohol consumption causes 5.9% of total deaths each year and contributes to 5.1% of the disease burden globally (WHO, 2014a). There is constant evidence from research findings that confirms the causal relationship between alcohol consumption and cancer, including breast and ovarian cancer. A meta-analysis of 124 cohort, case-controlled, and ecological studies conducting by the World Cancer Research Fund (2010) demonstrated a strong relationship between alcohol consumption and all age-breast cancer risk. Taking information from a meta-analyses of case-controlled data revealed that the breast cancer risk increased by 5% with five standard drinks (50g) per week and increased by 6% with one additional standard (10g) drink per day (World Cancer Research Fund, 2010). Regarding the relationship between alcohol consumption and ovarian cancer risk, a meta-analysis of 27 studies found that the relative risk was 1.03 for moderate alcohol drinking (1 to less than 3 standard drinks per day) and 1.09 for heavy alcohol drinking (≥ 3 standard drinks per day) (Norat et al., 2013). Current meta-analysis from the Continuous Update Project indicated that even only one standard alcohol drink per day (10g/day) increased the risk of premenopausal and post-menopausal breast cancer (World Cancer Research Fund International, 2017).

Alcohol consumption not only increases the risk of BGC, but also increases the risk of morbidity and mortality in BGC survivors. The Life After Cancer Epidemiology (LACE) study, which recruited 2,269 women after breast cancer, found that drinking three to four alcohol drinks or more per week may increase the risk of breast cancer recurrence in postmenopausal, overweight, and obese women (Kwan et al., 2010). In confirmation of this result, the After Breast Cancer Pooling Project also indicated that postmenopausal women who consumed more than 6.0g alcohol per day had an increased risk of recurrence of breast cancer (Kwan et al., 2013). Regarding mortality, an earlier study found that consumption of at least one alcoholic drink per week was associated with a 2.7 fold-increase in risk of death among breast cancer survivors (McDonald et al., 2002), though a systematic review (Norat et al., 2014) and some epidemiological studies (Kwan et al., 2013; Kwan et al., 2010) found no association between alcohol consumption and total mortality in breast cancer survivors, regardless of time of diagnosis. The inconsistency in research findings shows that there is currently insufficient evidence to draw conclusions about whether drinking alcohol has any effect on cancer survivors. Therefore, further research in this area is required to provide evidence to inform recommendations for this population.

2.4 HEALTH-RELATED QUALITY OF LIFE IN BREAST AND GYNAECOLOGICAL SURVIVORS AND ITS INFLUENCING FACTORS

As many cancer survivors are highly motived to seek information about healthy lifestyle behaviours in order to improve their HRQoL and their long-term outcomes, the need for specific information regarding lifestyle recommendations for each regional group has become particularly important. Thus, an examination of lifestyle factors and HRQoL and their relationship will provide further evidence for future programs that are environmentally specific for cancer survivors to improve their lifestyle behaviours, and hence, to maximise their HRQoL. In order to understand the HRQoL among women after BGC, this section reviews the literature on the HRQoL for this population.

2.4.1 Health-related quality of life

The definition of HRQoL has been used since the 1980s and includes "those aspects of overall quality of life that can be clearly shown to affect health – either physical or mental health" (Centers for Disease Control and Prevention, 2011). However, a more comprehensive definition of HRQoL that can be used for patients with cancer was suggested by Gotay and colleagues (1992) who proposed HRQoL as:

> a state of well-being which is a composite of two components: the ability to perform everyday activities, which reflects physical, psychological and social well-being, and the patient's satisfaction with the level of functioning and the control of disease and/or treatment-related symptom (p. 576).

As cancer diagnosis and treatment can have a significant impact on a person's general mental and physical health, it can influence their HRQoL. A prospective study that compared HRQoL between general populations and breast cancer survivors found that breast cancer survivors had poorer HRQoL than the general population at baseline and one year later (E. S. Lee et al., 2011). Strong evidence provided by a systematic review of qualitative studies on women after breast cancer concluded that cancer and its treatment have a significant effect on several domains of women's HRQoL (Devi & Hegney, 2011). Additionally, quantitative research findings have indicated that cancer treatment can result in decreased sexual functioning, desire, enjoyment, and menopausal symptoms among BGC survivors (Lowe et al., 2007; Mols et al., 2005). It also increases the long-term risks of other cancers and chronic diseases, such as cardiovascular disease and osteoporosis (Rozenberg et al., 2007). Systematic reviews examining HRQoL in breast cancer survivors have reported that these women experience specific problems, such as painful arms, cognitive dysfunction, and problems with sexual functioning (Mols et al., 2005; Pinto & de Azambuja, 2011). These reviews have also reported that women who survived longer after a diagnosis of breast cancer reported better overall HRQoL than women with fewer years of survival (Mols et al., 2005; Pinto & de Azambuja, 2011). One study reported that although cervical cancer survivors were coping well with their current disease, their mental health was worse than in the reference population (Korfage et al., 2009).

The relationships between HRQoL and survival among women with BGC have long been discussed. Some studies have shown that baseline quality of life predicts survival in advanced breast cancer but not in the early stages of disease, and that physical health is a significant prognostic factor for survival in women with advanced cancer (Montazeri, 2010). In addition, baseline physical aspects of HRQoL and its changes have been related to survival in other studies (Shimozuma et al., 2000). Recent research in the areas of ovarian cancer have also indicated that improvement in HRQoL for women after ovarian cancer can increase the survival time (D. Gupta, Braun, Staren, & Markman, 2013). The results of the study demonstrated that for every

10-point increase in quality of life over the past week, there was a 10% decreased risk of death (D. Gupta et al., 2013).

Despite a low HRQoL in women after cancer found by a number of studies, a review of 25 quantitative and five qualitative studies on the cervical cancer survivor population demonstrated that cervical cancer survivors had good general health status scores (Zeng et al., 2011). Interestingly, this study found that no differences existed in self-reported general health status between cervical cancer survivors and the general health population (Zeng et al., 2011). The differences in research findings regarding HRQoL is partly explained by differences in populations, including cancer stage, treatment methods, and levels of comorbidities (Huang et al., 2017; Zeng et al., 2011). Additionally, previous studies used different tools to measure HRQoL, including generic HRQoL (such as SF36) or cancer-specific HRQoL (such as FACT-G or FACT-B), causing difficulties when comparing results between studies. Further study is required to gain a better understanding of HRQoL in the population of women after BGC treatment. As HRQoL is influenced by a number of factors, the following section explores the current literature regarding the factors that influence HRQoL.

2.4.2 Factors influencing health-related quality of life

Socio-demographic factors and health status

A review of 26 quantitative and five qualitative studies indicated that age at diagnosis was an important HRQoL predictor in women after cervical cancer, as increasing age at diagnosis was associated with higher HRQoL (Zeng et al., 2011). Specifically focusing on mental health, a study indicated that older cervical cancer survivors had better mental health and fewer intrusive stressors than their younger counterparts (Gotay et al., 2008). In contrast, a study in Hong Kong found that older women had poorer social functioning after cervical cancer than younger women (Lai, Tang, & Chung, 2009). In addition to age, cultural context plays a role as an important HRQoL factor. A study conducted in multi-ethnic gynaecological cancer survivor groups found that faith in God promoted cancer survivors' well-being but possibly delayed their care-seeking behaviour (Ashing-Giwa et al., 2006). In Hong Kong, one study reported that social rejection of cervical cancer negatively affected survivors' emotional wellbeing as it is believed in Chinese society that cervical cancer is commonly caused by sexually transmitted diseases and/or having multiple sexual partners (P. W. Lee et al., 2007). Educational level, employment status, physical activity, and increased symptom problems have been reported to be associated with changes in HRQoL scores for women after breast cancer (E. S. Lee et al., 2011).

Regarding time since diagnosis, longer survival time was correlated with higher HRQoL, with cervical cancer survivors 2-5 years post diagnosis reporting more anxiety, body-image issues, and sexuality concerns than those who were 6-10 years post-diagnosis (Korfage et al., 2009). A study examining the association between comorbidities and HRQoL in cancer survivors also found that those who experience comorbid disease experience lower levels of HRQoL than others (Vissers et al., 2013). This study's results also indicated that comorbidities explained more variance in physical and emotional function, pain, and fatigue in comparison with socio-demographic and cancer characteristics (Vissers et al., 2013). In addition to comorbidities, cancer itself or antidepressant treatment are associated with severity of menopausal symptoms among women with breast cancer (P. Gupta et al., 2006), and more menopausal symptoms result in lower HRQoL, not only for women, but also for their partner's quality of life (P. Gupta et al., 2006).

Concerning sleep quality among women after BGC, previous studies have found that 52.0% of women reported habitual bad sleep quality (Furlani & Ceolim, 2006).

Women with bad sleep quality reported more daytime sleepiness and sleep medication use compared with women with good sleep quality (Furlani & Ceolim, 2006). Bad sleep quality not only caused a disturbance in cancer patients' daily activity, but also in their general HRQoL (Liao et al., 2014), especially their mental health (Xiao et al., 2016). While one recent study identified that sleep impairment was most strongly associated with physical and functional well-being (Sanford et al., 2013), another study found that poor sleep influenced both physical and mental health (Liu et al., 2013). Although all of these studies used the same sleep quality questionnaire, the Pittsburgh Sleep Quality Index developed by Buysse and colleagues (1989), and investigated patients prior to, during, and post treatment, their studies used different HRQoL questionnaires (Leong et al., 2010; Liao et al., 2014; Sanford et al., 2013; Xiao et al., 2016). It is not clear whether stage of cancer treatment and using different quality of life measurements could explain the discrepancies among results. Furthermore, these studies mainly used regression analyses to examine the direct influence of sleep impairment on HRQoL, while sleep impairment might interact with other factors to increase or reduce its effect on HRQoL. Future investigation is required to examine the direct and indirect effect of sleep on different domains of HRQoL, such as physical health, mental health, and cancer-specific HRQoL.

Self-efficacy

Self-efficacy is defined as people's belief about their capabilities to perform a specific behaviour in order to achieve a certain goal (Bandura, 1997b). Self-efficacy is a core concept of the social cognitive theory developed by Bandura (1986) and has been widely applied in research related to health behaviours and behavioural interventions in order to improve the health outcomes and HRQoL of people with chronic diseases (Lorig, Ritter, Laurent, & Plant, 2006; Lorig, Ritter, Villa, & Armas, 2009), including cancer (D. J. Anderson et al., 2015).

The usefulness of promoting self-efficacy in oncology has been widely documented. In a longitudinal study, self-efficacy was found to be the most robust factor predicting HRQoL in patients with newly diagnosed advanced lung cancer (Liao et al., 2014). Specifically focusing on the breast cancer population, a randomised control trial that implemented a counselling intervention to promote self-efficacy for women with breast cancer indicated an improvement in quality of life and reduction in distress in the interventional group (Lev & Owen, 2000).

In addition to the direct influence of self-efficacy on HRQoL, self-efficacy could influence HRQoL – seen as an outcome – directly or indirectly through the interactions with behaviours and other determinants (Bandura, 1997b, 2004b). This concept has been confirmed by a number of studies in the chronic disease area (Kikuchi et al., 2013; Nakamura, Watanabe, & Matsushima, 2014), as well as cancer (Kreitler et al., 2007). Using structural equational modelling, a study examining the interrelations between two kinds of stress antecedents, perceived stress, self-efficacy, and HRQoL indicated that self-efficacy directly influenced HRQoL and indirectly influenced HRQoL by reducing perceived stress and then increased HRQoL in patients with cancer (Kreitler et al., 2007). It has been confirmed that self-efficacy mediated the influence of fatigue on HRQoL for women with breast cancer (Haas, 2011). Although the interrelationships between self-efficacy, HRQoL, and other factors have been examined in populations with other chronic diseases, or cancer in general, the specific information of these interactions in the population with breast and gynaecological is very limited.

Lifestyle factors

A review of four randomised controlled trials on the influence of physical activity interventions on the quality of life of patients with cancer indicated that adherence to physical activity was significantly associated with better HRQoL in cancer survivors (J. E. Lee & Loh, 2013). Moreover, a recent study showed that physical activity and consuming more than five portions of fruits and vegetables per day was correlated with better quality of life in colorectal cancer survivors (Grimmett et al., 2011). This study also found a linear relationship between HRQoL and the total score of health behaviours, including smoking, following a fruit and vegetable diet, being physically active, and having moderate alcohol consumption (Grimmett et al., 2011). In addition to these research findings, a cross-sectional study of 1,389 participants with colorectal cancer found that the association between lifestyles factors (including BMI, smoking status, physical activity, and dietary intake) and HRQoL indicated that increasing the number of healthy lifestyles factors was associated with higher HRQoL, controlling for BMI, and smoking in the model (Schlesinger et al., 2014). Moreover, a cross-sectional study among 100 Iranian women after breast cancer found a positive association between healthy eating practices, physical activity, and HRQoL (Mohammadi et al., 2013). Maintaining proper body weight has also been associated with better HRQoL. A report from the American Cancer Society’s Study of Cancer Survivors indicated that higher BMI was significantly associated with lower physical HRQoL, and a normal weight group reported the highest physical HRQoL compared to the others (Westby, Berg, & Leach, 2016a).

In addition to the positive influence of protective lifestyle factors on HRQoL, the influence of unhealthy lifestyle factors on HRQoL have been examined in previous research. While a very early study found that alcohol consumption was associated with improved HRQoL in head and neck cancer patients (Allison, 2002), a later study found that alcohol consumption rates and cigarettes smoked per week were negatively correlated with HRQoL (Aarstad, Aarstad, & Olofsson, 2007). These inconsistences in research findings shed light on the importance of exploring dose effectiveness of alcohol consumption and smoking on HRQoL. A recent study identifying the association between alcohol consumption patterns and HRQoL found that moderate alcohol (1-15 g/day) drinkers were higher in HRQoL than that of non-drinkers and heavy drinkers (K. Kim & Kim, 2015), meaning moderate alcohol consumption might provide benefits to the health rather than harm (Grimmett et al., 2011; K. Kim & Kim, 2015). In contrast, smoking has been determined to be a negative factor for HRQoL in patients with cancer (Grimmett et al., 2011). There is limited information related to the influence of passive smoking on HRQoL among people after cancer, though its negative influence has been found in a population with heart failure (Weeks, Glantz, De Marco, Rosen, & Fleischmann, 2011).

Although a number of factors that influence the HRQoL of women after breast cancer have been found, such as socio-demographic, medical conditions, and treatment status (Mols et al., 2005), previous studies have primarily focused on how individual factors influence HRQoL, and limited studies have examined them in their interaction with other factors or the direct and indirect interactions between the study variables. This research therefore aims to examine the relative contributions of different factors on HRQoL in order to provide evidence for the future development of effective intervention programs for BGC survivors. These programs will have the potential to support women to increase their chances of improving their HRQoL in living with cancer and cancer survivorship.

2.5 CONCLUSION

This literature review was presented in three sections. The first section provided an overview of BGC, with prevalence, survival rates, and risk factors. The second section provided information in regards to lifestyle factors and HRQoL, with an explanation of how HRQoL is important in clinical and community settings to improve the health of women after BGC. The third section reviewed factors influencing HRQoL and the need to explore these components in a Vietnamese context. This review identified a number of important research gaps that need to be addressed in future studies, as presented below.

The review suggests that there is a need to explore the levels of physical activity, including frequency and intensity, and the association with food consumption and dietary patterns. Additionally, there is controversy in regard to a cut-off point for BMI in Asian populations. A further examination of BMI in populations with chronic disease, such as BGC is needed. Additionally, the evidence regarding dose effects of physical activity and diet on HRQoL have not been clearly stated.

In regard to factors influencing HRQoL, the review highlighted that there is insufficient evidence to draw conclusions about whether drinking alcohol has any effect on HRQoL. Although the influence of active smoking on HRQoL has been explored, the influence of passive smoking on this health outcome has not been clearly stated, especially in the Vietnamese context, where a high rate of smoke exposure has been found among women (WHO, 2010).

The review underlines that limited studies have included all five important health determinant elements: socio-demographic factors, health status, self-efficacy, lifestyle factors, and HRQoL. There is also a lack of knowledge concerning theoretical testing in relation to the influences of self-efficacy, lifestyle factors, and other personal factors on HRQoL. Additionally, it is also noted that few studies have applied a structural equation modelling approach to undertake model testing in this field. Through testing the theoretical model, the mediator effect, the directions, and the relationships between the concepts can be clarified and comprehensively understood. An understanding of these relationships may contribute to interventions that are tailor-made for Vietnamese women after BGC, and shed light on improving healthy lifestyle factors, which in turn can improve HRQoL for this population. Prior to the model testing, selection of a theoretical framework was required to guide the direction of the concepts included in the model. The next chapter reviews the theory related to the study's aims and objectives and provides the rationale for the final selection.

Chapter 3: Theoretical Framework

3.1 INTRODUCTION

Health behaviours have been increasingly researched in the last decade using a wide range of behavioural theories to guide hypothesis testing and to explore and understand the relationship between health behaviours and their outcomes. A number of common theories in the field of health behaviours have been widely applied. However, some theories are more suitable in different contexts involving reflecting unique characteristics of the individuals, groups, and organisations, or behaviours of interest (Glanz, Rimer, & Viswanath, 2011).

In addition to the examination of health behaviour influencing outcomes, health behaviour research has also focused extensively on understanding determinants of health behaviours, with a variety of predictors and covariates of behaviour being identified (Bandura, 2004a; Glanz et al., 2011). Of those determinants, self-efficacy – people's belief in their ability to perform a specific behaviour – has been identified as an important factor that can help to explain how people choose to perform a behaviour or to understand why some people decide to change the way they behave but others do not (Bandura, 1995; Hsu et al., 2011; Lorig et al., 2010; Wattana et al., 2007). Key theories in this field also note that self-efficacy can affect thought patterns that can enhance or undermine performance (Bandura, 1995). For these reasons, theories that have self-efficacy as an element of their constructs and are relevant to this current PhD study are discussed in this chapter.

This chapter consists of two main sections. The first section provides an overview of some common behavioural theories in the field of health behaviour that are most relevant to the study, including the health belief model, the trans-theoretical model, and social cognitive theory. The second part addresses how social cognitive theory underpins this study and the rationale for choosing the theory.

3.2 OVERVIEW OF SOME BEHAVIOURAL THEORIES

3.2.1 Health belief model

In the early 1950s, the health belief model (HBM) was initially developed by social psychologists in the U.S (Glanz et al., 2011). It has been extended to provide understanding about individuals' behaviours and to explain their responses to a range of public health programs. Since then, the HBM has been one of the most widely used conceptual frameworks in behavioural research to explain and predict health related behaviours and to guide the development of health behaviour interventions.

The HBM was adapted and applied by Marshall Becker in the 1970s to understand patients' behaviours in response to symptoms and their behaviours in response to a diagnosed illness (as cited in Glanz et al., 2011). In the HBM, Janz and Becker (1984) emphasised the importance of beliefs in behaviour change. They argued that individuals are likely to change when they believe they are at risk of developing a problem, when they believe the recommended changes would improve their conditions or reduce their risk, and when they believe they have ability and resources to accomplish the desired change. The HBM contains six primary concepts that are considered predictors of individuals' health behaviours for motivation or change. These core concepts include: (1) perceived susceptibility, (2) perceived severity, (3) perceived benefit of an action, (4) perceived barriers to taking that action, (5) cues to an action, and (6) self-efficacy (Janz & Becker, 1984).

Perceived susceptibility refers to a person's beliefs about how that person would likely get an illness or condition (Janz & Becker, 1984). For instance, after having breast cancer, a woman may believe that she is at risk of cancer reoccurrence before deciding to change her unhealthy behaviours or engaging in some health promotion programs.

Perceived severity refers to a person's beliefs or his or her perception of threat about the consequences of an illness or a disease that can affect his or her psychological, physical, and social conditions (Janz & Becker, 1984). For instance, after having breast cancer, a woman may perceive the severity of cancer reoccurrence to possibly cause disability, death, or social consequences, such as effects on work and family life.

Perceived benefit of an action refers to an individual's beliefs in the benefits that actions taken may influence positively on their physical and psychological health and social life or may reduce the threat (Janz & Becker, 1984).

Perceived barriers to taking that action refers to negative outcomes that a person believes will result from the action (Janz & Becker, 1984).

Cues to an action refer to an external or internal cue that motivates a person to act; such as physical symptoms and consultations from health professionals for public health campaigns (Janz & Becker, 1984).

Self-efficacy refers to a person's beliefs in his or her ability to take an action (Rosenstock, Stretcher & Becker, 1988). Self-efficacy was added to the HBM as a separate construct in 1988 following the suggestion of Rosenstock, Stretcher, and Becker (1988) to enhance the model's ability to predict behaviours.

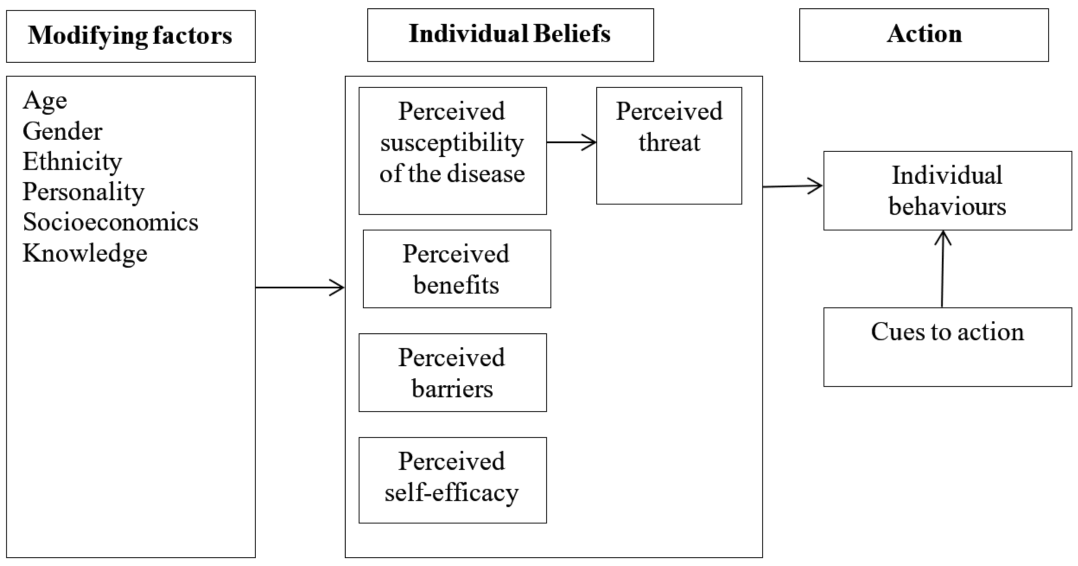

Figure 3-1. The Health Belief Model

Souce: Health Behaviour and Health Education: Theory, Research and Practice (Glanz, Rimer, and Viswanath, 2011)

As shown in Figure 3-1, the HBM specifies that individuals' behaviours can be changed if their health beliefs are modified accordingly by the provision of necessary information. This model identifies the factors affecting an individual's internal process of decision making and internal factors that affect the individual's behaviours. However, it does not take into consideration external factors, such as environmental factors (e.g., resources) that can equally influence individuals' behaviours. Additionally, this theory does not provide a framework for understanding the influences of behaviours on health outcomes, in the other words, the influence of behaviours on personal health. As previous studies have found that the performance of behaviours is influenced by both internal and external factors of individuals (Grimmett et al., 2011; Hsu et al., 2011; Short et al., 2013); and personal factors (including socio-demographic factors and health status), and that behaviours and outcomes interact together, other theories need to be taken into consideration for a better understanding of behavioural performance and how it influences health outcomes.

3.2.2 Trans-theoretical model

The trans-theoretical model (TTM) was developed in the 1980s by James O. Prochaska and colleagues (as cited in Glanz et al., 2011). The theory mainly focuses on the process of changing behaviours, which involves multiple stages rather than an event at one time point. While behavioural changes are being completed, decisional balance and self-efficacy play important roles in the process. Table 3.1 presents the main constructs of the trans-theoretical model.

Table 3-1. The Trans-theoretical Model Constructs

Domains	Constructs
Stages of Changes	Pre-contemplation, contemplation, preparation, action, maintenance, termination.
Processes of Change	Consciousness raising, dramatic relief, self-re-evaluation, environmental re-evaluation, self-liberation, helping relationships, counterconditioning, reinforcement management, stimulus control, social liberation.
Decisional balance	Evaluating the pros and cons of changing.
Self-efficacy	Confidence and temptation.

As shown in Table 3.2, the TTM concentrates on six stages of change, ten processes of change, decisional balance about the pros and cons of changing, and self-efficacy, including confidence and temptation. Prochaska and Velicer (1988) stated that a person's behaviour appears to move in a predictable way through stages. To go into the process of changing behaviours, a person needs to move from pre-contemplation stage, where they are not yet considering change or think change is not necessary, to the contemplation stage, where they begin to think about assuming behaviour change. After making the decision to change behaviour, the individual moves to the preparations stage to be ready for the action stage. While performing the behaviour, they need to work hard and make considerable changes to keep that behaviour going and to avoid giving up. However, while processing the behavioural change, they might move backward to an earlier stage or cycle and work through the stages several times due to the influence of factors, such as self-efficacy and decision balance. If a person has a high level of self-efficacy they are likely to progress to the next step of changing behaviours and so on. By successfully overcoming the maintenance stage, the person is then lead to the final stage - termination. At this point, they are regarded as having finished the whole process of changing behaviours and have a high level of confidence in their ability to change that behaviour.

As the TTM provides a framework for understanding the whole picture of behavioural changes, the theory proposes that different people can be at different stages of changing behaviour (Glanz et al., 2011). However, these differentiations can lead to difficulties for researchers in developing specific behavioural intervention programs to support people's behavioural changes. In addition, Bandura (1998) argued that the TTM mainly describes behaviours and it does not specify the determinants of behaviours, though the performance of behaviours is influenced by many factors, including personal and situational factors. This theory is therefore unable to support an explanation of the influence of personal and other related factors on the performance of behaviours and how these performed behaviours inform the outcomes. Additionally, the theory does not clearly articulate how socio-structural or environment factors influence health behaviour.

3.2.3 Social cognitive theory

The conceptual constructs of social cognitive theory (SCT) were first developed by Albert Bandura in 1977 and were integrated into social learning theory at that time. In social learning theory, Bandura (1977) argued that the relationships between people's self-efficacy and health behaviour are influenced by four sources:

performance accomplishments, vicarious experience, verbal persuasion, and physiological state. He claimed these factors could all predict a particular behaviour (Bandura, 1977). In 1986, Bandura then expanded and renamed the theory as the SCT to emphasise the influence of the cognitive process on behavioural performance. SCT emphasises interaction based on triadic reciprocity. In this model of reciprocal determinism, behaviour is seen to be formed and changed by the interaction with personal and environmental factors, meaning that persons, the situation or environment, and behaviours affect each other (Bandura, 1986). Furthermore, Bandura (1986) claimed that dealing with one's environment involves a complex set of behaviours. Additionally, cognitive, social, and behavioural subskills must be organised into integrated courses of action to exercise some control over the event (Bandura, 1986). These components affect situations, which in turn change the performance of behaviours. Therefore, "the development and activation of these three sets of interacting factors are highly interdependent" (Bandura, 1986, p. 24), as shown in Figure 3.2, with the core concept determining the interactions between these three elements is self-efficacy.

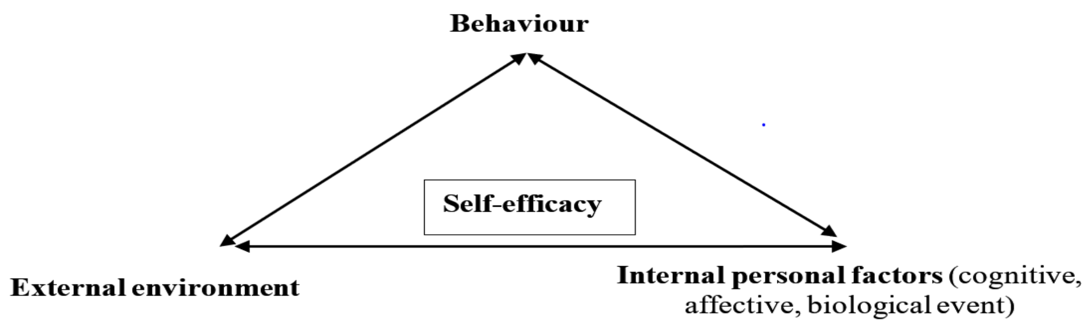

Figure 3-2. The Social Cognitive Model

Source: the Social Cognitive Theory (Bandura, 1986, p.24)

In 1986, Bandura claimed that self-efficacy is the central construct of SCT, as self-efficacy can determine people's confidence in their ability to organise and execute the course of action to accomplish specific tasks. He also stated that self-efficacy includes both efficacy expectation and outcome expectation. While efficacy expectation helps to enhance the performance of behaviours, outcome expectation optimises a better outcome for people to work toward to it (Bandura, 1986). In 2004, Bandura continued asserting that self-efficacy is an important determinant of behaviour, as it not only influences behaviour directly, but also shapes other factors that affect behaviours, including outcome expectations, goals, and socio-structural factors. For instance, people who have higher self-efficacy to follow a healthy diet tend to set a higher goal for themselves and are more likely to eat healthy foods. However, people with low self-efficacy will be more likely to give up and have less encouragement to follow a healthy diet. The structural paths of influence of self-efficacy on behaviour, and the influences of personal factors and behaviours to outcomes are presented in Figure 3.3.

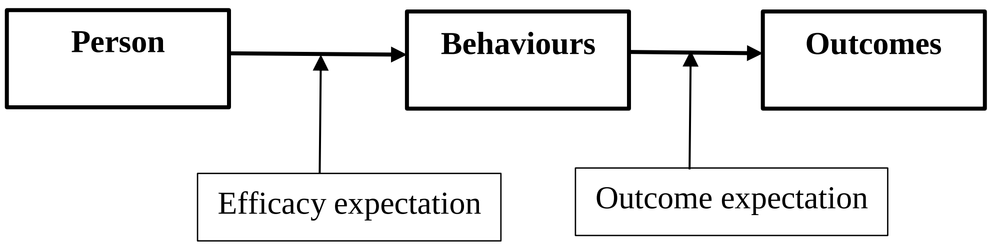

Figure 3-3. The Social Cognitive Theory and Self-efficacy Model

Source: Bandura (1977, 1986, 1997b)

While other behavioural theories primarily focus on initiating behaviour rather than how to maintain that behaviour, SCT focuses on explaining how people regulate their behaviour through control and reinforcement to achieve goal-directed behaviour that can be maintained overtime. With the concept of reciprocal determinism, SCT is able to explain the performance or changing of behaviour over time by providing the concepts of dynamic and reciprocal interactions between person, behaviour, and environment. Although SCT does not address the changing of behaviour throughout their lifetime, the theory has self-efficacy – confidence in ability to practice behaviour - as a core concept to explain the performance of behaviour in the individual's life while they gain more experiences, support, and confidence to practice that behaviour.

3.3 RATIONALE FOR SELECTING SOCIAL COGNITIVE THEORY

The findings of previous research indicate that SCT is useful for understanding performance and changes in lifestyle behaviours, such as physical activity, diet, smoking, and alcohol consumption (Lorig et al., 2006; Lorig et al., 2010; Swerissen et al., 2006; Wattana et al., 2007; White, Wójcicki, & McAuley, 2012; Xu, Toobert, Savage, Pan, & Whitmer, 2008). SCT also provides research studies with theoretical support for the examination of the association between lifestyle factors (behavioural factors) and HRQoL. For example, a study conducted by McNaughton, Crawford, Ball, and Salmon (2012) found SCT to be effective for understanding the relationship between nutrition, physical activity, and quality of life among older adults in Australia.

As the central construct of SCT is self-efficacy – confidence in one's ability to perform a behaviour – the theory is able to support a better understanding of why some people decide to practice or to change a behaviour, but others do not. A number of studies have examined the influence of self-efficacy on behaviour and have found that a higher level of self-efficacy is positively associated with performance of behaviour. However, Bandura (1986) also suggested that "strength of self-efficacy is not necessarily linearly related to behaviour choice" (p. 397). This is because self-efficacy influences behaviour in its interactions with other determinants (see Figure 3.3), especially socio-structural and personal factors. For example, people may have the same level of self-efficacy to perform exercise; but if they are in different environments or situations in which they are equipped with different levels of facility and support, they may be more likely to perform or not perform exercise. People who are well-facilitated, such as having gym equipment or easy access to gyms tend to exercise more than those who do not, though they may be at the same level of exercise self-efficacy (Deforche, Van Dyck, Verloigne, & De Bourdeaudhuij 2009; Cerin, Leslie, Vandelanotte, & Merom, 2008). Examining the impact of self-efficacy on behaviour with personal and socio-structural factors could provide a better method for understanding health behaviours and how these factors contribute to HRQoL in women after BGC.

In addition to the provision of a framework for understanding the reciprocal interactions of behavioural, environmental, and personal factors, SCT also provides guidance for modifying behaviours in an effective way by improving people's self-efficacy in order to change their health behaviour in a positive way. For instance, this theory has been applied in a number of successful interventional programs that aim to enhance participants' health behaviours and improve their HRQoL and health outcomes, such as chronic disease self-management programs developed by the Stanford Patient Education Research Centre (Lorig et al., 2006; Lorig et al., 2009; Lorig et al., 2010) and the Pink Women Wellness Program developed by D. J. Anderson and colleagues (2015) at the Queensland University of Technology. The theory therefore provides consistent support for an understanding of behavioural performance and provides guidance for behavioural intervention programs to improve patients' health outcomes.

Thus, social cognitive theory was deemed a suitable theoretical framework for this current study. It will also support further discussions for the development of a culturally adapted behavioural intervention program for women after cancer. The conceptual framework of this current PhD study and its hypothesised model is shown in Figure 3.4.

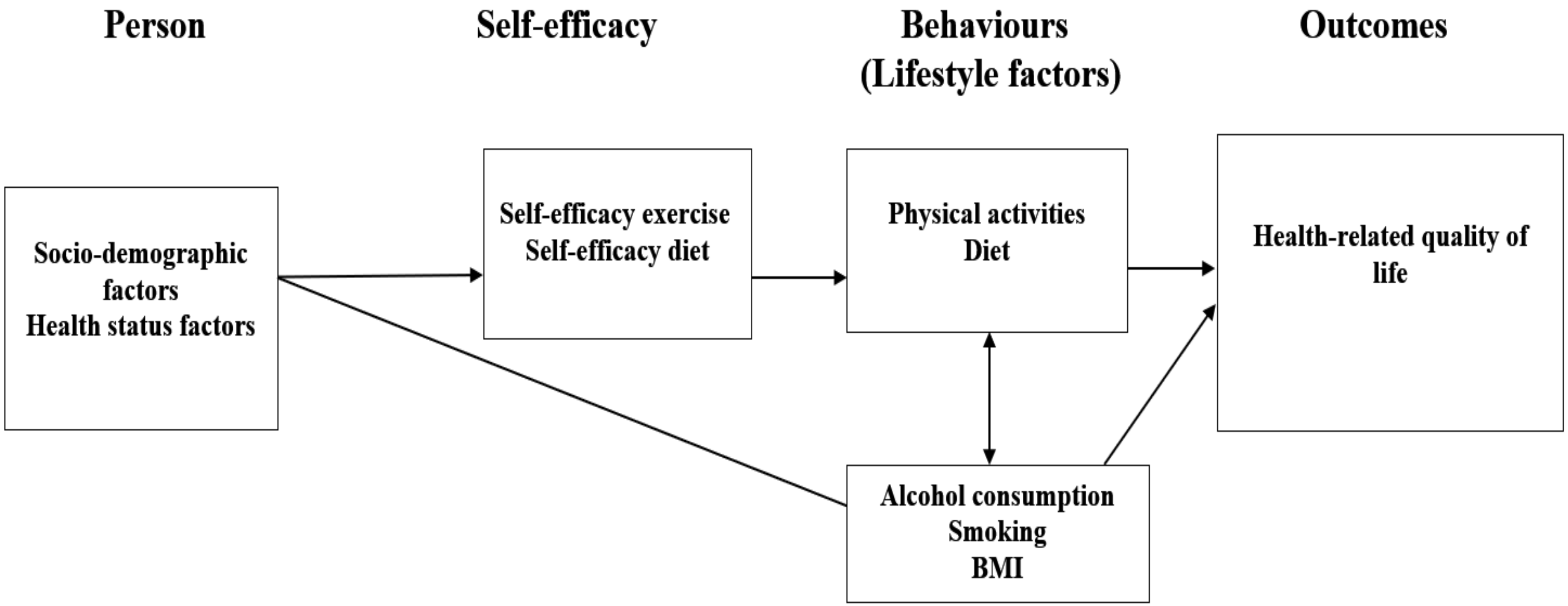

Figure 3-4. The conceptual framework and the hypothesised model of the study

3.4 CONCLUSION

The chapter provided a critique and overview of the behavioural theories that have been increasingly applied to health behaviour research, and discussed the choice of framework for this study. Based on its strengths and validated framework, SCT has been used in previous research to enable the examination of the relationships between lifestyle factors and HRQoL, and was thus deemed to be a suitable framework for the current study. The details of the methodology for the research project are introduced in the next chapter.

Chapter 4: Methodology

4.1 INTRODUCTION

This chapter presents the methodology for the study. The chapter begins by outlining the study's aims, objectives, and research questions. The main section of the chapter – the research design – is then explained under the following headings: sample, setting, data collection procedures, instrumentation, and statistical analysis. The ethical considerations are then described, followed by the conclusion of the chapter.

4.2 STUDY AIM, OBJECTIVES, AND RESEARCH QUESTIONS

4.2.1 Overall aim

The overall aim of this study is to provide a comprehensive understanding of the relationships between lifestyle factors and health related quality life (HRQoL) and to identify the socio-demographic factors, health status, and behavioural determinants of these variables among Vietnamese women after breast and gynaecological cancer (BGC).

4.2.2 Specific objectives

The specific objectives of this study are:

1. Exploring personal factors (socio-demographic factors and health status), self-efficacy levels, lifestyle factors, and HRQoL of Vietnamese women after BGC.

2. Identifying the relationships between personal factors (socio-demographic factors and health status), self-efficacy levels, lifestyle factors, and HRQoL based on the hypothesised model informed by the social cognitive theory.

3. Identifying the mediating roles of self-efficacy levels and lifestyle factors in the relationships between personal factors (socio-demographic factors and health status), self-eficacy levels, lifestyle factors, and HRQoL

4. Identifying the direct and indirect contributions of personal factors (socio-demographic factors and health status), self-efficacy levels, and lifestyle factors on HRQoL of Vietnamese women after BGC, based on the hypothesised model informed by the social cognitive theory.

4.2.3 Research questions

The research questions addressed in the study are:

Research Question 1: What are the personal factors (socio-demographic factors and health status), self-efficacy levels, lifestyle factors, and HRQoL of Vietnamese women after BGC?

Research Question 2: What are the relationships between personal factors (socio-demographic factors and health status), self-efficacy levels, lifestyle factors, and HRQoL?

2-1: How well do personal factors predict self-efficacy levels of Vietnamese women after BGC?

2-2: How well do personal factors and self-efficacy levels predict lifestyle factors of Vietnamese women after BGC?

2-3: How well do personal factors, self-efficacy levels and lifestyle factors predict HRQoL of Vietnamese women after BGC?

Research question 3: Do self-efficacy levels and lifestyle factors mediate the relationships between personal factors, self-efficacy levels, lifestyle factors, and HRQoL?

3-1: Do self-efficacy levels mediate the relationships between personal factors and HRQoL of Vietnamese women after BGC?

3-2: Do lifestyle factors mediate the relationships between personal factors, self-efficacy levels and HRQoL of Vietnamese women after BGC?

Research question 4: What are the direct and indirect contributions of personal factors, self-efficacy levels, and lifestyle factors on the HRQoL of Vietnamese women after BGC?

4.3 RESEARCH DESIGN

4.3.1 Design

A cross-sectional study design was used in this study to address the specific research aims and research questions. A cross-sectional study design allows the researcher to examine the relationships and interrelationships among study variables at a specific time point.

4.3.2 Sample size

Bandura (1986) stated that "personal and environmental factors do not function as independent determinants; rather, they determine each other" (p.23). Therefore an examination of interactions between independent factors will enable a better understanding of performing health behaviours and how they influence the outcomes. In order to achieve this, structural equation modelling (SEM) was conducted, as it provides a useful statistical analytical method to obtain a comprehensive understanding of the interactions between variables.

In this study, SEM was used to assess the relationships between factors and variables, corrected for measurement error. The sample size for this study was calculated using rules of thumb concerning model complexity and basic measurements of model characteristics (Hair, Black, Babin, & Anderson, 2010). For models with seven or fewer constructs, lower communalities, and multiple under-identified constructs, the minimum sample size is recommended to be 300 (Hair et al., 2010). Kline (2010) also suggested the rule of thumb concerning sample size and model complexity with a maximum ideal sample size-to-parameters ratio of 20:1 and a minimum ideal sample size-to-parameter ratio of 10:1. As presented in Figure 3.4, the hypothesised model for this study had five latent variables with 10 observed variables included in these latent variables. Therefore, the hypothesised model potentially had 36 parameters, requiring a minimum sample size of 360 observations. However, as some variables were dropped out of the model due to non-significance in the model specification test, the number of parameters in the final hypothesised model testing was less than 36 parameters. Taking the suggestions of Hair and colleagues (2010) and Kline (2010) together, and considering time and research budget constraints, a sample size of 300 participants was chosen for this phase of the study. This sample size allowed for exploration of around 30 parameters simultaneously. In structural equation modelling, researchers frequently require a larger sample than that determined by ordinary sample size calculations to maintain power, obtain stable parameter estimates and standard errors, and to calculate both observed and latent variables (Schumacker & Lomax, 2010). To avoid adverse effects of missing data, ten percent (10%) of the proposed sample size was added, making the final sample size 330.

4.3.3 Eligibility

Inclusion criteria:

- Vietnamese resident;
- aged 18 year and older;

- treated for breast and/or gynaecological cancer;
- had completed active treatment of chemotherapy and/or radiotherapy;
- able to read, write, and converse in Vietnamese; and
- had no metastatic disease (advanced cancer).

Exclusion criteria

- Too ill to participate; or
- had complications from treatments that were ongoing.

4.3.4 Setting

Data were collected using an online and paper-based survey conducted at three hospitals, and nine clinics in Hanoi, Vietnam. Hospitals where data were collected included the National Oncology Hospital, Hanoi Oncology Hospital, and Hanoi Medical University Hospital. These settings were selected as they were the largest treatments settings in the Hanoi region.

4.4 MEASUREMENTS

Data collection instruments were included to measure constructs specified in the conceptual framework, including personal factors (socio-demographic factors, health status), self-efficacy (diet self-efficacy and exercise self-efficacy), lifestyle factors, and HRQoL.

4.4.1 Personal factors

Socio-demographic factors

The measured demographic factors for the study were residence, age, religion, and marital status, the number of people in the household, household structure/living arrangement, educational status, employment status, and monthly income levels. All of these variables were self-reported.

Women were categorised into two groups, rural and urban. Their dates of birth were then collected to calculate age at the time of data collection. In regard to religion, four categories were allocated, including none, Buddhism, Catholic, and other (specify). Living arrangements were examined by asking two questions: 1) the number of people in the household, and 2) the household structure, with four categories: alone, couple only, couple and children, extended family/others (specify). In regard to educational status, participants were given six options: no schooling, primary school, junior school, senior school, certificate or diploma, and college or university or postgraduate. There were seven categories under employment status in this study: employed fulltime, employed part-time, employed casually, retired, home duties, unemployed, and permanently ill/unable to work. The final question in the socio-demographic information section asked about the current monthly income levels of the study participants. Participants were asked to select whether their income fit with one of five categorical options: (1) less than 1,600,000 VND, (2) 1,600,00 - < 9,000,000 VND, (3) 9,000,000 - < 20,000,000 VND, (4) > 20,000,000 VND, or (5) Don’t know.

Health status

Health status data included: years with cancer, type of cancer, treatment therapy, number of health problems, menopausal status, and sleep impairment.

Years with cancer was examined by a question asking about the date that cancer was diagnosed, which allowed for later calculation of the years with cancer at the time of data collection.

Type of cancer: participants were asked about their cancer type by asking them to identify one of six categories: breast, ovary, uterus, cervix, vulva, and other (specify).

With reference to treatments, participants were asked: "Which of the following treatments have you received?" and read a list of treatment options. A "yes/no" question answer was required.

The number of health problems was identified by asking women to respond "yes" or "no" and "year diagnosed" to a list of health problems. The number of health problems or co-morbidities was counted by adding the comorbidities together.

Menopausal status was identified by asking women three questions about their menstruation history in a consecutive order: (1) Have you had a menstrual period in the past 12 months?, (2) Have you had a menstrual period in the past three months?, and (3) Compared to a year ago, has the number of days between the start of one menstrual period and the start of your next period become less predictable? Based on the responses to the three questions related to menstrual periods in the last 12 months, three months, and whether menstrual periods were predictable, women were classified into three stages, including post-menopausal/menopausal, peri-menopausal, and pre-menopausal. Other questions (items 1 and 2) identified participants who had had a hysterectomy, those who had taken any form of oestrogen or hormone replacement therapy for menopause, and those who were in menopause prior to cancer treatment. These items were not included in the process of detecting menopausal stages. A summary of the classification process is presented in Figure 4.1.

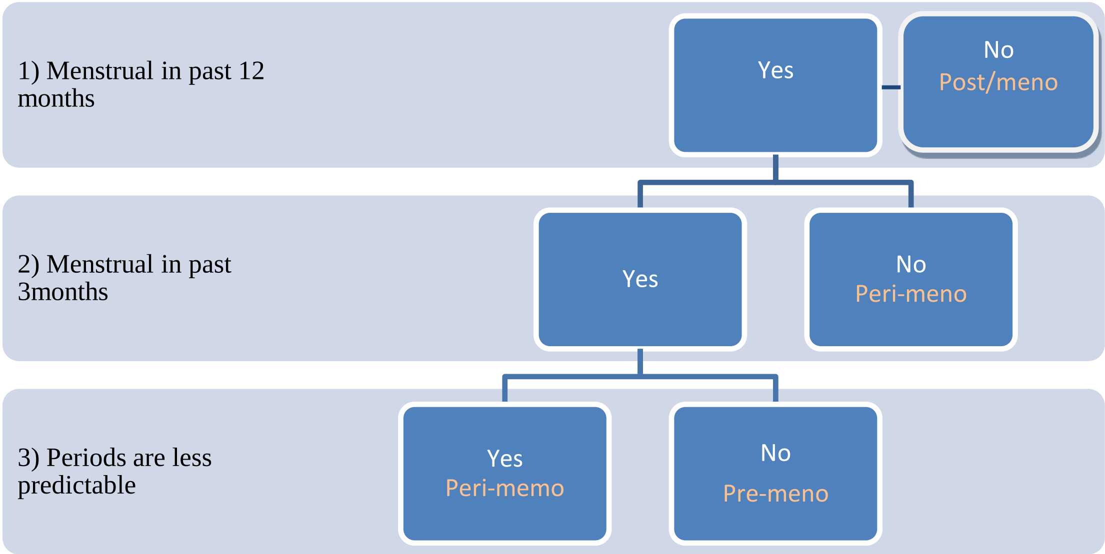

Figure 4-1: Classification of menopausal stages

Sleep impairment: the Pittsburgh Sleep Quality Index (PSQI) developed by Buysse and colleagues (1989) was used to measure sleep impairment among the study participants. The PSQI is a 19 item self-reported questionnaire that measures subjective sleep impairment. The 19 items were transformed and combined to form seven components, including (1) subjective sleep quality, (2) sleep latency, (3) sleep duration, (4) habitual sleep efficiency, (5) sleep impairment, (6) use of sleeping medication, and (7) daytime dysfunction. These components were then combined to create three domains, namely sleep efficiency (components 3 and 4), perceived sleep quality (components 1, 2, and 6), and daily disturbance (components 5 and 7). The scale has good reliability and validity for both community and clinical groups with mental and physical health problems, in different age groups, and in different cultural contexts, with Cronbach's alpha ranging from 0.62-0.83 (Buysse et al., 1989; Furlani & Ceolim, 2006; P. C. Wang, Yip, & Chang, 2016). The subscale scores were summed to produce a global score ranging from 0 to 21. A PSQI global score greater than five was suggestive of significant sleep impairment (Buysse et al., 1989) and this cut off was also used in previous research studies (Xiao et al., 2016).

The PSQI has been translated into Vietnamese and managed by Mapi Research Trust. Permission was granted by the Mapi Research Trust to use the Vietnamese version for purpose of this study.

4.4.2 Self-efficacy

Self-efficacy was measured using Bandura's Self-efficacy to Regulated Exercise Scale and Self-efficacy Regulated Eating Habits Scale (Bandura, 2006). Permission was granted by the scale developer – Professor Albert Bandura to translate and use these scales. The Self-efficacy to Regulated Exercise Scale contains 18 items and Self-efficacy Regulated Eating Habits Scale includes 30 items. Participants were asked to rate how confident they were to complete an exercise or healthy eating programme on a regular basis for each of the situations listed. A rating scale from 0 to 100 was provided, with 0 representing "cannot do at all", 50 representing "moderate certainty about being able to do the behaviour", and 100 representing "highly certain can do". Scores for each scale were summed and the average self-efficacy scores for exercise or eating habits were calculated, with the higher score reflecting higher levels of self-efficacy. Mean diet and exercise self-efficacy scores were used as continuous variables in the analysis.

The diet self-efficacy scale has been used in previous studies with the internal consistency of the scale considered satisfactory, with Cronbach's alphas ranging from 0.97 to 0.98 (R. L. Anderson, 2008; Smith-DiJulio & Anderson, 2009).

Exercise self-efficacy was measured using the Self-efficacy for Exercise Scale developed by Bandura (2006) and showed good reliability and validity. The internal consistency of the scale was considered satisfactory, with Cronbach's alphas of 0.89

to 0.96 (Cornick, 2015; Darawad et al., 2016; Everett, Salamonson, & Davidson, 2009; Pei, Wang, Sun, & Zhang, 2016; van der Heijden, Pouwer, Romeijnders, & Pop, 2012), and internal consistency and test-retest reliability of .96 and .86, respectively (Y. Shin, Jang, & Pender, 2001).

4.4.3 Lifestyle factors

In this study, the lifestyle factors assessed included weight and BMI, diet or eating behaviours, physical activity, alcohol consumption, and smoking.

Weight and BMI

In this study, weight was measured using body mass index, participants' perception of their weight, and waist hip ratio.

Body mass index (BMI)

Women were asked to report their weight and height for later calculation of BMI. The threshold of BMI, as proposed by the WHO (2014c) is: less than or equal to 18.49 is underweight; 18.50 to 24.99 is normal weight; from 25.00 to 29.99 is overweight; and equal to or more than 30.00 is obese. However, the cut-off point of BMI for Asian people is very controversial. In 2004, the WHO indicated that Asian people had a higher risk of weight related disease at lower BMIs. In this publication, the WHO (2004) suggested the cut-off points for BMI public health action for the Asian populations should be: less than or equal to 18.49 kg/m^2 is underweight, 18.50 to 22.99 kg/m^2 is normal weight, 23.00 – 27.49 kg/m^2 is an increased risk/overweight (compared to 25kg/m^2 for the white European population), and equal to or greater than 27.5kg/m^2 is a high risk/obesity (compared to 30kg/m^2 for the white European population). The current study used both cut-points (classification standard and Asian suggested cut-point) to define women's weight for descriptive purposes. BMI was analysed as a continuous variable in this study to provide greater analytic and descriptive power. Further analysis for current study, including bivariate statistics, regression, and SEM used BMI as a continuous variable.

Participants' perception of their weight status

To assess participants' perceptions of their weight status, participants were asked "Do you think your current weight is?" with three options of "acceptable", "too high", or "too low".

Waist hip ratio

Research findings have suggested that BMI does not reflect internal fat, which is better assessed using waist hip ratio (Gill et al., 2003). Therefore, two questions regarding waist hip circumference were added into the survey. However, descriptive analysis results indicated that this information was misreported by more than three-quarters of the study participants, and for this reason, these data were not used for further analysis.

Diet and eating behaviours

In this study, diet was assessed by asking women questions related to their vegetable and fruit consumption.

In regards to vegetable intake, the question "How many servings of vegetables do you have at least once a day?" was asked. Women freely filled in the blank space for the number of vegetable serves they consumed. Next, the question: "Do you currently eat at least five servings of vegetables every day?" was included with a "yes/no" response option provided. If women answered "yes" to the second question, they were asked to provide an answer for the question "How long have you had at least five servings of vegetable every day?".

In relation to fruit consumption, the same consecutive order and question structure used for vegetable consumption was applied, including three questions (1) “How many servings of fruit do you have at least a day?”, (2) “Do you currently eat at least two servings of fruit every day?”, and (3) “If yes, how long have you had at least two servings of fruit every day?”.

Physical activity

In this study, physical activity was measured by three questions. The first question was “During the past month, how many times did you exercise for at least 30 minutes at a time at a somewhat hard exertion level (or a higher level)?” with five response options provided. The second question was “Do you exercise for 150 minutes each week at a somewhat to hard exertion level?” with five response options provided. Finally, participants were asked to self-rate their current levels of physical activity (general daily activity plus exercise) using a scale from 0 to 10. Energy expenditure was unable to be detected from these questions. Therefore, the International Physical Activity Questionnaire (IPAQ) was added to the survey.

The IPAQ was developed by an International Consensus Group in 1998 (as cited in Craig et al., 2003) and is available for public use and no permission was required for the use of this instrument. This instrument has been translated into Vietnamese and tested for reliability and validity among older Vietnamese adults (Tran, Lee, Au, Nguyen, & Hoang, 2013). Permission to use the Vietnamese version was obtained from the authors.

The IPAQ was developed as an instrument for cross-national assessment of physical activity in many countries and for standardising measures of health related physical activity behaviours of populations from many countries in different cultural contexts (Craig et al., 2003). The questionnaire elicits information about physical activity over the last seven day period and has been used to compare the physical activity behaviours among and between populations. The short form of the IPAQ contains seven items, asking about three domains of physical activity, including walking, moderate physical activity, and vigorous physical activity. In this scale, vigorous physical activity refers to activities that take hard physical effort and make participants breathe much harder than normal. This type of physical activity was only counted if participants exercised for at least 10 minutes at a time. Moderate activities refer to activities that take moderate physical effort and make participants breathe somewhat harder than normal for at least 10 minutes. The energy expenditure for each domain and for total physical activity were expressed in MET-minutes per week and calculated based on the following formulas:

- Walking MET-minutes per week = 3.3*walking minutes*walking days
- Moderate MET-minutes per week = 4.0*moderate-intensity activity minutes*moderate days
- Vigorous MET-minutes per week = 8.0*vigorous-intensity*vigorous-intensity days
- Total physical activity MET-minutes per week = sum of walking + moderate + vigorous MET-minutes per week scores

After calculating total energy, physical activity was divided into three levels as per the following (Müller et al., 2017):

- Health-enhancing physically active: vigorous-intensity activity on at least three days achieving a minimum of at least 1,500 MET-min per week OR seven days of any combination of walking, moderate-intensity, or vigorous-intensity activities achieving a minimum of at least 3,000 MET-min per week.

- Minimally active: three or more days of vigorous activity of at least 20 min per day OR five or more days of moderate-intensity activity or walking of at least 30 min per day OR five or more days of any combination of walking, moderate-intensity, or vigorous-intensity activities achieving a minimum of at least 600 MET-min per week.
- Inactive: no activity reported OR some activity reported but not enough to meet ‘health-enhancing physically active’ or ‘minimally active’.

Alcohol consumption

Four questions were used to ask about participants’ alcohol use. Firstly, participants were asked “Have you ever drunk alcohol-containing beverages?” with six response options provided, including “never”, “drank in the past”, “rarely”, “occasionally”, “regularly”, and “always”. If one of the options “regularly” or “always” was selected, women were asked to answer the next two questions “How many years have you been a regular alcohol drinker?” and “On average, how many drinks of alcohol do you have a day?” Women were also asked “During the past week (seven days), how many standard size drinks did you have per day, on average?”.

Smoking

In the current study, four questions were asked in regards to active smoking: (1) “Have you ever smoked?” with six response options provided, including “never”, “smoked in the past”, “rarely”, “occasionally”, “regularly”, and “always”; (2) “How many years have you been a tobacco smoker?”; (3) “On average, how many cigarettes do you smoke a day?”; and (4) “During the past week (seven days), how many cigarettes did you smoke?”.

Smoking rates among Vietnamese women are low, at 1.4% among adult women, although a high smoking rate has been reported among Vietnamese men (WHO , 2010; Xuan et al., 2013). As there are no restrictions on where people can smoke in Vietnam, women can be exposed to smoke from others at home and at the work place. Therefore, questions related to passive smoking were added into the survey. These questions included (1) “Are you exposed to smoke at home?”, (2) “How many family members smoke tobacco inside your home?”, (3) “If you live with a smoker, how many years have you lived with them?”, (4) “How many hours per day are you exposed to tobacco smoke at home?”, (5) “Are you exposed to smoke at work?”, (6) “On average, how many people smoke at your work place?”, and (7) “How many hours per day are you exposed to tobacco smoke at work?”.

4.4.4 Health-related quality of life

HRQoL was measured using both OptumTM SF-36v2 Health Survey (SF36) developed by Medical Outcomes Trust and Functional Assessment of Cancer Therapy-General Scale (FACT-G) developed by David Cella (1993). Although the SF36 is a well-validated instrument and has been used in different populations and different contexts, it is a generic HRQoL measurement and is not a cancer-specific HRQoL tool. To enable the comparison of HRQoL results in this study with non-cancer and cancer-specific populations and to measure cancer-specific HRQoL, the FACT-G was added to the suite of study questionnaires to measure HRQoL. Both the SF-36v2 and the FACT-G have been translated into Vietnamese and are under management of the Optum™ and FACIT organisations, respectively. Licences to use these scales were granted by Optum™ for the SF-36v2 and by the FACIT organisation for the FACTG.

SF-36v2 Health Survey

SF-36v2 is a 36 item questionnaire and measures eight domains of health, including: physical function, role-physical, bodily pain, general health, vitality, social functioning, role-emotional, and mental function. These domains are then combined to contribute to two main domain measures: physical health (physical component score - PCS) and mental health (mental component score - MCS).

The SF36 was scored following the scoring procedure stated in the SF 36 Health Survey Manual. Firstly, 36 items were recoded into the final item value. Secondly, the health domain total raw scores were calculated by summing the item scores for each domain scale. Thirdly, the health domain scale total raw scores were transformed into 0-100 scores using the following formula:

$$Transformed\ score\ = \frac{Actual\ raw\ score - Lowest\ possible\ raw\ score}{Possible\ raw\ score}\ x\ 100$$

Fourthly, the health domain scale 0-100 scores for each domain were transformed to z-scores by using 1998 general US Population means and standard deviations to derive z-scores. Finally, norm-based scoring (T-score) was performed by multiplying z-scores of each scale by 10 and adding the resulting product to 50.

The scores for the physical health (physical component score - PCS) and mental health (mental component score - MCS) were also calculated using norm-based methods. The aggregation of PCS and MCS were calculated by multiplying each domain z-score by its respective physical or mental factor score coefficient and then summing the eight products. Each component score (aggregated score of PCS or MCS) then was transformed to the norm-based score by multiplying each aggregate component scale score by 10 and adding the resulting product to 50.

The advantage of norm based scoring is that it allows a basis for meaningful comparison across the eight dimensions of scales and PCS and MCS. It also allows the comparisons of these scores with norm-scores by using a rule that any health domain scale or component summary measure that falls outside the T-score range of 45 to 55 could be considered outside the average range for the US general population.

Reliability statistics for the whole scale have been reported in several previous studies, with Cronbach's alpha ranging from 0.70 to 0.90 (Ware & Sherbourne, 1992; Wee, Davis, & Hamel, 2008).

FACT-G

The FACT-G is a 27 item questionnaire used to assess HRQoL in adult patients with cancer of mixed ages and sites (Cella et al., 1993). The FACT-G generates subscales scores on four dimensions: physical well-being, social/family well-being, emotional well-being, and functional well-being. Items are rated on a five point scale from 0 to 4 with 0 meaning "not at all" and 4 meaning "very much". An overall cancer-specific HRQoL score is obtained by summing the four subscales. The possible range for the total scale score ranges from 0 to 108, with a higher score indicating a better cancer-specific HRQoL. Cronbach's alpha for the scale has been reported in previous studies to range from 0.86 to 0.89 (Overcash, Extermann, Parr, Perry, & Balducci, 2001).

4.5 DATA COLLECTION PROCEDURE

Data were collected using both an online and paper-based survey and continued for a 1.5 month period (from the 22nd June 2016 to the 30th July 2016) until the sample size was reached.

4.5.1 Online recruitment and survey

Connections with the Breast Cancer Network Vietnam and the Cancer Discussion Forum were set up prior to conducting the study.

The Breast Cancer Network Vietnam is a non-profit organisation whose mission is to improve the quality of life for women with or after breast cancer, and to increase early detection rates of breast cancer in Vietnamese women. This network has connections with numerous Vietnamese women with or after breast cancer as the first or the second cancer diagnosis. The network provides free forums, websites, Facebook chats, and workshops for women with or after cancer and their family members.

The Cancer Discussion Forum includes a website and Facebook fan page for people with or after cancer and their family members to discuss their current disease and conditions. The aim of the forum is to support people with or after cancer to obtain more information about their care and treatment.

The connections with the Breast Cancer Network Vietnam and the Cancer Discussion Forum and fan page supported the study by advertising the study to Vietnamese women after breast and/or gynaecological cancer treatment. These networks advertised the information about the current PhD research, its recruitment criteria, and provided an invitation to participate in the study on their website, forum, Facebook page, and through posters at workshops. Vietnamese women were able to register their interest to participate into the study by emailing the researcher. The survey package link, including the information sheet, recruitment/eligibility checklist, consent form, and a self-report survey were sent to the women after registration of interest via their provided email. The registered women self-screened the recruitment checklist to see if they meet the inclusion criteria using the link provided in the email sent to them. They were eligible to participate in the study if they satisfied all inclusion criteria, and were excluded if any of the exclusion criteria were ticked. If participants were eligible, the structured self-report survey was automatically sent to their email using Key Survey Platform (platform provided by QUT). The participants used the links attached in the email to respond to the survey. The online survey took approximately 80-90 minutes to complete. In some cases, if participants wanted to complete the survey using a paper-based format, a hard copy of the information sheet and survey was sent to the participant's address for self-completion of the survey and a reply-paid envelope was provided. Participants put their completed survey into the envelope and returned it. All paper-based and completed questionnaires were sent to the researcher's office in Vietnam, which was at the Hanoi Medical Collage, 35 Doan Thi Diem Street, Dong Da District, Hanoi, Vietnam.

The Key Survey Platform provided by QUT was an effective way to manage the online survey. This data collection program allowed participants to complete the survey at different time points and to save their responses until they had completed the survey and submitted it. The researcher was able to send reminders to participants if they did not complete the survey using the data management program. Additionally, this program minimised missing data, as it reminded participants if they did not respond to the questions. For sensitive questions, if the participants did not want to answer, they could tick the "skip" box and go on the next question.

4.5.2 Face-to-face recruitment and data collection

As the literature indicates that the online-survey response rate is only 20%-25% (Shih & Fan, 2009) in the community and is influenced by the level of access to the Internet, face-to-face recruitment was also used concurrently to recruit more participants. Permission to collect data at hospitals was obtained along with relevant ethics approvals. The researcher contacted senior nurses at the outpatient units of the data collection sites to ask for their help to screen women to identify those who met the eligibility criteria. The nurses screened women who came for follow-up and health check-up appointments. The nurses then asked patients if they agreed that the researcher or a research assistant could meet them to introduce them to the study. If they agreed, the researcher or research assistant met the potential participants individually and provided them with the participant information sheet. The researcher or research assistant explained the information sheet and answered any questions to ensure participants were clear about the study and their potential involvement. Following this, the researcher or research assistants provided copies of the survey to participants to complete, which took approximately 80-90 minutes. Participants then returned their completed survey to a locked box provided near the meeting room of the outpatient unit. If there were any questions, participants could ask the researcher or research assistant for additional information before returning the survey to the box. Where participants did not wish to spend 80-90 minutes completing the survey at the hospital, they were provided with a reply-paid envelope to take home with their paper-based survey. After completing the survey, participants put their completed survey into the envelope and sent it to the researcher's office in Vietnam. Return of the survey was considered as providing consent to participate in the study.

Confidentiality and anonymity were maintained during the study. Any information obtained in connection with this research project that could identify the participants remained confidential. Once all data were collected, data were coded to de-identify survey responses. The recruitment documents were kept in a separate section of the research student's computer and in a different filing cabinet drawer to ensure no association was made between participants' names and the completed surveys. No identifiable data were/will be used in data analysis and were/will be reported.

4.6 DATA MANAGEMENT

4.6.1 Data entry

For the online survey, data were exported from the QUT Key survey with the SPSS file format. For the paper-based survey, data were entered into the Statistical Packages for the Social Science Version 21 (SPSS Inc., Chicago, IL, USA). The original instruments were stored in a locked cabinet accessible to the researcher only. The online survey data and paper-based survey data were then merged together to be prepared for the next steps of data management.

4.6.2 Data cleaning

Approximately 10% of the data (thirty participant recording files) were checked for potential typographical errors. All of these 30 participant recording files were reviewed and checked against the results sheets. The review indicated that few typographical errors were found. However, a couple of the errors were related to spelling mistakes in the string variables, and one was related to responding to the Likert scales items. Two typographical errors were found where "0" was entered instead of "1" for an item related to menopausal status, and "99990" was entered instead of "9999" representing missing data. These typographical mistakes did not exceed 5% of data checked. According to (Houston, Probst, & Martin, 2015), a 5% error rate within electronic datasets is acceptable for data analysis.

After screening 10% of the data, all variables including categorical data, continuous data, and all items that made up the scales were inspected using frequency distributions. Any value that was outside the possible range of the scale score was inspected and checked against the original data. No value that was outside the possible range of the scale score was found. One typing-mistake related to the cancer diagnosis date was found. This information was checked against the original data and corrected.

4.6.3 Missing data

Missing data was handled in two steps. Firstly, the pattern of missing data was determined. Data were assessed to find whether missing data were missing completely at random (MCAR), missing at random, or missing not at random. Data were then input based on the type of missing data detected.

Detecting patterns of missing data: The pattern of missing data indicated that all 330 cases contained missing value(s) and only 47 items among 758 items/variables in the datasets had complete data. The missing data ranged from a low of 1.2% for items relating to eating five servings of vegetables per day, to a high of 39.7% for items asking about hip circumference. A total of 10.2% (n = 21,387) of the data values (209,683) were missing, including string variables. Therefore, all data were assessed to determine the type of missing data.

Little's test (1998) was performed to determine whether data was MCAR. A significant value of this test indicates that the data are not MCAR. As Little's test is an omnibus test, it considers the dataset as a whole, not the individual variables. All numeric variables (excluded string variables) were entered into the Little's test to determine types of missing data. The result indicated that the data were MCAR (*Chi-square*= 24501.67; *df*=91753; *p*= 1.00).

Handling missing data and data imputation: Expectation-maximisation (known as the EM algorithm) was used to impute data. Many other imputation methods "underestimate the true variability in the data because there is no error associated with the imputed observations" (Howell, 2007). EM can avoid these problems by estimating variances and covariances that incorporate the residual variance from the regression.

The EM method has been confirmed as a nearly unbiased method for handling missing values that are at least missing at random. The EM produces nearly unbiased estimates of means, variances, and covariances (Howell, 2007). However, to have consistent data imputation, it is suggested that while using the EM method, the imputation should be done from scale to scale to increase the accuracy of the imputed values (Howell, 2007). This suggestion was applied while imputing data for the current study. That is, missing data was imputed for each scale using the EM technique. These imputed missing data scales were then merged together for data analysis.

4.6.4 Checking for normality and multivariate normality

As univariate tests for assessing normality can be graphical and non-graphical, normality of all continuous variables of the study were checked based on the following criteria: (1) median was within 10% of mean; (2) the value of skewness was between -3 and +3 and the kurtosis index was between ± 10; (3) the histogram looked approximately symmetrical and bell-shaped; and (4) normal probability plots with the points for the cases fell along the diagonal line running from lower left to upper right.

Normality on each of the variables is a necessary but not sufficient condition for multivariate normality to hold, and the multivariate normality needs to be assessed independently (Burdenski, 2000). In this study, multivariate normality was explored by calculating the Mahalanobis distance and plotting a scattergram against derived Chi-square values. After plotting these values into the scattergram, if the plots resembled a straight line, it was concluded that the data had multivariate normality (Burdenski, 2000).

4.6.5 Checking for multicollinearity, outliners, normality of residuals, and equality of variances

Multicollinearity and outliers were checked prior to conducting regression analysis. Multicollinearity was checked using the variance inflation factors (VIF). If two variables were co-linear with VIF over 10, then one variable was removed from the model. The outliers and influential observations were identified using Cook's distance statistics. If the values of Cook's distance were greater than 1, further investigation was conducted.

Normality of residuals was checked for continuous explanatory variables. Residual assumptions included: (1) residuals were normally distributed; (2) residuals had a mean of zero; and (3) residuals had a constant variances (homoscedasticity). If the assumption was violated, nonlinear transformation of the variables was conducted.

Equality of variances (homogeneity of variance) was checked for categorical explanatory variables. Levene's test for equality of variances was conducted to assess the equality of variances between groups in each categorical variable. Significant levels in the results of Levene's test (p value < 0.05) indicated differences in the variances between groups. If the resulting p-value of Levene's test was more than 0.05, equality of variances between groups was assumed.

4.7 DATA ANALYSIS

Data analysis was undertaken using SPSS version 21. Statistical significance is reported at the conventional $p < 0.05$ level (two tailed). To answer this study's research questions, statistical analysis was performed in four steps, including univariate analysis, bivariate analysis, regression analysis, and structural equation modelling.

Univariate analysis

Descriptive statistics were used to summarise demographic, socio-structural factors, health status, lifestyle factors, self-efficacy, HRQoL, and confounders (including sleep impairment and menopausal status) for the whole sample. The aim of this step was to provide a descriptive profile of the study sample and to determine the pattern of each study variable for the following steps.

Bivariate statistics

Bivariate relationships between the dependent variable (HRQoL) and independent variables (demographic and socio-structural factors, lifestyle factors, self-efficacy, and confounders) were assessed. Pearson and Spearman correlation analysis was conducted for examination of continuous independent variables. One-way ANOVA or Kruskal-Wallis tests were used to test the differences in HRQoL in relation to categorical variables that had more than two categories, such as educational status and smoking status. Mann Whitney U tests or t-tests were used to test for differences in HRQoL between groups of categorical variables that had two categories. The purpose of this analytic step was to identify significant factors associated with lifestyle factors and HRQoL. These associated factors were then entered into the regression model in the next phase to identify factors predicting lifestyle factors and HRQoL.

Multivariate statistics

General linear regression was used in this step to identify the predictors of lifestyle factors and HRQoL. Independent variables were selected from the results of the bivariate analysis, whereby only independent variables that were significantly correlated with lifestyle factors or HRQoL were entered into the regression model. Categorical variables were coded as binary dummy variables before being entered into regression models. The employment variable was re-coded into employed and unemployed; education was recoded into lower education (high school and lower) and higher education (college and higher levels) to enable comparison with other literature related to educational levels among women after BGC (D. J. Anderson et al., 2015; Weaver et al., 2013). Income was recoded into lower income and high income groups using a cut-off point for average income in Vietnam. As descriptive analyses indicated that the sub-category "don't know" (n=25, 7.6%) in response to the income question was mainly reflective of data from participants who were older but did not have any pensions (n=13, 3.9%) and/or were unemployed (n=20, 6.1%), this sub-category was included in the lower income group. An adjusted R^2 was used to indicate the contribution of different independent variables to lifestyle factors or HRQoL. The aim of this analytic step was to test the main effects of different predictive variables on lifestyle factors and HRQoL.

Prior to the multiple regression analysis, assumptions of this test were assessed, including linearity, homoscedasticity, and multicollinearity. Linearity assumes a straight line relationship between the predictor variables and the criterion variable, and homoscedasticity assumes that scores are normally distributed about the regression line. Linearity and homoscedasticity were assessed by examination of a scatter plot. The absence of multicollinearity assumes that predictor variables are not too related and were assessed using VIF. VIF values over 10 suggested the presence of multicollinearity.

Structural equation modelling

Structural equation modelling was conducted to examine the interactions between the study variables and to identify the mediation effects for self-efficacy and lifestyle factors in relation to the HRQoL outcome. Variables entered in the model were based on the results from the regression test. Only variables that were significant predictors of HRQoL were entered in the SEM models for final testing of interactions and examination of mediation effects. Modelling was informed using the theoretical constructs of social cognitive theory. Prior to the test, assumptions were assessed, including multivariate normal distribution, linearity, sequence (relationship between endogenous and exogenous variables), and non-spurious relationship.

The goodness of fit of the model was evaluated based on the χ^2, goodness of fit index (GFI), adjusted goodness of fit index (AGFI), comparative fit index (CFI), and root mean square error of approximation (RMSEA). Satisfactory goodness of fit was defined as $\chi^2/df < 2.0$, GFI > 0.95, AGFI > 0.90, CFI > 0.97, and RMSEA < 0.005 and accepted goodness of fit was defined as $\chi^2/df < 3.0$, GFI > 0.90, AGFI > 0.85, CFI > 0.95, and RMSEA < 0.008.

Mediation effects of self-efficacy and lifestyle factors were assessed using SEM following the criteria for mediation effects, which included four steps: (1) causal variables had to be significant predictors of the outcome variable without controlling for mediators in the model; (2) causal variables had to be significant predictors of mediators while controlling for the outcome variable in the model; (3) mediators had to significantly predict the outcome variable while controlling for causal variables; and (4) to establish a complete mediation effect, the relationship between causal variables and the outcome variable had to be a zero coefficient, otherwise a partial mediation effect was established.

4.8 ETHICAL CONSIDERATIONS

Ethical approvals were obtained from QUT (approval number 1600000528) and a local ethics committee, Hanoi School of Public Health – Institutional Ethical Review Board, with approval number 158/2016/YTCC-HD3. Letters of acceptance were also obtained from participating hospitals, centres, and networks in Vietnam prior to data collection. No additional ethics approval was required from these hospitals, centres and networks. Informed consent was obtained from all participants and data were managed to ensure confidentiality, as described in previous sections. Participants were informed that they could be referred to counselling support should complete the survey result in any distress. No such referrals were required throughout the study.

4.9 CONCLUSION

This chapter presented the methodology used to achieve the study aims and answer the study questions and explained the research design. A summary of the participant socio-demographics, data collection procedures, instruments used, data management procedures, and data analysis procedures for the study was also provided. Ethical considerations with approval numbers were also presented in this chapter. The results of the study are discussed in the next three chapters.

Chapter 5: Descriptive Statistics of the Survey Data

5.1 INTRODUCTION

This chapter reports the descriptive findings from the survey in Vietnam. Within one month of data collection, 330 eligible participants had completed the survey using either a paper-based or online survey method. This chapter begins with a description of the recruitment procedure. The results of the descriptive analysis to describe the study sample and the key study variables are then presented. This includes the results of univariate analyses for data relating to personal factors, including socio-demographics, health status, menopausal status, sleep quality, and self-efficacy variables. Data relating to lifestyle factors and health-related quality of life (HRQoL) follows.

The main research question to be addressed in this chapter is: What are the personal factors (socio-demographic factors and health status), self-efficacy levels, lifestyle factors, and HRQoL of Vietnamese women after BGC?

5.2 RECRUITMENT FLOW CHART

Data were collected using a paper-based survey in nine outpatient clinics at three hospitals located in Hanoi, Vietnam, and through an online survey of a community sample. Data were collected over 1.5 months, from the 22nd June 2016 to the 30th July 2016. For the paper based method, 307 eligible women consented and returned their survey, among those, 293 women completed the survey and 14 women did not. With regards to the online survey, 32 eligible women started to complete the survey but only 23 women completed and returned the survey. In terms of missing data, no missing data were found in the online submitted survey; however, a few missing items were identified in the paper based survey. The handling of missing data was addressed as discussed in Chapter 4.

As shown in Figures 5.1 and 5.2, although the response rate was higher in the online survey method compared to the face-to-face method (64% and 39.9%, respectively), the completion rates and missing data rate were higher for the paper-based method. As implied consent was used in this study, only submitted surveys were considered as consent to participate in the study. The final sample size for the study was 330 participants, including 307 collected from paper based method and 23 collected from online survey method.

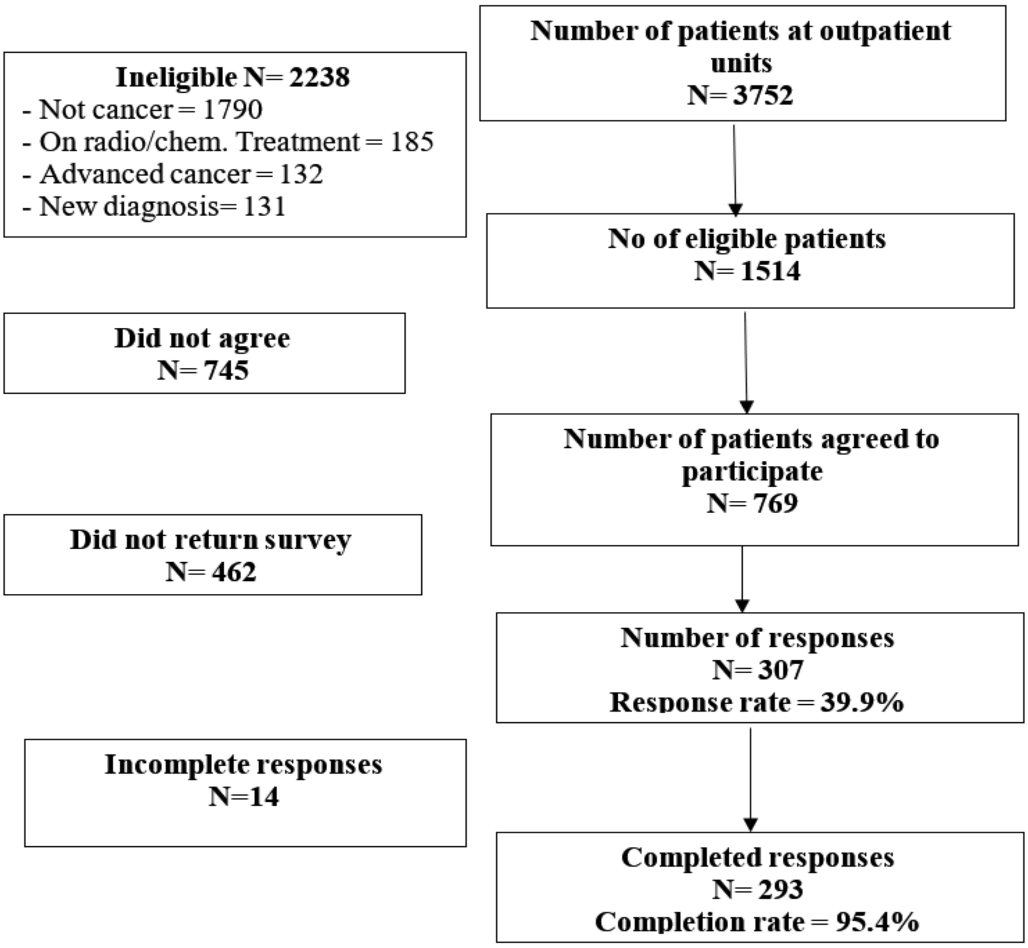

Figure 5-1. Paper-based recruitment flowchart

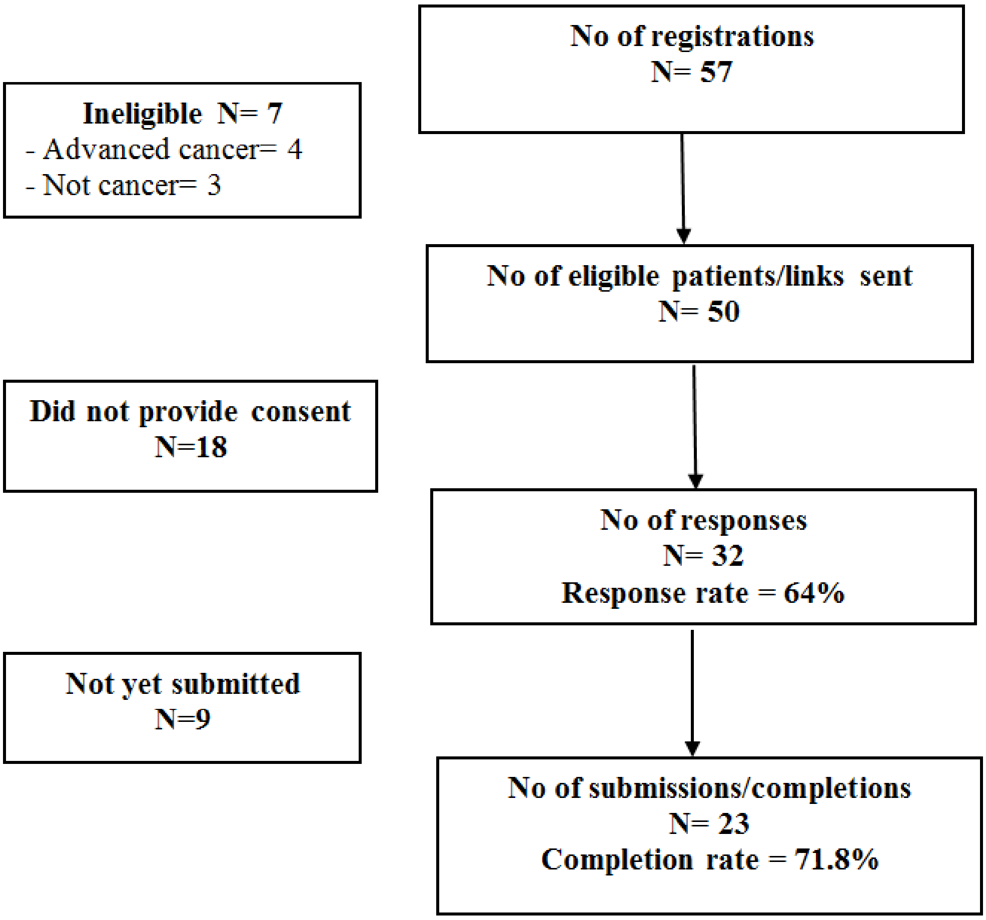

Figure 5-2. Online recruitment flowchart

5.3 SOCIO-DEMOGRAPHIC CHARACTERISTICS OF THE STUDY SAMPLE

Table 5.1 summarises the socio-demographic profile of the study participants. The results indicate that the majority of the participants lived in an urban area (*n*= 207, 62.7%). Their average age was approximately 50 years (*M*= 49.83, *SD*=10.76), ranging from 25-88 years. Most of the women were married (*n*=247, 84.2%), only one participant identified as being in a de facto relationship (.3%). The remaining women were single, separate, divorced, or widowed (*n*= 51, 15.3%). The majority of participants had no religion (*n*= 237; 71.8%), while the remaining participants were Buddhist (*n*= 86, 26.1%) and Catholic (*n*=7, 2.1%). Participants in the study reported that the number of people in their household ranged from 1-16, with a median of four people (*IQR*: 3.0, 5.0). More than fifty percent (52.4%) of the study participants were living with their partner and children, and one third (31.2%) were living with their extended family. Regarding their educational status, more participants had completed a college or higher degree (*n*=130, 39.4%), followed by secondary school (*n*=71, 21.5%). The majority of participants were either employed full time (*n*=125, 37.9%), part-time (*n*=26, 7.9%), or casually (*n*=23, 7.0%). More than half (*n*=208, 63.0%) of the study participants had a monthly income in between 1,600,000 VND (approximately AUD 100) and 9,000,000 VND (approximately AUD 560), which reflects a mid-class income in Vietnam, where the average monthly income in 2016 was about 4,000,000 VND (approximately AUD 260).

Table 5-1. Self-reported demographic characteristics of participants (N=330)

Variables	**Number**	**Percentage (%)**	**Mean (*SD*)/ Median (*Range, IQR*)**
Residence			
Rural	123	37.3	
Urban	207	62.7	
Age			49.83 (*SD*=10.76)
Religion			
None	237	71.8	
Buddhism	86	26.1	
Catholics	7	2.1	
Marital status			
Married	278	84.2	
De facto	1	.3	
Single	8	2.4	
Separated/divorced	11	3.3	
Widowed	32	9.7	
Number of people in the household*			4.00 (*R*:1.0-16.0, *IQR*: 3.0, 5.0)
Household structure			
Alone	5	1.5	
Couple only	31	9.4	
Couple and children	173	52.4	
Extend Family	103	31.2	
Others	18	5.5	
Educational status			
No schooling	3	.9	
Primary school	18	5.5	
Secondary school	71	21.5	
High school	60	18.5	
Diploma or certificate	48	14.5	
College or higher	130	39.4	
Employment status			
Employed full time	125	37.9	
Employed part-time	26	7.9	
Employed casual	23	7.0	
Retired	76	23.0	
Home duties	68	20.6	
Unemployed	6	1.8	
Permanently ill/unable to work	6	1.8	
Income (per month)			
Less than 1,600,000 VND	73	22.1	
1,600,000 - < 9,000,000 VND	208	63.0	
9,000,000 - < 20,000,000 VND	18	5.5	
> 20,000,000 VND	6	1.8	
Don’t know	25	7.6	

*Data show the median with the interquartile range (difference between upper and lower quartiles)

5.4 HEALTH STATUS OF THE STUDY SAMPLE

5.4.1 General health status

Table 5.2 presents the health status of the study participants. Their average length of cancer diagnosis was 3.0 years (*median*= 3.0, *range*: .0-17.0, *IQR*: 1.0, 5.0). The majority of participants were diagnosed with breast cancer (*n*=286, 86.7%). Participants received different types of cancer treatments while they were treated for cancer, such as surgery (*n*=294, 89.1%), chemotherapy (*n*=259, 78.5%), and localised radiotherapy (*n*=238, 72.1%). In terms of comorbidities, participants had a median of two other health problems (*median*= 2.00, *range*: .0-9.0, *IQR*: 1.0, 3.0) in addition to their cancer diagnosis. The most common health problems reported by women in this study were back problems (*n*=156, 47.3%), headaches or migraine (*n*=135, 40.9%), and arthritis (*n*= 92, 27.9%)

The results also indicate that one third of participants had another cancer (*n*=118, 35.8%). These data are inconsistent with literature related to comorbidities among people with cancer. Further exploration of the data showed that among 118 participants who reported having another cancer, 115 cases reported that they had an additional cancer diagnosis at the same time as their breast or gynaecological cancer diagnosis. Taking these data into consideration, it was more likely that participants misunderstood this question. Therefore, this item was excluded from further analysis.

Table 5-2. Self-reported health status of participants (N=330)

Variables	Number	Percentage (%)	Mean (*SD*)/ Median (*Range, IQR*)
Year(s) with cancer*			3.00 (*R*: 0-17, *IQR*: 1, 5)
Type of cancer			
Breast cancer	286	86.7	
Gynaecological cancer	44	13.3	
Ovary	9	2.7	
Uterus	12	3.6	
Cervix	23	7.0	
Cancer treatment received (Yes)			
Surgery	294	89.1	
Chemotherapy	259	78.5	
Radiotherapy – localised	238	72.1	
Radiotherapy – whole body	11	3.3	
Transplant	1	.3	
Others	159	48.2	
Number of health problems*			2.00 (*R*: 0-9, *IQR*: 1, 3)
Most common health problems			
Headaches/migraine	135	40.9	
Hypertension	53	16.1	
Back problem	156	47.3	
Arthritis	92	27.9	
Osteoporosis	82	24.8	

*Data show the median with the interquartile range (difference between upper and lower quartiles)

5.4.2 Reproductive health

Participants' reproductive health is reported in Table 5.3. Approximately one-fifth of the study participants had their uterus (*n*=56, 17%) or ovaries (*n*=69, 20.9%) removed. Only a quarter had a menstrual period in the last 12 months (*n*=86, 26.1%) or in the last three months (*n*=70, 21.2%,) even though only one-fifth were pre-menopausal prior to their cancer treatment (*n*=88, 26.7%). More than one fifth of the study participants (*n*=76, 23%) reported that their menstrual periods were less predictable. Only fifteen participants (4.5%) took oestrogen as before their diagnosis.

Table 5-3. Self-reported reproductive health of participants (N=330)

Variables	Number	Percentage (%)
Removed uterus (Yes)	56	17.0
Removed both ovaries (Yes)	69	20.9
Had menstrual period last 12 months (Yes)	86	26.1
Had menstrual period last 3 months (Yes)	70	21.2
Menstrual period less predictable (Yes)	76	23.0
Taken oestrogen before (Yes)	15	4.5
Menopause prior to cancer treatment (Yes)	88	26.7

Menopausal status was then determined by assessing the response to the reproductive health questions and based on the flowchart described in Chapter 4. Table 5.4 presents the results of the descriptive analyses to determine menopausal status among the study participants and the use of menopause inducing treatments.

Approximately one third of the study participants were menopausal or post-menopausal (*n*= 244, 73.9%) with one fifth peri-menopausal (*n*= 58, 17.6%), and the remainder pre-menopausal (*n*= 28, 8.5%). Among the menopausal/post-menopausal group, approximately one sixth of the study participants had their uterus removed (*n*= 52, 15.8) and one fifth (*n*= 62, 18.8%) had both ovaries removed. Approximately half of the study participants reported that they were not menopausal prior to their cancer treatment (n= 159, 48.2%).

Table 5-4. Menopausal status and treatment (N= 330)

Variables	Total n (%)	Removed uterus		Removed ovaries		Taken oestrogen		Menopause prior to cancer treatment	
		N	Y	N	Y	N	Y	N	Y
Menopause/Post-menopause	244 (73.9)	192 (58.2)	52 (15.8)	182 (55.2)	62 (18.8)	232 (70.3)	12 (3.6)	159 (48.2)	85 (25.8)
Peri-menopause	58 (17.6)	55 (16.7)	3 (0.9)	53 (16.1)	5 (1.5)	57 (17.3)	1 (0.3)	56 (17.0)	2 (0.6)
Pre-menopause	28 (8.5)	27 (8.2)	1 (0.3)	26 (7.9)	2 (0.6)	26 (7.9)	2 (0.6)	27(8.2)	1 (0.3)
TOTAL	330 (100)	274 (83.0)	56 (17.0)	261 (79.1)	69 (20.9)	315 (95.5)	15 (4.5)	242 (73.3)	88 (26.7)

5.4.3 Sleep impairment

A total mean score of the study participants' sleep impairment is presented in Table 5.5, with descriptions of the seven component scores and three subscales (the 19 self-rated items in the PSQI were combined to form seven component scores). The mean score for each component ranged from 0-3. These seven components were then grouped to create three domains, namely sleep efficacy (combined from components 3 and 4), perceived sleep quality (combined from components 1, 2 and 6), and daily disturbance (combined from components 5 and 7). As suggested in the scoring guideline, the cut-off point of five or more of the total score indicated sleep impairment. A higher score was associated with higher sleep impairment. In this current study, Cronbach's alpha of the PSQI was 0.79.

The average total sleep quality score was 6.61 (*SD*= 3.41) indicating that participants in this study had a poor sleep quality. Categorising of the total scores based on cut-off point of five shows that 68.2% (*n*= 225) of the study participants had sleep impairment. Although participants had good sleep efficiency (*M*= 1.69, *SD*= 1.77), they perceived their sleep quality to be at a high level (*M*= 2.89, *SD*= 1.54) and many experienced daily disturbance (*M*= 2.02, *SD*= 1.05). These issues can be explained when examining the components of the PSQI. The study participants had difficulty falling asleep, as indicated in low mean scores of the sleep latency component (*M*= 1.51, *SD*= .88), experienced sleep disturbance (*M*= 1.23, *SD*= .58), and perceived sleep quality (*M*= 1.16, *SD*= .61).

Table 5-5. Self-reported sleep impairment of the study participants

	Measure	N(%)	Mean	SD	Skewness	Kurtosis	Possible score
Components	Subjective sleep quality (C1)		1.16	.61	.15	.15	0-3
	Sleep latency (C2)		1.51	.88	-.06	-.71	0-3
	Sleep duration (C3)		1.02	.93	.57	-.59	0-3
	Habitual sleep efficiency (C4)		.67	.99	1.27	.309	0-3
	Sleep disturbance (C5)		1.23	.58	.58	.808	0-3
	Use of sleep medications (C6)		.22	.52	2.78	8.74	0-3
	Daytime disturbances (C7)		.79	.73	.58	-.16	0-3
Domains	**Sleep efficiency (C3,C4)***		1.69	1.77	1.54	.10	0-6
	Perceived sleep quality (C1,C2,C6)*		2.89	1.54	1.05	.03	0-9
	Daily disturbance (C5,C7)*		2.02	1.05	1.05	.38	0-6
Total Score	**Total Score**		6.61	3.41	3.41	.15	0-21
	Sleep impairment	225 (68.2)					
	No sleep impairment	105 (31.8)					

*C: Component of the PSQI.

*Each domain of the PSQI is calculated by summing up 2 or 3 components of PSQI

5.5 SELF-EFFICACY

Table 5.6 presents participants' confidence levels in relation to healthy eating and exercise. As the possible score ranged from 0 to 100, the mean scores of self-efficacy exercise (*M*= 47.22, *SD*= 20.90) and diet (*M*= 48.88, *SD*= 20.33) indicated deficits in self-efficacy level of the study's participants, as their mean scores were lower than the mid-points of the self-efficacy scales. Reliability statistics were conducted in this current study, Cronbach's alpha scores were 0.97 and 0.96 for diet self-efficacy and exercise self-efficacy, respectively.

Table 5-6. Self-reported self-efficacy of the study participants (N=330)

Measure	Mean	Median	SD	Skewness	Kurtosis	Possible score
Exercise self-efficacy (18 items)	47.22	48.63	20.90	.14	-.58	0-100
Diet self-efficacy (29 items)	48.88	48.88	20.33	.06	-.68	0-100

5.6 LIFESTYLE FACTORS

The following sections report participants' lifestyle behaviours, including exercise, diet/eating habits, alcohol consumption, smoking and passive smoking, and BMI.

5.6.1 Physical activity

Moderate exercise

Participants were asked how often they had undertaken exercise for at least 30 minutes at a time at a moderate level in the past month. More than forty percent of the study participants reported either performing moderate exercise daily (*n*= 93; 28.2%) or five to six times per week (*n*= 46, 13.9%), with about a quarter of the women reporting exercising moderately one to two times per week (*n*= 74, 22.4%). Approximately one fifth of the participants reported no moderate exercise in the past month (*n*= 71, 21.5%).

Vigorous exercise

Participants were asked whether they exercised for 150 minutes each week. Half of the participants performed vigorous exercise for either more than six months (*n*= 101, 30.2%) or less than six months (*n*= 64, 19.4%). The remainder did not exercise vigorously. While one third of the participants reported planning for vigorous exercise either in the next 30 days (*n*= 60, 18.8%) or in the next six months (*n*= 54, 16.4%), one sixth of participants had no plan to start vigorous exercise in the next six months (*n*= 51, 15.5%).

Overall physical activity

The overall physical activity question asked participants to rate their overall physical activity, including general daily activity and exercise on a scale of 0 to 10. The average overall level of physical was reported as being 4.53 (*SD*= 2.04), with a median of 5.00 (*IQR*: 3.0; 6.0).

Energy expenditure

The energy expenditure of study participants was measured using the International Physical Activity Questionnaire and is reported in Table 5.7. Approximately 50% of participants had performed a moderate level of physical activity over the last seven days (*n*=168, 50.9%), and a further one-quarter had performed a low level of physical activity (*n*=91, 27.6%). Regarding energy expenditure per week, the study participants undertook a moderate level of physical activity on average (*median*= 1386.0 MET-minute per week, *IQR*=503.6-2788.8) in a week. They also reported a median of 240.0 (*IQR*: 120.0-330.0) minutes for sitting per day.

Table 5-7. Self-reported energy expenditure by physical activity of the study participants - IPAQ scoring (N=330)

Characteristics	Number	Percentage (%)	Median (*Range*, *IQR*)
Physical activity (MET-minutes per week)*			**1386.0 (*R*: .0-12453.0: *IQR*:503.6-2788.8)**
Low	91	27.6	264.0 (*R*: 0.0-1782.0, *IQR*: 0.0-438.0)
Moderate	168	50.9	1386.0 (*R*: 495.0-4320.0, *IQR*: 1245.0-1386.0)
High	71	21.5	4506.0 (*R*: 1573.0-12453.0, *IQR*: 3279.0-6426.0)
Sitting per day (min)*			240.0 (*R*: 0.0-1802.0, *IQR*: 120.0-330.0)

*Data show the median with the interquartile range (difference between upper and lower quartiles)

5.6.2 Eating habits

Vegetable intake

Participants were asked how many servings of vegetables they consumed per day. Responses ranged from 1 to 10, with the mean being 2.77 (*SD*= 1.34) and median 2.0 (*IQR*= 2.0; 3.0). Approximately half of the study participants reported they currently ate at least five servings of vegetables per day (*n*= 158, 47.9%). Years reported consuming five servings of vegetables per day ranged from 0 to 40, with the median being less than 1 year (*IQR*: .0; 3.0).

Fruit intake

Responses for the number of fruit servings consumed at least a day ranged from 0 to 9, with the mean being 1.81 (*SD*= 1.19) and median 2.00 (*IQR*: 1.0; 2.0). The majority of the study participants reported that they consumed at least two servings of fruit per day (*n* = 205, 62.1%). Years reported consuming two servings of fruit per day ranged from 0 to 30, with the mean being 2.81 (*SD*= 4.12) and median 1.9 (*IQR*: .0; 4.0).

5.6.3 Alcohol consumption

The majority of participants were not current drinkers, with approximately half of the participants reporting never drinking (*n*= 155, 47.0%) and one fifth of participants being ex-drinkers (*n*= 66, 20.0%). The remainder were current drinkers either rarely (*n*= 54, 16.4%) or occasionally (*n*= 50, 15.2%), with only a small proportion of participants reporting they regularly drank alcohol (*n*= 5, 1.5%). Of the participants who currently drank alcohol, their average quantity of alcohol consumed was .18 (*Range*= .0-1.5) standard drinks. Of the five participants who regularly drank alcohol, the average number of years consuming alcohol was 6.0 years (*Range:* 1.1-10.0), with the average quanity of alcohol consumed being 1.00 standard drinks.

5.6.4 Smoking

Active smoking

Almost all participants had never smoked tobacco (*n*= 323, 97.9%), five participants (1.5%) were ex-smokers, and only two participants (.6%) reported being current smokers. Of the five participants who had been smokers, their average years being a smoker ranged from .26 years to 21.2 years, with an average smoking years of 7.18. These individuals smoked from 1 to 2 cigarettes a day. Among the two current smokers, the numbers of cigarettes smoked per day in the last seven days ranged from 1 to 2 cigarettes.

Passive smoking

Approximately forty percent of the participants (*n*= 131, 41.5%) reported that they were living with smokers. Among those living with smokers, thirteen participants (3.9%) were not exposed to smoke, as they reported that their share-house smoker(s) did not smoke indoors. The number of hours participants who were exposed to smoke at home ranged from 0 to 30 hours, with a median of 1.0 hour. The number of smokers in the household ranged from 1 to 28 smokers, with a median of 1.0 smoker.

In regards to passive smoking exposure at work places, one fifth of the participants (*n*= 75, 22.7%) reported that they were exposed to smoke at work. Among those exposed to smoke at work, the number of hours exposed to smoke ranged from two minutes to eight hours per day, with a median of 1 hour (*IQR*: 1.0; 2.5). The number of smokers at the workplace ranged from 0 to 15 smokers, with a median of 3 smokers (*IQR*: 2.0-5.0).

5.6.5 Body mass index (BMI)

Participants' BMIs were calculated based on self-reported height and weight. The mean BMI was 22.02 (*SD*=2.52), indicating participants of the study had a normal range of BMI. To enable further examination of women who were out of the normal range, the continuous BMI variable was transformed into four categories, including underweight, normal weight, overweight, and obese based on the WHO's (2014c) standard classification of BMI cut-off points. The results indicated that the majority of the study participants had a normal range of BMI (*n*=260, 81.2%), as such, they perceived their weights to be acceptable (*n*=253, 76.7%). While the BMI results indicated that 39 (11.8%) of the study participants were overweight or obese, forty-three (10.3%) of the participants perceived their weight was too high. The remaining participants (*n*= 23, 7%) were underweight.

Using a BMI cut-off-point suggested by the WHO (2004) for Asian women, the data indicated that the number of overweight women increased to 98 (29.7%) and obese women increased to 8 (2.4%) compared to the proportions when using the standard classification, which were 37 (11.2%) and 2 (.6%), respectively.

Table 5.8 describes the lifestyle factors of the study participants.

Table 5-8. Self-reported lifestyle factors of the study participants (N=330)

Characteristics	No	%	Mean (*SD*)/ Median (*Range*, *IQR*)
PHYSICAL ACTIVITY			
Moderate exercise (30mins/time)			
Daily	93	28.2	
5-6 times per week	46	13.9	
3-4 times per week	46	13.9	
1-2 times per week	74	22.4	
None	71	21.5	
Vigorous exercise (150min/week)			
More than six months	101	30.6	
Less than six months			
Plan to exercise in the next 30 days	64	19.4	
Plan to exercise in the next six	60	18.8	
months	54	16.4	
No, don't plan to start	51	15.5	
Self-rated overall level of physical activity*			5.00 (*R*: 1.0-10.0, *IQR*: 3.0-6.0)
EATING HABITS			
Number of vegetable servings per day*			2.00 (*R*: 0.0-8.0, *IQR*: 2.0- 3.0)
Five serves of vegetables per day			.
Yes	158	47.9	
No	172	52.1	
Years, having five servings of vegetables per day*			.00 (*R*: .0- 40.0, *IQR*: .0- 3.0)
Number of fruit servings per day*			2.00 (*R*: .0-9.0, *IQR*: 1.0-2.0)
Two servings of fruit per day			
Yes	205	62.1	
No	125	37.9	
Years, having two servings of fruit per day *			1.90 (*R*: .0-30.0, *IQR*: .0-4.0)
ALCOHOL CONSUMPTION			
Frequency of consuming alcohol			
Never	155	47.0	
Ex-drinker	66	20.0	
Current drinker			
Rarely	54	16.4	
Occasionally	50	15.2	
Regularly	5	1.5	
If currently drinking, average quantity of alcohol consumed in the last seven days (n= 111)			.18 (*R*: 0.0 -1.5)
If regularly drinking, years consuming alcohol* (n= 5)			6.0 (*R*: 1.1- 10.0)
If regularly drinking, average alcohol drank a day (n=5)			1.00 (*R*: 0.0-2.0)

*Data show the median with the interquartile range (difference between upper and lower quartiles)

Table 5.8 (Cont). Self-reported lifestyle factors of the study participants (N=330)

Characteristics	No	%	Mean (*SD*)/ Median (*Range*, *IQR*)
SMOKING			
Frequency of smoking			
Never	321	97.2	
Ex-smoker	7	2.1	
Current smoker	2	.6	
Smoking years* (n= 9)			7.18 (*R*: .3 – 21.3)
Average cigarettes smoked a day (n= 9)			.65 (*R*: .0 – 2.0)
Stay with smoker			
Yes	137	41.5	
No	193	58.5	
Numbers of smokers in the household* (n=137)			1.0 (*R*: 1.0-28.0,*IQR*: 1.0; 1.0)
Hours exposed to smoke at home* (n=137)			1.0 (*R*: .0-30.0, *IQR*: 1.0; 2.5)
Never	13	3.9	
Less than10 hours	120	36.3	
10-30 hours	6	1.8	
Exposed to smoke at work			
Yes	75	22.7	
No	255	77.3	
Number of smokers at work* (n=75)			3.0 (*R*: .0-15, *IQR*: 2.0-5.0)
Hours exposed to smoke at work*			2.0 (*R*: .03-8.0, *IQR*: 1.0-3.5)
BODY MASS INDEX (BMI)			
BMI (standard classification)			22.02 (*SD*=2.52)
Under weight	23	7.0	
Normal range	268	81.2	
Overweight	37	11.2	
Obese	2	.6	
BMI (Asian cut-off point classification)			22.02 (*SD*=2.52)
Under weight	23	7.0	
Normal range	201	60.9	
Overweight	98	29.7	
Obese	8	2.4	
Perceived weight			
Acceptable	253	76.7	
Too high	43	13.0	
Too low	34	10.3	

*Data show the median with the interquartile range (difference between upper and lower quartiles)

5.7 HEALTH-RELATED QUALITY OF LIFE

5.7.1 Mental health and physical health (SF36)

As shown in Figure 5.3 and Table 5.9, the averages for physical health (PCS-SF36) and mental health (MCS-SF36) norm-based scores were 43.92 (*SD*=7.13) and 43.51 (*SD*= 9.59). These scores were less than the norm of 50, indicating a lower physical health and mental health of the study participants compared to general population. The skewness and kurtosis data indicate that both the PCS and MCS were normally distributed.

Table 5.9 and Figure 5.3 also present the summary data for the scale scores for the eight dimensions. The four domains at the left of the profile figure correspond to what is observed for physical health (PCS-SF36) and the four domains at the right correspond to what is observed for mental health (PCS-SF36). Five dimension scale scores were lower than the norm, showing deficits in physical function (*M*=44.69, *SD*= 8.94), role physical (*M*= 41.59, *SD*= 8.66), general health (*M*= 38.16, *SD*= 9.98), social function (*M*= 42.11, *SD*= 8.55), and role emotional (*M*= 38.29, *SD*= 10.35) in comparison to the norm. The whisker boxes (Figure 5.4) indicate that more than 75% of the study participants had a deficit in physical health and mental health compared to the norm. This current study found that Cronbach's alpha for whole scale of SF36 was 0.92.

Table 5-9. Norm-based scoring SF36 profile of the study participants (N=330)

Measure	Mean	Median	*SD*	*Skewness*	*Kurtosis*
Physical function	44.69	46.51	8.94	-.92	.34
Role physical	41.59	42.16	8.66	-.23	.03
Bodily pain	46.79	46.06	8.53	.32	-.56
General health	38.16	37.68	9.98	.21	-.43
Vitality	48.98	48.97	9.13	.18	-.28
Social function	42.11	40.49	8.55	-.12	.20
Role emotional	38.29	36.44	10.35	.01	-.27
Mental function	46.30	47.19	10.47	-.28	-.54
Physical health (PCS)	43.92	44.28	7.13	-.31	-.09
Mental health (MCS)	43.51	44.13	9.59	-.13	-.29

PCS: physical component score, MCS: mental component score

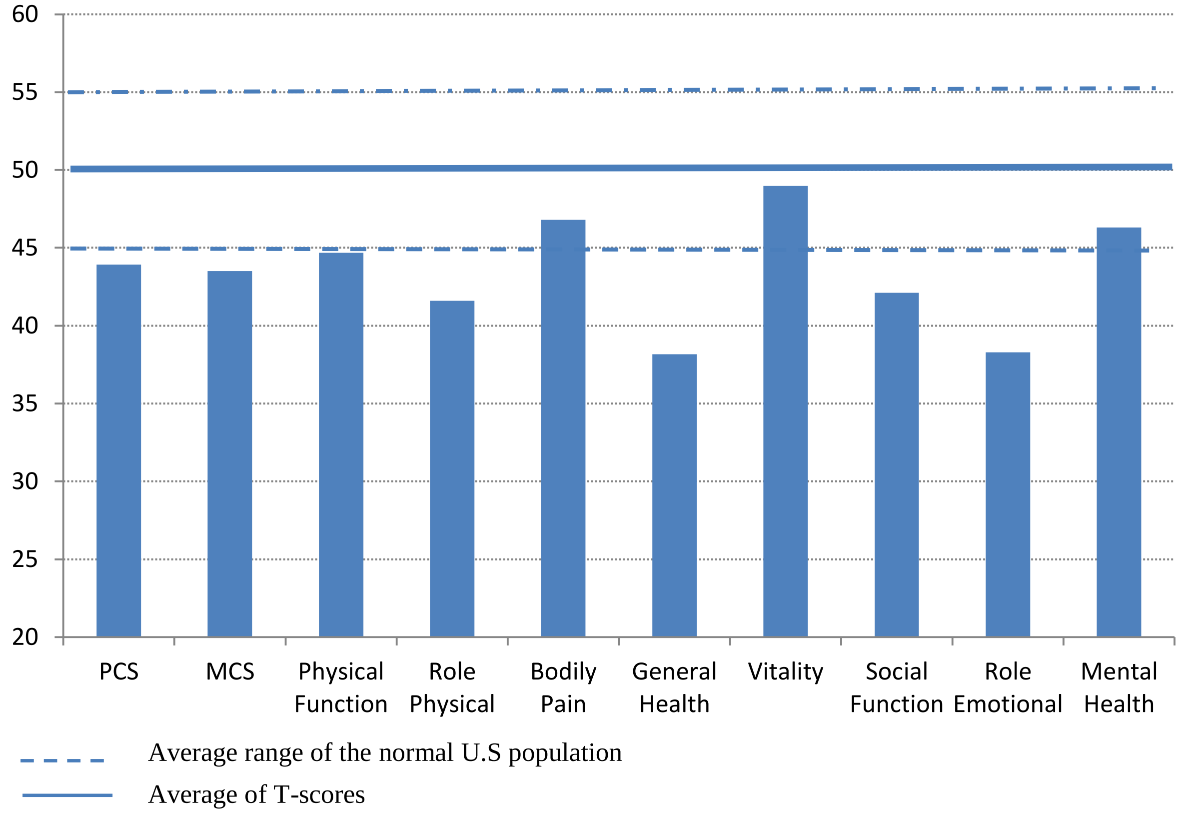

Figure 5-3. SF 36 Health profile of the study participants

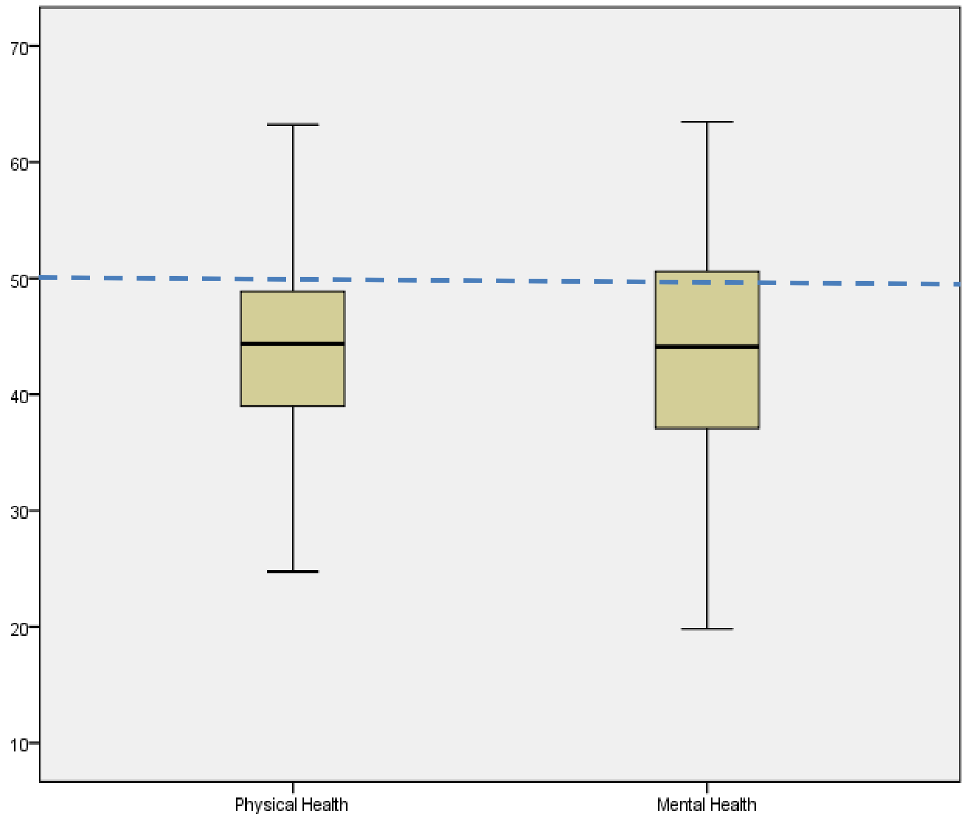

Figure 5-4. Whisker boxes presenting physical health (PCS) and mental health (MCS) of the study participants compared to the norm

5.7.2 Cancer-specific HRQoL (FACT-G)

Table 5.10 shows the mean scores for health-related quality of life based on FACT-G scoring. Participants reported that their social wellbeing score was highest at 21.92 (*SD*= 5.38), followed by functional well-being (*M*= 21.09, *SD*= 5.00), and physical well-being (*M*= 20.30, *SD*= 4.74). Emotional well-being (*M*= 17.24, *SD*= 4.25) was reported at a lower score compared to other subscale scores. Participants' total FACT-G score was 80.61 (*SD*= 15.81).

Figure 5.5 below illustrates the comparison between FACT-G scores for Australian adults (Janda, DiSipio, Hurst, Cella, & Newman, 2009) and the study participants. The total FACT- G mean score of the study sample was 80.6, lower than that of the Australian sample. Although the study participants reported higher social wellbeing and functional wellbeing compared to the Australian sample, their physical wellbeing and emotional wellbeing scores were lower than that of the Australian sample, indicating a deficit in physical wellbeing and emotional wellbeing in the women who participated in the study. The whisker box (Figure 5.6) indicates that more than 50% of the study participants had a deficit in cancer-specific HRQoL compared to the norm. In this study, Cronbach alpha of the Vietnamese version of FACT-G was 0.81.

Table 5-10. Self-reported FACT-G scores of the study participants (N=330)

Measure	Mean	Median	SD	Skewness	Kurtosis	Possible score
Physical wellbeing (7items)	20.36	21.00	4.74	-.63	.068	0-28
Social wellbeing (7items)	21.92	22.16	5.38	-.44	-.08	0-28
Emotional wellbeing (6items)	17.24	18.00	4.25	-.67	.54	0-24
Functional wellbeing (7items)	21.09	21.00	5.00	-.74	.59	0-28
Total scale score	80.61	83.00	15.81	-.48	-.14	0-108

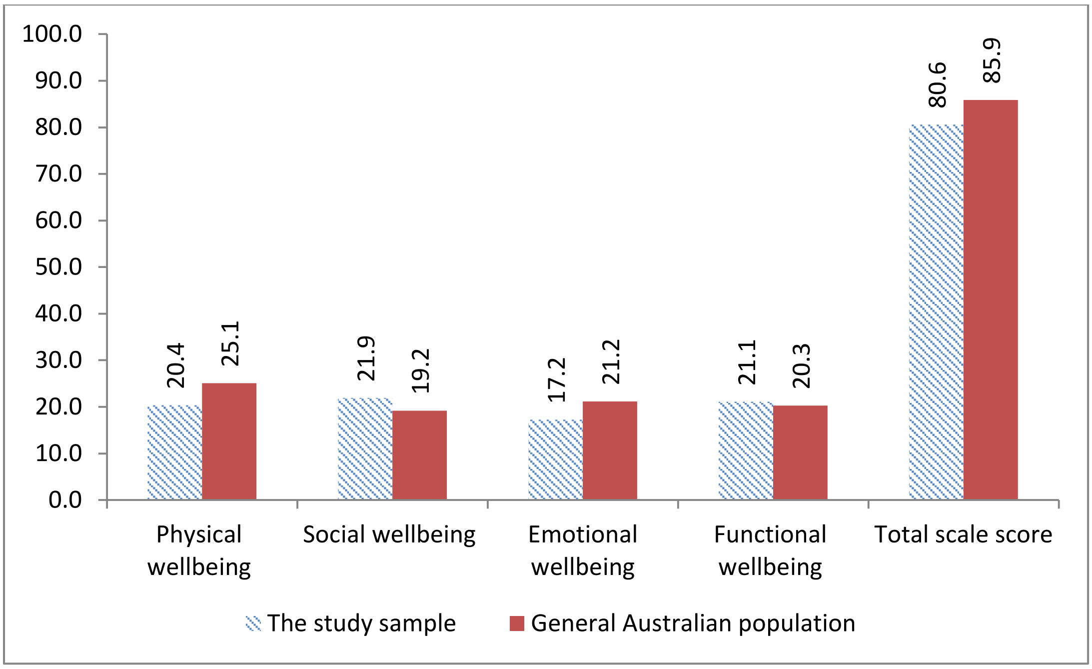

Figure 5-5. FACT-G Health profile of the study participants compared to the Australian general population

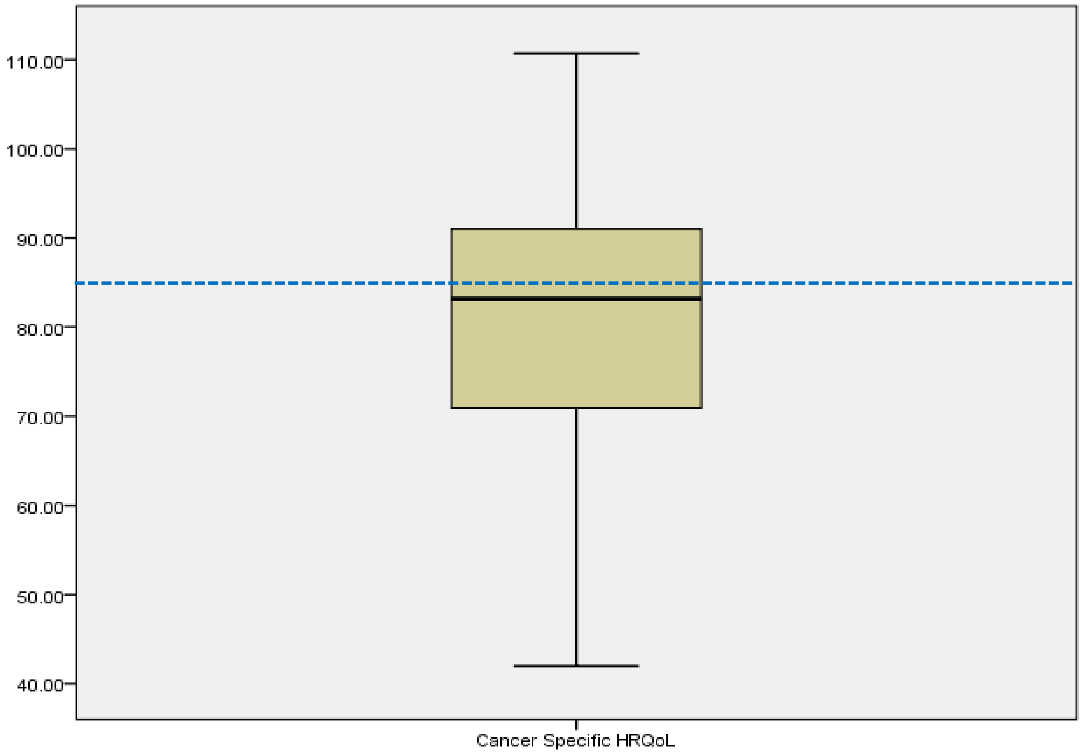

Figure 5-6. Whisker box presenting cancer-specific HRQoL (FACT-G) of the study participants compared to the norm

5.8 CONCLUSION

This chapter examined the socio-demographic, health status, menopausal status, sleep quality, self-efficacy, lifestyle factors, and HRQoL of Vietnamese women after BGC. The results indicate that the majority of the study participants were in the middle income class, and had two comorbidities in addition to their cancer, on average. Many of them were peri- or post-menopausal and had sleep impairment. They reported lower levels of physical activity, consumed less vegetables than the recommended level, and many were exposed to smoke at home and at the workplace. A small proportion of participants were reported to be current alcohol drinkers; however, they consumed only one standard alcohol drink per day or less. On average, participants' BMI average scores indicated a healthy body weight of the study participants. In regards to quality of life, the HRQoL scores reported by SF36 and FACT-G indicated a deficit in HRQoL in the study participants compared to population norms. Further examination of factors influencing lifestyles and HRQoL are described in Chapters 6 and 7.

Chapter 6: Results of Bivariate and Multivariate Analysis

6.1 INTRODUCTION

This chapter presents the results from the bivariate and multivariate analyses of the study data to answer the research question: "What are the relationships between personal factors (socio-demographic factors and health characteristics), self-efficacy levels, lifestyle factors, and health-related quality of life (HRQoL)?". The chapter begins with an examination of the relationships between personal factors (demographic factors and health characteristics) and self-efficacy. Next, the relationships between personal factors, self-efficacy, and lifestyle factors, with lifestyle factors viewed as outcome variables, are described. Finally, the relationships between personal factors, self-efficacy, lifestyle factors, and the study outcome – HRQoL – are examined and presented. The chapter concludes with a summary of the findings.

6.2 INFLUENCES OF PERSONAL FACTORS ON SELF-EFFICACY

6.2.1 Influences of personal factors on diet self-efficacy

Bivariate statistics

The Pearson product-moment correlation coefficient (r) was used to explore the correlations between diet self-efficacy, age, and sleep impairment, as these variables were continuous and normally distributed. Spearman's Roh (r_s) was performed to examine the correlation between diet self-efficacy and the number of people in the household, number of years with cancer, and number of health problems, as these variables were not normally distributed. The results indicate that there was a negative correlation between diet self-efficacy and sleep impairment ($r_{s=}$ -.15, $p < .01$). This result reflected that participants who had more confidence in following a healthy diet were less likely to suffer from sleep impairment, or vice versa. No significant relationship between diet self-efficacy and age, the number of people in the household, number of years with cancer, and number of health problems were found, as shown in Table 6.1.

Table 6-1. Correlations Between Diet Self-efficacy and Continuous Variables of Personal Factors

Variables	Diet self-efficacy
Age (*r*)	-.01
Number of people in the household (r_s)	.01
Number of years with cancer (r_s)	-.02
Number of health problem (r_s)	-.07
Sleep impairment (*r*)	$-.15^{**}$

$^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$

Table 6.2 describes the bivariate association between diet self-efficacy and residence, religion, marital status, family structure, education, employment, income, perceived weight, cancer type, and menopausal stage. ANOVA and t-test were performed to examine these associations. The results indicate that women who lived in an urban area (*M*=51.22, *SD*= 20.19) had significantly higher diet self-efficacy scores than women who lived in rural areas (*M*=45.38, *SD*= 20.18), *t(DF)*= 2.54, $p < .05$. Significant differences between diet self-efficacy scores and employment groups were also found (*t(DF)*= -3.48, $p < .001$). The results indicate that women with higher education (diploma or higher) were more confident about following a healthy diet than women in the lower education group (high school or lower). There was also a significant difference (*t(DF)*= -4.09, $p < .001$)

between the higher income and lower income groups, with higher income women (*M*= 51.96, *SD*= 19.80) reporting higher confidence in their ability to follow a healthy diet compared to the lower income group (*M*= 42.14, *SD*= 20.01). No statistically significant associations were established between the diet self-efficacy scale and religion, marital status, family structure, employment status, perceived weight, cancer type, and menopausal stage (Table 6.2).

Table 6-2. Associations Between Diet Self-efficacy and Categorical Variables of Personal Factors

Variables		Mean	SD	t or F
Residence	Urban	51.22	20.19	2.54*
	Rural	45.38	20.18	
Religion	No	50.25	20.50	1.71
	Yes	46.02	19.76	
Marital status	Unmarried	50.89	22.58	.71
	Married	48.70	19.93	
Nuclear family structure	No	47.40	21.02	-1.40
	Yes	50.53	19.67	
Education	High school or lower	44.89	20.75	-3.48***
	Diploma or higher	52.59	19.37	
Employment	Not employed	48.23	22.26	-.62
	Employed	49.61	18.57	
Income	Low income or don't know	42.14	20.01	-4.09***
	High income	51.96	19.80	
Perceived weight	Acceptable	48.78	20.71	.45
	Too high	51.65	18.18	
	Too low	47.68	20.54	
Cancer type	Breast cancer	51.56	19.23	.88
	Gynaecological cancer	48.66	20.5	
Menopausal stage	Pre-menopausal	46.16	15.29	1.99
	Peri menopausal	44.91	20.61	
	Menopausal/post-menopausal	50.36	20.70	

*$p < .05$, ** $p < .01$, *** $p < .001$

Multivariate statistics

A general linear model (GLM) was used to assess the relationships between personal factors and diet self-efficacy. Model specification was based on bivariate analysis and earlier theoretical and empirical results. According to the previous bivariate analysis, residence, education, income, and sleep impairment were significantly correlated with diet self-efficacy; thus, these variables were included in the model. As indicated in Table 6.3, the model as a whole explained 6.4% of the variance in the diet self-efficacy scores, *adjusted* R^2= .064, F= 6.59, p< .001. Income and sleep impairment were significant predictors of diet self-efficacy, with income reporting the highest beta value (β = -6.90, p < .05), followed by sleep impairment (β = -.79, p < .05). The results indicate that the lower income group had an average of 6.9 units lower diet self-efficacy scores compared to the high income group. Additionally, an increase in the sleep impairment score resulted in reducing the diet self-efficacy score .79 times.

Table 6-3. General Linear Model Results Predicting Diet Self-efficacy by Personal Factors

Variables	**B**	**S.E.**	***t***	***p***
Intercept	58.49	2.55	22.88	.000
Residence (ref. urban area)	-2.12	2.44	-.87	.384
Education (ref. higher education)	-3.58	2.57	-1.39	.164
Income (ref. high income)	-6.90	2.96	-2.23	.026
Sleep impairement	-.79	.32	-2.38	.018
R^2	.075			
Adjusted R^2	.064			
F	6.59^{***}			

*p< .05, ** p < .01, *** p < .001

6.2.2 Influence of personal factors on exercise self-efficacy

Bivariate statistics

Pearson conduct moment and Spearman rho were used to examine the correlations between age, the number of people in the household, number of years with cancer, number of health problems, and sleep impairment with exercise self-efficacy. Sleep impairment was the only variable to demonstrate significant associations, being negatively correlated with diet self-efficacy (r= -.12, p< .05). No significant correlations were identified between exercise self-efficacy and age, the number of people in the household, number of years with cancer, or number of health problems.

Table 6-4. Correlations Between Exercise Self-efficacy and Continuous Variables of Personal Factors

Variables	Diet self-efficacy
Age (r)	-.01
Number of people in the household (r_s)	-.03
Number of years with cancer (r_s)	.05
Number of health problems (r_s)	-.02
Sleep impairment (r)	$-.12^{*}$

*p< .05, ** p< .01, *** p< .001

As exercise self-efficacy was normally distributed, bivariate associations between exercise self-efficacy and categorical variables of personal factors were examined using independent t-test and one way ANOVA. As shown in Table 6.5, t-tests exhibited significant differences in the mean scores of exercise self-efficacy according to residence ($t(DF)$= -1.98, p< .05) and education status ($t(DF)$= 1.34, p< .05). No statistically significant relationships were identified between exercise self-efficacy and religion, marital status, family structure, employment status, income, perceived weight, cancer type, or menopausal status, as shown in Table 6.5.

Table 6-5. Associations Between Exercise Self-efficacy and Categorical Variables of Personal Factors

Variables		Mean	SD	t or F
Residence	Urban	44.19	20.14	-1.98^{*}
	Rural	48.82	21.16	
Religion	No	46.60	21.42	-.68
	Yes	48.35	19.48	
Marital status	Unmarried	46.40	23.37	-.24
	Married	47.23	20.42	
Nuclear family structure	No	48.24	22.07	.95
	Yes	46.06	19.73	
Education	High school or lower	48.77	20.85	1.34^{*}
	Diploma or higher	45.67	20.84	
Employment	Not employed	48.24	22.05	.99
	Employed	45.94	19.85	
Income	Low income/don't know	48.56	20.87	.82
	High income	46.48	20.89	
Perceived weight	Acceptable	46.15	20.72	1.13
	Too high	49.74	20.33	
	Too low	50.78	22.56	
Cancer type	Breast cancer	47.51	20.72	.90
	Gynaecological cancer	44.45	21.91	
Menopausal stage	Pre-menopausal	44.48	16.63	2.60
	Peri-menopausal	42.01	21.94	
	Menopausal/post-menopausal	48.61	20.91	

$^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$

Multivariate statistics

A general linear model was used to determine the predictors of exercise self-efficacy. The model was specified based on the bivariate test results and theoretical frame work (see Figure 3-4 for further details). As residential address, education status, and sleep impairment significantly related to exercise self-efficacy, these variables were entered into the model. The model as a whole explained 2.8% of the exercise self-efficacy variance and all three independent variables were significant predictors of exercise self-efficacy. Residence provided the highest beta value (β = -5.32, p < .05), followed by education status (β = 4.71, p < .05), indicating that women living in a rural area had higher exercise self-efficacy compared to women living in an urban area, while the high education group had a higher exercise self-efficacy score compared to the low education group. A significant predictor of sleep impairment was exercise self-efficacy (β = -.75, p < .05), indicating that every unit increase in sleep impairment resulted in a .75 reduction in exercise self-efficacy scores, with a higher score in sleep impairment indicating a higher sleep impairment.

Table 6-6. General Linear Model Results Predicting Exercise Self-efficacy by Personal Factors

Variables	B	S.E.	*t*	*p*
Intercept	51.92	2.67	19.44	<.001
Residence (ref. urban area)	-5.32	2.41	-2.21	.028
Education (ref. higher education)	4.71	2.34	2.01	.045
Sleep impairment	-.75	.33	-2.27	.024
R^2	.037			
Adjusted R^2	.028			
F	4.18^{**}			

$^{*}p< .05$, $^{**}p < .01$, $^{***}p < .001$

6.3 INFLUENCES OF PERSONAL FACTORS AND SELF-EFFICACY ON LIFESTYLE FACTORS

This section presents the results of analyses examining the relationships between personal factors, self-efficacy, and lifestyle factors. In this section, lifestyle factors are viewed as outcome variables to examine the influences of personal factors and self-efficacy on lifestyle factors. As shown in Table 5.8, which describes lifestyle factors, some lifestyle factor variables were categorical variables and the sample size of each category of those variables was small, violating the assumptions of the statistical tests related to these variables. Therefore, only the continuous variables of lifestyle factors were used to examine the relationship between personal factors, self-efficacy, and lifestyle.

6.3.1 Bivariate statistics

Physical activity in relation to personal factors and self-efficacy

As self-rated physical activity and energy expenditure were continuous and non-normally distributed variables, the bivariate association between these two variables and personal factors and self-efficacy was examined using non-parametric tests, including Spearman rho (r_s), Mann-Whitney U test, and Kruskal-Wallis test. The results indicate that self-rated physical activity was associated with residence (U= 10715, p< .05), income (U= 9566, p< .05), the number of health problems (r_s= -.12, p< .05), exercise self-efficacy (r_s= .56, p< .01), and diet self-efficacy (r_s= .27, p< .01). In regards to energy expenditure, there were significant associations between energy expenditure and exercise self-efficacy (r_s= .46, p< .01), diet self-efficacy (r_s= .25, p< .05), as presented in Table 6.7

Table 6-7. Correlations Between Personal Factors, Self-efficacy, and Physical Activity

Independent variables	Statistical test	*Physical activity*	
		Self-rated physical activity	**Energy expenditure**
Residence	Mann-Whitney	10715*	12697
Age	Spearman rho	.03	.10
Religion	Mann-Whitney	10396	10078
Marital status	Mann-Whitney	6814	7205
Number of people in the household	Spearman rho	-.05	-.002
Household structure	Mann-Whitney	13160	12903
Education	Mann-Whitney	12948	12739
Employment	Mann-Whitney	12429	12854
Income	Mann-Whitney	9566*	10555
Perceived weight	Kruskal-Wallis	2.44	.78
Number of years with cancer	Spearman rho	.04	-.003
Type of cancer	Mann-Whitney	5215	6036
Number of health problems	Spearman rho	-.12*	-.03
Menopausal stage	Kruskal-Wallis	.91	1.58
Sleep impairment	Spearman rho	-.09	.01
Exercise self-efficacy	Spearman rho	.56**	.46**
Diet self-efficacy	Spearman rho	.27**	.25**

*p< .05, ** p < .01, *** p < .001

Eating habits in relation to personal factors and self-efficacy

The number of vegetable servings consumed per day, years having five servings of vegetables per day, number of fruit servings consumed per day, and years having two fruit servings per day were included as variables for eating habits to examine the bivariate associations between eating habits and personal factors and self-efficacy.

There were significant correlations between the number of vegetable servings consumed per day and exercise self-efficacy (r_s= .20, p< .01) and diet self-efficacy (r_s= .37, p< .01), indicating that as exercise self-efficacy or diet self-efficacy increased, the number of vegetable servings consumed per day increased.

In regards to years having five vegetable servings per day, there were statistically significant associations between age (r_s= .13, p< .05), perceived weight (χ^2= 7.71, p< .05), exercise self-efficacy (r_s= .22, p< .01), and diet self-efficacy (r_s= .47, p< .01) and years having five servings of vegetables per day, indicating that an increase in the age, exercise self-efficacy, or diet self-efficacy scores was associated with increasing years of having five servings of vegetables per day.

In regards to the number of fruit servings consumed per day, religion (U= 9657, p< .05), income (U= 9003, p< .01), sleep impairment (r_s= -.12, p< .05), exercise self-efficacy (r_s= .16, p< .01), and diet self-efficacy (r_s= .37, p< .01) were significantly associated with amount of fruit consumed per day. The results indicate that those with no religion and higher income had a higher number of fruit servings per day, compared to those with a religion and lower income. Additionally, an increase in exercise self-efficacy or diet self-efficacy was associated with an increase in consuming more fruit servings per day.

There were positive correlations between years having two fruit servings per day and age (r_s= .10, p< .05), diet self-efficacy (r_s= .30, p< .01), and exercise self-efficacy (r_s= .46, p< .01), indicating an increase in age or diet self-efficacy or exercise self-efficacy was associated with an increased number of years having two fruit servings per day. Significant differences were identified in the mean rank of the years having two fruit servings per day by different groups of religion (U= 9197, p< .05), education (U= 11752,

$p < .05$), and income ($U = 9468$, $p < .01$), with higher years of having two fruit servings per day being associated with having no religion, higher education, or higher income groups.

Table 6-8. Correlations Between Personal Factors, Self-efficacy, and Eating Habits

Independent variables	Statistical test	*Eating habits*			
		Number of vege servings/day	**Years having five vege servings/day**	**Number of fruit servings/day**	**Years having two fruit servings/day**
Residence	Mann-Whitney	12586	12537*	11313	11401
Age	Spearman rho	.06	.13*	-.03	.10*
Religion	Mann-Whitney	10567	10339	9657*	9197*
Marital status	Mann-Whitney	6847	6563	7067	6723
Number of people in the household	Spearman rho	.03	-.00	.07	.06
Household structure	Mann-Whitney	13248	12254	13312	13089
Education	Mann-Whitney	12538	12333	11987	11752*
Employment	Mann-Whitney	13141	12161	12346	12346
Income	Mann-Whitney	10205	10472	9003**	9468**
Perceived weight	Kruskal-Wallis	3.22	7.71*	.71	4.85
Number of years with cancer	Spearman rho	-.07	.05	-.08	.06
Type of cancer	Mann-Whitney	6083	5883	5945	5575
Number of health problems	Spearman rho	-.01	.05	-.10	.06
Menopausal stage	Kruskal-Wallis	.04	1.92	.26	2.34
Sleep impairment	Spearman rho	-.05	-.06	-.12*	-.05
Exercise self-efficacy	Spearman rho	.20**	.22**	.16**	.30**
Diet self-efficacy	Spearman rho	.37**	.47**	.37**	.46**

*p< .05, ** p < .01, *** p < .001

Alcohol consumption in relation to personal factors and self-efficacy

There were statistically significant associations between the average quantity of alcohol consumed in the last seven days and residence (U= 11337, p< .01), education (U= 12771, p< .01), the number of years with cancer (r_s= -.12, p< .05), number of health problems (r_s= -.20, p< .01), menopausal stage (χ^2= 17.34, p< .05), and sleep impairment (r_s= -.15, p< .01). These results indicate that people living in urban areas (U= 11337, p< .01) and higher educated women (U= 12771, p< .01) had a higher average quantity of alcohol consumed in the last seven days. The premenopausal group had consumed significantly more alcohol in the last seven days (χ^2= 17.34, p< .05) compared to the peri- and post-menopausal groups. An increased average quantity of alcohol consumed in the last seven days was significantly correlated with a lower number of health problems (r_s= -.20, p< .01) and less sleep impairment (r_s= -.15, p< .01).

Smoking in relation to personal factors and self-efficacy

A significant difference was identified in the mean rank of hours exposed to smoke at home between married and unmarried groups (U= 5617, p< .01), indicating more hours exposed to smoke at home in the married group. In regards to hours exposed to smoke at work, a significant difference was found between employed and unemployed groups, with the employed group having more hours exposed to smoke at the work place than non-workers (U= 11476, p< .01). However, Kruskal-Wallis (χ^2= 13.93, p< .05) test indicated that unemployed group had the higest mean rank score (*mean rank*= 182.56), followed by the full-time employed group (*mean rank*= 181.25), and too-ill/unable- to- work- group had the lowest mean rank score (*mean rank*= 126.0).

BMI in relation to personal factors and self-efficacy

There were significant associations between BMI and residence, age, perceived weight, menopausal stage, and sleep impairment. The results indicate that women living in urban areas had a higher mean rank of BMI than women living in rural areas (U= 10537, p< .01), being older was positively associated with higher BMI (r_s= 1.6, p< .01), and an increase in sleep impairment was associated with reducing BMI (r_s= -.12, p< .05). As expected, women who participated in the study perceived their weight status in accordance with their BMI (χ^2= 70.57, df=2 p< .001). Women in the post-menopausal or menopausal stage reported higher BMI compared to pre-menopausal and peri-menopausal groups (χ^2= 6.16, df=2, p< .05).

Table 6-9. Correlations Between Personal Factors, Self-efficacy, and Alcohol Consumption, Smoking, and BMI

Independent variables	Statistical test	*Average quantity of alcohol consumed in the last seven days*	*Smoking*		*BMI*
			Hours exposed to smoke at home	**Hours exposed to smoke at work**	
Residence	Mann-Whitney	11637**	11988	12148	10537**
Age	Spearman rho	-.10	-.02	-.08	.16**
Religion	Mann-Whitney	10503	10724	10986	9072
Marital status	Mann-Whitney	7165	5617**	7111	7018
Number of people in the household	Spearman rho	-.09	.06	-.01	.02
Household structure	Mann-Whitney	13571	13008	13291	12852
Education	Mann-Whitney	12771*	12373	12334	13462
Employment	Mann-Whitney	12831	12571	11476**	12934
Income	Mann-Whitney	10727	10485	10709	11324
Perceived weight	Kruskal-Wallis	.12	.10	2.75	70.57***
Number of years with cancer	Spearman rho	-.12*	.06	-.01	.09
Type of cancer	Mann-Whitney	6095	5360	5786	5601
Number of health problems	Spearman rho	-.20**	-.01	.03	-.06
Menopausal stage	Kruskal-Wallis	17.34*	.33	.06	6.16*
Sleep impairment	Spearman rho	-.15**	.05	.03	-.12*
Exercise self-efficacy	Spearman rho	-.00	-.01	.01	.11
Diet self-efficacy	Spearman rho	.05	-.03	.00	.08

*p< .05, ** p < .01, *** p < .001

6.3.2 Multivariate statistics

General linear modelling was performed to examine the influences of personal factors and self-efficacy on lifestyle factors. Only independent variables that were significantly correlated with lifestyle factors were entered into the model for further analysis.

Predictors of physical activity

Residence, income, number of health problems, exercise self-efficacy, and diet self-efficacy were entered in the general linear model to examine the relationships of these variables and self-rated physical activity, as these variables were significantly associated with self-rated physical activity in the bivariate analysis. The model as a whole explained 30.9% of self-rated physical activity variances (R^2= .320, *adjusted* R^2= .309, F= 30.48, p< .001). Income (β = -.58, p < .05), the number of health problems (β = -.11, p < .05), and exercise self-efficacy (β = .05, p < .05) were significant predictors of self-rated physical activity. The results indicate that the score for the lower income group was .58 times lower in the self-rated level of physical activity scores. While an increase in one comorbidity resulted in a .11 lower self-rated physical activity score, an increase of one score for exercise self-efficacy predicted an .05 times increase in the self-rated physical activity score.

In regards to predictors of energy expenditure, exercise self-efficacy and diet self-efficacy were included in the model. The model as a whole explained 8.3% of energy expenditure (R^2= .089, adjust R^2= .083, F= 18.97, p< .01). Only exercise self-efficacy was a significant predictor of energy expenditure (β = 28.56, p < .001), indicating an increase of one score for exercise self-efficacy was associated with an increase of 28.56 in the score for energy expenditure (Table 6.10).

Table 6-10. General Linear Model Results Predicting Physical Activity by Personal Factors and Self-efficacy

Variables	**B**	**S.E.**	***T***	***p***
Outcome: self-rated physical activity				
Intercept	2.51	.33	7.64	<.001
Residence (ref. urban area)	-.06	.21	-.29	.772
Income (ref. high income)	-.58	.23	-2.51	.013
Number of health problems	-.11	.06	-2.01	.045
Exercise self-efficacy	.05	.01	10.76	<.001
Diet self-efficacy	-.01	.01	-.33	.737
R^2	.320			
Adjusted R^2	.309			
F	30.48^{***}			
Outcome: energy expenditure				
Intercept	597.68	320.48	1.86	.063
Exercise self-efficacy	28.56	5.6	5.05	<.001
Diet self-efficacy	1.71	5.80	.29	.768
R^2	.089			
Adjusted R^2	.083			
F	15.97^{**}			

$^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$

Predictors of eating habits

Table 6.11 presents the results of the general linear model test determining the predictors of eating habits. The results indicate that diet self-efficacy was a significant predictor of the number of vegetables consumed per day (β = .02, p < .001), indicating that an increase in the diet self-efficacy score resulted in a .02 times increase in the number of vegetables consumed per day.

In regards to the years having five vegetable servings outcome, significant predictors of years having five vegetable servings included residence ($\beta = 1.46$, $p < .05$), age ($\beta = .07$, $p < .05$), and exercise self-efficacy ($\beta = .01$, $p < .01$). The results indicate that women living in rural areas had more years consuming five servings of vegetables compared to women living in urban areas. An increase of one year of age or one score of self-efficacy resulted in increasing years having five servings of vegetable per day, at .07 and .01 times, respectively. The model as a whole explained 9.2% of the variance, $R^2 = .109$, *adjusted* $R^2 = .092$, $F = 6.57$, $p < .001$.

For the model predicting the number of fruit servings consumed per day, diet self-efficacy was the only significant predictor ($\beta = .02$, $p < .001$), showing that a one score increase in diet self-efficacy predicted a .02 increase in the number of fruit servings consumed per day. The model as a whole explained 9.9% of the variance in the number of fruit servings consumed per day ($R^2 = .111$, *adjusted* $R^2 = .099$, $F = 8.12$, $p < .001$).

There were significant associations between age ($\beta = .07$, $p < .01$) and diet self-efficacy ($\beta = .04$, $p < .01$) to years having two fruit servings per day. The results indicate that an increase of either one year of age or one score of diet self-efficacy resulted in a .07 or .04 times increase in years of having two fruit servings per day, respectively. The model as a whole explained 10.2% of the variance in years having two fruit servings per day ($R^2 = .118$, *adjusted* $R^2 = .102$, $F = 7.22$, $p < .001$) (Table 6.11).

Table 6-11. General Linear Model Results Predicting Eating Habits by Personal Factors and Self-efficacy

Variables	B	S.E.	*t*	*p*	
Outcome: number of vegetable servings consumed per day					
Intercept	1.61	.21	7.79	<.001	R^2 **= .118**
Exercise self-efficacy	.02	.004	.55	.579	***Adjusted*** R^2 **= .113**
Diet self-efficacy	.22	.004	5.82	.000	F**= 21.96*****
Outcome: years having five vegetable servings per day					
Intercept	-5.47	1.90	-2.88	.004	R^2 **= .109**
Residence (ref. urban area)	1.46	.61	2.35	.021	***Adjusted*** R^2 **= .092**
Perceived weight (ref. too low)	.28	.97	.28	.774	F**= 6.57*****
Age	.07	1.22	2.19	.029	
Exercise self-efficacy	.01	.03	2.64	.009	
Diet self-efficacy	.06	.02	.85	.395	
Outcome: number of fruit servings consumed per day					
Intercept	1.12	.26	4.24	<.001	R^2 **= .111**
Religion (ref. religious)	.21	.14	1.48	.138	***Adjusted*** R^2 **= .099**
Income (ref. high income)	-.15	.14	-1.07	.283	F***= 8.12******
Exercise self-efficacy	.001	.00	.38	.699	
Diet self-efficacy	.02	.00	4.37	<.001	
Sleep impairment	-.03	.02	-1.77	.077	
Outcome: years having two fruit servings per day					
Intercept	-4.02	1.27	-3.15	.002	R^2 **= .118**
Religion (ref. religious)	.68	.48	1.42	.157	***Adjusted*** R^2 **= .102**
Education (ref. high education)	.06	.52	.12	.903	F***= 7.22******
Income (high income)	-.57	.56	-1.03	.306	
Age	.07	.02	3.44	.001	
Exercise self-efficacy	.02	.01	1.76	.078	
Diet self-efficacy	.04	.01	3.45	.001	

$^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$

Predictors of alcohol consumption

Residence, education, menopausal stage, years with cancer, the number of health problems, and the sleep impairment were included in the model predicting the average quantity of alcohol consumed in the seven days, as these independent variables were found to be significantly correlated with alcohol consumption variables in the bivariate analyses. No significant predictors of alcohol consumption were found (see Table 6.12).

Predictors of passive smoking

Women who were employed were significantly more exposed to smoke at work, with .36 times higher score in the hours exposed to smoke at work compared to unemployed women (β = -.36, $p < .05$). However, further analysis examining association between 7 employment groups and the hours exposed to smoke at work found no significant association (R^2= .036, *adjusted* R^2= .012, F= 1.49, p= .160).

Predictors of BMI

Residence, menopausal stage, age, and sleep impairment were included in the model determining the predictors of BMI. The model as a whole explained 5.8% of the BMI variance (R^2= .058, *adjusted* R^2= .044, F= 3.99, $p< .01$). Residence (β = -.59, $p < .05$), age (β = -.03, $p < .05$) and sleep impairment (β = -.11, $p < .05$) were significant predictors of BMI. The results indicate that an increase of one year of age or decrease in one score of sleep impairment predicted an increase in the BMI score at .03 and .11 times, respectively. Women living in an urban area had higher scores for BMI compared to women living in a rural area (Table 6.12).

Table 6-12. General Linear Model Results Predicting the Amount of Alcohol Consumption, Passive Smoking, and BMI by Personal Factors and Self-efficacy

Variables	B	S.E.	*t*	*p*	
Outcome: Average quantity of alcohol consumed in the last seven days					
Intercept	2.72	.66	4.11	<.001	R^2 = .022
Residence (ref. urban)	-.63	.48	-1.302	.194	*Adj.* R^2 = .000
					F= 1.02[ns]
Education (ref. high education)	-.34	.47	-.721	.471	
Menopausal stage(ref. post meno)					
Pre-menopause	-.45	.83	-.54	.588	
Peri-menopause	-.53	.61	-.87	.385	
Years with cancer	.12	.08	1.54	.125	
Number of health problems	.06	.14	.43	.662	
Sleep impairment	.01	.04	.10	.918	
Outcome: hours exposed to smoke at home					R^2 = .010
Intercept	1.34	.46	2.88	.004	*Adj.* R^2 = .004
Marital status (ref. married)	-.78	.44	-1.76	.078	F=1.64 [ns]
Outcome: hours exposed to smoke at work					R^2 = .018
Intercept	.71	.10	6.92	<.001	*Adj.* R^2 = .015
Employment (ref. employed)	-.36	.15	-2.43	.015	F= 5.93[*]
Outcome: BMI					
Intercept	21.51	.76	28.29	<.001	R^2 = .058
Residence (ref. urban)	-.59	.28	-2.08	.038	*Adj.* R^2 = .044
Menopausal stage (ref. post meno)					F=3.99 [**]
Pre-menopause	-.05	.52	-.09	.927	
Peri-menopause	-.47	.38	-1.31	.192	
Age	.03	.01	2.17	.031	
Sleep impairment	-.11	.04	-2.69	.010	

[*]$p< .05$, [**] $p < .01$, [***] $p < .001$,[ns] non-significant

6.4 INFLUENCE OF PERSONAL FACTORS, SELF-EFFICACY AND LIFESTYLE FACTORS ON HRQOL

6.4.1 Bivariate associations

Normality tests were conducted to examine HRQoL scores measured by SF36 and FACT-G, as the SF36 provides data on physical health (physical component score - PCS-SF36) and mental health (mental component score - MCS-SF36); whereas, FACT-G provides data on cancer-specific HRQoL. The results indicated that the physical component score and mental component score measured by the SF36 and the total FACT-G score were normally distributed. Therefore, the associations between non-normal distributed independent variables and HRQoL scores were examined by a Spearman Rho correlation test. The associations between age, sleep impairment, self-efficacy, and HRQoL score were examined by Pearson correlation.

As HRQoL scores were normally distributed, the associations between HRQoL and the categorical variables were then examined by t-test and one way ANOVA.

Physical health (PCS-SF36) score in relation to personal factors, self-efficacy levels, and lifestyle factors

Table 6.13 presents the results of the Pearson correlation and Spearman rho tests used to examine the bivariate associations between the physical health (PCS-SF36) and continuous variables of personal factors, self-efficacy levels, and lifestyle factors. Age (r= -.25, p< .01), the number of years with cancer (r_s= -.12, p< .05), the number of health problems (r_s= -.30, p< .01), sleep impairment (r= -.25, p< .01), and hours exposed to smoke at home (r_s= -.16, p< .05) were negatively and significantly correlated with PCS-SF36. Energy expenditure (r_s= .16, p< .01), self-rated level of exercise (r_s= *.11*, p< .05), years having two fruit servings per day (r_s= .11, p< .05), and quantity of alcohol consumption (r_s= .14, p< .05) were positively correlated with physical health (PCS-SF36).

Table 6-13. Correlations Between Physical Health and Continuous Variables of Personal Factors, Self-efficacy, and Lifestyle Factors

Variables	Physical Health (PCS-SF36)
Age (r)	$-.25^{**}$
Number of people in the household (r_s)	-.08
Number of years with cancer (r_s)	$-.12^{*}$
Number of health problem (r_s)	$-.30^{**}$
Sleep impairment (r)	$-.25^{**}$
Exercise Self-efficacy (r)	.09
Diet Self-efficacy (r)	$.16^{**}$
BMI (r_s)	-.01
Energy expenditure (r_s)	$.16^{**}$
Self-rated level of exercise (r_s)	$.11^{*}$
Number of vegetable servings consumed per day (r_s)	.04
Years having five vegetable servings per day (r_s)	-.001
Number of fruit servings consumed per day (r_s)	.05
Years having two fruit servings per day (r_s)	$.11^{*}$
Average quantity of alcohol consumed in the last seven days (r_s)	$.14^{*}$
Hours exposed to smoke at home (r_s)	$-.16^{*}$
Hours exposed to smoke at work (r_s)	-.07

*p< .05, ** p< .01, *** p< .001

As the physical health (PCS-SF36) score was normally distributed, t-test and one way ANOVA were used to examine the bivariate associations between physical health and the categorical variables of personal factors, self-efficacy, and lifestyle. As presented in Table 6.14, there were significant differences in the mean scores of physical health in different groups of education (t= -3.18, p< .001), employment (t= -4.74, p< .001), income (t= -4.81, p< .001), and vigorous exercise (F= 6.27, p< .05).

Table 6-14. Associations between Physical Health and Categorical Variables of Personal Factors, Self-efficacy, and Lifestyle Factors

Variables		Mean	SD	t or F
Residence	Urban	43.22	7.27	-1.37
	Rural	44.33	7.02	
Religion	No	43.63	7.43	-1.15
	Yes	44.63	6.25	
Marital status	Unmarried	42.55	7.28	-1.51
	Married	44.17	7.08	
Nuclear family structure	No	43.17	7.29	-1.80
	Yes	44.59	6.91	
Education	High school or lower	42.58	6.19	-3.18**
	Diploma or higher	45.05	7.66	
Employment	Not employed	42.01	6.89	-4.74***
	Employed	45.65	6.94	
Income	Low income/don't know	41.10	6.82	-4.81***
	High income	45.11	6.92	
Perceived weight	Acceptable			
	Too high			
	Too low			
Cancer type	Breast cancer	43.91	7.26	-.06
	Gynaecological cancer	43.97	6.26	

*p< .05, ** p < .01, *** p < .001

Table 6.14 (cont.) Associations Between Physical Health and Categorical Variables of Personal Factors, Self-efficacy, and Lifestyle Factors

	Variables	Mean	SD	t or F
Menopausal stage	Pre-menopausal	47.44	6.40	4.49**
	Peri-menopausal	44.83	6.85	
	Menopausal/post- menopausal	43.29	7.15	
Moderate exercise (30mins/time)	Per day	43.73	7.49	1.34
	5-6 times per week	44.44	6.47	
	3-4 times per week	42.99	7.10	
	1-2 times per week	45.33	6.89	
	None	42.94	7.20	
Vigorous exercise (150min/week)	More than 6 months	44.69	7.56	3.27*
	Less than 6 months	45.90	6.72	
	Plan to exercise in the next 30	42.27	6.02	
	days	43.65	6.50	
	Plan to exercise in the next 6	42.09	7.87	
	mths			
	No, don't plan to start			
Five servings of vegetables per day	No	43.78	6.85	-.40
	Yes	44.11	7.52	
Two servings of fruit per day	No	43.27	7.31	-1.35
	Yes	44.37	7.05	
Frequency of consuming alcohol	Never	43.05	7.19	2.76
	Ex-drinker	43.96	6.24	
	Current drinker	45.13	7.39	
Stay with smoker	No	43.85	7.22	-.21
	Yes	44.01	7.00	
Exposed to smoke at work	No	44.05	6.94	.53
	Yes	43.46	7.75	

*p< .05, ** p < .01, *** p < .001

Mental health (MCS-SF36) score in relation to personal factors, self-efficacy levels, and lifestyle factors

Bivariate correlations between the mental health score (MCS-SF36) and personal factors, self-efficacy, and lifestyle factors are presented in Table 6.15. The results indicate that the number of health problems (r_s= -.21, p< .01) and sleep impairment (r_s= -.35, p< .01) were negatively and significantly correlated with mental health. There were significant positive correlations between mental health and exercise self-efficacy (r= .26, p< .01), diet self-efficacy (r= .28, p< .01), self-rated exercise level (r_s= .19, p< .01), the number of vegetable servings consumed per day (r_s= .15, p< .01), years having five vegetables servings per day (r_s= .13, p< .01), number of fruit servings consumed per day (r_s= .17, p< .01), and years having two servings of fruit per day (r_s= .19, p< .01) (Table 6.15).

Table 6-15. Correlations Between Mental Health and Continuous Variables of Personal Factors, Self-efficacy, and Lifestyle Factors

Variables	Mental Health (MCS-SF36)
Age (*r*)	-.06
Number of people in the household (r_s)	-.07
Number of years with cancer (r_s)	-.03
Number of health problem (r_s)	-.21**
Sleep impairment (*r*)	-.35**
Exercise Self-efficacy (*r*)	.26**
Diet Self-efficacy (*r*)	.28**
BMI (r_s)	.05
Energy expenditure (r_s)	.07
Self-rated level of exercise (r_s)	.19**
Number of vegetable servings consumed per day (r_s)	.15**
Years having five vegetable servings per day (r_s)	.13*
Number of fruit servings consumed per day (r_s)	.17**
Years having two fruit servings per day (r_s)	.19**
Average quantity of alcohol consumed in the last seven days (r_s)	.08
Hours exposed to smoke at home (r_s)	-.002
Hours exposed to smoke at work (r_s)	.004

*p< .05, ** p< .01, *** p< .001

As the mental health score (MCS-SF36) was normally distributed, t-test and one way ANOVA were used to examine the bivariate associations between mental health and categorical variables of personal factors, self-efficacy levels and lifestyle. As shown in Table 6.16, there were significant differences in the mean score of mental health in regards to education (t= -2.41, p< .05), income (t= -3.33, p< .01), vigorous exercise (F= 4.99, p< .001), having five servings of vegetables per day (t= -2.17, p< .001), and having two servings of fruit per day (t= -4.21, p< .001).

Table 6-16. Associations Between Mental Health and Categorical Variables of Personal Factors, Self-efficacy Levels, and Lifestyle Factors

Variables		Mean	SD	t or F
Residence	Urban	42.65	10.11	-1.25
	Rural	44.02	9.25	
Religion	No	43.89	9.85	1.16
	Yes	42.54	8.87	
Marital status	Unmarried	43.78	9.76	.22
	Married	43.46	9.57	
Nuclear family structure	No	42.95	9.22	-1.01
	Yes	44.02	9.91	
Education	High school or lower	42.14	9.28	-2.41*
	Diploma or higher	44.67	9.72	
Employment	Not employed	42.49	9.72	-1.86
	Employed	44.46	9.44	
Income	Low income/don't know	40.84	8.86	-3.33**
	High income	44.63	9.68	
Perceived weight	Acceptable	43.49	9.67	.86
	Too high	44.85	9.02	
	Too low	41.96	9.64	
Cancer type	Breast cancer	43.57	9.41	.32
	Gynaecological cancer	43.08	10.74	

*p< .05, ** p < .01, *** p < .001

Table 6.16 (cont.). Associations Between Mental Health and Categorical Variables of Personal Factors, Self-efficacy Levels, and Lifestyle Factors

Variables		Mean	SD	t or F
Menopausal stage	Pre-menopausal	44.95	8.03	.38
	Peri-menopausal	43.66	8.29	
Five servings of vegetables per day	Menopausal/post-menopausal	43.31	10.04	-2.17^{**}
Moderate exercise (30mins/time)	Per day	45.09	9.37	1.37
	5-6 times per week	41.34	9.32	
	3-4 times per week	42.65	8.39	
	1-2 times per week	43.39	10.57	
	None	43.48	9.57	
Stay with smoker	Yes	43.16	9.34	-.78
	No	44.00	9.93	
Exposed to smoke at work	Yes	43.46	9.63	-.16
	No	43.66	9.50	

$^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$

Cancer-specific HRQoL (FACT-G) score in relation to personal factors, self-efficacy, and lifestyle factors

Table 6.17 presents the results of the Pearson correlation and Spearman rho tests examining the bivariate associations between cancer-specific HRQoL (FACT-G score) and the continuous variables of personal factors, self-efficacy, and lifestyle factors. The results indicate that age (r= -.11, p< .05), the number of health problems (r_s= -.28, p< .01), sleep impairment (r= -.39, p< .01), and hours exposed to smoke at work (r_s= -.11, p< .05) were significantly negatively correlated with the cancer-specific HRQoL. Exercise self-efficacy (r=.17, p< .01), diet self-efficacy (r=.22, p< .01), self-rated level of exercise (r=.12, p< .05), the number of vegetable servings consumed per day (r=.12, p< .05), years having five vegetables servings per day (r=.12, p< .05), number of fruit servings consumed per day (r=.*20*, p< .01), and years having two fruit servings per day (r=.*17*, p< .01) were significantly positively correlated with the cancer-specific HRQoL score.

Table 6-17. Correlations Between Cancer-specific HRQoL (FACT-G) Scores and Continuous Variables of Personal Factors, Self-efficacy, and Lifestyle Factors

Variables	Cancer-specific HRQoL (FACTG)
Age (r)	-.11*
Number of people in the household (r_s)	-.07
Number of years with cancer (r_s)	-.05
Number of health problem (r_s)	-.28**
Sleep impairment (r)	-.39**
Exercise self-efficacy	.17**
Diet self-efficacy diet	.22**
BMI	.04
Energy expenditure	.02
Self-rated level of exercise	.12*
Number of vegetable servings consumed per day	.12*
Years having five vegetable servings per day	.12*
Number of fruit servings consumed per day	.20**
Years having two fruit servings per day	.17**
Average quantity of alcohol consumed in the last seven days	-.004
Hours exposed to smoke at home	-.003
Hours exposed to smoke at work	-.11*

*p< .05, ** p< .01, *** p< .001

As the cancer-specific HRQoL score was normally distributed, t-tests and one way ANOVAs were used to examine the bivariate associations between cancer-specific HRQoL and the categorical variables of personal factors, self-efficacy, and lifestyle. As shown in Table 6.18, there were significant differences in the mean scores of the cancer-specific HRQoL in different groups in regards to education (*t*= -4.05, *p*< .001), employment (*t*= -2.55, *p*< .05), income (*t*= -3.87, *p*< .001), moderate exercise (*F*= 2.86, *p*< .05), vigorous exercise (*F*= 2.72, *p*< .05), having five servings of vegetables per day (*t*= -2.61, *p*< .05), and having two servings of fruit per day (*t*= -3.98, *p*< .001).

Table 6-18. Associations Between Cancer-specific HRQoL scores and Categorical Variables of Personal Factors, Self-efficacy levels, and Lifestyle Factors

Variables		Mean	SD	t or F
Residence	Urban	79.46	16.17	-1.08
	Rural	81.41	15.67	
Religion	No	80.93	15.67	.45
	Yes	80.06	16.409	
Marital status	Unmarried	80.47	17.46	-.11
	Married	80.72	15.58	
Nuclear family structure	No	79.54	15.06	-1.24
	Yes	81.72	16.53	
Education	High school or lower	76.94	16.16	-4.05^{***}
	Diploma or higher	83.87	14.92	
Employment	Not employed	78.41	16.56	-2.55^{*}
	Employed	82.87	14.98	
Income	Low income/don't know	75.58	16.81	-3.87^{***}
	High income	82.83	14.98	
Perceived weight	Acceptable	80.69	15.84	.96
	Too high	82.90	14.93	
	Too low	77.83	17.15	

$^{*}p< .05$, $^{**}p < .01$, $^{***}p < .001$

Table 6.18 (cont.). Associations Between Cancer-specific HRQoL scores and Categorical Variables of Personal Factors, Self-efficacy levels, and Lifestyle Factors

Variables		Mean	SD	t or F
Cancer type	Breast cancer	80.89	16.07	.62
	Gynaecological cancer	79.29	14.52	
Menopausal stage	Pre-menopausal	85.54	13.09	1.45
	Peri-menopausal	80.50	15.29	
	Menopausal/post- menopausal	80.17	16.24	
Moderate exercise (30mins/time)	Per day	80.92	15.75	2.86^{*}
	5-6 times per week	79.14	15.61	
	3-4 times per week	75.96	15.09	
	1-2 times per week	85.28	14.23	
	None	79.54	17.45	
Vigorous exercise (150min/week)	More than 6 months	83.42	15.61	2.72^{*}
	Less than 6 months	83.06	16.33	
	Plan to exercise in the next	78.45	14.32	
	30days	79.85	16.05	
	Plan to exercise in the next 6	79.85	16.20	
	mths			
	No, don't plan to start			
Five servings of vegetables per day	No	78.37	16.01	-2.61^{**}
	Yes	83.01	15.53	
Two servings of fruit per day	No	76.19	16.69	-3.98^{***}
	Yes	83.31	14.85	
Frequency of consuming alcohol	Never	79.54	16.92	.99
	Ex-drinker	80.69	12.94	
	Current drinker	82.33	15.84	
Stay with smoker	No	80.26	15.06	-.57
	Yes	81.27	16.98	
Exposed to smoke at work	No	78.23	15.93	-1.52
	Yes	81.40	15.49	

$^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$

6.4.2 Multivariate associations

Predictors of physical health (PCS-SF36)

A hierarchical general linear model was used to determine the predictors of physical health (PCS-SF36) and to determine the relative contribution of each block of variables to physical health by examining the R^2 change. The model was specified based on the bivariate test results and theoretical grounds, as shown in Table 6.19. As cancer type and menopausal status were considered potential confounders of HRQoL based on the literature review, these two variables were entered into the final step.

At Step 1, demographic factors (education, employment, income, and age) were entered and explained 12% of the physical health's variance. At Step 2, health status variables (years with cancer, number of health problems, and sleep impairment were entered; and explained 18% of the physical health's variances. Diet self-efficacy was entered at Step 3, with lifestyle factors (energy expenditure, self-rated level of exercise, years having two fruit servings per day, average quantity of alcohol consumed in the last seven days, and hours exposed to smoke at home) entered at Step 4, explaining 19% and 22% of the physical health's variances, respectively. Two potential confounders (menopausal status and cancer type) were entered at Step 5; however, they were not significantly associated with physical health. At this step, age was no longer a significant predictor of physical health. Therefore, those two variables were not found to be confounders of physical health (PCS-SF36) in this study. Thus, the model at Step 4 was used for interpretation.

The model at Step 4 as a whole explained 22.4% of physical health's variance $R^2 = .254$, *adjusted* $R^2 = .224$, $F = 8.25$, $p < .001$. Income, age, the number of health problems, sleep impairment, energy expenditure, average quantity of alcohol consumed in the last seven days, and hours exposed to passive smoking within the home were significant predictors of physical health. The results indicate that the high income group had higher mean scores of physical health compared to the low income group (β= -3.09, p< .01). An increase in age (β= -.08, p< .05), the number of health problems (β= -.57, p< .01), sleep impairment (β= -.36, p< .01), average quantity of alcohol consumed in the last seven days (β= -2.97, p< .01), or hours exposed to smoke at home (β= -.33, p< .01) resulted in reducing physical health at .09, .57, .36. 2.79, and .33 times, respectively. The results indicate that an increase of one standard alcohol consumption resulted in an increase of 3.25 times in the physical health mean score (β= 3.25, p< .05).

Table 6-19. Hierarchical General Linear Model Results Predicting Physical Health by Personal Factors, Self-efficacy Levels, and Lifestyle factors

Step	***Variables***	***Coefficients***	***SE***	***Adjusted R^2***	***R^2 change***
1	Education (ref. diploma or higher)	-.05	.88	.12***	
	Employment (ref. employed)	-1.25	.91		
	Income (ref. high income group)	**-3.69*** **	.97		
	Age	**-.13** **	.04		
2	Education (ref. diploma or higher)	.02	.88	.18***	.06***
	Employment (ref. employed)	-.62	.91		
	Income (ref. high income group)	**-3.49*** **	.96		
	Age	-.08	.05		
	Years with cancer	-.11	.13		
	Number of health problems	**-.63** **	.23		
	Sleep impairment	**-.41*** **	.11		
3	Education (ref. diploma or higher)	.27	.87	.19***	.01***
	Employment (ref. employed)	-.68	.89		
	Income (ref. high income group)	**-3.32** **	.96		
	Age	-.01	.04		
	Years with cancer	-.11	.13		
	Number of health problems	**-.63** **	.23		
	Sleep impairment	**-.39** **	.11		
	Self-efficacy diet	.02	.02		

*p< .05, ** p < .01, *** p < .001

Table 6-20 (Cont). Hierarchical General Linear Model Results Predicting Physical Health by Personal Factors, Self-efficacy Levels, and Lifestyle factors

Step	*Variables*	*Coefficients*	*SE*	*Adjusted R^2*	*R^2 change*
4	Education (ref. diploma or higher)	.49	.85	$.22^{***}$	$.03^{***}$
	Employment (ref. employed)	-.58	.89		
	Income (ref. high income group)	**-3.09^{**}**	.95		
	Age	**$-.08^{*}$**	.04		
	Years with cancer	-.08	.13		
	Number of health problems	**$-.57^{*}$**	.23		
	Sleep impairment	**$-.36^{**}$**	.11		
	Self-efficacy diet	.01	.02		
	Energy expenditure	**$.00^{*}$**	.00		
	Self-rated level of exercise	-.07	.22		
	Years having two fruit servings per day	.09	.09		
	Average quantity of alcohol consumed in the last seven days	**2.97^{*}**	1.31		
	Hours exposed to smoke at home	**$-.33^{**}$**	.12		
5	Education (ref. diploma or higher)	.22	.85	$.22^{***}$	.00
	Employment (ref. employed)	-.89	.88		
	Income (ref. high income group)	**-2.96^{**}**	.94		
	Age	-.07	.04		
	Years with cancer	-.07	.12		
	Number of health problems	**$-.59^{**}$**	.22		
	Sleep impairment	**$-.35^{**}$**	.11		
	Self-efficacy diet	.01	.02		
	Energy expenditure	**$.00^{*}$**	.00		
	Self-rated level of exercise	-.04	.19		
	Years having two2 fruit servings per day	.09	.09		
	Average quantity of alcohol consumed in the last seven days	**2.75^{*}**	1.30		
	Hours exposed to smoke at home	**$-.35^{**}$**	.12		
	Cancer type (ref. Gyn cancer)	-1.50			
	Menopausal status (ref. pre-meno)				
	Postmeno/menopause	-1.35	1.39		
	Peri-menopause	-.94	1.49		

$^{*}p< .05$, $^{**}p < .01$, $^{***}p < .001$

Predictors of mental health (MCS-SF36)

A hierarchical general linear model was used to determine the predictions of personal factors, self-efficacy, and lifestyle factors on mental health (measured by the SF36) and to determine the relative contribution of each block of variables to mental health by examining the R^2 change. The model was based on the theoretical grounds and bivariate statistics results, and only those variables that significantly correlated with mental health were included in the model. As cancer type and menopausal status were considered potential confounders of HRQoL based on the literature review, those two variables were entered into the final step.

At Step 1, demographic factors (education and income) were entered and explained 2% of the mental health's variance. At Step 2, health status variables (number of health problems and sleep impairmente) were entered, and explained 12% of the mental health's variance. At Step 3, self-efficacy (exercise self-efficacy and diet self-efficacy) variables were entered, with lifestyle factors (vigorous exercise, alcohol use, self-rated level of exercise, number of vegetable servings per day, years having five vegetable servings per day, number of fruit servings per day, and years having two fruit servings per day) entered at step 4, explaining 18% and 20% of the mental health's variances, respectively. Two potential confounders (menopausal status and cancer type) were entered at Step 5; however, they were not significantly associated with mental health. Therefore, those two variables were not found to be confounders of mental health (MCS-SF36) in this study. Thus, the model at Step 4 was used for interpretation.

As shown in Table 6.20, the model as a whole explained 20.0% of the mental health's variance R^2= .241, *adjusted* R^2= .200, F= 5.82, p< .001. Income (β= -2.47, p< .05), number of health problems (β= -.72, p< .05), sleep impairment (β= -.66, p< .001), exercise self-efficacy (β= .10, p< .05), and number of vegetable servings consumed per day (β= .76, p< .05) were significant predictors of the mental health. The results indicate that the low income group had lower mental health scores compared to the high income group. Every increase in one health problem or a score in sleep impairment resulted in reducing the mental health score. In contrast, an increase of one score for exercise self-efficacy contributed to an increase in the mental health score.

Table 6-21. General Linear Model Results Predicting Mental Health by Personal Factors, Self-efficacy Levels, and Lifestyle Factors

Step	*Variables*	*Coefficients*	*SE*	*Adjusted R^2*	*R^2 change*
1	Education (ref. higher)	-.97	1.08	.02*	
	Income (ref. high income group)	-3.23*	1.08		
2	Education (ref. higher)	-.26	1.03	.12**	.10**
	Income (ref. high income group)	-3.07*	1.11		
	Number of health problems	-.70*	.31		
	Sleep impairment	-.82***	.16		
3	Education (ref. higher)	-.36	1.02	.18***	.07***
	Income (ref. high income group)	-2.69*	1.06		
	Number of health problems	-.70*	.30		
	Sleep impairment	-.68***	.15		
	Self-efficacy exercise	.09**	.03		
	Self-efficacy diet	.07*	.03		
4	Education (ref. higher)	-.09	1.05	.19***	.01*
	Income (ref. high income group)	**-2.47***	1.09		
	Number of health problems	**-.72***	.31		
	Sleep impairment	**-.66*****	.15		
	Self-efficacy exercise	**.10****	.03		
	Self-efficacy diet	.04	.03		
	Vigorous exercise (ref. no exercise plan)	-1.82	1.57		
	More than six months	-4.13	1.78		
	Less than six months	-1.92	1.76		
	Plan to exercise in the next 30 days	-1.22	1.50		
	Plan to exercise in the next six months				
	Alcohol use (ref. current drinker)				
	Never	-1.11	1.23		
	Ex-drinker	-.74	1.43		
	Self-rated exercise level	-.03	.29		
	Number of vegetable servings per day	**.76***	.43		
	Years having five vegetable servings per day	-.04	.11		
	Number of fruit servings per day	.12	.47		
	Years having two fruits servings per day	.11	1.4		

*p< .05, ** p < .01, *** p < .001

Table 6-22 (Cont). General Linear Model Results Predicting Mental Health by Personal Factors, Self-efficacy levels, and Lifestyle Factors

Step	*Variables*	*Coefficients*	*SE*	*Adjusted R^2*	*R^2change*
5	Education (ref. higher)	-1.36	1.05	$.19^{***}$	.0
	Income (ref. high income group)	**-2.48^{*}**	1.09		
	Number of health problems	**$-.72^{*}$**	.31		
	Sleep impairment	**$-.66^{***}$**	.15		
	Self-efficacy exercise	**$.11^{**}$**	.03		
	Self-efficacy diet	.04	.03		
	Vigorous exercise (ref. no exercise plan)	-2.07	1.57		
	More than six months	-4.48	1.78		
	Less than six months	-2.15	1.76		
	Plan to exercise in the next 30 days	-1.25	1.50		
	Plan to exercise in the next six months				
	Alcohol use (ref. current drinker)				
	Never	-1.04	1.23		
	Ex-drinker	-.73	1.43		
	Self-rated exercise level	-.01	.29		
	Number of vegetable servings per day	**$.76^{*}$**	.43		
	Years having five vegetable servings per day	-.04	.11		
	Number of fruit servings per day	.15	.47		
	Years having two fruits servings per day	.11	.14		
	Cancer type (ref. Gyn cancer)	-1.01	1.48		
	Menopausal status (ref. pre-meno)				
	Post-meno/menopause	.73	1.80		
	Peri-menopause	1.34	1.39		

$^{*}p< .05$, $^{**}p < .01$, $^{***}p < .001$

Predictors of cancer-specific HRQoL (FACT-G score)

A general linear model was used to determine the predictors of the cancer-specific HRQoL (FACT-G) score and relative contribution of factors on cancer-specific HRQoL. The model was specified based on the bivariate test results and theoretical grounds, as shown in Table 6.21. As cancer type and menopausal status were considered potential confounders of cancer-specific HRQoL based on the literature review, those two variables were entered into the final step.

At Step 1, demographic factors (education, employment, income, and age) were entered and explained 6% of the cancer-specific HRQoL (FACT-G) variance. At Step 2, health status (number of health problems, and sleep impairment) variables were entered, explaining 20% of the cancer-specific HRQoL's variances. At Step 3, self-efficacy (exercise self-efficacy and diet self-efficacy) variables were entered, with lifestyle factors (moderate exercise, vigorous exercise, self-rated exercise level, number of vegetable servings per day, years having five vegetable servings per day, number of fruit servings per day, and hours exposed to smoke at work) entered at step 4, explaining 22% and 27% of the cancer-specific HRQoL's variances, respectively. Two potential confounders were entered at Step 5; however, they were not significantly associated with cancer-specific HRQoL. Therefore, those variables were not determined to be confounders of cancer-specific HRQoL. Thus, the model at Step 4 was used for interpretation.

The model as a whole explained 26.6% of the cancer-specific HRQoL's variance $R^2 = .315$, *adjusted* $R^2 = .266$, $F = 6.38$, $p < .001$. The results indicate that education ($\beta = -4.98$, $p < .05$), the number of health problems ($\beta = -1.57$, $p < .01$), sleep impairment ($\beta = -1.40$, $p < .001$), exercise self-efficacy ($\beta = .12$, $p < .05$), years having two fruit servings per day ($\beta = .25$, $p < .05$), and hours exposed to smoke at work ($\beta = -1.11$, $p < .05$) were significant predictors of the cancer-specific HRQoL. In regards to moderate exercise, only the group performing moderate exercise 1-2 times per week had significant differences in the mean score of cancer-specific HRQoL compared to the "no exercise" group ($\beta = 5.41$, $p < .05$), indicating that women who undertook moderate exercise 1-2 times per week had higher cancer-specific HRQoL scores than those who did not. No significant differences in the mean score of the cancer-specific HRQoL were identified between groups undertaking moderate exercise “5-6 times per week” and “3-4 times per week” compared to the “no exercise” group. Similarly, only women who performed vigorous exercise for more than six months had a significantly higher score for cancer-specific HRQoL compared to those who had no exercise plan (β= 7.10, p< .05). However, when assessing the prediction of moderate and vigorous exercise to cancer-specific HRQoL, no significant predictions were found. Although income was not a significant predictor of cancer-specific HRQoL, the β coefficient shows that the difference in cancer-specific HRQoL score varied between the high and low income groups (β= -3.97, p> .05).

Table 6-23. General Linear Model Results Predicting Cancer-specific HRQoL Score by Personal Factors, Self-efficacy Levels, and Lifestyle Factors

Step	*Variables*	*Coefficients*	*SE*	*Adjusted R^2*	*R^2change*
1	Education (ref. diploma or higher)	-4.14*	2.03	.06***	
	Employment (ref. employed)	-1.18	2.11		
	Income (ref. high income group)	-4.56*	2.23		
	Age	-.10	.09		
2	Education (ref. diploma or higher)	-3.56	1.89	.20***	.14***
	Employment (ref. employed)	.91	1.97		
	Income (ref. high income group)	-4.07*	2.08		
	Age	.06	.09		
	Number of health problems	-1.84***	.53		
	Sleep impairment	-1.45***	.25		
3	Education (ref. diploma or higher)	-3.70*	1.89	.22***	.02***
	Employment (ref. employed)	.47	1.96		
	Income (ref. high income group)	-3.61	2.08		
	Age	.07	.09		
	Number of health problems	-1.85***	.49		
	Sleep impairment	-1.35***	.25		
	Self-efficacy exercise	.09*	.04		
	Self-efficacy diet	.03	.04		
4	Education (ref. diploma or higher)	**-4.98******	1.88	.27***	.05*
	Employment (ref. employed)	.16	1.94		
	Income (ref. high income group)	-3.97	2.07		
	Age	.11	.09		
	Number of health problems	**-1.57******	.49		
	Sleep impairment	**-1.40*******	.24		
	Self-efficacy exercise	**.12*****	.05		
	Self-efficacy diet	-.03	.04		
	Moderate exercise (ref. no exercise)				
	Per day	-4.19	3.14		
	5-6 times per week	-2.54	3.20		
	3-4 times per week	-4.31	2.86		
	1-2 times per week	**5.41*****	2.93		
	Vigorous exercise (ref. no exercise plan)	**7.10*****	2.67		
	More than six months	2.97	2.95		
	Less than six months	2.57	2.94		
	Plan to exercise in the next 30days	3.01	2.48		
	Plan to exercise in the next 6 months				
	Self-rated exercise level	-.74	.49		
	Number of vegetable servings per day	.79	.67		
	Years having five vegetable servings per day	.01	1.6		
	Number of fruit servings per day	.63	.75		
	Years having two fruits servings per day	**.28*****	.13		
	Hours exposed to smoke at work	**-.98*****	.57		

*p< .05, ** p < .01, *** p < .001

Table 6-24 (Cont). General Linear Model Results Predicting Cancer-specific HRQoL (FACT-G) Score by Personal Factors, Self-efficacy Levels, and Lifestyle Factors

Step	*Variables*	*Coefficients*	*SE*	*Adjusted R^2*	*R^2change*
5	Education (ref. diploma or higher)	**-5.05****	1.88	.27***	.05*
	Employment (ref. employed)	.06	1.95		
	Income (ref. high income group)	-3.92	2.07		
	Age	.11	.10		
	Number of health problems	**-1.57****	.50		
	Sleep impairment	**-1.40*****	.24		
	Self-efficacy exercise	**.13***	.05		
	Self-efficacy diet	-.03	.05		
	Moderate exercise (ref. no exercise)				
	Per day	-4.26	2.65		
	5-6 times per week	-2.90	2.93		
	3-4 times per week	-4.46	2.95		
	1-2 times per week	**5.47***	2.48		
	Vigorous exercise (ref. no exercise plan)	**6.90***	3.13		
	More than six months	3.03	3.21		
	Less than six months	2.55	2.85		
	Plan to exercise in the next 30days	2.89	2.93		
	Plan to exercise in the next 6 months				
	Self-rated exercise level	-.76	.49		
	Number of vegetable servings per day	.77	.68		
	Years having five vegetable servings per day	.02	.16		
	Number of fruit servings per day	.66	.74		
	Years having two fruits servings per day	**.27***	.23		
	Hours exposed to smoke at work	**-.95***	.39		
	Cancer type (ref. Gyn cancer)	.02	2.25		
	Menopausal status (ref. pre-meno)				
	Post-meno/menopause	1.80	2.97		
	Peri-menopause	2.85	2.22		

$^{*}p < .05$, $^{**} p < .01$, $^{***} p < .001$

Table 6.22 summarises the significant influential factors for self-efficacy levels, lifestyle factors, and HRQoL. The results indicate that exercise self-efficacy was a significant predictor of physical activity, diet variables, and HRQoL, whereas diet self-efficacy only predicted eating habits among lifestyle factor variables.

Table 6-25. A Summary of the Results for Statistically Significant Predictors of the Outcome Variables

Outcome variables	Significant predictors		
	Personal factors	Self-efficacy	Lifestyle factors
Self-efficacy		N/A	N/A
Diet self-efficacy	Income, sleep impairment		
Exercise self-efficacy	Residence, education, sleep impairment		
Lifestyle factors			N/A
Self-rated physical activity	Income, number of health problems	Exercise self-efficacy	
Energy expenditure		Exercise self-efficacy	
Number of vegetable servings consumed per day		Diet self-efficacy	
Years having five vegetable servings per day	Residence, age	Exercise self-efficacy	
Number of fruit servers consumed per day		Diet self-efficacy	
Years having two fruit servings per day	Age	Diet self-efficacy	
Average quantity of alcohol consumed in the last seven days	None		
Hours exposed to smoke at home	None		
Hours exposed to smoke at work	None		
BMI	Residence, sleep impairment, age		

Table 6.22 (cont.). A Summary of the Results for Statistically Significant Predictors of the Outcome Variables

Outcome variables	Significant predictors		
	Personal factors	Self-efficacy	Lifestyle factors
HRQoL			
*Physical Health (PCS – SF36_*	Income, age, number of health problems, sleep impairment		Energy expenditure, the average quantity of alcohol consumed in the last 7 days, hours exposed to smoke at home
Mental Health (PCS – SF36)	Income, number of health problems, sleep impairment	Exercise self-efficacy	Number of vegetable servings consumed per day
Cancer-specific HRQoL (FACT-G)	Education, number of health problems, sleep impairment	Exercise self-efficacy	years having two fruit servings per day, and hours exposed to smoke at work.

6.5 CONCLUSION

This chapter presented the results of the bivariate and multivariate analyses examining the relationships between personal factors, self-efficacy, lifestyle factors, and HRQoL. This chapter also explored the individual contribution of independent variables on outcome variables and the relative contributions of block (latent) variables to HRQoL. Further statistical analysis to test the theory, including mediation effects and the direct and indirect relationships between the constructs is required. The following chapter presents the results of the analyses testing the hypothesised theory using structural equational modelling.

Chapter 7: Structural Equation Modelling Testing the Hypothetical Model

7.1 INTRODUCTION

This chapter presents the results of the structural equation modelling undertaken to test the hypothesised model, including the mediation effects of self-efficacy within the model. This chapter aims to address the two research aims for Vietnamese women with BGC: (1) To identify the mediating role of self-efficacy levels and lifestyle factors in the relationships between personal factors, self-efficacy levels, lifestyle factors, and HRQoL; and (2) to identify the direct and indirect contributions of personal factors, self-efficacy levels, and lifestyle factors on HRQoL. The chapter begins with an assessment of the measurement models. It then examines the mediation effect of self-efficacy and tests the hypothesised model. The results of the test for each model are presented in a sequence corresponding to the order of the research questions.

7.2 ASSESSING THE MEASUREMENT MODELS

As shown in the conceptual framework for the study (Figure 3-4), the hypothesised model for the study included four constructs (personal factors, self-efficacy, lifestyle factors, and HRQoL). These constructs could be latent variables or contain latent variable constructs. The personal factors construct including socio-demographic factors and health status was latent variables. Self-efficacy was a latent variable with diet self-efficacy and exercise self-efficacy indicators. Lifestyle factor was latent variable with exercise, diet, alcohol consumption, smoking and BMI as indicators. The HRQoL construct had the FACTG score as latent variables with its component scores and the SF36 as latent variable with the physical component score and mental component score. According to Schumacker and Lomax (2010), the SEM approach with latent variables is undertaken in two steps: 1) validation of the measurement model, and 2) testing the structure model. Statistical significance is reported at the conventional $p < .05$ level (two-tailed).

The measurement model consisted of the latent variables and their indicator variables. Connections among the latent variables were not considered, as no causation was assessed and only correlations between latent variables were considered. The measurement model steps were examined using confirmatory factor analysis if all the measurements were reflective of latent variables. A model with any formative latent variable was validated by including at least two unrelated constructs with reflective indicators. The purpose of validation of the measurement model was to validate the way in which the latent variables in the model were measured. If SEM analysis showed a good fit, this was an indication that indicator variables reflected the latent variables they were supposed to and that the latent variables were different from each other.

To examine the mediating effect, a few criteria had to be met for a variable to be designed as a mediator (Hayes, 2009). Firstly, the causal variables (personal factors, lifestyle factors) had to have a significant effect on the dependent variables (HRQoL). Secondly, causal factors (personal factors and lifestyle factors) needed to be significantly associated with the mediators (self-efficacy) while controlling for the outcome variable (HRQoL) in the model. Thirdly, the mediator had to be a significant predictor of the outcome variable while controlling for causal variables. The final step was to examine the direct path between the predictor and the dependent variable. There were two conclusions relating to the mediation effect: (1) if the direct path between the predictor and the dependent variable was zero coefficients, there was a completed mediation effect, and (2) if the direct path between the predictor and the dependent variable was a non-zero coefficient, there was a partial mediation effect.

As presented in Table 6.22, a number of factors have been found as direct predictors of physical health, mental health, and cancer-specifi HRQoL, including socio-demographic factors (income, age, and education), health status (number of health problems and sleep impairment), self-efficacy (exercise self-efficacy and diet self-efficacy), and lifestyle factors (energy expenditure, average quantity of alcohol consumed in the last 7 days, hours exposed to smoke at home, the number of vegetable servings consumed daily, years having 2 fruit serving daily and hours exposed to smoke at work). Only significant predictors were selected to enter into the final theoretical testing model to examine the indirect effect and mediation effect of personal factors, self-efficacy levels, and lifestyle factors on the outcome of HRQoL, including Physical Health, Mental Health, and Cancer Specific HRQoL.

Based on the definition of formative and reflective measurement models described in the Chapter 4, models testing the mediation effect had three reflective measurement models and three formative measurement models, as presented in Table 7.1. Validation of these measurement models is discussed in the next section.

The goodness of fit of the model was evaluated based on the χ^2, goodness of fit index (GFI), adjusted goodness of fit index (AGFI), comparative fit index (CFI), and root mean square error of approximation (RMSEA). Satisfactory goodness of fit was defined as $\chi^2/df < 2.0$, GFI > 0.95, AGFI > 0.90, CFI > 0.97, and RMSEA < 0.005 and accepted goodness of fit was defined as $\chi^2/df < 3.0$, GFI > 0.90, AGFI > 0.85, CFI > 0.95, and RMSEA < 0.008.

Table 7-1. Reflective and Formative measurement models testing hypothetical models

Construct	Model and Indicators	Measurement model	
		Reflective	Formative
Personal factors	**Sociodemographic factors** Income Age Education		x
	Health status Number of health problems Sleep impairment		x
Self- efficacy	**Self-efficacy** Diet self-efficacy Exercise self-efficacy	x	
Lifestyle	**Lifestyle_ exercise** Energy expenditure The number of vegetable serves per day Years having two fruit serving per day Average quantity of alcohol consumed in the last 7 days Hours exposed to smoke at home Hours exposed to smoke at work		x
HRQoL	**SF26** Physical Health (PCS) Mental Health (MCS)	x	
	FACT-G Physical Well-being Social Well-being Emotional well-being Functional well-being	x	

7.2.1 Validating the reflective measurement model

A confirmatory factor analysis was conducted to estimate whether the hypothesised model of three reflective factors model fit the data. When specifying the initial model (Figure 7.1) and examining the model, the results indicated that the model did not fit the data well, χ^2(N= 330, *df*= 17)= 161.92, *p*= .000, CFI= .893, GFI=.881, AGFI= .728, RMSEA= .161, PCLOSE= .000, LO90= .139. The results of the regression weight modification indices also suggested that seven covariate paths should be added between e1 and e8, e2 and e7, e2 and e8, e3 and e8, e4 and e7, e4 and e8, and e7 and e8. Thus, a modified model added these seven paths for further examination (Figure 7.1).

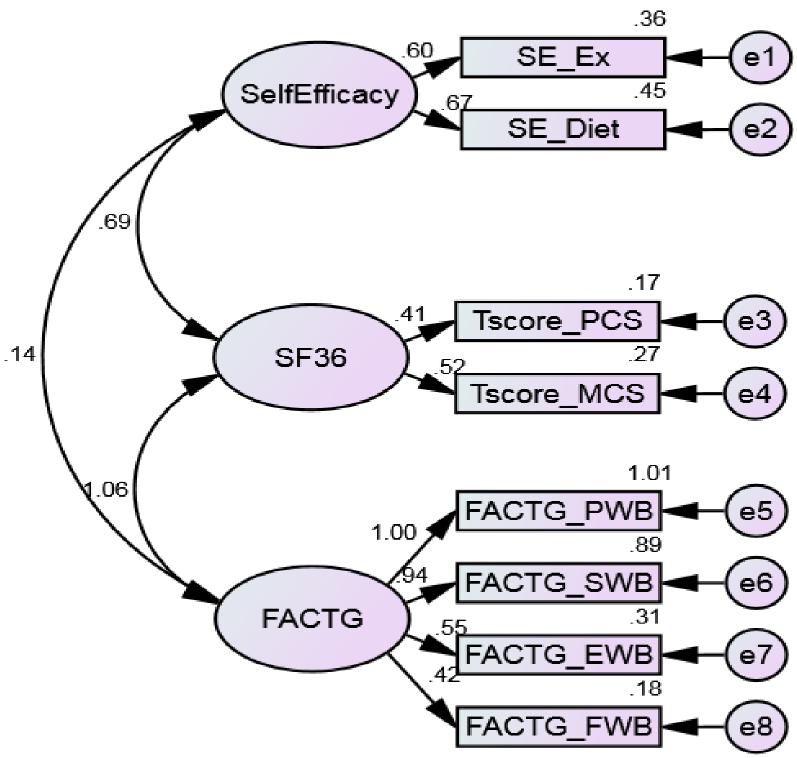

Figure 7-1. Standardised parameter estimate for the specified reflective measurement model

A review of the modified model (Figure 7.2) shows that the model did not fit the data well, $\chi 2$(N= 330, df= 10)= 19.03, p= .040, CFI= .993, GFI=.987, AGFI= .952, RMSEA= .052, PCLOSE= .409, LO90= .011. Figure 7.2 shows that all of the factor loadings were significant at p< .001and standardised loadings ranged from a low of .14 to a high of .86. Tabachnick and Fidel (2007) suggested cut-offs for standardised factor loadings as 0.32 (poor), 0.45 (fair), 0.55 (good), 0.63 (very good) or 0.71 (excellent). Therefore, standardised factors loadings of this modified model were poor. The figure also indicates that all factors were significantly inter-correlated, with correlations ranging from .38 to .93, with the exception of FACT-G, which did not correlate to FACT-G_PWB scores with a correlation of 1.08, indicating that these two were different from the others. The results from the squared multiple correlations ranged from .18 to .85, indicating non-substantive item reliabilities. Cunningham (2008) suggested that item reliabilities exceeding .50 and corresponding to approximate factor loading of .70 are desirable, though values of item reliabilities exceeding .30 seem acceptable. Therefore, this reflective measurement model was not valid.

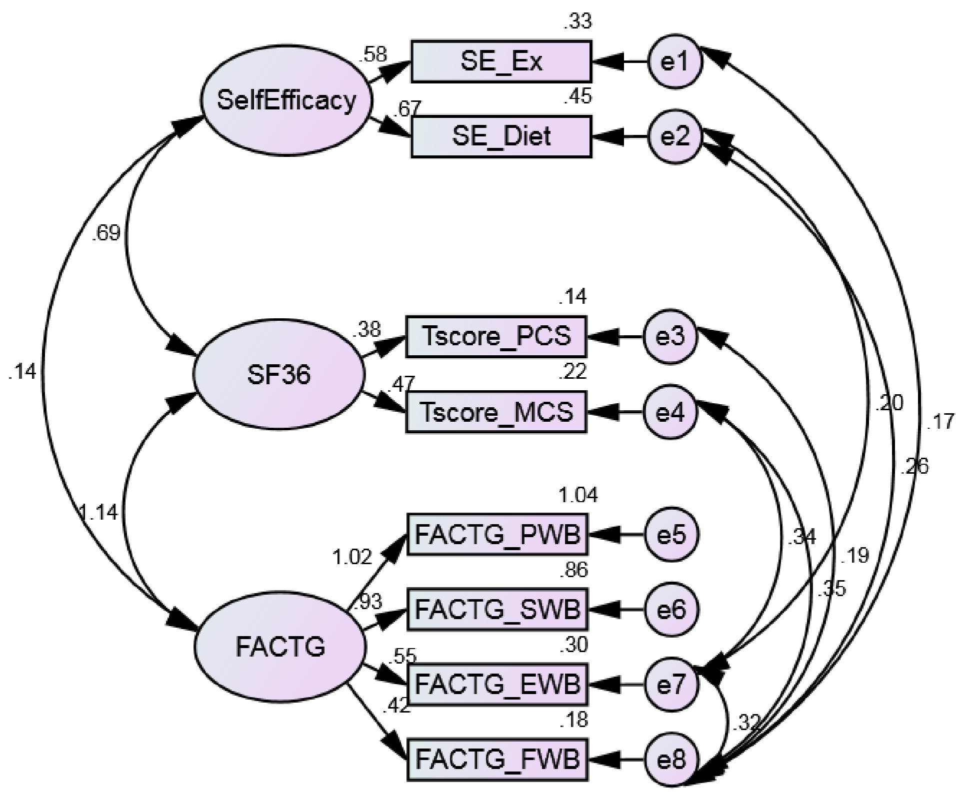

Figure 7-2. Standardised parameter estimates for the modified reflective measurement model

7.2.2 Validating the formative measurement models

A model with any formative latent variable was validated by including at least two unrelated constructs with reflective indicators. Assessing formative measurement of the following formative latent variables was therefore modelled with SF36 (physical health and mental health) and FACT-G (cancer specific HRQoL).

With formative latent variable of socio-demographic factors

The validity of the formative construct of socio-demographic factors was assessed by including two unrelated latent constructs with reflective indicators, including SF36 (physical health and mental health) and FACT-G (cancer specific HRQoL). Figure 7.3 depicts the hypothesised model. The structure of the socio-demographic factors was modelled as a formative first-order construct with three freely correlated indicators: (1) age, (2) income, and (3) qualification/educational status. SF36 and FACT-G were modelled as reflective constructs. The results indicated that the model did not fit the data well, χ^2(N= 330, df = 22)= 236.46, p= .000, CFI= .855, GFI=.862, AGFI= .717, RMSEA= .172, PCLOSE= .000, LO90= .153.

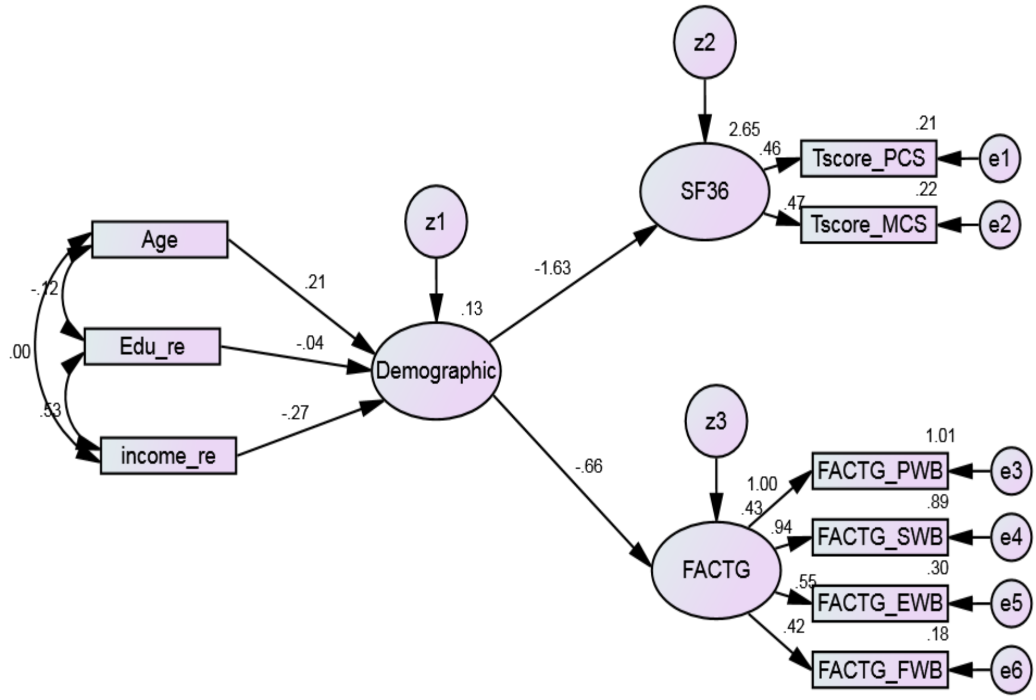

Figure 7-3. Standardised parameter estimates for the formative measurement model with a socio-demographic latent variable

The results of covariances and regression weights modification indices suggested that covariance paths should be added between e2 and e6, e2 and e5, e6 and z2, e5 and z2, and e5 and e6. These paths were added for further assessment of the model, as shown in Figure 7.4. The results indicate that the modified model did not fit the data well, χ^2(N= 330, df= 17)= 93.26, p= .000, CFI= .949, GFI=.943, AGFI= .848, RMSEA= .117, PCLOSE= .000, LO90= .094). No suggestion was found for improving the model in the modified model indices. Therefore, further inspections of the model result were not conducted.

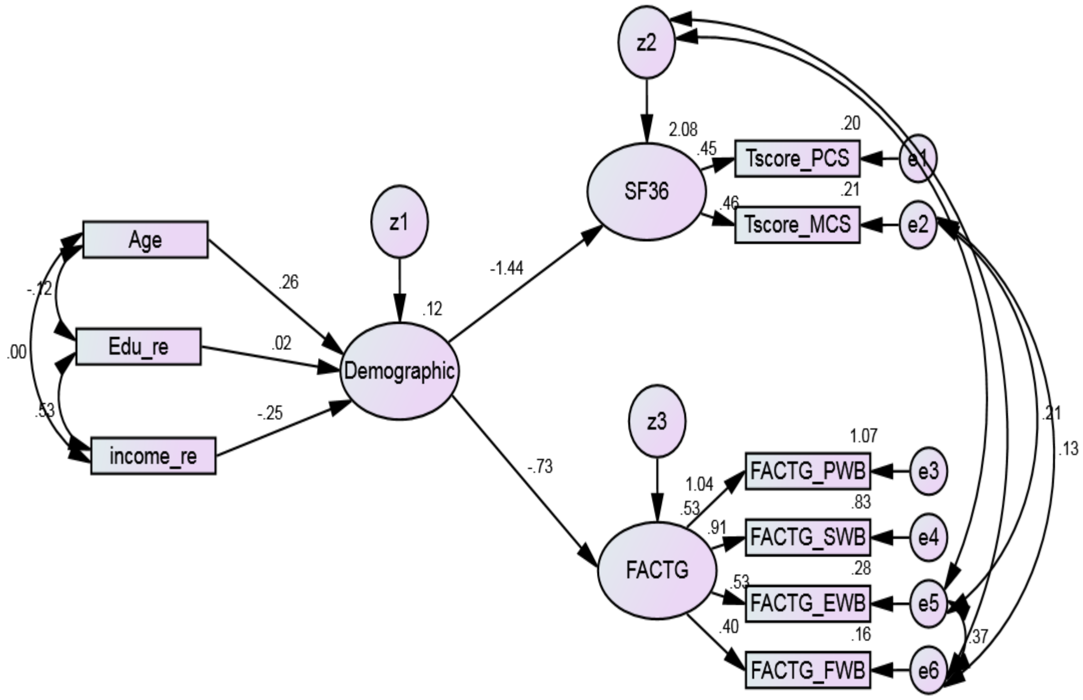

Figure 7-4. Standardised parameter estimates for the modified formative measurement model with a socio-demographic latent variable

With latent variable of health status

The structure of the health status was modelled as a formative first-order construct with two freely correlated indicators: (1) number of health problems and (2) sleep impairment, with SF36 (physical health and mental health) and FACT-G (cancer-specific HRQoL) modelled as reflective constructs. The results indicated that the model did not fit the data well, χ^2(N= 330, df = 17)= 179.45, p= .000, CFI= .883, GFI=.873, AGFI= .731, RMSEA= .170, PCLOSE= .000, LO90= .148, as shown in Figure 7.5.

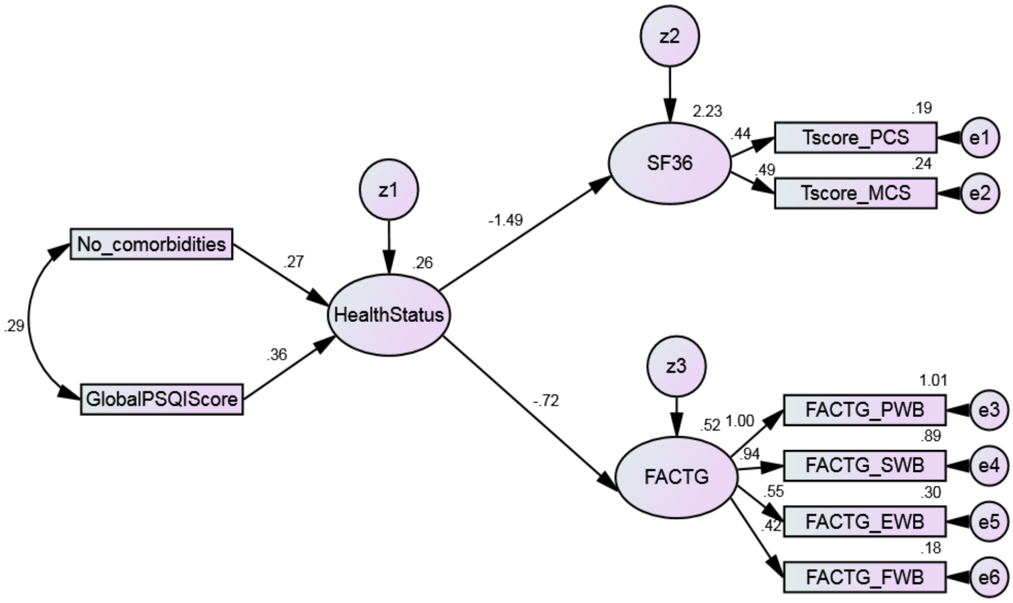

Figure 7-5. Standardised parameter estimates for the formative measurement model with health status as the latent variable

The results of covariances and regression weights modification indices suggested that sevens covariances path should be added between e5 and e6, e3 and e6, e2 and e6, e2 and e5, e2 and e3, e1 and e6, e1 and e5. These paths were added for further assessment of the model, as shown in Figure 7.6. The results indicate that the modified model did not fit the data well, χ^2(*N*= 330, *df*= 11)= 49.92, *p*= .000, CFI= .972, GFI=.964, AGFI= .884, RMSEA= .108, PCLOSE= .001, LO90= .076.). No suggestion was found for improving the model in the modified model indices. Therefore, further inspections of the model result were not conducted.

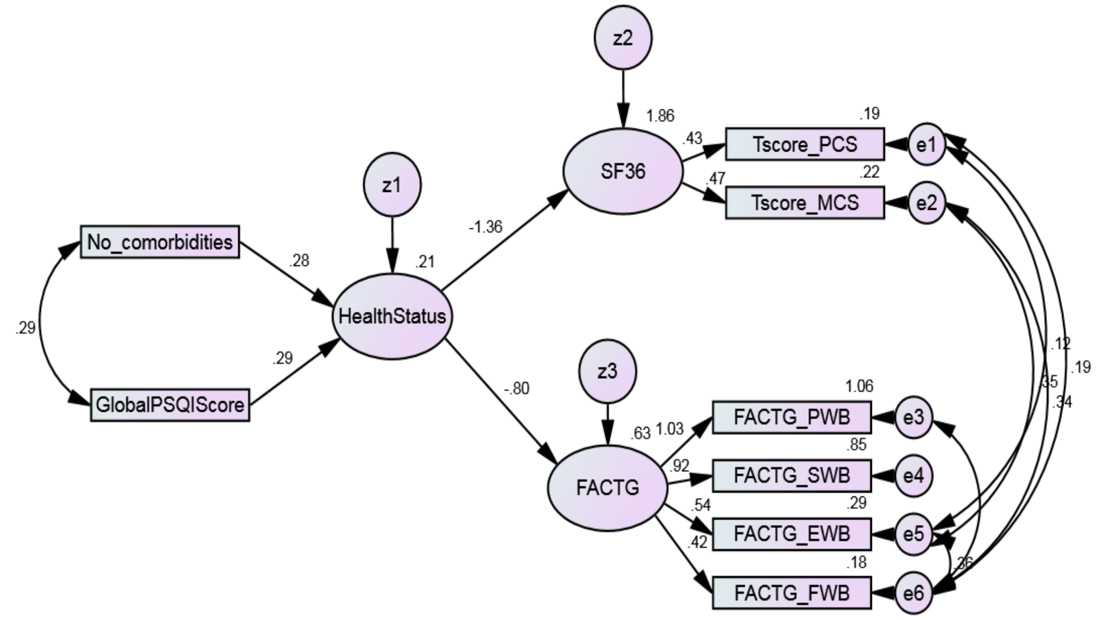

Figure 7-6. Standardised parameter estimates for the modified formative measurement model with health status as the latent variable

With latent variable of lifestyle factors

The structure of the lifestyle factors was modelled as a formative first-order construct with six freely correlated indicators: (1) energy expenditure, (2) number of vegetable servings consumed per day, (3) years having two fruit servings per day, (4) average quantity of alcohol consumed in the last 7 days, (5) hours exposed to smoke at home, and (6) hours exposed to smoke at work. Since lifestyle factors were associated with self-efficacy and HRQoL, self-efficacy was included in the model as one of reflective constructs and FACT-G (cancer-specific HRQoL) were modelled as another reflective construct. The results indicated that the model did not fit the data well, χ^2(N= 330, df = 35)= 134.08, p= .000, CFI= .902, GFI=.933, AGFI= .859, RMSEA= .089, PCLOSE= .000, LO90= .073 (Figure 7.7).

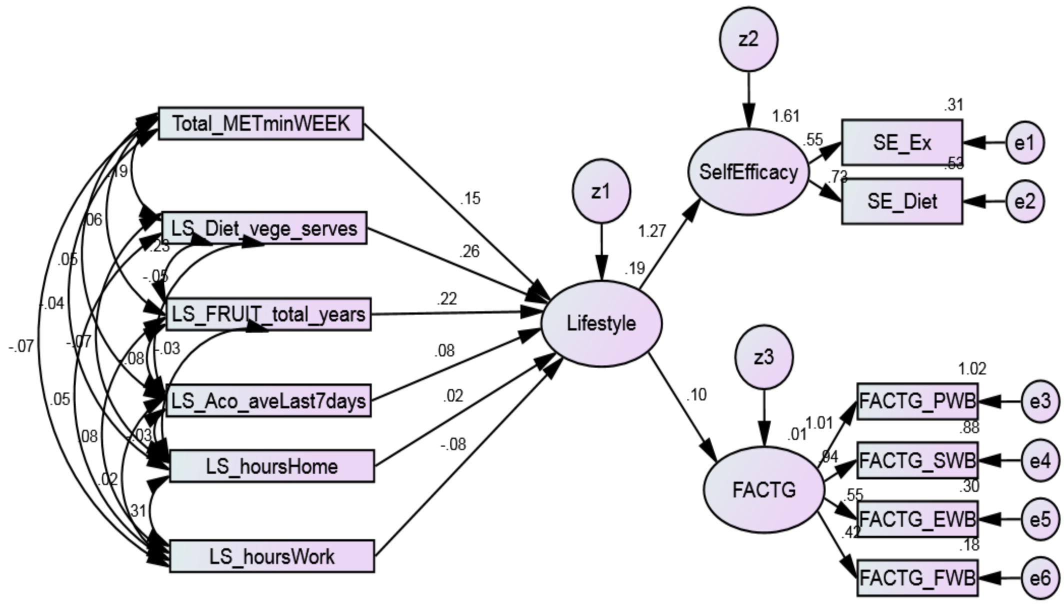

Figure 7-7. Standardised parameter estimates for the formative measurement model with lifestyle factors as the latent variable

Since the model did not fit the data well, an inspection of corvariances and regression weights modification indices was conducted to determine whether any modification in paths of the model can be improved. The modification indices indicated that four paths should be added, which were the paths between e2 and e6, and e2 and e5, e5 and e6, e1 and e6. The results indicated that the model did not fitted well with the data, χ^2(N= 330, df= 33)= 75.96, *p*= .00, CFI= .964, GFI=.985, AGFI= .918, RMSEA= .063, PCLOSE= .119, LO90= .044. No sugesstion for improving the model in the modified model indices has been shown (Figure 7.8). No suggestion was found for improving the model in the modified model indices (Figure 7.8). Therefore, further inspections of the model result were not conducted.

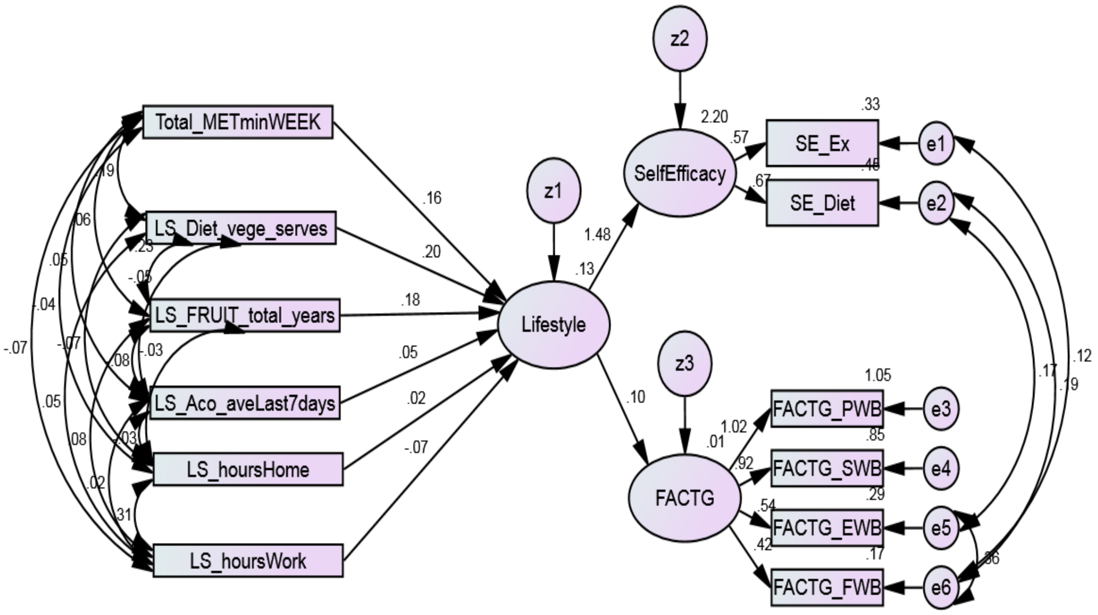

Figure 7-8. Standardised parameter estimates for the modified formative measurement model with lifestyle factors as the latent variable

In summary, this section examined the measurement models of latent variables included in the hypothesised model to determine whether these latent variables were validated. The results indicate that the combinations of indicators into these latent variables were not valid for further analyses using SEM with these latent constructs. Therefore, further assessment of the hypothesised model was conducted using manifest variables selected from results in Chapter 6.

7.3 TESTING THE HYPOTHESISED MODEL

Structural equation modelling (SEM) was undertaken to test the hypothesised model examining the mediation effect of self-efficacy in relation to personal factors, lifestyle factors, and HRQoL and to examine the direct and indirect influence of different factors on HRQoL. The general linear model analysis results presented in Chapter 6 were used to elucidate the factors by which the dependent variables (HRQoL) might potentially be influenced and to what extent. These findings were then used with the hypothesised model as a basis for covariate structural analysis. Based on these analyses, the structural equational models were specified for three outcomes of HRQoL, namely physical health (PCS-SF36), mental health (MCS-SF36), and cancer-specific HRQoL (FACTG).

Literature indicates that people who are engaging in healthy behaviours tend to be involved in other healthy activities compared to those who are not engaged in any health behaviours (Jepson, Harris, Platt, & Tannahill, 2010). For example, previous studies have demonstrated a positive relationship between healthy eating behaviour and exercise (King, Mohl, Bernard, & Vidourek, 2007). Additionally, Badura (1986) stated that higher self-efficacy promotes practising health behaviour performance. Therefore, if people had higher exercise self-efficacy, they tended to practice exercise and were thus also likely to engage in other positive health behaviours. For these reasons, paths between exercise self-efficacy and other lifestyle behaviours were added for SEM model testing if significant associations between exercise self-efficacy and lifestyle factors other than physical activity were found.

7.3.1 Model testing with physical health as an outcome variable

As presented in Tables 6.19 and 6.22, personal factors (including income, age, the number of health problems, and sleep impairment) and lifestyle factors (including energy expenditure, alcohol consumed in the last seven days, and hours exposed to smoke at home) were significant predictors of physical health (PCS-SF36). Self-efficacy was not a significant predictor of physical health. Therefore, this section only examines the mediation effects of lifestyle factors in the relationships between personal factors, lifestyle factors, and physical health. In Chapter 4, the assessments of SEM assumption identified that age, the number of health problems, energy expenditure, average of quantity of alcohol consumed in the last seven days, and hours exposed to smoke at home contained some outliers and were not normally distributed. Therefore, the assumptions of parametric SEM were violated. Thus, asymptotically distribution free estimation was used rather than maximum likelihood in the data analysis. The SEM model was specified based on general (normal) linear model (GLM) results presented in Chapter 6 and theoretical grounds. The results indicate that the model fit the data well, χ^2(N= 330, df= 3)= 2.801, p= .423, CFI= 1.000, GFI=.997, AGFI= .962, RMSEA= .000, PCLOSE= .711, LO90= .000, as shown in Figure 7.9. The results of fit indices showed that χ^2/df = .934 and CFI = 1.00, giving a consideration that the model was overfit. According to Schumacker and Lomax (2010), an overfit model can fit the data with the sample rather than reflecting the overall population and the regression coefficient and R-square can be misleading. A further inspection of fit indices was conducted. According to Kenny (2015), comparative fit index (CFI) is an incremental measure based on a non-centrality measure and it should only be used when comparing two models. Kenny (2015) also stated that the Chi square test is affected by the sample size. For models with less than 200 cases, Chi square is a reasonable measure of fit, but not a good measurement of fit for a model with more cases. Since the sample size of this study was 330 participants, other model fit indices were used. The results show GFI=.997, AGFI= .962, RMSEA= .000, PCLOSE= .711, LO90= .000, indicating a good fit of the model. Additionally, AIC= 68.801 and CAIC= 227.171 indicating a ratio of AIC/CAIC= .303, which indicates an acceptable fit of the model. To summarise, the model fit the data well and the results were good enough to reflect the overall population the sample was taken from.

The model as a whole explained 20.2% of the variance in the physical health score. Age, income, the number of health problems, and sleep impairment, explained

0.4% in energy expenditure, 3.7% in average quantity of alcohol consumed in the last seven days, and 0.4% of hours exposed to smoke at home, respectively.

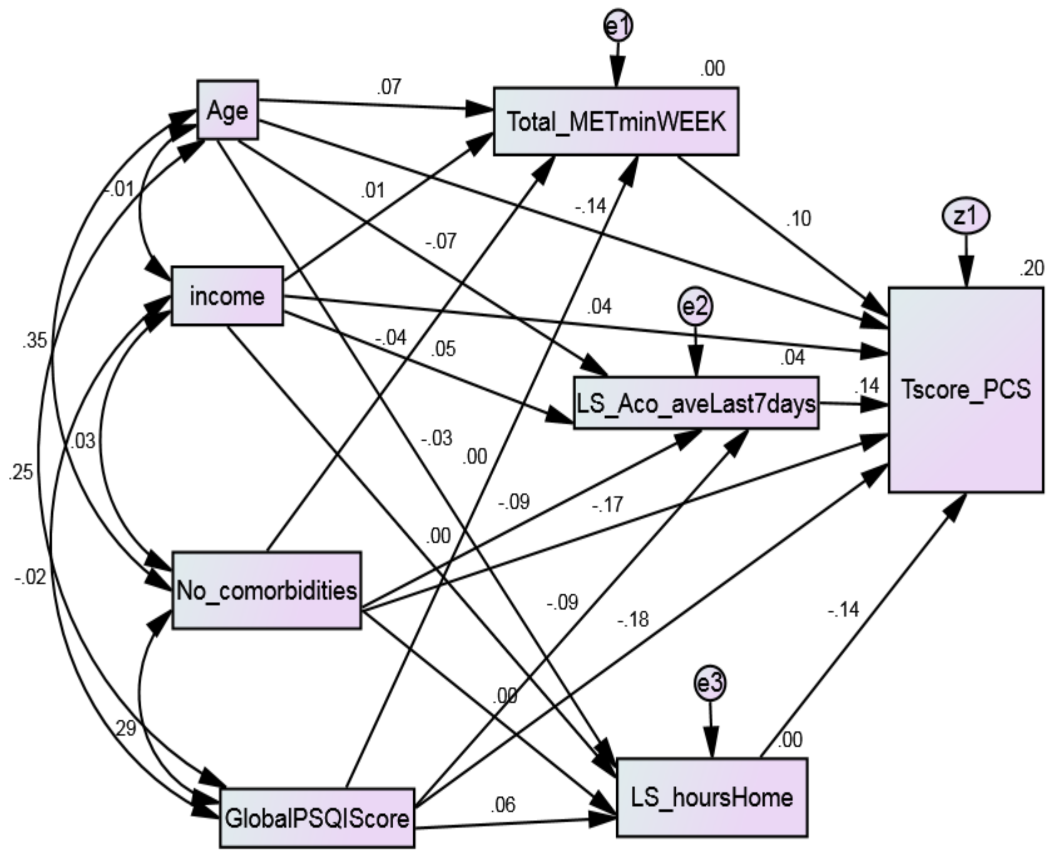

Figure 7-9. Standardised parameter estimates for hypothesised model testing with physical health outcome

Table 7.2 presents the results of coefficients between variables and the paths between variables in the mode. The parameters were estimates by maximum likelihood (ML) method to maximise the likelihood that obtained values of the criterion variables would be correctly predicted.

Table 7-2. Coefficients and the Paths Between Variables in the Model of Physical Health Outcome

Coefficients between variables			Raw *β*	Standardized *β*	*p* value
Energy expenditure	<---	Age	13.168	.069	.208
Energy expenditure	<---	Income	10.209	.005	.914
Energy expenditure	<---	Number of health problem	-45.895	-.039	.479
Energy expenditure	<---	Sleep impairment	-.726	-.001	.983
Average quantity of alcohol in last seven days	<---	Age	-.002	-.065	.216
Average quantity of alcohol in last seven days	<---	income	.015	.053	*
Average quantity of alcohol in last seven days	<---	Number of health problem	-.016	-.095	.167
Average quantity of alcohol in last seven days	<---	Sleep impairment	-.008	-.092	.123
Hours exposed to smoke at home	<---	Age	-.007	-.030	.645
Hours exposed to smoke at home	<---	Income	-.006	-.003	.974
Hours exposed to smoke at home	<---	Number of health problem	.003	.002	.962
Hours exposed to smoke at home	<---	Sleep impairment	.043	.061	.227
Physical health	<---	Sleep impairment	-.371	-.178	***
Physical health	<---	Energy expenditure	.000	.105	*
Physical health	<---	Income	.313	.044	.374
Physical health	<---	Number of health problem	-.716	-.175	***
Physical health	<---	Age	-.092	-.139	**
Physical health	<---	Average quantity of alcohol in the last seven days	3.533	.143	**
Physical health	<---	Hours exposed to smoke at home	-.407	-.135	**
Age	<-->	income	-.074	.513	.885
Age	<-->	Number of health problem	6.488	-.007	***
Income	<-->	Number of health problem	.051	.349	.696
Income	<-->	Sleep impairment	-.067	.029	.752
Number of health problem	<-->	Sleep impairment	1.740	-.020	***
Age	<-->	Sleep impairment	9.141	.294	***

$^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$

Exploring mediation effects with physical health outcome

To meet the criteria of the mediation effect, the direct effect of causal variables to the outcome variable of physical health (PCS-SF36) without controlling for mediators was obtained from the GLM results presented in Table 6.19.

As shown in Table 7.3, while controlling for other variables physical health in the model, income was the only significant mediator for the average quantity of alcohol consumed in the last seven days (β = .53, p< .05). All four steps in testing mediating effects were numbered in the table as (1), (2). (3), and (4). The path between income and physical health was not significant for the presence of the average quantity of alcohol consumed in the last seven days, indicating a partial mediation. This result indicates that while the high income group had a higher mean score of physical health compared to the low income group (β= -3.20, p< .01), if women in these income groups consumed alcohol, there may not be any significant difference in physical health between the low and high income groups. Apart from the mediation effect of the average quantity of alcohol consumed in the last seven days for the path between income and physical health, no other mediation effects were found for lifestyle factors in the relationship between personal factors (age, income, number of health problems, and sleep impairment) and physical health. As the criteria for mediation effects were not met, the hypotheses were rejected in this regard.

Table 7-3. Mediation Effects of Lifestyle Factors in Relationships Between Personal Factors and Physical Health

Causal variables	Mediator	Outcome	Model without mediator: (1) Causal variables directly affect physical health without mediator	Mediation model: (2) Causal variables directly affects mediator	Mediation model: (3) Mediator directly affects physical health	Mediation model: (4) Causal variables directly affect physical health	Conclusion
Age	Energy expenditure	Physical health	-.09*	.069ns	.111*	-.139**	No mediation effect
Income			-3.20**	.005ns		.040ns	No mediation effect
Number of health problems			-.59**	-.039ns		-.172**	No mediation effect
Sleep impairment			-.36**	-.001ns		-.184***	No mediation effect
Age	Average quantity of alcohol consumed in the last seven days	Physical health	-.09*	-.065ns	.134*	-.147**	No mediation effect
Income			-3.20**	.053*		.045ns	**Partial mediation effect**
Number of health problems			-.59**	-.095ns		-.167**	No mediation effect
Sleep impairment			-.36**	-.092ns		-.176***	No mediation effect
Age	Hours exposed to smoke at home	Physical health	-.09*	-.030ns	-.139**	-.141**	No mediation effect
Income			-3.20**	-.003ns		.037ns	No mediation effect
Number of health problems			-.59**	.002ns		-.174**	No mediation effect

*p< .05, ** p < .01, *** p < .001

Examining the direct and indirect relationships between the study variables and physical health outcome

In regards to the total effect, direct effects, and indirect effects, the standardised forms of these three effects are displayed in Table 7.4. Sleep impairment had the strongest total effect for physical health, with a total effect of -.199, which was comprised of a direct effect of -.178, and mediated effects via three mediators (energy expenditure, average quantity of alcohol in the last seven days, and hours exposed to smoke at home) of -.022. The total effect of the number of health problems on the physical health was -.193, with a direct effect of -.175, and an indirect effect via three mediators of -.018. Income had a very low but positive total effect on physical health due to a very low direct effect of .004; its indirect effect on physical health was .008. Age had a total effect of -.137 to PCS-SF36, with a direct effect on physical health of -.139 and indirect effect of .002.

Bootstrapping was conducted to examine the indirect effects of lifestyle factors on the physical health in the model with all three mediators. The results indicate that the indirect effect of sleep impairment was -.178 (95% CI: -.051 to .009), the number of health problems was -.022 (95% CI: -.048 to .003), income was .044 (95% CI: -.027 to .033), and age was -.137 (95% CI: -.018 to .038) on physical health, respectively. As the intervals (CIs) of these indirect effects contained zero, it was concluded that these indirect effects were not different from zero. Therefore, no mediation effect was found once all three mediators were put into the model and examined at the same time.

In summary, this result identified that sleep impairment had the strongest total effect on physical health. When separating mediators in the model, the average quantity of alcohol consumed in the last seven days partially mediated the relationship between income and physical health. However, no mediation effect was found when all three mediators were included in the model and examined at the same time.

Table 7-4. Standardised Total Effects, Direct Effects and Indirect Effect of Model with Physical Health (PCS-SF36) Outcome

	Sleep impariment	Number of health problem	Income	Age	Hours exposed to smoke at home	Average quantity of alcohol last 7 days	Energy expenditure
Standardised total effects							
Hours exposed to smoke at home	.061	.002	-.003	-.030	-	-	-
Average quantity of alcohol in the last seven days	-.092*	-.095	.053	-.065	-	-	-
Energy expenditure	-.001	-.039	.005	.069	-	-	-
Physical health	-.199**	-.193	.053**	-.137**	-.135*	.143*	.105*
Standardised direct effects							
Hours exposed to smoke at home	.061	.002	-.003	-.030	-	-	-
Average quantity of alcohol in the last seven days	-.092*	-.095	.053	-.065	-	-	-
Energy expenditure	-.001	-.039	.005	.069	-	-	-
Physical health	-.17**	-.175	.044**	-.139**	-.135*	.143*	.105*
Standardised indirect effects							
Hours exposed to smoke at home	-	-	-	-	-	-	-
Average quantity of alcohol in the last seven days	-	-	-	-	-	-	-
Energy expenditure	-	-	-	-	-	-	-
Physical health	-.022	-.018	.008	.002	-	-	-

Note: "-" no pathway between the two variable, *p< .05, ** p < .01, *** p < .001, ns non-significance

7.3.2 Model testing with mental health as an outcome variable

As presented in Tables 6.20 and 6.22, personal factors (including income, the number of health problems, and sleep impairment), self-efficacy exercise, and lifestyle factors (number of vegetable servings consumed per day) were significant predictors of mental health (MCS-SF36). Since both self-efficacy and lifestyle factors were found to be predictors of mental health, this section examines the mediation effects of: (1) self-efficacy mediating relationships between personal factors and mental health, and (2) lifestyle factors mediating relationships between self-efficacy and mental health.

In Chapter 4, the assessments of SEM assumptions showed that age, the number of health problems, and number of vegetable servings consumed per day contained some outliers and were not normally distributed. Therefore, the assumptions of parametric SEM were violated. Thus, asymptotically distribution free estimation was used rather than maximum likelihood in the data analysis. The SEM model was specified based on the general (normal) linear model (GLM) results presented in Table 6.20 and theoretical grounds. The results indicate that the model fit the data well, $\chi^2(N= 330, df= 3)= 4.808$, $p= .86$, CFI= .977, GFI=.996, AGFI= .975, RMSEA= .043, PCLOSE= .476, LO90= .000, AIC= 40.808, CAIC= 127.192, as shown in Figure 7.10. The model as a whole explained 21.5% of the variance in the MCS-SF36 score. Income, the number of health problems, and sleep impairement explained 1.9% of the variance in exercise self-efficacy. These personal factors indirectly influenced the number of vegetable servings consumed per day via exercise self-efficacy, and together with exercise self-efficacy explained 2.9% in the variance of the number of vegetable servings consumed per day.

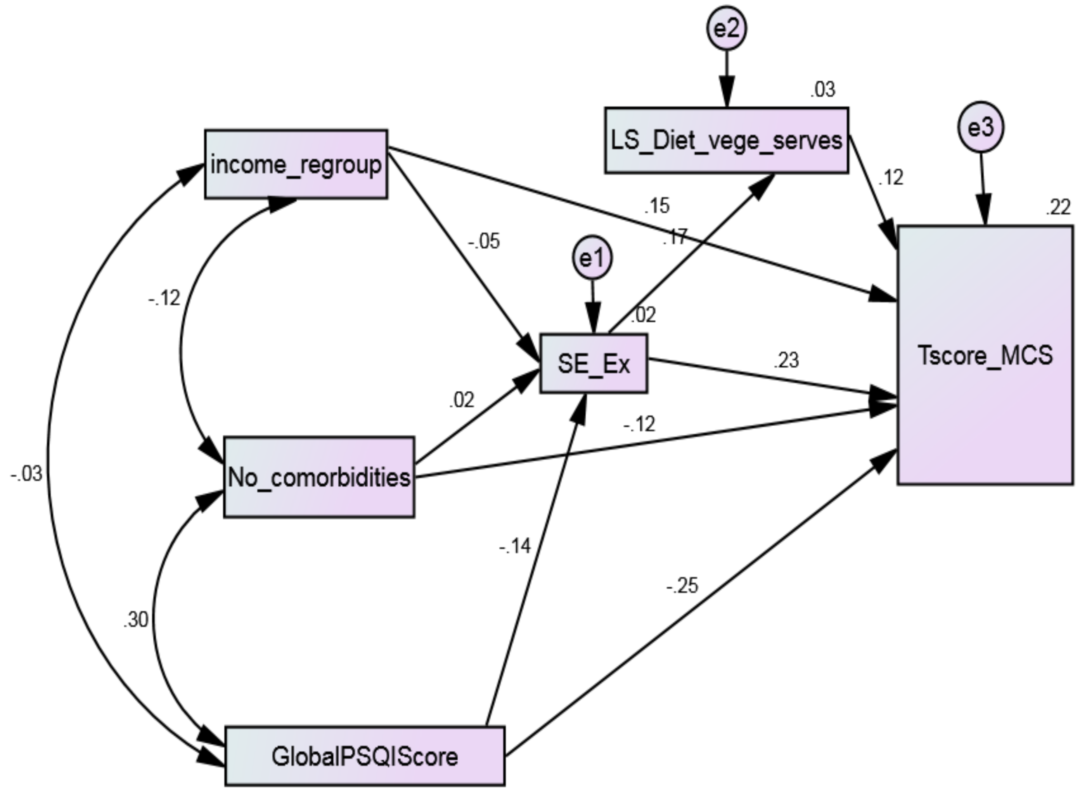

Figure 7-10. Standardised parameter estimates for hypothesised model testing with mental health outcome

Table 7.5 presents the results of the coefficients between variables and the paths between variables in the mode. The parameters were estimates from the maximum likelihood (ML) method to maximise the likelihood that obtained values of the criterion variables would be correctly predicted.

Table 7-5. Coefficients and the Paths Between Variables in the Model of Mental Health Outcome

Coefficients between variables			Raw β	Standardized β	p value
Exercise self-efficacy	<---	Sleep impairment	-.833	-.136	*
Exercise self-efficacy	<---	Income	-2.092	-.046	.408
Exercise self-efficacy	<---	Number of health problems	.218	.018	.753
Number of vegetable servings consumed per day	<---	Exercise self-efficacy	.011	.169	***
Mental health	<---	Exercise self-efficacy	.103	.225	***
Mental health	<---	Number of health problems	-.653	-.119	*
Mental health	<---	Sleep impairment	-.712	-.254	***
Mental health	<---	Number of vegetable servings consumed per day	.859	.119	*
Mental health	<---	Income	3.217	.153	**
Number of health problems	<-->	Income	-.099	-.125	*
Sleep impairment	<-->	Income	-.052	-.033	.556
Number of health problems	<-->	Sleep impairment	1.767	.298	***

$^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$, ^{ns} non-significance

Exploring mediation effects with the outcome of mental health

As shown in Table 7.6, while controlling for other variables and mental health in the model, only sleep impairment significantly affected the mediator, namely exercise self-efficacy (β = -.136, p< .05). All four steps in testing mediating effects were numbered in the table as (1), (2). (3), and (4). The path between sleep impairment and mental health was significant; however, the effect of sleep impairment on mental health was reduced from -.68 to -.254 with the presence of exercise self-efficacy, indicating a partial mediation of exercise self-efficacy on the relationship between sleep impairment and mental health. This result indicates that the more sleep impairment a woman had, the lower the scores on mental health; however, the effect of sleep impairment on mental health could be reduced if she had a higher confidence in the ability to exercise. Apart from the mediation effect of exercise self-efficacy on the relationship between sleep impairment and mental health, no other mediation effects of lifestyle factors on the relationship between exercise self-efficacy and mental health were found. As the criteria of mediation effect were not met, the hypotheses were rejected.

Table 7-6. Mediation Effects Self-efficacy and Lifestyle Factors in Relationships Between Personal Factors, Self-efficacy, Lifestyle Factors and Mental Health

Causal variables	Mediator	Outcome	Model without mediator	Mediation model			Conclusion
			(1) Causal variable directly affect mental health outcome without mediator	(2) Causal variable directly affects mediator	(3) Mediator directly affects mental health outcome	(4) Causal variable directly affect mental health outcome	
Income	Exercise self-efficacy	Mental health	-2.90^{*}	$-.046^{ns}$	$.225^{***}$	$.153^{**}$	No mediation effect
Number of health problems			$-.64^{*}$	$.018^{ns}$		$-.119^{*}$	No mediation effect
Sleep impairment			$-.68^{***}$	$-.136^{*}$		$-.254^{***}$	**Partial mediation**
Exercise self-efficacy	Number of vegetable consumed per day	Mental health	$.20^{ns}$	$.169^{***}$	$.119^{*}$	$.225^{***}$	No mediation effect

$^{*}p< .05$, $^{**}p < .01$, $^{***}p < .001$

Examining the direct and indirect relationships between the study variables outcome of mental health

In regards to the total effects, direct effects, and indirect effects, the standardised forms of these three effects are displayed in Table 7.7. Sleep impairment had the strongest total effect of -.288 on mental health, which was comprised of a direct effect of -.136 and a mediated effect (indirect effect) via self-efficacy of -.254. The total effect of exercise self-efficacy on mental health was .245, with a direct effect of .225, and an indirect effect via the number of vegetable servings consumed per day of .020. Income had a low total effect on mental health of .142, with a direct effect on mental health of .153, and indirect effect via exercise self-efficacy of -.011. The number of health problems had a negative and total effect on mental health of -.114, with a direct effect of -.119, and an indirect effect via exercise self-efficacy of .004.

Exploring the total and indirect effects of the number of vegetable servings consumed per day, the results indicate that exercise self-efficacy has the strongest total effect on the number of vegetable servings consumed per day. Sleep impairmenthad an indirect effect on the number of vegetable servings consumed per day of -.023 via exercise self-efficacy. Income and the number of health problems did not have significant total effects on the number of vegetable servings consumed per day.

Bootstrapping was conducted to examine the indirect effects of personal factors and the indirect effect of exercise self-efficacy on mental health. The results indicate that the indirect effect of income via exercise self-efficacy on mental health was -.011 (95% CI: -.043 to .012), p= .298; sleep impairment via exercise self-efficacy on mental health was -.033 (95% CI: -.069 to .009), p=.018, and the number of health problems was .004 (95% CI: -.021 to .033), p= .729. The indirect effect of exercise self-efficacy via the number of vegetable servings consumed per day on mental health was .020

(95% CI: .004 to .045), *p*= .006. The results indicate that when putting all mediators in one model and assessing them at the same time, exercise self-efficacy was a mediator for the relationship between sleep impairment and mental health, and the number of vegetable servings consumed per day was a mediator for the relationship between exercise self-efficacy and mental health.

In summary, this section shows that sleep impairment had the strongest total effect on mental health. When separating mediators in the model, only one mediation effect was found, which was for exercise self-efficacy mediating the effect of sleep impairment on mental health. However, when all mediators were included in the model and examined at the same time, two mediation effects were found: (1) exercise self-efficacy mediated the effect on sleep impairment on mental health, and (2) number of vegetable servings consumed per day mediated the effect of exercise self-efficacy on mental health.

Table 7-7. Standardised Total Effects, Direct Effects and Indirect Effects of the Model with Mental Health Outcome

	Income	Sleep impairment	Number of health problems	Exercise self-efficacy	Number of vegetable servings consumed per day
Standardised total effects					
Exercise self-efficacy	-.046	-.136*	.018	-	-
Number of vegetable servings consumed per day	-.008	-.023*	.003	.169**	-
Mental health	.142**	-.288**	-.114*	.245**	.119*
Standardised direct effects					
Exercise self-efficacy	-.046	-.136*	.018	.000	.000
Number of vegetable servings consumed per day	-	-	-	.169**	-
Mental health	.153**	-.254**	-.119*	.225**	.119*
Standardised indirect effects					
Exercise self-efficacy	-	-	-	-	-
Number of vegetable servings consumed per day	-.008	-.023*	.003	-	-
Mental health	-.011	-.033*	.004	.020**	-

Note: "-" no pathway between the two variable, $^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$

7.3.3 Model testing with cancer-specific HRQoL as an outcome variable

As presented in Tables 6.21 and 6.22, personal factors (including education, the number of health problems, and sleep impairment), self-efficacy exercise, and lifestyle factors (years having two fruit servings per day and hours exposed to smoke at work) were significant predictors of cancer-specific HRQoL (FACT-G). Although cancer-specific HRQoL scores were significantly diffiences between group of vigorous exercise and moderate exercise, these variales were not found as predictors of cancer-specific HRQoL, these variables were not included in the SEM model. Since both self-efficacy and lifestyle factors were found to be predictors of cancer-specific HRQoL, this section examines the mediation effects of: (1) self-efficacy mediating relationships between personal factors and cancer-specific HRQoL, and (2) lifestyle factors mediating relationships between self-efficacy and cancer-specific HRQoL.

In Chapter 4, the assessments of SEM assumptions showed that the number of health problems, years having two fruit servings per day, and hours exposed to smoke at work contained some outliers and were not normally distributed. Therefore, the assumptions of parametric SEM were violated. Thus, asymptotically distribution free estimation was used rather than maximum likelihood in data analysis. The SEM model was specified based on the general (normal) linear model (GLM) results presented in Table 6.21 and theoretical grounds. The results indicate that the model fit the data well, χ^2(N= 330, df= 7)= 7.529, p= .376, CFI= .995, GFI=.999, AGFI= .998, RMSEA= .015, PCLOSE= .800, LO90= .000, AIC= 49.529, CAIC= 150.310, as shown in Figure 7.11. The model as a whole explained 24.7% of the variance in the FACTG score. Education, the number of health problems, and sleep impairment explained 1.9% of exercise self-efficacy variance. These personal factors indirectly influenced years having two fruit servings per day and hours exposed to smoke at home via exercise self-efficacy, and together with self-efficacy explained 4.3% of the variances in years having two fruit servings per day, and 0.7% of the variance in hours exposed to smoke at home, respectively.

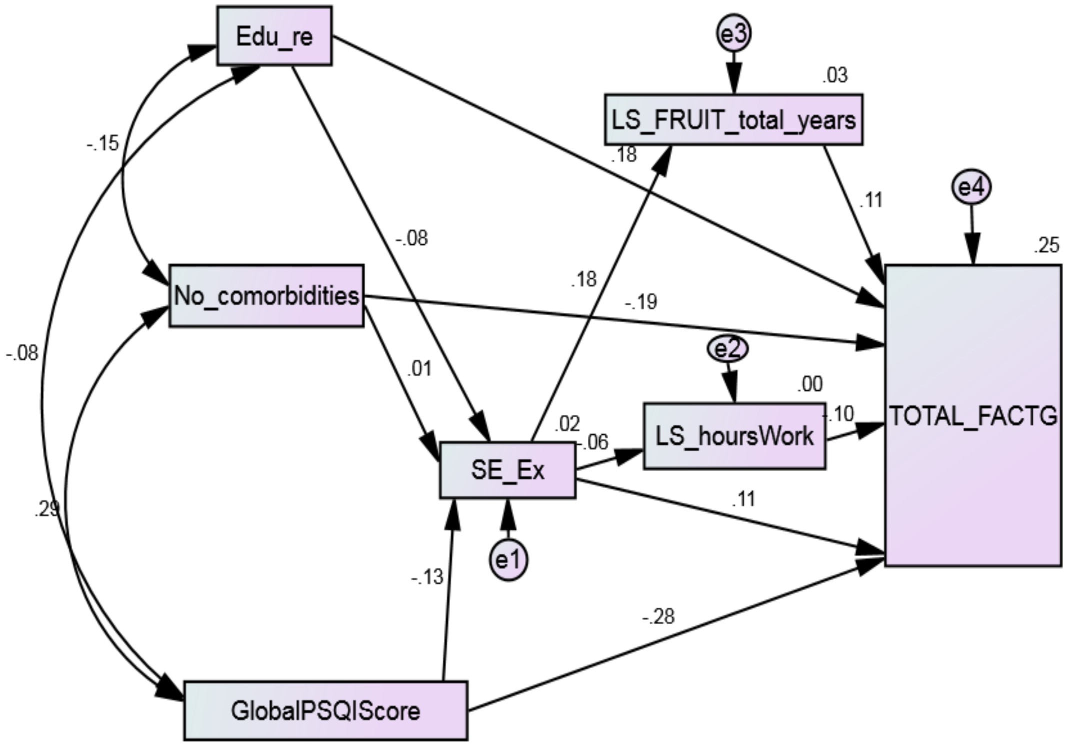

Figure 7-11. Standardised parameter estimates for hypothesised model testing with cancer-specific HRQoL

Table 7.8 presents the results of the coefficients between variables and the paths between variables in the model. The parameters were estimates from the maximum likelihood (ML) method to maximise the likelihood that obtained values of the criterion variables would be correctly predicted.

Table 7-8. Coefficients and the Paths Between Variables in the Model of Cancer-specific HRQoL Outcome

Coefficients between variables			Raw β	Standardized β	p value
Exercise self-efficacy	<---	Education	-3.477	2.305	.131
Exercise self-efficacy	<---	Number of health problems	.313	.685	.648
Exercise self-efficacy	<---	Sleep impairment	-.731	.342	*
Years having two fruit servings per day	<---	Exercise self-efficacy	.039	.008	***
Hours exposed to smoke at work	<---	Exercise self-efficacy	-.002	.003	.636
Cancer-specific HRQoL	<---	Years having two fruit servings per day	.409	.168	*
Cancer-specific HRQoL	<---	Education	5.625	1.546	***
Cancer-specific HRQoL	<---	Number of health problems	-1.732	.501	***
Cancer-specific HRQoL	<---	Sleep impairment	-1.407	.232	***
Cancer-specific HRQoL	<---	Exercise self-efficacy	.087	.038	*
Cancer-specific HRQoL	<---	Hours exposed to smoke at work	-1.102	.602	.067
Education	<-->	Number of health problems	-.136	.047	*
Education	<-->	Sleep impairment	-.120	.092	.192
Number of health problems	<-->	Sleep impairment	1.790	.365	***

$^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$, ^{ns} non-significance

Exploring mediation effects with outcome of cancer-specific HRQoL

As shown in Table 7.9, while controlling for other variables and cancer-specific HRQoL in the model, only sleep impairment significantly affected the mediators, namely exercise self-efficacy (β = -.120, p< .05). All four steps in testing mediating effects were numbered in the table as (1), (2). (3), and (4). The path between sleep impairment and cancer-specific HRQoL was significant; however, the effect of sleep impairment on cancer-specific HRQoL was reduced from -1.380 to -.298 with the presence of exercise self-efficacy, indicating a partial mediation of exercise self-efficacy in the relationship between sleep impairment and cancer-specific HRQoL. This result indicates that the more sleep impairment a woman had, the lower the score on cancer-specific HRQoL; however, the effect of sleep impairment on cancer-specific HRQoL could be reduced if she had higher confidence in the ability to exercise. In addition to the mediation effect of exercise self-efficacy on the relationship between sleep impairment and cancer-specific HRQoL, years having two fruit servings per day mediated the relationship between exercise self-efficacy and cancer-specific HRQoL. The results indicate that the higher exercise self-efficacy women had, the higher cancer-specific HRQoL they gained. The mediation effect result highlights that the effect of exercise self-efficacy on cancer-specific HRQoL could be reduced if these women had more years consuming two fruit servings per day. Apart from these partial mediation effects, exercise self-efficacy did not mediate the relationships between education and cancer-specific HRQoL, or the number of health problems and cancer-specific HRQoL. Hours exposed to smoke at work did not mediate the relationship between exercise self-efficacy and cancer-specific HRQoL.

Table 7-9. Mediation Effects Self-efficacy and Lifestyle Factors in Relationships Between Personal Factors, Self-efficacy, Lifestyle Factors and Cancer-specific HRQoL

$^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$

Causal variables	Mediator	Outcome	Model without mediator: (1) Causal variable directly affect cancer-specific HRQoL without mediator	Mediation model: (2) Causal variable directly affects mediator	Mediation model: (3) Mediator directly affects cancer-specific HRQoL	Mediation model: (4) Causal variable directly affect Cancer-specific HRQoL	Conclusion
Education	Exercise self-efficacy	Cancer-specific HRQoL	-4.81^{*}	$-.084^{ns}$	$.113^{*}$	$.175^{***}$	No mediation
Number of health problems			-1.64^{**}	$.026^{ns}$		$-.188^{***}$	No mediation
Sleep impairment			-1.38^{***}	$-.120^{*}$		$-.298^{***}$	**Partial mediation**
Exercise self-efficacy	Years having two fruit servings per day	Cancer-specific HRQoL	$.126^{**}$	$.206^{***}$	$.099^{*}$	$.113^{*}$	**Partial mediation**
Exercise self-efficacy	Hours exposed to smoke at work	Cancer-specific HRQoL	$.126^{**}$	$-.024^{ns}$	$-.099^{ns}$	$.113^{*}$	No mediation

Examining the direct and indirect relationships between the study variables outcome of cancer-specific HRQoL

In regards to the total effects, direct effects, and indirect effects of variables on cancer-specific HRQoL, the standardised forms of these three effects are displayed in Table 7.10. Sleep impairment had the strongest total effect of -.314 on cancer-specific HRQoL, which was comprised of a direct effect of -.298 and a mediated effect (indirect effect) via exercise self-efficacy of -.016. The total effect of exercise self-efficacy on cancer-specific HRQoL was .136, with a direct effect of .133 and an indirect effect of .023 via years having two fruit servings per day and hours exposed to smoke at work. The number of health problems had a total effect on cancer-specific HRQoL of -.184, with a direct effect of -.188 and an indirect effect of .004 via exercise self-efficacy. Education had a total effect on cancer-specific HRQoL of .164, which comprised of a direct effect of .175 and an indirect effect of -.011.

Bootstrapping was conducted to examine the indirect effects of personal factors (sleep impairment, the number of health problems, and education) on cancer-specific HRQoL and the indirect effect of exercise self-efficacy on cancer-specific HRQoL. The results indicate that the indirect effect of sleep impairment via exercise self-efficacy on cancer-specific HRQoL was -.016 (95% CI: -.047 to - .002), p= .020; the number of health problems via exercise self-efficacy on cancer-specific HRQoL was .004 (95% CI: -.014 to .020), p=.784, and education via exercise self-efficacy on cancer-specific HRQoL was -.011 (95% CI: -.021 to .033), p= .729. The indirect effect of exercise self-efficacy via the years having two fruit servings per day on cancer-specific HRQoL was .020 (95% CI: -.035 to .002), p= .098. The indirect effect of exercise self-efficacy via both years having two fruit servings per day and hours exposed to smoke at work was .023 (95% CI: -.035 to .002), p= .013. Although hours exposed to smoke at work did not mediate the relationship between self-efficacy and cancer-specific HRQoL, this variable, together with years having two fruit servings per day mediated the effect of exercise self-efficacy on cancer-specific HRQoL.

These results highlight that sleep impairment had the strongest total effect on cancer-specific HRQoL. When separating mediators in the model, two mediation effects were found: (1) exercise self-efficacy mediated the effect of sleep impairment on cancer-specific HRQoL, and (2) years having two fruit servings per day mediated the effect of exercise self-efficacy on cancer-specific HRQoL. These mediation effects were confirmed in the model when all mediators were included. Although hours exposed to smoke at work did not mediate the relationship between self-efficacy and cancer-specific HRQoL, this variable, together with years having two fruit servings per day, mediated the effect of exercise self-efficacy on cancer-specific HRQoL.

Table 7-10. Standardised Total Effects, Direct Effects and Indirect Effects of the Model with Cancer-specific HRQoL Outcome

	Sleep impairment	Number of health problems	Education	Exercise self-efficacy	Years having 2 fruit servings per day	Hours exposed to smoke at work
Standardised total effects						
Exercise self-efficacy	-.120*	.026	-.084	-	-	-
Years having two fruit servings per day	-.025*	.005	-.017	.206	-	-
Hours exposed to smoke at work	.003	-.001	.002	-.024	-	-
Cancer-specific HRQoL	-.314**	-.184**	.164**	.136**	.099*	-.090*
Standardised direct effects						
Exercise self-efficacy	-.120*	.026	-.084	-	-	-
Years having two fruit servings per day	-	-	-	.206*	-	-
Hours exposed to smoke at work	-	-	-	-.024	-	-
Cancer-specific HRQoL	-.298**	-.188**	.175**	.113*	.099*	-.090*
Standardised indirect effects						
Exercise self-efficacy	-	-	-	-	-	-
Years having two fruit servings per day	-.025*	.005	-.017	-	-	-
Hours exposed to smoke at work	.003	-.001	.002	-	-	-
Cancer-specific HRQoL	-.016*	.004	-.011	.023*	-	-

Note: "-" no pathway between the two variable, * $p < .05$, ** $p < .01$, *** $p < .001$, ns non-significance

7.3.4 Model testing with cancer-specific HRQoL as the latent outcome variable

As mention in the Chapter 4, cancer-specific HRQoL (FACT-G) was calculated by a sum of the total score of four domain scores in the cancer-specific HRQoL scale. It is therefore noteworthy that the hypothesis testing the model of cancer-specific HRQoL was tested with the latent variable of cancer-specific HRQoL with four domain scores.

The same independent variables used the model for cancer-specific HRQoL as single variable were also entered in this model to examine whether there were any differences when cancer-specific HRQoL was considered as a single or a latent variable in the hypothetical testing model.

The results indicate that the model did not fit the data well, χ^2(N= 330, *df*= 17)= 113.61, *p*= .000, CFI= .722, GFI=.949, AGFI= .989, RMSEA= .099, PCLOSE= .000, LO90= .080, AIC= 110.000, CAIC= 373.950, as shown in Figure 7.12.

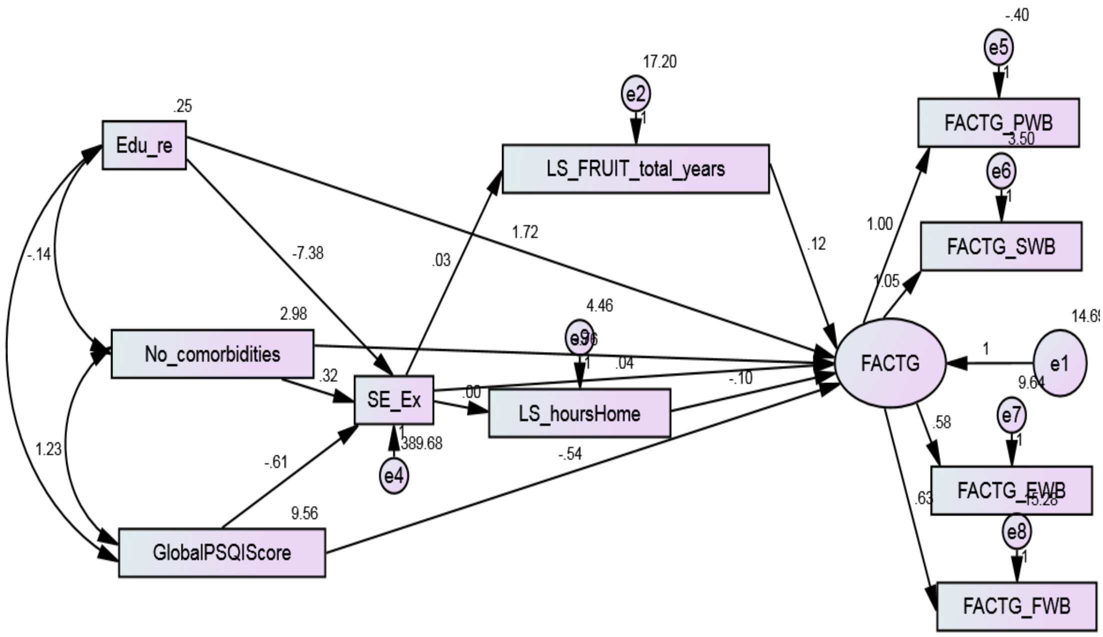

Figure 7-12. Standardised parameter estimates for hypothesised model testing with cancer-specific HRQoL as a latent variable

As the model for the cancer-specific HRQoL latent variable did not fit the data well, the model was then re-specified based on the modification indices and a reasonable added pathway following the literature review. Three pathways were added in the re-specified model, including education to years having two fruit servings per day, education to hours exposed to smoke at work, and covariance between e7 and e8. The model still did not fit the data well. χ^2(N= 330, *df*= 24)= 92.646, *p*= .000, CFI= .779, GFI=.995, AGFI= .990, RMSEA= .093, PCLOSE= .000, LO90= .074, AIC= 154.646, CAIC= 303.418, as shown in Figure 7.12.

Although some modification indices were suggested in the output, these suggestions were not correlated with the literature, for example, covariate paths between sleep impairment and e8. As such, no further model re-specification was conducted. The interpretation of the hypothetical model for cancer-specific HRQoL was based on the cancer-specific HRQoL as a single variable in this study.

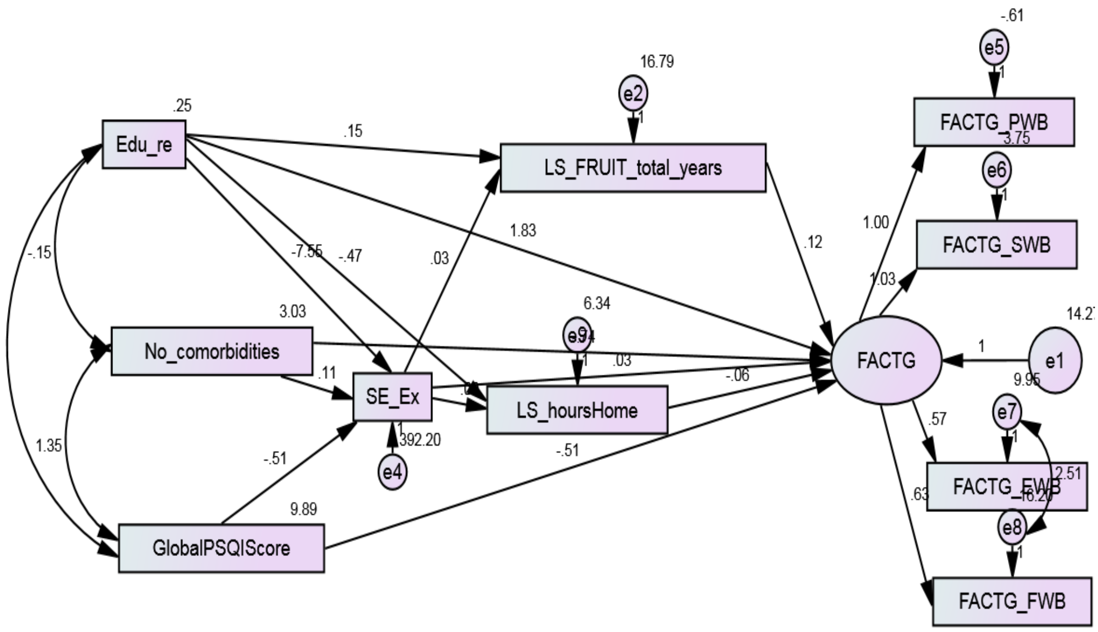

Figure 7-13. Standardised parameter estimates for hypothesised model testing with cancer-specific HRQoL as a latent variable (FACT-G)

7.4 CONCLUSION

This chapter presented the results of the testing of theoretical models involving personal factors, self-efficacy, and lifestyle factors with HRQoL, as assessed by physical health (PCS-SF36), mental health (MCS-SF36), and cancer-specific HRQoL (FACT-G). Based on the theoretical framework, latent variables of personal factors, self-efficacy exercise, lifestyle factors, and HRQoL were formed and validated prior to testing the theoretical model. Validation of measurement models (reflective and formative) was conducted and indicated that forming latent variables was not validated for full hypothesis testing of the whole hypothesis model. Therefore, models were tested with manifest variables selected from multivariate statistical results. The models were specified based on theoretical grounds to inform the variables selected.

A number of important findings were established through the analyses. Firstly, the average quantity of alcohol consumed in the last seven days partially mediated the relationship between income and physical health. This result indicates that while the high income group had higher physical health compared to the low income group, if women in these income groups consumed alcohol, there was no significant difference in physical health between the groups. Secondly, when separating mediators in the model, only one mediation effect was found, which was exercise self-efficacy mediating the effect of sleep impairment on mental health. However, when all mediators were included in the model and examined at the same time, two mediation effects were found: (1) exercise self-efficacy mediated the effect of sleep impairment on mental health, and (2) the number of vegetable servings consumed per day mediated the effect of exercise self-efficacy on mental health. Thirdly, two mediation effects on cancer-specific HRQoL were found: (1) exercise self-efficacy mediated the effect of sleep impairment on cancer-specific HRQoL, and (2) years having two fruit servings per day mediated the effect of exercise self-efficacy on cancer-specific HRQoL. The mediation effect results highlight that the effect of exercise self-efficacy on cancer-specific HRQoL could be reduced if these women had more years consuming two fruit servings per day. Finally, the sleep impairment had a significant and the strongest total effect on physical health, mental health, and cancer-specific HRQoL.

This chapter tested three hypothesised models based on social cognitive theory and the results indicate that the sample data supports the hypothesised models. Therefore, these models provide empirical evidence for understanding the complex relationships among constructs in the hypothesised model. Significant findings and interpretations for the complex relationship among the constructs in the hypothesised model are discussed in the next chapter.

Chapter 8: Discussion

8.1 INTRODUCTION

This chapter discusses the key results of the study in relation to the existing literature. The chapter comprises four sections. The first section compares study participants' characteristics, including personal factors, self-efficacy, lifestyle factors, and health-related quality of life (HRQoL) in women after breast and gynaecological cancer (BGC). The second section focuses on the relationships between personal factors, self-efficacy, lifestyle factors, and HRQoL, and explains the findings in conjunction with the literature. The third part illustrates the mediation effects of self-efficacy and specific lifestyle factors on HRQoL. Finally, the fourth section considers the interactions between the study variables as identified from structural equation modelling. The final section also considers the results in relation to the theoretical framework used for the study.

8.2 PERSONAL FACTORS, SELF-EFFICACY, LIFESTYLE FACTORS AND HRQOL

Research Question 1: What are the personal factors (socio-demographic factors and health status), self-efficacy levels, lifestyle factors, and HRQoL of Vietnamese women after BGC?

8.2.1 Personal factors

Women who participated in this study were aged between 25-88 years old, with a mean age of 49.8 years old. This age profile is similar to that of previous research undertaken with samples of women with or after breast and gynaecological cancer. For example, studies from Western countries have reported an average age ranging from 48 to 61 years (D. J. Anderson et al., 2015; D. Gupta et al., 2013; Leong et al., 2010b;

Mwaka et al., 2016), and a study involving Taiwanese women reported an average age of 54 for women after breast cancer and 55 for women after cervical cancer (Huang et al., 2017). The age profile is also consistent with a study reviewing the status of female breast cancer in Vietnam, which reported that the most common age group for Vietnamese women with breast cancer is 45 to 55 years (Trieu, Mello-Thoms, & Brennan, 2015).

In addition to age, the education status and income of the study participants are similar to those of other studies undertaken in Western countries (D. J. Anderson et al., 2015; Weaver et al., 2013) but reflect some differences to findings of studies conducted in low and middle income countries (Bao et al., 2013; Hsu et al., 2012; Mwaka et al., 2016). Over one third of the study participants were well-educated, having either college or university qualifications; more than half of the participants had a middle or high income. Although the study participants had a lower education status compared to similar studies with Australian and American women after breast cancer (D. J. Anderson et al., 2015; Weaver et al., 2013), they had higher education levels than the average for the Vietnamese population, where only 7.3% of population hold university qualifications or higher (Linh, 2014). Additionally, the education level of the study participants is higher than that reported in studies undertaken in China, Taiwan, or Uganda (Bao et al., 2013; Hsu et al., 2012; Mwaka et al., 2016). The high education level reported by the sample in this study reflects the convenience nature of the sampling approach. That is, data were collected at hospitals in Hanoi, a metropolitan city in Vietnam, whose residents typically have higher education levels compared to people living in other parts of the country. Moreover, the study survey was lengthy and required a reasonable level of literacy to complete. While the number of participants recruited using the online survey method was low, the use of an online survey also meant that certain sections of the population were excluded.

While there are similarities in age, education status, and income between the study participants in this study and those from other countries, a higher proportion of married participants were recruited compared to that of Western women (D. J. Anderson et al., 2015; Mwaka et al., 2016; Weaver et al., 2013). This proportion is, however, quite similar to samples of Chinese or Taiwanese women after breast or cervical cancer (Huang et al., 2017; Yan et al., 2016). The divorce rate in this study was even lower than the divorce rate in Vietnam in 2007, which was reported at 5.7% (United Nations Population Division, 2008). The lower likelihood of divorce among Vietnamese and Chinese women compared to Western women reflects social norms and cultural expectations in Asian countries, which are deeply affected by Confucian ethics (Li, 2000). For example, Vietnamese traditional values follow an expectation of "men make house, women make home" ("*đàn ông xây nhà, đàn bà xây tổ ấm*"). These social norms and beliefs about gender roles mean that women are reluctant to divorce their partners.

The average number of people in the household in this study was four. This number is higher than the average number of family members in a Western household, such as Australia and the US, but similar to that of Vietnamese household reports. Traditionally, there are two or three generations in a house in Vietnam (Vietnam Ministry of Health, 2016). This population statistic was reflected in the current study, with 31.2% of the participants' reporting having household structures that included extended family.

The average length of cancer diagnosis in the current study was 3.0 years. This clinical profile is consistent to that of similar studies undertaken in Australia, where years from breast cancer diagnosis ranged from 2.9 years to 3.4 years for control and intervention groups, respectively (D. J. Anderson et al., 2015). However, the time since diagnosis in this study was lower than that in a similar study undertaken in Taiwan where the average length of cancer diagnosis for breast and gynaecological cancer survivors were 5.6 and 6.3 years, respectively (Yan et al., 2016). In terms of comorbidities, participants had two other health problems in addition to their cancer diagnosis, on average. As the majority of women with BGC in this study were aged 40 years or over, comorbidities associated with the ageing process were expected (Fu et al., 2015; McCaskill-Stevens & Abrams, 2011). Although this study found that the most common health problems among the sample were back problems, headaches, or migraine, other studies have found that hypertension and heart disease were the most common health problems among women with BGC (Fu et al., 2015; D. W. Shin et al., 2008). Given the convenience sampling approach used in this study, larger population based studies are required to more accurately understand health status factors amongst women after BGC in Vietnam.

In regards to menopausal stage, this study identified that nearly three quarters of women were at a menopausal or postmenopausal stage. This is higher than that of women who participated in a similar study undertaken in Australia and India, in which approximately 50% of participants were at menopausal or postmenopausal stages (McGuire, 2015; Surakasula, Nagarjunapu, & Raghavaiah, 2014). However, as shown in the results chapter, the average age of the participants in this study was 50 years old, and as such 48.2% of participants reported that they had menopause prior to cancer treatment. These data confirm that participants' menopausal stage was more likely to be associated with the ageing process rather than cancer treatments.

The average total sleep quality score of 6.61 indicated that participants in this study had poor sleep quality. Categorising the total scores based on a cut-off point of five shows that 68.2% of the study participants had sleep impairment. The proportion of women with sleep impairment is slightly higher than that reported in a study of American women one year after ovarian cancer treatment (64.8%) (Clevenger, Schrepf, & DeGeest, 2013) and higher than that reported in a study of Brazilian women with BGC (52%) (Furlani & Ceolim, 2006). There are many factors linked to sleep impairment. Discomfort associated with the current cancer and comorbidities (Trill, 2013) can be a potential reason for poor sleep quality. Concerns about health status and its impact of social roles can also create distress, which in turn results in sleep impairment (Clevenger et al., 2012; Trill, 2013). Menopause and associated symptoms are also negatively correlated with sleep quality (Shaver & Woods, 2015). The high levels of sleep impairment in this study sample confirm that sleep quality is an important health concern for this population and requires more attention in practice. More detailed investigation of factors contributing to sleep quality is required to improve HRQoL in women after BGC.

8.2.2 Self-efficacy

Self-efficacy is a core concept of the social cognitive theory developed by Bandura (1986) and has been widely applied in research related to health behaviours and behavioural interventions in order to improve the health outcomes and quality of life of people with chronic disease (Lorig et al., 2006; Lorig et al., 2009), as well as cancer (D. J. Anderson et al., 2015). According to Bandura (1986, 1997a), self-efficacy is confidence in the ability to carry out actions and make decisions that are part of the success in progress to better outcomes. Higher self-efficacy levels predict the likelihood of performing healthy lifestyle activities, as suggested in social cognitive theory (Bandura, 1977, 1986), and confirmed in several studies (D. J. Anderson et al., 2015; Haas, 2011; Liao et al., 2014; Lorig et al., 2010).

Studies exploring self-efficacy among Vietnamese people with chronic diseases have been conducted and reported over the past decade. However, these studies used different scales to measure self-efficacy levels in Vietnamese people (Dao-Tran, 2012; Nguyen, 2009) creating difficulties when comparing self-efficacy across groups of Vietnamese people with or without chronic diseases. However, these studies provided similar results to those of this study, whereby self-efficacy levels among Vietnamese people with chronic diseases were below the level required to effectively engage in behaviour changes (Dao-Tran, 2012; Nguyen, 2009). The present study also found that the average levels of diet self-efficacy and exercise self-efficacy of Vietnamese women after BGC were lower than the middle point of the scale score, which ranged from 0 to 100. A further review of literature in the area of diet and exercise self-efficacy levels among people with chronic disease or cancer measured using the same instruments as the present study identified that diet self-efficacy levels ranged from 59.0 to 59.6 (R. L. Anderson, 2008; Smith-DiJulio & Anderson, 2009) and exercise self-efficacy levels ranged from 29.5 to 79.2 (Darawad et al., 2016a; Everett et al., 2009; Y. Shin et al., 2001; van der Heijden, Pouwer, & Pop, 2014). The current study results indicate that exercise self-efficacy levels among Vietnamese women after BGC are lower than that of Australian and Korean people (Everett et al., 2009; Y. Shin et al., 2001; Smith-DiJulio & Anderson, 2009), but higher than that of Dutch and Jordanians with chronic disease (Darawad et al., 2016a; van der Heijden et al., 2014). The levels of diet self-efficacy in Vietnamese women after BGC are also lower than that for Australian women with chronic disease (Smith-DiJulio & Anderson, 2009).

The differences in self-efficacy levels across samples from different sociocultural and clinical contexts are an important observation. Social cognitive theory proposes that self-efficacy is confidence in the ability to perform or change behaviours at certain time points and in certain contexts. Both self-efficacy and behavioural performance are thus influenced by environmental factors or contextual situations. The influence of environment and social contextual factors on self-efficacy to exercise behaviours has been confirmed in previous studies of the Chinese population with type 2 diabetes and peripheral neuropathy (Pei et al., 2016), but not yet in the populations with or after cancer. This current study did not directly examine the influence of environmental and social contextual factors on self-efficacy, or the direct and indirect interaction of environment and self-efficacy on behaviour change. As such, further exploration of the mediation effects or interactions between factors, such as cultural beliefs and perceptions and the relationship between self-efficacy and behavioural performance would provide evidence to better understand differences in self-efficacy levels across different populations. Additionally, such research could help to explain why people with the same self-efficacy levels and health conditions perform their behaviours differently.

8.2.3 Lifestyle factors

Lifestyle factor is a broad term encompassing a variety of factors that positively or negatively influence a person's health. In the area of disease prevention and management, the Australian Institute of Health and Welfare (2013) divided lifestyle factors into two groups: (1) healthy lifestyle factors, including exercise, a well-balanced diet, and healthy body weight; and (2) unhealthy lifestyle factors, including smoking and misusing alcohol. In this current PhD study, lifestyle factors were measured across five dimensions, including physical activity levels and exercise, eating habits (fruit and vegetable intake), alcohol consumption, passive and active smoking, and body mass index (BMI).

In regards to physical activity levels and exercise, this study found that the prevalence of moderate and vigorous exercise among Vietnamese women after BGC was 21.5% and 50.7%, respectively, with 27.3% of the study's participants having low levels of energy expenditure. These data are consistent with the Vietnamese National Health Report, which indicated that 65% of the Vietnamese population aged 15 or older did not vigorously exercise (Vietnam Ministry of Health, 2006). In comparison with studies involving women after BGC in other countries, the prevalence of vigorous exercise (50.0% vs 33.2%) and moderate exercise (78.5% vs 62.7%) in Vietnamese women was higher than that of Australian women (D. J. Anderson et al., 2015). According to the WHO (2016), the prevalence of insufficient physical activity is positively associated with the level of income, as high income countries have more than double the prevalence of physically inactive people compared to low income countries, for both men and women. The WHO (2016) also concluded that nearly every second woman in high income countries is not sufficiently physically active. The increased automation of work and recreational activities in higher income countries creates environments where there is insufficient physical activity, in contrast to social and work practices in developing nations, where such conveniences are not readily accessible. The perception of exercise and exercise levels can also differ from country to country. For example, while in Vietnam, the term exercise is considered to include walking or Tai Chi, in most Western countries exercise often refers to aerobic exercise or jogging. These exercise types are different in terms of energy expenditure and intensity (Hui, Woo, & Kwok, 2009). Exercise intensity and frequency therefore need to be assessed in more detail and reflect socio-cultural conditions.

Four parameters should be used to assess physical activity, including frequency, intensity, time, and type (Kyu et al., 2016). Although the results of this study showed that the frequency of exercise among Vietnamese women after BGC is higher than that reported for Australian women (D. J. Anderson et al., 2015), exercise intensity is not high. Study participants reported they spent an average of 1,386 MET-minute per week, which is lower than the average level reported in a study of older women in Vietnam (Dinh, Dong, Chung, & Lee, 2013), in a study of hypertension, diabetes, and congenital heart disease patients in Western countries (Duclos et al., 2015; Müller et al., 2017), and a study of Spanish cancer survivors (Ruiz-Casado et al., 2016). A minimum of at least 1,500 MET-min per week needs to be achieved to reach health-enhancing physical activity levels (Craig et al., 2003; Müller et al., 2017). Vietnamese women in this study did not achieve the recommended level of exercise to benefit their health. This may be due to comorbidities, as suggested by other studies (Bao et al., 2013; Nelson et al., 2016). Participants in this study had an average of two comorbidities in addition to their current cancer diagnosis and these health conditions may have limited them from undertaking hard physical exercise. The range of factors that contribute to these low levels of activity needs to be understood to ensure optimal health for this population.

This study found that a majority (62.1%) of the participants were eating the recommended two servings of fruit per day, with less than half eating the recommended five servings of vegetables per day. This is consistent with findings of a similar study undertaken in Australia (McGuire, 2015). However, the prevalence of healthy eating in this study was lower than that identified in previous Vietnam data, which reported that 52%-88% of Vietnamese women reported eating recommended diets (Vietnam Ministry of Health, 2006). One possible explanation for the reduced vegetable and fruit consumption in Vietnamese women may be current reports in Vietnam warning about the harm of using pesticides and chemicals to keep fruit and vegetables fresh (Thuy, Van Geluwe, Nguyen, & Van der Bruggen, 2012). As the links between cancer and pesticides or chemicals used in farming have been established by research evidence and discussed in social media (Thuy et al., 2012), some Vietnamese people are more hesitant when buying vegetables and fruit. The negative influence of media exposure on healthy lifestyle choices has been reported in studies undertaken with Belgian people with cancer (Nelissen, Beullens, Lemal, & Van den Bulck, 2015). Another reason for the lower level of vegetable consumption could be related to the number of people in the household (Arruda et al., 2014). In this study, the average number of people in the household was reported to be four, indicating that the majority of the women were living with extended families. Since dietary patterns and food choices differ between age groups, gender, and social mobility (Arruda et al., 2014), women living in an extended family might face difficulties following a specific diet when the whole family have meals together but have different food choices.

It should also be noted that the lower consumption of vegetables by the study participants compared to the average levels among Vietnamese women (Vietnam Ministry of Health, 2006) could be due to the instrument used in the study. The instrument used to measure vegetable and fruit consumption in this study was developed for the Western context and might not capture the type of vegetable consumption more common in the Vietnamese context, where many dishes are vegetable based. Therefore, as the questions captured only the number of vegetable servings, this might not reflect the fact that one meal might include a mix of several vegetables. Future research should use a more detailed food frequency questionnaire to capture all aspects of diet, especially vegetables and fruit used in Vietnamese daily consumption.

Consistent with the Vietnam National Health Report (Vietnam Ministry of Health, 2006), Vietnamese women in this study did not consume alcohol regularly. This lower rate of alcohol consumption is consistent with social norms in Vietnam, where smoking and alcohol drinking are considered socially undesirable for women. Only one-third (33.1%) of the participants reported that they currently consumed alcohol, either rarely or occasionally, with only five women reporting that they drank alcohol regularly. Additionally, when consuming alcohol at special events, the average quantity of alcohol consumption was 0.18 standard drinks, with a range from 0.5 to 1.5 standard drinks, indicating their alcohol consumption was at levels recommended by the World Cancer Research Fund (2013). While some evidence indicates that drinking three to four alcoholic drinks or more per week may increase the risk of breast cancer recurrence in postmenopausal, overweight, and obese women (Kwan et al., 2010), controversy remains about the recommended levels of alcohol consumption. That is, some authors have argued that a moderate consumption of alcohol – meaning at recommended levels – is associated with a better cardiovascular and overall survival than no alcohol consumption (Newcomb et al., 2013).

With regards to tobacco smoking, this study found that 97.2% of the participants had never smoked tobacco. However, a high prevalence of smoking exposure at home and at work was reported by the women in this study (47.5% and 22.7%, respectively). These data are in line with current data reported in Vietnam, which indicates that only 0.2% to 6.0% of Vietnamese women smoke (Vietnam Ministry of Health, 2006), although 41.4% of female workers are exposed to second-hand-smoke at indoor workplaces, and 68.8% of females are exposed to passive smoking at home (World Health Organization, 2010). While smoking is not common for Vietnamese women, it is accepted among men, causing a high rate of smoke exposure among non-smokers in Vietnam. The effect of passive smoking on breast cancer in women's health in Vietnam has not attracted much attention, though negative effects of smoking and passive smoking on breast cancer risk (Gao et al., 2013; Wada et al., 2015), and health outcomes and survival (Vietnam Ministry of Health, 2006) have been reported.

The current study used two different BMI cut-off points to enable a comparison of BMI using standard cut-off points and Asian BMI cut-off points. The average BMI of Vietnamese women in this current study was lower than that of Western women (Chan et al., 2014), and the proportion of overweight and obese women in this sample was also lower than that of Vietnam National Health Report data using standard BMI cut-off points (Vietnam Ministry of Health, 2006). Approximately 7% of participants were underweight. This may be due to the effects of cancer and its treatments. There are currently no nutrition booklets or guidelines for Vietnamese patients during and after cancer treatment. Patients often find information themselves through social media and the internet. The messages provided through these media are often confusing and contradictory. For example, an association between protein, meat intake, and cancer risks can be reported without clearly presenting information about the amount or type of meat that increases risk. As a result, Vietnamese people might reduce their meat-protein intake or even stop consuming protein, which leads to an imbalanced diet. One study of a sample of Vietnamese people with oesophageal cancer identified that 43.8% of the sample consumed less than 1 gram/kg/day of protein and decreased their protein intake even after receiving gastrostomy feeding support (Quyen et al., 2017). Providing nutrition guidelines with specific recommendations relating to servings, food types, and energy intake would be useful for women with BGC, especially in the Vietnamese context, where significant gaps exist and where Western food choices do not readily apply.

8.2.4 Health-related quality of life

HRQoL is considered an important outcome in many cancer trials for BGC patients (D. J. Anderson et al., 2015; Clevenger et al., 2013). There are many reasons for the current focus on HRQoL in this population. Firstly, the prevalence of breast and gynaecological cancers is increasing with improvements in detection and treatment resulting in longer survival time for this population (Allemani et al., 2015; Coleman et al., 2008; Lan et al., 2012). Secondly, breast and gynaecological cancers affect women's identity, especially among those losing their breasts, uterus, or ovaries after surgery. Thirdly, linkages between survival and HRQoL have been demonstrated in a growing number of studies (Gotay et al., 2008; Hsu, Ennis, Hood, Graham, & Goodwin, 2013). Studying HRQoL is critical to improve patients' health outcomes.

The average self-report scores for physical health (PCS) and mental health (MCS) were 43.92 and 43.51, respectively. These scores were less than the norm of 50, indicating lower physical health and mental health of the study participants compared to the general population (Ware & Sherbourne, 1992b). Vietnamese women in this sample had lower scores for both physical health and mental health compared to studies of European and Latina Americans with gynaecological cancer (Ashing-Giwa et al., 2009) and Australian and American women with breast cancer (D. J. Anderson et al., 2015; Xiao et al., 2016). Descriptive analyses indicated that the Vietnamese women in this study identified that role limitations were physical and emotional. The role physical scores of the SF36 were lowest among the subscales of the physical health (PCS) and role emotional scores were lowest among subscales of the mental health (MCS). These low scores indicate that physical and emotional health impacts were related to difficulties with working or other daily activities and feelings of social isolation that may result from their disease and treatments. In contrast to findings of the current study, some previous studies have reported improvements in physical health and mental health measured by SF36 for breast cancer patients from pre-treatment until one year after treatment (Ganz, Kwan, Stanton, Bower, & Belin, 2011; Xiao et al., 2016). These studies also found that the mental health of women after cancer can be as good as that of the general population, although their physical health remains lower than that of the general population (Ganz et al., 2011; Xiao et al., 2016). The similarities in terms of low physical health after cancer for Vietnamese women and women living in other countries is consistent with the growing body of evidence highlighting the wide range of health problems experienced by cancer survivors. The differences in the mental health among these groups of women do, however, require further exploration.

In regards to cancer-specific HRQoL, the total mean score of the study sample was lower than that of an Australian sample (80.6 vs 85.9) (Janda et. al, 2008) indicating a deficit in cancer-specific HRQoL of the women who participated in the study. However, the cancer-specific HRQoL scores for women in this study were higher than that reported in other studies, including Australian women (80.6 vs 74.3 – intervention group and 78.2 – control group at base line) (D. J. Anderson et al., 2015), and European and Latina-American women (80.6 vs 61.0) (Ashing-Giwa et al., 2009). The differences in the HRQoL scores measured by SF36 and FACT-G highlight the importance of using measures that are sensitive to identifying the sequelae of cancer treatment and processes on HRQoL. The generic instrument, SF36, was developed for use in the general population, and thus may not be sensitive to specific impacts of cancer. Similarly, the FACTG was designed to measure HRQoL among all types of adults with cancer, and lacks items to measure breast and gynaecological cancer-specific concerns (Zeng et al., 2011). Despite these limitations, this study is one of the very first studies to explore HRQoL in Vietnamese women. There are no available data to compare HRQoL of the current study participants with other Vietnamese populations with chronic diseases or cancer. To provide effective support for the Vietnamese population with BGC at difference stages and periods of their survival, a longitudinal study is required. Studies in this area should use measurements suitable for capturing specific concerns of women after breast and gynaecological cancers.

In summary, this section has discussed the similarities and differences in personal factors, self-efficacy levels, lifestyle factors, and HRQoL of Vietnamese women after breast and gynaecological cancer, compared to that of other studies including Asian and Western women. Given the convenience nature of the sample in this study, it is difficult to draw conclusions about socio-demographic and other characteristics of the sample. Nevertheless, findings relating to lifestyle behaviours and HRQoL provide important insights into potential areas of concern for this group. Further studies that have been designed to enable more rigorous comparisons with data from other populations are required in order to understand the reasons for the differences observed across various populations.

8.3 RELATIONSHIPS BETWEEN PERSONAL FACTORS, SELF-EFFICACY, LIFESTYLE FACTORS, AND HEALTH-RELATED QUALITY OF LIFE

Research Question 2: What are the relationships between personal factors (socio-demographic factors and health status), self-efficacy levels, lifestyle factors, and HRQoL?

2-1: How well do personal factors predict self-efficacy levels of Vietnamese women after BGC?

2-2: How well do personal factors and self-efficacy levels predict lifestyle factors of Vietnamese women after BGC?

2-3: How well do personal factors, self-efficacy levels, and lifestyle factors predict the HRQoL of Vietnamese women after BGC?

8.3.1 Factors predicting self-efficacy

Significant relationships were identified between self-efficacy and the socio-demographic characteristics and health status of the study participants. The main predictor of both diet self-efficacy and exercise self-efficacy was sleep impairment, with the more sleep impairment experienced, the lower self-efficacy perceived. In addition to sleep impairment, another significant predictor for diet self-efficacy was income, and predictors for exercise self-efficacy were residence and education. These findings are consistent with those of previous studies and Bandura's (1986) social cognitive theory (Adegbola, 2015; Mostafai, Mostafai, & Mostafai, 2012; P. C. Wang et al., 2016). The negative impact of sleep impairment on self-efficacy has been reported in other studies (Adegbola, 2015; D. J. Anderson et al., 2017). Moreover, the influence of living environment on self-efficacy is also supported by the theoretical constructs that underpin social cognitive theory (Bandura, 1986; Bandura, 1997).

Sleep impairment has been associated with major depression, mood disturbances, impaired health status, feelings of low self-worth and energy, and poor motivation and concentration (P. C. Wang et al., 2016). Such experiences understandably impact on perceived capability to perform a designated task successfully. Two studies have found correlations between sleep impairment and self-efficacy (Maxine, 2015; Mostafai et al., 2012), and others have identified the influences of self-efficacy on sleep impairment or sleep self-efficacy (Rutledge, La Guardia, & Bluestein, 2013). However, there is limited evidence about the impacts of sleep impairment on self-efficacy to perform a specific behaviour, such as exercise or following a healthy diet. Although there are limited research findings to confirm this study's finding, the information drawn from the relevant studies suggests that sleep impairment affects self-efficacy. Further research to explore this relationship is needed to improve self-efficacy, and consequently improve healthy lifestyle behaviours.

The results of this study indicate that income is a significant predictor of diet self-efficacy, with the higher income group reporting higher diet self-efficacy levels. This finding supports the literature that suggests socio-economic status affects self-efficacy in general (Haas, 2011). As previously discussed, studies have identified that some Vietnamese women are worried about the linkage between cancer and chemicals used in the food market (Thuy et al., 2012). As a result, they may have reduced their vegetable and fruit consumption. These perceptions about current food market issues might lower diet self-efficacy and lessen their vegetable and fruit consumption, even though they understand the benefits of following a healthy diet. The ability to choose healthy foods is also linked with income. According to the Victorian Health Promotion Foundation, "people with less money, less education, insecure working conditions and poor living conditions are more likely to experience food insecurity and have higher levels of dietary-related disease" (as cited in Friel, Hattersley, & Ford, 2015, p9). Women in the high income groups may have reported higher diet self-efficacy levels because they had greater capacity to finance healthy food purchases and follow the recommended diets for cancer survivors.

Residence and education were predictors of exercise self-efficacy. This finding is consistent with social cognitive theory, in which Bandura (1986) stated that an individual's belief in self-efficacy may vary across contexts and behaviours. That is, living arrangements can determine self-efficacy levels through the availability of facilities supporting behaviour performance. One study undertaken in Taiwan found that participants who lived in rural areas were less interested in recreational sports than their urban counterparts (C. Chen et al., 2017). The study also demonstrated that gender (being male) and higher education were associated with greater engagement in recreational sports (C. Chen et al., 2017). Some prior studies have identified that factors influencing exercise self-efficacy include the availability of exercise facilities, security of the living environment, and family members' exercise behaviours and encouragement (C. Chen et al., 2017; Cleland et al., 2015; Ptomey et al., 2016), These factors were not included in the analysis, but could be possible explanations for the differences in exercise self-efficacy levels between the rural and urban women observed in this study.

8.3.2 Factors predicting lifestyle factors

This current study found that higher income, lower number of health problems, and higher exercise self-efficacy were significant predictors of greater physical activity levels. Living in a rural area, older age, higher exercise self-efficacy, and higher diet self-efficacy were predictors of greater vegetable and/or fruit consumption. The predictors of higher BMI were living in an urban area, poorer sleep quality, and older age. Interestingly, this study found no predictors of alcohol consumption or active or passive smoking, though some factors contributing to alcohol consumption and smoking habits have been indicated in previous studies (Courtois, Reveillere, Paus, Berton, & Jouint, 2007; Prabhu, Srinivas, Vishwanathan, & Raavi, 2014). The reasons for these insignificant associations are likely due to the low number of participants who engaged in alcohol consumption and smoking. The influences of personal factors on physical activities, diet, and BMI are in-line with previous studies' findings (Abed, 2010; Haas, 2011; Ganasegeran et al., 2012; Friel et al., 2015; Morgan et al., 2016; J. Pollard et al., 2001)and are discussed below.

While global data suggests that exercise levels are associated with income levels, those in higher income countries are less likely to be physically active compared to those in low income countries (WHO, 2016). However, studies at national levels report contrasting findings, with low income groups having lower exercise levels (Abed, 2010; Haas, 2011). A study that examined the possible factors that affect lifestyle choice identified that financial difficulty affected lifestyle choices, including exercise (Abed, 2010). Another study that surveyed women with breast cancer also reported that lower financial status was correlated with lower physical activity levels (Haas, 2011). One possible explanation for this finding in the present study is that Vietnamese women with a low income or financial difficulty might not have the time or resources to engage in physical activity, or the physical activity in which they engage is of a different type to that measured by the instruments in this study.

Significant relationships were identified between the number of comorbidities and physical activity, with higher numbers of health problems associated with lower levels of physical activity, supporting previous findings (Nelson et al., 2016). The current study did not distinguish between pre-existing conditions, such as arthritis or osteoporosis, and those related to cancer treatment, such as lymphedema. Clarification of this point would have permitted further analysis of the relationship between limiting conditions and physical activity levels.

While social cognitive theory points to the importance of the self-efficacy construct to behavioural performance (Bandura, 1977, 1986), findings relating to the influence of exercise self-efficacy on exercise behaviours are inconsistent. Some studies have reported that self-efficacy is an important predictor of exercise behaviours (R. L. Anderson, 2008; Dutton et al., 2009; Pei et al., 2016), while others have not (Hsu et al., 2011). A study undertaken of Taiwanese women after breast cancer demonstrated that exercise self-efficacy did not significantly predict exercise frequency change over time, though the outcome expectation was identified as a predictor of exercise frequency (Hsu et al., 2011). Meanwhile, a study conducted with people with type 2 diabetes and mid-life women indicated that exercise self-efficacy significantly predicted a positive physical activity change in the study participants, suggesting an intervention to bolster patients' self-efficacy has the potential to improve physical activity levels (R. L. Anderson, 2008; Dutton et al., 2009; Pei et al., 2016). Other studies conducted about people with breast cancer and chronic diseases have found that an increase in self-efficacy scores was associated with higher physical activity levels (Haas, 2011; Pei et al., 2016). Although self-efficacy has not always been shown to be a significant predictor of physical activity (Hsu et al., 2011), a number of research findings from cross-sectional, intervention, or longitudinal surveys have confirmed the value of this conceptual construct (R. L. Anderson, 2008; Dutton et al., 2009; Pei et al., 2016).

The current study results are consistent with the literature relating to factors influencing eating habits, in which higher age is associated with healthier eating habits (Ganasegeran et al., 2012), and where rural women and people with a higher income are more likely to eat more vegetables than urban women and women with lower income (J. Pollard, Greenwood, Kirk, & Cade, 2001). In addition, self-efficacy has been identified as a significant predictor of healthy eating habits (R. L. Anderson, 2008; Gase et al., 2016; Kushida, Iriyama, Murayama, Saito, & Yoshita, 2017; Nguyen, 2009; Wang, Kogashiwa et al., 2016). The current study builds on previous work, which suggests potential pathways through which personal factors and cognitive factors, such as self-efficacy, can have an effect on healthy eating. However, other studies have highlighted a strong influence of social and environmental factors (such as availability of healthy food) on healthy eating behaviours (Friel et al., 2015; Morgan et al., 2016; J. Pollard et al., 2001). The current study did not include these variables in the model.

Similar to previous studies, this study identified that older people and those living in urban areas had higher BMI scores than that of younger people and those living in rural areas (Grandner, Schopfer, Sands-Lincoln, Jackson, & Malhotra, 2015; Nelson et al., 2016). The current study findings are also in line with the literature, which indicates that poorer sleep is associated with higher BMI (Grandner et al., 2015). As previously discussed, sleep quality is associated with many factors, including age, menopausal status, and disease condition. The association between sleep and BMI requires further investigation to examine the linear covariate of age, menopausal status, and disease condition, which can be obscured by the relationship between sleep and BMI. A longitudinal study would enable an examination of how sleep and BMI vary by menopausal status, disease condition, and age within an individual over different time points.

8.3.3 Factors predicting health-related quality of life

The current study's findings suggest that physical health (PCS) was adversely affected by increased age, increased number of health problems, and sleep impairment, while it was positively influenced by higher income, greater energy expenditure, higher average quantity of alcohol consumed (although at safe levels), and fewer hours exposed to smoke at home. No significant effect of self-efficacy was found on physical health. Mental health (MCS) was adversely influenced by increased number of health problems and sleep impairment, while it was positively impacted by higher income, higher exercise self-efficacy, and greater number of vegetables consumed per day. Cancer-specific HRQoL (FACT-G) was negatively impacted by a greater number of health problems and sleep impairment, while it was positively influenced by higher education, higher exercise self-efficacy, more vigorous and moderate exercise, more years having two servings of fruit per day, and fewer hours exposed to smoke at work. These results of the multivariable analyses confirm the existence of inverse relationships between age, the number of health problems, and sleep impairment and HRQoL (Brink et al., 2012; Clevenger et al., 2013; D. W. Shin et al., 2008), and the positive impacts of healthy lifestyle factors and self-efficacy on HRQoL (Brink et al., 2012; Mohammadi et al., 2013; Muller et al., 2017; Yan et al., 2016).

The negative influence of smoking on health status and HRQoL has been well-documented in previous findings (Aarstad et al., 2007; Braithwaite et al., 2012). However, evidence of the impact of passive smoking on HRQoL among cancer survivors is limited. The findings of this study support the literature in populations with chronic disease (Y. W. Kim et al., 2015; Weeks et al., 2011). A study that determined the impact of passive smoking on HRQoL in patients with heart failure found that passive smoking predicted lower scores in all domains of HRQoL after adjusting for age, sex, emotional well-being, and general health perceptions (Weeks et al., 2011). This finding highlights the need to identify women who are exposed to smoke, so that interventions can be implemented to improve awareness regarding harmful passive smoking and how to avoid it to ensure their HRQoL will not be diminished.

Interestingly, this current study found that those who reported a higher quantity of alcohol consumption had better HRQoL. This is in contrast to current literature that has identified the harmful effects of alcohol consumption on HRQoL and the increased risk of reoccurrence among people with and after cancer associated with alcohol consumption (Aarstad et al., 2007; Kwan et al., 2010; Norat et al., 2014). Despite these negative impacts of alcohol consumption to the health of cancer survivors, similar to the results of the present study, one study that examined the alcohol consumption patterns and HRQoL in South Korean adults found that HRQoL among moderate drinkers (1-15g/day of alcohol) was higher than that of non-drinkers and heavy drinkers (K. Kim & Kim, 2015). Additionally, an earlier study in Canadian people with head and neck cancer showed that alcohol drinking was associated with better physical and role functioning and better HRQoL (Allison, 2002). However, those studies used bivariate analyses to examine the relationships between alcohol consumption and HRQoL. As such, they were unable to assess this relationship in interaction with other confounders and covariates that contributed to HRQoL among the studies' participants (Allison, 2002). Another study in people with colorectal cancer showed that moderate-alcohol-drinkers had better physical, role, and social functions and lower fatigue scores compared to non-drinkers (Grimmett et al., 2011). Although this study used logistic regression to assess whether these HRQoL functions and fatigue differed between moderate and non alcohol drinking groups, no covariate was controlled in the model testing. The current PhD study used a regression model (general linear model) to determine the association between alcohol consumption and HRQoL, while controlling for other factors in the model. The model was therefore able to detect the independent effects. Importantly, descriptive analyses (as shown in Table 5.3) in this study identified that Vietnamese women consumed alcohol moderately, with 1-1.5 standard drinks per day (1 standard drink = 10 grams of pure alcohol) and no participant had heavy alcohol consumption. It is therefore not surprising that no relationship was observed between higher rates of alcohol consumption and poorer HRQoL. Given the contradictory results in this area, further studies are required to compare the HRQoL levels for people with different patterns of alcohol consumption in order to better understand the relationship between HRQoL and alcohol consumption.

No relationship was identified between self-efficacy and physical health, though this current study did identify that self-efficacy was a predictor of mental health and cancer-specific HRQoL. This finding contrasts with that of prior studies in which significant relationships between self-efficacy and physical well-being were found (Boehmer, Luszczynska, & Schwarzer, 2007; Haugland, Wahl, Hofoss, & DeVon, 2016; Westby, Berg, & Leach, 2016b). There are a number of possible reasons for the non-significant finding in this study. Firstly, it is possible that the instruments used were not sufficiently sensitive to detect the specific health problems and quality of life concerns of women with BGC. This study also focused on self-perceived confidence and HRQoL, addressing health related aspects and their perceived impact on functioning rather than actual assessment of physical functioning. Secondly, the finding might be due to interactions between the variables included in the model. As presented in Table 6.19, exercise self-efficacy and the number of health problems were included in the model predicting physical health due to their significance in the bivariate analysis. As women who participated in this study had an average of two comorbidities in addition to their cancer, their health condition might have limited their physical functioning or restricted participation in some exercise programs, even though they had high levels of exercise self-efficacy. These factors together could contribute to the non-significant contribution of exercise self-efficacy to physical health in the present study.

In summary, this section has highlighted key findings regarding factors influencing self-efficacy, lifestyle factors, and HRQoL. In general, the findings are consistent with social cognitive theory and the existing literature. Self-efficacy is an important aspect of lifestyle and HRQoL. While the higher number of health problems and more sleep impairment can impair the HRQoL of women after BGC, enhancing self-efficacy and a promoting a healthy lifestyle can result in a better HRQoL for this population. This section also highlighted the relationship between alcohol consumption and HRQoL. The following sections discuss the mediation effects and intercorrelations between the study variables, including personal factors, self-efficacy levels, lifestyle factors, and HRQoL.

8.4 MEDIATION EFFECTS OF SELF-EFFICACY AND LIFESTYLE FACTORS ON HEALTH-RELATED QUALITY OF LIFE

Research Question 3**:** Do self-efficacy levels and lifestyle factors mediate the relationships between personal factors, self-efficacy, lifestyle factors, and HRQoL?

3-1: Does self-efficacy levels mediate the relationships between personal factors and HRQoL of Vietnamese women after BGC?

3-2: Do lifestyle factors mediate the relationships between personal factors, self-efficacy levels, and HRQoL of Vietnamese women after BGC?

8.4.1 Mediation effects of self-efficacy and lifestyle factors on physical health

As presented in Chapter 7, self-efficacy was not a mediator of the relationships between personal factors and physical health (PCS-SF36). When examining the mediation effects of lifestyle factors in the relationships between personal factors and HRQoL, the results indicated that when separating mediators in the model, average quantity of alcohol consumed in the last seven days partially mediated the relationship between income and physical health. However, when all three mediators were included in the model and examined at the same time, no mediation effect was found. Although there is limited evidence in regards to the mediation effects of alcohol consumption between income and HRQoL, this mediation effect is supported by the existing literature. A study undertaken with a sample of South Korean adults indicated no significant association between economic status and levels of alcohol consumption (K. Kim & Kim, 2015). Additionally, the study also found that moderate drinkers had higher scores of HRQoL compared to non-drinkers or heavy drinkers (K. Kim & Kim, 2015). Moderate consumption of alcohol is therefore associated with better HRQoL, and the association between HRQoL and income is through income's association with alcohol consumption. In terms of mediation effects, the mediation effect of alcohol consumption requires further examination. That is, alcohol consumption will be considered a mediator in the relationship between income and HRQoL if three criteria are met: (1) income significantly predicts HRQoL, (2) alcohol consumption significantly predicts HRQoL, and (3) when alcohol consumption is added as a mediator in the relationship, income needs to be a predictor of alcohol consumption, alcohol consumption needs to be predictor of HRQoL, and the path between income and HRQoL becomes non-significant. Although these criteria were satisfied in this current study, covariates of both alcohol consumption and HRQoL (such as race) were not collected and included in the model. Moreover, the small number of women in this study who were consuming alcohol limits the confidence in the study findings. As shown in the results chapter, only a small proportion of women who participated in the current study consumed alcohol, and among those drinkers, their alcohol consumption was at a moderate level.

This current study results indicate that when three lifestyle factors were added into the model, the mediation effect of alcohol consumption was not significant. This might be due to interactions between the lifestyle factor variables (energy expenditure, alcohol consumption, and hours exposed to smoke), which were not clarified in this study. Finally, women after BGC have different health status and perspectives compared to other populations, which might lead to differences in HRQoL among this population.

It is also important to note that this finding differs to that of previous studies in which an increase in alcohol consumption was associated with worse health outcomes (Aarstad et al., 2007; Gao et al., 2013; Kwan et al., 2010). A recent longitudinal study with 30 years follow up indicated that even moderate levels of alcohol consumption was associated with adverse brain outcomes, including cognitive decline (Topiwala et al., 2017). Given these potential adverse effects of alcohol consumption, it is important to interpret the findings of the present study with some caution. Taking all factors into consideration, further examination of the mediation effects of alcohol consumption in relationships between income and HRQoL is recommended to better understand the issues raised by the findings of this study.

8.4.2 Mediation effects of self-efficacy and lifestyle factors on the mental health outcome

The principal goals of the model testing were to investigate: (1) the mediation effect of self-efficacy and its relationship between personal factors and mental health and (2) the mediation effect of lifestyle factors and its relationship between self-efficacy and mental health. As presented in Chapter 7, when separating mediators in the model, only one partial mediation effect was found. This was for exercise self-efficacy partially mediating the effect of sleep impairment on mental health. However, when all mediators were included in the model and examined at the same time, two mediation effects were found: (1) exercise self-efficacy mediated the effect on sleep impairment on mental health, and (2) the number of vegetable servings consumed per day mediated the effect of exercise self-efficacy on mental health.

The relationships between the sleep impairment, self-efficacy, and mental health (MSC-SF36) have been examined in previous studies indicating the negative impacts of sleep impairment and positive effects of self-efficacy on HRQoL, respectively (Adegbola, 2015; D. J. Anderson et al., 2015; Brink et al., 2012). However, these studies examined the influences of sleep impairment and self-efficacy on mental health or HRQoL, without examining the interactions between the study variables. One study used structural equation modelling to explore the mediating role of sleep impairment and its relationship between general self-efficacy and mental health. The study found that sleep impairment significantly reduced the positive impact of general self-efficacy on mental health (Brink et al., 2012). In the reverse direction, the question of whether self-efficacy mediates the relationship between sleep impairment and HRQoL has not been fully addressed by the literature. One study found that enhancing self-efficacy of women after breast cancer through an intervention aimed at improving self-efficacy and understanding of health promoting lifestyle had a positive effect on both physical health and mental health (PCS and MCS) and sleep quality; however, the mediation effects were not assessed in that study (D. J. Anderson et al., 2015). Further support for the mediating role of self-efficacy in relationships between fatigue or depression and HRQoL have been provided by studies undertaken in the population of people with breast cancer and dementia caregivers (Haas, 2011; P. C. Wang et al., 2016). Nevertheless, limited evidence exists in the literature regarding the mediating role of self-efficacy and its relationship between sleep mpairment and HRQoL. The current study is one of the first studies to explore this mediating role in women after BGC. A partial mediation effect was supported, such that changes in self-efficacy lead to improvements in HRQoL for people with sleep impairment.

In regards to the mediation effects of the number of vegetables consumed per day in the relationship between exercise self-efficacy on mental health (MCS-SF36), the results indicate that when the model with all mediators was analysed, a mediation effect was found, indicating that interactions between variables in the model created a significant mediation effect. This finding confirmed previous multivariate analyses, which indicated that exercise self-efficacy (D. J. Anderson et al., 2015; D. J. Anderson & Yoshizawa, 2007; Boehmer et al., 2007), and healthy eating behaviours (Mohammadi et al., 2013) are positively associated with HRQoL. However the current study findings are in contrast to results from other studies that have reported no association between vegetable or fruit consumption and HRQoL (Chai et al., 2010). One potential reason for this difference may be because this study used self-report measures to assess the number of vegetable servings consumed. This study also supports previous research that has shown higher levels of exercise self-efficacy to be associated with better healthy eating behaviours. This study builds on previous work by examining the mediation effects that suggest a potential pathway through which self-efficacy can have an effect on lifestyle behaviours resulting in a better HRQoL (Haas, 2011). A few studies were identified that have examined self-efficacy as a mediator in the relationships between lifestyle behaviours and HRQoL (Haugland et al., 2016; Kreitler et al., 2007); however, there is limited evidence in relation to the mediation effects of healthy eating behaviour and its relationship between self-efficacy and HRQoL. In terms of considering how lifestyle factors mediate the relationship between self-efficacy and HRQoL, the current study supports the findings from a previous study with a sample of breast cancer patients that indicated that physical activity was a mediator for the relationship between general self-efficacy and HRQoL (Haas, 2011). These findings highlight the importance of improving both self-efficacy and healthy lifestyles to improve HRQoL for the population with BGC.

8.4.3 Mediation effects of self-efficacy and lifestyle factors on cancer-specific health-related quality of life

The mediation effects of self-efficacy and lifestyle factors in the relationship between the study variables and physical health and mental healthwere discussed in the previous section. However, to fully understand these mediation effects in relation to the outcome of HRQoL among women after BGC, it is important to examine these effects using the cancer-specific HRQoL outcome measure. This section considers: (1) the mediation effect of self-efficacy in the relationship between personal factors and cancer-specific HRQoL, and (2) the mediation effect of lifestyle factors in the relationship between self-efficacy and cancer-specific HRQoL. As presented in Chapter 7, when separating mediators in the model, two mediation effects were found: (1) exercise self-efficacy mediated the effect of sleep impairment on cancer-specific-HRQoL, and (2) years having two servings of fruit per day mediated the effect of exercise self-efficacy on cancer-specific HRQoL. These mediation effects were confirmed in the model with all mediators included.

Concerning the mediation effect of exercise self-efficacy in the relationship between sleep impairment and cancer-specific HRQoL, the relationships between sleep impairment, self-efficacy, and HRQoL were previously discussed in the above sections, where the outcome was mental health. As stated, after BGC, women are likely to experience higher levels of depression and stress (Clevenger et al., 2013) compared to others in the population due to the effects of their disease and its impacts on the woman’s role and body appearance. Previous studies have indicated that depression and stress are causes of sleep impairment which leads to lower self-efficacy and HRQoL (Clevenger et al., 2013; Kreitler et al., 2007; P. C. Wang et al., 2016). In this study, women reported the lowest mean score in the emotional wellbeing subscale compared to scores for physical wellbeing, social wellbeing, and functional wellbeing of the FACT-G. Additionally, mental health showed more deficits than physical health of SF36. HRQoL and self-efficacy variables in this study were collected through a self-reported survey reflecting participants' perceptions of their quality of life. As such, the observation that self-efficacy mediates the relationships between sleep impairment and mental health or cancer-specific HRQoL, but not physical health may be due to the fact that these measures all reflect subjective perceptions of their experience.

Regarding years having two servings of fruit per day mediating the effect of exercise self-efficacy on cancer-specific HRQoL, this relationship was discussed in the previous section. This current study finding confirmed findings from other studies and is consistent with social cognitive theory in that healthy lifestyle factors mediate the relationships between self-efficacy and HRQoL (Bandura, 1986, 1997a; Haas, 2011). This finding provides useful evidence for future development of intervention programs aimed at improving HRQoL for populations after BGC.

In recent years, there has been growing interest among health researchers and practitioners to understand the determinants of HRQoL, as it is suggested that HRQoL data can provide valuable insights into the treatment and care of patients (Bottomley et al., 2005). Many studies have emphasised the role of self-efficacy and lifestyle behaviours in the improvement of HRQoL and have examined the interactions and influence of these variables on HRQoL (D. J. Anderson et al., 2015; Ashing-Giwa et al., 2009; Huang et al., 2017). Evidence regarding the impacts of different variables on HRQoL provides crucial information for health policy and care planning to improve patients' health status. However, each disease creates different impacts on patients' health status and HRQoL. It is therefore important to select validated and suitable instruments to measure HRQoL in populations with chronic diseases (Bowling, 2005), such as women after BGC. The Functional Assessment of Cancer Therapy General Questionnaire (FACT-G) and the Medical Outcomes Study Short Form Survey (SF-36) are two of the most commonly-used instruments to measure HRQoL in people with BGC (Montazeri, 2010; Zeng et al., 2011). Each measure has its own strengths and limitations and is selected depending on the objectives of each individual study. While the SF36 is a general HRQoL measure, the FACT-G is a cancer-specific measure (Huang et al., 2017; Zeng et al., 2011). This current study used both general and cancer-specific HRQoL measures, providing evidence for clinical practice and research when assessing either general HRQoL or cancer-specific HRQoL in women after BGC. Different measurements produce different results (Huang et al., 2017). This study identified different factors and mediating pathways for general physical and mental HRQoL and for cancer-specific HRQoL. These findings highlight the importance of ensuring suitable instruments are used for studies assessing HRQoL in women after BGC.

8.5 DIRECT AND INDIRECT EFFECTS OF PERSONAL FACTORS, SELF-EFFICACY, AND LIFESTYLE FACTORS ON HEALTH-RELATED QUALITY OF LIFE: A THEORETICAL REFLECTION

Research Question 4: What are the direct and indirect contributions of personal factors, self-efficacy levels, and lifestyle factors on HRQoL of Vietnamese women after BGC?

8.5.1 Direct and indirect effects of personal factors, self-efficacy, and lifestyle factors on health-related quality of life

As presented in Chapter 7, sleep impairment and self-efficacy were factors directly and indirectly associated with HRQoL, and they had the strongest total impacts on either physical health, mental health, or cancer-specific HRQoL. The negative effect of sleep impairment on HRQoL was reduced via the effect of self-efficacy on healthy lifestyle factors. In contrast, self-efficacy had a positive impact on HRQoL and this impact could be buffered via healthy lifestyle factors. These findings confirmed previous multivariate study findings Kreitler, Peleg, & Ehrenfeld, 2007; Liu et al., 2013; Xiao et al., 2016; Yan et al., 2016) that indicate that sleep impairment and self-efficacy are predictors of HRQoL. Additionally, some other studies using structural equation modelling have reported that the total effects of sleep impairment and self-efficacy on HRQoL are the direct effect and the indirect effects or mediating effect together (Brink et al., 2012; Haas, 2011). While Brink and colleagues (2012) found that fatigue indirectly influenced both physical health and mental health through self-efficacy, Haas's (2011) study indicated that self-efficacy indirectly impacted HRQoL via fatigue and physical activity. These findings indicate that these study variables have similar interactions, as one could be a mediator of the other's impacts on HRQoL. The findings of the current study were that: (1) sleep impairment indirectly impacted HRQoL through self-efficacy, and (2) self-efficacy indirectly impacted HRQoL through healthy lifestyle factors (fruit and vegetable consumption). While participants' HRQoL was affected by health status, such as comorbidities, these findings may also reflect the fact that patients are experiencing low self-efficacy and reducing their activity levels and attention to a healthy diet, resulting in lower physical activity and less engagement with eating a healthy diet. Therefore, an intervention focused on increasing self-efficacy in women after BGC would be of value in strengthening HRQoL. However, considering the mediation effects, lifestyle factors should also be considered in these interventions, as facilitating lifestyle changes together with increasing self-efficacy will lead to positive health effects and improved HRQoL, as found in a previous intervention program (D. J. Anderson et al., 2015).

8.5.2 Latent variables vs manifest variables: A theoretical reflection and revised conceptual framework

The conceptual framework for this current study was based on the social cognitive theory developed by Bandura (1977, 1986). As discussed in Chapter 2 and Chapter 3, each construct of the conceptual framework refers to a latent variable where a latent variable is one that cannot be observed directly (Cai, 2012), for instance, lifestyle factors (behaviours) including physical activity, eating habits, BMI, smoking, and alcohol consumption. Each of these manifest variables was collected using different instruments or measurements and was observed directly. These manifest variables (physical activity, eating habits, BMI, smoking, and alcohol consumption) are indicators of latent variables (lifestyle factors). Therefore, it is important to understand the pattern of observed data at the item level. From this perspective, item indicators are tools that allow one to build measurement models for a desired latent construct, and hence, parcelling of items is warranted (Little, Cunningham, Shahar, & Widaman, 2002; Marcoulides & Schumacker, 2001). Before conducting analytical tests, the construct of latent variables needs to be assessed to determine whether these constructs are valid for inclusion in the model testing.

As presented in Chapter 7, all latent variables included in the model testing were constructed based on the theoretical framework and validated using structural equation modelling. The results indicate that the formation of these latent variables was not valid to include in the model testing. Hypothesis testing models were therefore conducted using manifest variables rather latent variables. The non-validation of these latent variables provides some considerations for future research while forming latent variables: (1) manifest variables included in the latent variables should be based on previous literature, (2) specification of the latent model testing must accurately represent the theory, (3) the measurement model (latent model) should be tested prior to conducting hypothesis testing, and (4) a revision of constructs should be considered when the latent constructs are not validated (Cohen, Cohen, Teresi, Marchi, & Velez, 1990).

When manifest variables were included in the hypothesis testing model rather than latent variables, the findings from the current study partially supported the hypothesised conceptual framework proposed for this study. Based on social cognitive theory, the initial conceptual framework had two primary assumptions: (1) personal factors, self-efficacy, and lifestyle factors would have both direct and indirect impacts on HRQoL, and (2) self-efficacy and lifestyle factors would mediate the impacts of variables included in the model to predict HRQoL. As indicated by the study results, the first assumption about the direct and indirect effects of personal factors, self-efficacy, and lifestyle factors on HRQoL was partially supported, with some significant paths found, while others were not. The second assumption of the framework was not fully supported. While exercise self-efficacy mediated the relationship between sleep impairment on HRQoL, diet self-efficacy was neither a predictor nor a mediator of HRQoL. Interestingly, the study found that a healthy diet (fruit and vegetable consumption) mediated the impact of exercise self-efficacy on HRQoL. Although previous studies have linked the relationships between exercise and healthy eating behaviours, the linkage between exercise self-efficacy and a healthy diet has not been addressed by the literature. The mediation effect of quantity of alcohol consumption on the relationship between income and physical health was identified;

however this mediation effect was non-significant when all factors and mediators were assessed in one model. The findings from this current study suggested five standardised equations based on significant mediation effects found, as follows:

1) Physical health (PCS-SF36) = 49.69 + (-.04)income + (.14)average quantity of alcohol consumption.

2) Mental health (MCS-SF36) = 40.11 + (-.14)sleep impairment + (.23)exercise self-efficacy.

3) Mental health (MCS-SF36)= 40.11 + (.02)exercise self-efficacy + (.12)number of vegetable servings consumed per day.

4) Cancer-specific HRQoL (FACT-G)= 85.17 + (-.13)sleep impairment + (.11)exercise self-efficacy.

5) Cancer-specific HRQoL (FACT-G)= 85.17 + (.18)exercise self-efficacy + (.11)years having two servings of fruit per day.

These equations provide evidence for future research to form hypotheses to determine the factors that influence HRQoL in women after breast and gynaecological cancer. Although social cognitive theory emphasises the role of reciprocal determinism in which people, behaviours, and environment interact and influence each other, underpinning the impact of self-efficacy (Bandura, 2002, 2004b), environmental factors (such as cultural differences, living arrangements, or food access) were not included in the models in this study. However some pathways were found in this study that are worthy of further investigation, such as the average quantity of alcohol consumption, as its effects on physical health were mediated by the impact of income; and exercise self-efficacy, as it mediated the influences of sleep impairment on mental health and cancer-specific HRQoL. Future research would benefit from further examination of these mediation effects, as well as the impact of environmental factors on self-efficacy, lifestyle factors, and the outcomes of HRQoL.

In terms of direct influence, the results presented in Chapter 6 show that physical activity and healthy eating behaviours were associated with better physical health, mental health, and cancer-specific HRQoL. No significant association was found in regards to alcohol consumption, smoking, and BMI as predictors of physical health, mental health, or cancer-specific HRQoL. These results suggest consideration of including alcohol consumption and smoking (active and passive smoking), as well as BMI in the latent variable of lifestyle factors. An understanding of the relationships between lifestyle factors and physical health, mental health, and cancer-specific HRQoL might be more profound if the interactions among lifestyle factors themselves are known.

While diet self-efficacy was a predictor of healthy eating behaviours and healthy eating behaviours were predictors of HRQoL, diet self-efficacy was dropped out of the model testing factors influencing HRQoL. These results indicate that exercise self-efficacy had a stronger impact on both physical activity and health eating behaviour compared to diet self-efficacy. Additionally, the impact of sleep impairment on HRQoL was mediated by exercise self-efficacy. It is therefore highly recommended that clinical strategies aimed at improving HRQoL should focus more on exercise self-efficacy while facilitating a lifestyle change consultation for women after breast and gynaecological cancer, especially in groups with sleep impairment who have lower HRQoL.

The theoretical framework informing this current study provides some guidance for developing intervention programs for women after breast and gynaecological cancer. Firstly, lifestyle modification programs need to incorporate self-efficacy as an integrated component of the program due to their relationships and mediation effects. Secondly, improvement of sleep quality should be a priority due to its negative impact on HRQoL. Finally, as shown in the above five equations, it is critical that intervention programs determine whether the outcome is physical health, mental health, or cancer-specific HRQoL to ensure that the efficacy of any interventions can be identified.

8.6 CONCLUSION

This chapter discussed the key findings of the study in regard to personal factors, self-efficacy levels, lifestyle factors, and HRQoL in Vietnamese women after BGC and the inter-interactions between these study variables. The study found that Vietnamese women had deficits in their physical health, mental health, and cancer-specific HRQoL after BGC. This study highlights the importance of sleep management to improve patients' health outcomes. The study also identified that exercise self-efficacy can reduce the negative impacts of sleep impairment to HRQoL and lifestyle factors can boost the positive impact of self-efficacy on these health outcomes. These findings provide useful evidence for future research and to inform intervention programs aimed at improving HRQoL for Vietnamese women after BGC. The next chapter describes the study's strengths and limitations, in addition to providing implications for theory, research, and practice in more detail.

Chapter 9: Conclusions

9.1 INTRODUCTION

This chapter begins with a summary of the key findings of the research, followed by a discussion of the strengths and limitations of the study. Implications for theory, future research, and clinical practice are then presented.

9.2 SUMMARY OF SIGNIFICANT FINDINGS

The characteristics of a convenience sample of Vietnamese women after breast and gynaecological cancer (BGC) were explored in this research. The results indicate that that the majority of the study participants were in the middle income class, and had two comorbidities in addition to their cancer, on average. Many of them were peri or post-menopausal and had sleep impairment. Participants had deficits in their self-efficacy levels, as their self-efficacy mean scores were lower than the mid-points of the self-efficacy scales. They reported lower levels of physical activity, consumed less vegetables than the recommended level, and many were exposed to smoke at home and at the workplace. A small proportion of participants were reported to be current alcohol drinkers; however, they consumed only one standard alcohol drink per day or less. On average, participants' BMI average score indicated a healthy body weight. In regards to health-related quality of life (HRQoL), results indicate a deficit in HRQoL of the study participants compared to population norms.

Multivariate analyses used to identify significant factors influencing self-efficacy, lifestyle factors, and HRQoL were guided by the study's hypothesised model. The results identified that income and sleep mpairment were significant predictors of diet self-efficacy, whereas residence, education, and sleep impairment significantly predicted exercise self-efficacy, indicating that people with sleep impairment had lower confidence in their ability to follow both a healthy diet and exercise regime. No significant relationship was found between health status and self-efficacy. Given the limited evidence regarding the influences of socio-demographic factors and health status on self-efficacy among women after cancer, further research in this area is warranted.

Three predictors were significantly related to self-rated levels of physical activity, including income, number of health problems, and exercise self-efficacy level. However, only exercise self-efficacy was a predictor of energy expenditure levels per week. Although these findings are supported by the literature (Abed, 2010; Haas, 2011; Nelson et al., 2016), demonstrating the contributions of these factors to the performance of physical activity, the instruments used to measure physical activity levels need to be taken into consideration, as this current study showed that perceptions of physical activity levels can be different from actual physical activity levels within the same population. This accounts for some of the differences in factors identified as predicting self-rated physical activity levels and actual energy expenditure. In regards to fruit and vegetable consumption, while rural residence, older age, higher diet self-efficacy, and higher exercise self-efficacy were predictors of higher vegetable consumption, only older age and higher diet-exercise self-efficacy predicted optimal fruit consumption. Urban residence, higher sleep impairment, and older age were predictors of a higher BMI, demonstrating the importance of monitoring BMI in older women and improving their sleep quality to support BMI management. The overall findings shed light on factors to consider in building interventions to improve self-efficacy and promote a healthy lifestyle for this population.

In the multivariate analyses, factors that directly influenced HRQoL were also examined and a number of factors that predicted HRQoL were identified. Among these significant factors, sleep impairment was the strongest factor influencing physical health, mental health, and cancer-specific HRQoL, highlighting the importance of including this factor in future interventions to improve HRQoL for this population.

A series of model tests were undertaken to determine the mediation effects of self-efficacy and lifestyle factors on HRQoL, with a number of important findings established through the analyses. Firstly, average quantity of alcohol consumed in the last seven days partially mediated the relationship between income and physical health. This result indicates that while the high income group had higher physical health compared to the low income group, if women in these income groups consumed alcohol (at low to moderate levels), there was no significant difference in physical health between the low and high income groups. Secondly, when separating mediators in the model, only one mediation effect was found, which was exercise self-efficacy mediating the effect of the sleep impairment on mental health. However, when all mediators were included in the model and examined at the same time, two mediation effects were found: (1) exercise self-efficacy mediated the effect of the sleep impairment on mental health, and (2) the number of vegetable servings consumed per day mediated the effect of exercise self-efficacy on mental health. Thirdly, two mediation effects on cancer-specific HRQoL were found: (1) exercise self-efficacy mediated the effect of sleep impairment on cancer-specific HRQoL, and (2) years having two servings of fruit per day mediated the effect of exercise self-efficacy on cancer-specific HRQoL. The mediation effect results highlight that the effect of exercise self-efficacy on cancer-specific HRQoL could be reduced if these women had more years consuming two servings of fruit per day. Finally, sleep impairment had a significant and the strongest total effect on physical health, mental health, and cancer-specific HRQoL.

9.3 STRENGTHS AND LIMITATIONS

This study provides distinctive contributions to the existing knowledge in relation to lifestyle factors and HRQoL in women after BGC and has a number of strengths. First, this study was conducted in an understudied population. No previous studies have reported on lifestyle factors and HRQoL in Vietnamese women after BGC living in their country of origin. Second, this study is the first to provide a comprehensive and in-depth examination of the relationship between personal factors (socio-demographic characteristics and health status), self-efficacy levels, lifestyles factors, and HRQoL, with data reporting on direct and indirect effects using both regression and structural equation modelling analyses. In the past, researchers have focused on examining factors that are associated with self-efficacy, lifestyle factors, and HRQoL (D. Anderson et al., 2017; D. J. Anderson et al., 2012; Schlesinger et al., 2014; Xiao et al., 2016; Yan et al., 2016; Zeng, Ching, & Loke, 2011), but have not fully provided evidence of the reciprocal interactions between these variables. Third, the study makes significant contributions to the literature in terms of testing social cognitive theory using a structural equation modelling approach. The study was particularly unique in that it tested the role of self-efficacy and lifestyle factors as mediators, and their joint effects on the outcome of HRQoL. The use of structural equation modelling is a powerful technique for testing social cognitive theory, because this statistical method tests a theoretical model guided by specific hypothesis testing. In doing so, it advances the understanding of complex relationships among constructs. Fourth, the forming of latent variables was validated before hypothesis testing, highlighting the importance of using suitable scales to measure variables included in one construct. As limited studies have tested social cognitive theory in the population after BGC, especially in the Vietnamese context, this study provides empirical evidence in these areas. Fifth, careful attention was given to the quality of the data in this research. The use of standardised instruments to measure HRQoL is an advantage of this study. While SF36 was used to measure the physical health and mental health of the study participants, the study also used FACT-G to measure cancer-specific HRQoL. Using both instruments provides a more complete picture of HRQoL from both a general population perspective, as well as enabling a focus on cancer-specific HRQoL concerns.

However, there are some limitations that need to be taken into consideration. As this study used a cross-sectional study design, causality cannot be unequivocally determined, as this study design is not ranked highly on the continuum for research looking at cause and effect. The design was deemed to be appropriate to answer research questions raised in this study, as the questions focused on HRQoL at a given time point and understanding the descriptive correlates of HRQoL status. However, it is acknowledged that associations, rather than causal links were identified. A longitudinal design is required to observe whether HRQoL changes further after weeks or months among BGC survivors when they are exposed to the factors included in this study.

There are also some limitations associated with the models that were developed and tested. That is, the lifestyle factors were formed by elements of exercise, fruit and vegetable consumption, BMI, smoking, and alcohol consumption. Although this construct was not statistically supported, it provides an initial step to capture the concept of lifestyle behaviours among women after BGC. Moreover, the construct of lifestyle factors was modelled as a formative model, using continuous variables to measure diet, exercise, smoking and alcohol consumption would enable the formation of a reflective model for these latent variables, providing suggestions for future study in this area. This study has therefore provided a building block for future study in the health field and theory development.

Another limitation of this study is the data collection methods. The data were collected using a self-reporting survey. This might have resulted in recall, reporting, or a social desirability bias, rather than reflecting actual behaviour. To minimise these biases, participants were allowed to take time to respond to questions and they could submit the completed survey once it was done. Participants therefore had time to consider responses before finalising them. Moreover, participants were informed that their information was confidential and data would be reported as group data only. No individual data would be presented. Nevertheless, the limitations associated with self-reporting of behaviours are important to consider when interpreting the study findings.

In addition, the convenience nature of the study sample and the small sample size mean that caution must be taken when generalising the findings to other populations. The study sample was primarily drawn from one major hospital. Moreover, as some of the lifestyle behaviours of interest to the present study were present in only a small proportion of the study population, the sample size was not large enough to examine variation with respect to these behaviours.

Finally, outcome expectations and environmental factors, two constructs central to social cognitive theory, were not measured in this study. Although it would be ideal to test the entire theoretical model, in reality, this is generally not achievable in consideration of minimising responder burden. Future research should focus on this topic and include these two constructs in the model, using short measures to reduce the burden for participants.

9.4 IMPLICATIONS

9.4.1 Theoretical implications

The conceptual framework for this study was based on the social cognitive theory developed by Bandura (1986). This theoretical framework provided an adequate fit to the data and supported the majority of the hypothetical relationships and findings. The current study not only confirmed the mediation role of self-efficacy levels, but also highlighted its strong influence on health outcomes, including physical health, mental health, and cancer-specific HRQoL. The study also determined that lifestyle factors mediated the role of self-efficacy on HRQoL, which can reduce or increase the impact of self-efficacy on outcomes of HRQoL in the context of social cognitive theory.

With regard to explaining variance in the outcome variables, the study's results indicate that the models testing the mediation effects of self-efficacy and lifestyle factors accounted for significant amounts of variance in most of the constructs. Variables included in these models testing the mediation effect explained 20%, 22%, and 25% of the variance in physical health, mental health, and cancer-specific HRQoL, respectively. These findings make a distinctive contribution to social cognitive theory literature and confirm that the hypothetical constructs under discussion are highly relevant. Social cognitive theory therefore provides a useful framework for understanding lifestyle factors, self-efficacy, and outcomes of HRQoL among women after BGC and has significant potential to guide development of intervention programs focusing on facilitating lifestyle change through promoting self-efficacy to improve HRQoL for this population. The findings of this study are particularly useful as scant literature has tested social cognitive theory in relation to lifestyle factors and HRQoL in women after BGC.

In this study, two constructs, socio-demographic characteristics and health status factors, were personal factors identified for testing using the social cognitive theoretical framework. Specific socio-demographic characteristics were selected from regression analyses, resulting in the inclusion of three key indicators: age, income, and education. For the health status construct, only sleep mpairment and number of health problems were included on the basis of findings from the regression analyses. From a statistical point of view, these constructs require further validation before examining the whole model. No statistical model fit for these constructs was found, suggesting that indicators included in these constructs might not reflect the whole construct's concepts. These findings emphasise the importance of further examination of forming these constructs in future studies. This study finding provides useful information, not only for future research, but also in extending knowledge of social cognitive theory in the areas of BGC while examining personal factors, such as socio-demographics and health status, as no previous studies have explore these areas.

9.4.2 Implications and recommendations for future research

There are several noteworthy implications and recommendations for future research that were identified from this study. Firstly, it is recommended that future research should explore and report more extensively on the influence of factors such as self-efficacy, lifestyle, and HRQoL in women after BGC, as limited studies have focused on this area. A wider range of additional factors should be considered in future studies, such as the severity of the comorbidities, cancer, and environment factors for a more extensive examination of the impact of these variables on health outcomes.

Retesting and validating the models with a larger sample size is warranted in future studies. More specifically, more constructs from social cognitive theory should be included when testing the model based on this theoretical framework. For example, the inclusion of outcome expectations and environmental factors is warranted in future studies. Findings from this current study suggest that more work needs to be done in regards to developing and validating the constructs within the theory. Furthermore, when developing the constructs, further studies are required to consider whether to use a formative model or reflective model, as the wrong approach could lead to bias and invalid results. Additionally, a larger sample size would allow model analysis with covariates included to reduce the bias of the study interpretation.

Finally, longitudinal trials are required to explore the impact of the reciprocal relationship of the major concepts on healthy lifestyle practices and then HRQoL, especially in the examination of the relationships between self-efficacy and/or sleep impairment. Causalities of these relationships can be assessed in these longitudinal studies at different time points.

9.4.3 Implications and recommendations for healthcare practice and policy

The lower levels of physical activity and healthy diets identified in this study suggest that more strategies are required to improve healthy behaviours among Vietnamese women after BGC. These strategies could be implemented through community networks for women after BGC. Expert advice is required and can be delivered through online resources or through workshops and meetings in communities or at hospitals when women come for their health check-ups and treatment follow up. This study also found a significant association between the number of health problems and levels of physical activity. Women with heart disease or arthritis might experience some difficulties performing aerobic exercise or jogging; however, Tai Chi or Qioing exercises with light movement could be a better choice for these people. As such, information that is tailored specifically to the social and cultural context of the patient populations is required.

Although participants in this study intend to consume more vegetables or fruit, their actual eating habits do not reflect their intention. To improve people's consumption of fruit and vegetables, the control of chemical and presidise used for fruits and vegetables needs more attention by the govement.

As sleep impairment was the most significant factor influencing HRQoL, interventions to improve sleep quality among women after BGC are urgently required. Although this current study did not examine factors influencing sleep mpairment, general advice about getting enough sleep, such as having the same bed time every day, avoiding heavy meals within a couple of hours of bedtime, and exercising, could improve the sleep quality of this population, which could in turn improve their HRQoL.

To improve healthy lifestyles and HRQoL, programs should focus on improving self-efficacy for this population, as self-efficacy has been found to be an important predictor of both lifestyle practices and HRQoL. Additionally, self-efficacy has been found to be a mediator, mediating the impact of personal factors on HRQoL. Improving self-efficacy has the potential to minimise the negative effects of some factors on HRQoL that are not directly modifiable, such as age and residence.

9.5 CONCLUSION

This study confirms the usefulness of social cognitive theory in guiding research and practice in relation to health behaviours and HRQoL, and the importance of advanced statistical models in generating evidence in this area. By highlighting the significant role that self-efficacy and other personal factors have in influencing health behaviours, and the complex relationships between personal factors, lifestyle factors, and health behaviours in influencing HRQoL, this thesis provides clinicians, researchers, and policy makers with important new evidence to inform program development.

References

Aarstad, A. K. H., Aarstad, H. J., & Olofsson, J. (2007). Quality of life, drinking to cope, alcohol consumption and smoking in successfully treated HNSCC patients. *Acta Oto-Laryngologica*, *127*(10), 1091-1098. doi:10.1080/00016480601158757

Abed, H. (2010). What factors affect the lifestyle choices of people with schizophrenia. *Mental Health Review Journal 15*(2), 21-27. doi:10.5042/mhrj.2010.0368

Adegbola, M. (2015). Sleep quality, pain and self-efficacy among community-dwelling adults with sickle cell disease. *Journal of National Black Nurses Association*, *26*(1), 15-21.

Allemani, C., Weir, H. K., Carreira, H., Harewood, R., Spika, D., Wang, X. S., . . . & Coleman, M. P. (2015). Global surveillance of cancer survival 1995-2009: analysis of individual data for 25,676,887 patients from 279 population-based registries in 67 countries (CONCORD-2). *Lancet*, *385*(9972), 977-1010. doi:10.1016/s0140-6736(14)62038-9

Allison, P. J. (2002). Alcohol consumption is associated with improved health-related quality of life in head and neck cancer patients. *Oral Oncology, 38*(1), 81-86. doi:https://doi.org/10.1016/S1368-8375(01)00031-8

American Cancer Society. (2011). *Global Cancer Factors and Figure* (2nd ed.). Atlanta: Amrican Cancer Society.

Anderson, D. J., Seib, C., McCarthy, A. L., Yates, P., Porter-Steele, J., McGuire, A., & Young, L. (2015). Facilitating lifestyle changes to manage menopausal symptoms in women with breast cancer: a randomized controlled pilot trial of The Pink Women's Wellness Program. *Menopause*. doi:10.1097/gme.0000000000000421

Anderson, D. J., Seib, C., Tjondronegoro, D., Turner, J., Monterosso, L., McGuire, A., . . . & McCarthy, A. L. (2017). The women’s wellness after cancer program: a multisite, single-blinded, randomised controlled trial protocol. [Journal article]. *BMC Cancer, 17*(1), 98. doi:10.1186/s12885-017-3088-9

Anderson, D. J., & Yoshizawa, T. (2007). Cross-cultural comparisions of health related quality of life in Australian and Janpanese midlife women: the Australian and Japanese midlife women's health study. *Menopause, 14*(4), 697-707.

Anderson, R. L. (2008). *Exercise and dietary behaviour change in a sample of midlife Australian women* PhD. Queensland University of Technology.

Arruda, S. P. M., da Silva, A. A. M., Kac, G., Goldani, M. Z., Bettiol, H., & Barbieri, M. A. (2014). Socioeconomic and demographic factors are associated with dietary patterns in a cohort of young Brazilian adults. *BMC Public Health, 14*(1), 654. doi:10.1186/1471-2458-14-654

Ashing-Giwa, K. T., Padilla, G. V., Bohorquez, D. E., Tejero, J. S., Garcia, M., & Meyers, E. A. (2006). Survivorship: a qualitative investigation of Latinas diagnosed with cervical cancer. *Journal Psychosocial Oncology, 24*(4), 53-88. doi:10.1300/J077v24n04_04

Ashing-Giwa, K. T., Tejero, J. S., Kim, J., Padilla, G. V., Kagawa-Singer, M., Tucker, M. B., & Lim, J. W. (2009). Cervical cancer survivorship in a population based sample. *Gynecologic Oncology, 112*(2), 358-364. doi:10.1016/j.ygyno.2008.11.002

Australian Bureau of Statistics. (2013). *4125.0 Gender indicators, Australia, Jan 2013.* Retrieved from http://www.abs.gov.au/ausstats/abs@.nsf/Lookup/4125.0main+features3320Jan%202013

Australian Institute of Health and Welfare (AIHW). (2012). *Cancer survival and prevalence in Australian. Period estimates from 1982 to 2010.* Retrieved from http://www.aihw.gov.au/WorkArea/DownloadAsset.aspx?id=10737422721.

Australian Institute of Health and Welfare (AIHW). (2013). *Lifestyle risk factors*. Retrieved from http://www.health.gov.au/internet/publications/publishing.nsf/Content/womens-health-policy-toc~womens-health-policy-experiences~womens-health-policy-experiences-lifestylerisk

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavior change. *Psychological Review, 84*(2), 191-215.

Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. Englewood Cliffs, NJ: Prentice-Hall Inc.

Bandura, A. (1995). *Self-efficacy in changing societies*. Cambrige, UK: Cambridge Univeristy Press.

Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York: Freeman.

Bandura, A. (1998). Health promotion from the perspective of social cognitive theory. *Psychology and Health, 13*, 623-649.

Bandura, A. (2002). Social cognitive theory in cultural context. *Applied Psychology, 51*, 269-290.

Bandura, A. (2004a). Health promotion by social cognitive mean. *Health Education & Behavior, 31*(2), 143-164.

Bandura, A. (2004b). Model of causality in social learning theory. In A. Freeman, M. J. Mahoney, P. DeVito & D. Martin (Eds.), *Cognition and Psychotherapy* (pp. 24-44). New York: Springer.

Bandura, A. (2006). Guide for constructing self-efficacy scales. In F. Pajaers & T. Urdan (Eds.), *Self-efficacy beliefs of adolescents*. The United States of America: Information Age Publishing.

Bao, P. P., Zheng, Y., Nechuta, S., Gu, K., Cai, H., Peng, P., . . . & Lu, W. (2013). Exercise after diagnosis and metabolic syndrome among breast cancer survivors: a report from the Shanghai Breast Cancer Survival Study. *Cancer Causes Control, 24*(9), 1747-1756. doi:10.1007/s10552-013-0252-7

Beasley, J. M., Newcomb, P. A., Trentham-Dietz, A., Hampton, J. M., Bersch, A. J., Passarelli, M. N., . . . & Willett, W. C. (2011). Post-diagnosis dietary factors and survival after invasive breast cancer. *Breast Cancer Research Treatment, 128*(1), 229-236. doi:10.1007/s10549-010-1323-z

Boehmer, S., Luszczynska, A., & Schwarzer, R. (2007). Coping and quality of life after tumor surgery: Personal and social resources promote different domains of quality of life. *Anxiety, Stress, & Coping, 20*(1), 61-75. Retrieved from doi:10.1080/10615800701195439

Borisch, B. (2009). *Lifestyle Factors – what we know and what we are doing about them*. Stockholm. Retrieved from http://www.unige.ch/medecine/isg/collaborateurs/borisch/conferences/Lifestylefactors_Stockholm_2009.pdf

Bottomley, A., Therasse, P., Piccart, M., Efficace, F., Coens, C., Gotay, C., . . . & Shepherd, L. (2005). Health-related quality of life in survivors of locally advanced breast cancer: an international randomised controlled phase III trial. *Lancet Oncology, 6*(5), 287-294. doi:10.1016/s1470-2045(05)70100-5

Bowling, A. (2005). *Measuring health: A review of quality of life measurement scales* (3rd Edition ed.). The United Kingdom: Bell & Brain Ltd, Glasgow.

Braithwaite, D., Izano, M., Moore, D. H., Kwan, M. L., Tammemagi, M. C., Hiatt, R. A., . . . & Caan, B. (2012). Smoking and survival after breast cancer diagnosis: a prospective observational study and systematic review. *Breast Cancer Research and Treatment, 136*(2), 521-533. doi:10.1007/s10549-012-2276-1

Brink, E., Alsén, P., Herlitz, J., Kjellgren, K., & Cliffordson, C. (2012). General self-efficacy and health-related quality of life after myocardial infarction. *Psychology, Health & Medicine, 17*(3), 346-355. doi:10.1080/13548506.2011.608807

Burdenski, T. (2000). Evaluating univariate, bivariate, and multivariate normality using graphical and statistical procedures. *Multiple Linear Regression View Point, 26*(2).

Buysse, D. J., Reynolds, C. F., 3rd, Monk, T. H., Berman, S. R., & Kupfer, D. J. (1989). The Pittsburgh Sleep Quality Index: a new instrument for psychiatric practice and research. *Psychiatry Research, 28*(2), 193-213.

Cai, L. (2012). Latent variable modeling. *Shanghai Arch Psychiatry*, *24*(2), 118-120. doi:10.3969/j.issn.1002-0829.2012.02.010

Cancer Council Victoria. (2015). *Living well after cancer*. Retrieved from http://www.cancervic.org.au/living-with-cancer/living-well-after-cancer#cancer-survivor

Centers for Disease Control and Prevention. (2011). *Health related quality of life. National Center for Chronic Disease Prevention and Health Promotion, Division of Population Health*. Retrieved from http://www.cdc.gov/hrqol/concept.htm

Cerin, E., Leslie, E., Vandelanotte, C., & Merom, D. (2008). Recreational facilities and leisure-time physical activity: An analysis of moderators and self-Efficacy as a mediator. *Health Psychology, 27*(2), 126-135. doi:10.1037/0278-6133.27.2(Suppl.).S126

Cella, D. F., Tulsky, D. S., Gray, G., Sarafian, B., Linn, E., Bonomi, A., . . . et al. (1993). The Functional Assessment of Cancer Therapy scale: development and validation of the general measure. *J Clin Oncol, 11*(3), 570-579. doi:10.1200/jco.1993.11.3.570

Chai, W., Nigg, C. R., Pagano, I. S., Motl, R. W., Horwath, C., & Dishman, R. K. (2010). Associations of quality of life with physical activity, fruit and vegetable consumption, and physical inactivity in a free living, multiethnic population in Hawaii: A longitudinal study. *International Journal of Behavioral Nutrition and Physical Activity, 7*(1), 83. doi:10.1186/1479-5868-7-83

Chan, D. S. M., Vieira, A. R., Aune, D., Bandera, E. V., Greenwood, D. C., McTiernan, A., . . . & Norat, T. (2014). Body mass index and survival in women with breast cancer—systematic literature review and meta-analysis of 82 follow-up studies. *Annals of Oncology, 25*, 1901–1914.

Chen, C., Tsai, L. T., Lin, C. F., Huang, C. C., Chang, Y. T., Chen, R. Y., & Lyu, S. Y. (2017). Factors influencing interest in recreational sports participation and its rural-urban disparity. *PLoS One, 12*(5), e0178052. doi:10.1371/journal.pone.0178052

Chen, X., Lu, W., Zheng, W., Gu, K., Matthews, C. E., Chen, Z., . . . & Shu, X. O. (2011). Exercise after diagnosis of breast cancer in association with survival. *Cancer Prevention Research (Philadelphia, Pa.), 4*(9), 1409-1418. Retrieved from cmedm. doi:10.1158/1940-6207.CAPR-10-0355

Chlebowski, R. T., & Blackburn, G. L. (2015). Final survival analysis from the randomized Women's Intervention Nutrition Study (WINS) evaluating dietary intervention as adjuvant breast cancer therapy. *Cancer Research, 75*, 5-8. doi:10.1158/1538-7445.SABCS14-S5-08

Clegg, L. X., Li, F. P., Hankey, B. F., Chu, K., & Edwards, B. K. (2002). Cancer survival among US whites and minorities: a SEER (Surveillance, Epidemiology, and End Results) Program population-based study. *Archives of Internal Medicine, 162*(17), 1985-1993.

Cleland, V., Sodergren, M., Otahal, P., Timperio, A., Ball, K., Crawford, D., . . . & McNaughton, S. A. (2015). Associations between the perceived environment and physical activity among adults aged 55-65 years: Does urban-rural area of residence matter? *Journal of Aging Physical Activity*, *23*(1), 55-63. doi:10.1123/japa.2012-0271

Clevenger, L., Schrepf, A., Christensen, D., DeGeest, K., Bender, D., Ahmed, A., . . . Lutgendorf, S. K. (2012). Sleep disturbance, cytokines, and fatigue in women with ovarian cancer. *Brain, Behavior, and Immunity, 26*(7), 1037-1044. doi:10.1016/j.bbi.2012.04.003

Clevenger, L., Schrepf, A., & DeGeest, K. (2013). Sleep disturbance, distress, and quality of life in ovarian cancer patients during the first year post diagnosis. *Cancer*, *119*(17), 3234-3241. doi:10.1002/cncr.28188

Cohen, P., Cohen, J., Teresi, J., Marchi, M., & Velez, C. N. (1990). Problems in the measurement of latent variables in structural equations causal models. *Applied Psychological Measurement*, *14*(2), 183-196. doi:10.1177/014662169001400207

Coleman, M. P., Quaresma, M., Berrino, F., Lutz, J.-M., Angelis, R. D., Capocaccia, R., ... & Micheli, A. (2008). Cancer survival in five continents: A worldwide population-based study. *Lancet Oncol, 9*, 730-756.

Cornick, J. E. (2015). Factor structure of the Exercise Self-Efficacy Scale. *Measurement in Physical Education and Exercise Science, 19*(4), 208-218. doi:10.1080/1091367X.2015.1074579

Craig, C. L., Marshall, A. L., Sjostrom, M., Bauman, A. E., Booth, M. L., Ainsworth, B. E., . . . Oja, P. (2003). International physical activity questionnaire: 12-country reliability and validity. *Medicine & Science in Sports Exercise, 35*(8), 1381-1395. doi:10.1249/01.mss.0000078924.61453.fb

Cunningham, E. G. (2008). *A practical guide to structural equation modeling using Amos*. VIC: Statsline.

Courtois, R., Reveillere, C., Paus, A., Berton, L., & Jouint, C. (2007). Links between stress factors, mental health and initial consumption of tobacco and alcohol during pre-adolescence. *Encephale*, *33*(3 Pt 1), 300-309.

Danaei, G., Hoorn, S. V., Lopez, A. D., Murray, C. J. L., Ezzati, M., & Comparative Risk Assessment collaborating group. (2005). Causes of cancer in the world: Comparative risk assessment of nine behavioural and environmental risk factors. *Lancet*, *366*, 1784–1793.

Dao-Tran, T.-H. (2012). *An investigation of factors influencing diabetes self-management among adults with type 2 diabetes in Vietnam.* Master of Applied Science Queensland University of Technology.

Darawad, M. W., Hamdan-Mansour, A. M., Khalil, A. A., Arabiat, D., Samarkandi, O. A., & Alhussami, M. (2016a). Exercise Self-Efficacy Scale. *Clinical Nursing Research*, 1054773816683504. doi:10.1177/1054773816683504

Darawad, M. W., Hamdan-Mansour, A. M., Khalil, A. A., Arabiat, D., Samarkandi, O. A., & Alhussami, M. (2016b). Exercise Self-Efficacy Scale: Validation of the Arabic version among Jordanians with chronic diseases. *Clinical Nursing Research*, 1054773816683504. doi:10.1177/1054773816683504

Deforche, B., & Van Dyck, D., Verloigne, M., & De Bourdeaudhuij, I. (2009). *Self-efficacy as a moderator in the relationship between physical activity and perceived social and physical environmental*. Retrieved from http://activelivingresearch.org/self-efficacy-moderator-relationship-between-physical-activity-and-perceived-social-and-physical

Deurenberg, P., Deurenberg-Yap, M., & Guricci, S. (2002). Asians are different from Caucasians and from each other in their body mass index/body fat per cent relationship. *Obesity Reviews, 3*(3), 141-146.

Devi, K., & Hegney, D. G. (2011). Effects of psychoeducational interventions on sexual functioning, quality of life and psychological outcomes in patients with gynaecological cancer: A systematic review. *JBI Library of Systematic Reviews, 9*(58), 2533-2571. Retrieved from http://connect.jbiconnectplus.org/ViewSourceFile.aspx?0=5968.

Dinh, T. V., Dong, H. V., Chung, N. T., & Lee, A. H. (2013). Validity and reliability of a food frequency questionnaire to assess habitual dietary intake in Northern Vietnam. *Vietnam Journal of Public Health, 1*(1), 57-65.

Dong, J.-Y., He, K., Wang, P., & Qin, L.-Q. (2011). Dietary fiber intake and risk of breast cancer: a meta-analysis of prospective cohort studies. *The American Journal Of Clinical Nutrition, 94*(3), 900-905. doi:10.3945/ajcn.111.015578

Donnelly, T. T. (2006). The health-care practices of Vietnamese-Canadian women: Cultural influences on breast and cervical cancer screening. *Canadian Journal of Nursing Research, 38*(1), 82-101.

Dossus, L., Boutron-Ruault, M. C., Kaaks, R., Gram, I. T., Vilier, A., Fervers, B., . . . Clavel-Chapelon, F. (2014). Active and passive cigarette smoking and breast cancer risk: results from the EPIC cohort. Int J Cancer, 134(8), 1871-1888. doi:10.1002/ijc.28508

Doyle, C., Kushi, L. H., Byers, T., Courneya, K. S., Demark-Wahnefried, W., Grant, B., . . . & Andrews, K. S. (2006). Nutrition and physical activity during and after cancer treatment: An American Cancer Society guide for informed choices. *CA: A Cancer Journal for Clinicians, 56*, 323–353.

Duclos, M., Dejager, S., Postel-Vinay, N., di Nicola, S., Quéré, S., & Fiquet, B. (2015). Physical activity in patients with type 2 diabetes and hypertension – insights into motivations and barriers from the MOBILE study. *Vascular Health and Risk Management 11*, 361-371.

Dutton, G. R., Tan, F., Provost, B. C., Sorenson, J. L., Allen, B., & Smith, D. (2009). Relationship between self-efficacy and physical activity among patients with type 2 diabetes. *J Behav Med, 32*. doi:10.1007/s10865-009-9200-0

Everett, B., Salamonson, Y., & Davidson, P. M. (2009). Bandura's exercise self-efficacy scale: Validation in an Australian cardiac rehabilitation setting.

International Journal of Nursing Studies, 46(6), 824-829. doi:http://dx.doi.org/10.1016/j.ijnurstu.2009.01.016

Farhud, D. D. (2015). Impact of Lifestyle on Health. *Iran J Public Health, 44*(11), 1442-1444.

Friel, S., Hattersley, L., & Ford, L. (2015). *Evidence review: Addressing the social determinants of inequities in healthy eating*. Retrieved from https://www.google.com.au/url?sa=t&rct=j&q=&esrc=s&source=web&cd=3&cad=rja&uact=8&ved=0ahUKEwiYuN_x0-XWAhUEwLwKHdXFAloQFgg1MAI&url=https%3A%2F%2Fwww.vichealth.vic.gov.au%2F-%2Fmedia%2FResourceCentre%2FPublicationsandResources%2FHealth-Inequalities%2FFair-Foundations%2FFull-reviews%2FHealthEquity-Healthy-eating-review.pdf%3Fla%3Den%26hash%3D414B322AFC205222837CD771B2BB511B650165B1&usg=AOvVaw3dNc3mI-lxOvESUQqeetgS

Fu, M. R., Axelrod, D., Guth, A. A., Cleland, C. M., Ryan, C. E., Weaver, K. R., . . . & Melkus, G. E. (2015). Comorbidities and Quality of Life among Breast Cancer Survivors: A Prospective Study. *Journal of Personalized Medicine, 5*(3), 229-242. doi:10.3390/jpm5030229

Furlani, R., & Ceolim, M. F. (2006). Sleep quality of women with gynecological and breast cancer. *Rev. Latino-Am Enfermagem 14*(6), 872-878.

Ganasegeran, K., Al-Dubai, S. A., Qureshi, A. M., Al-abed, A.-a. A., AM, R., & Aljunid, S. M. (2012). Social and psychological factors affecting eating habits among university students in a Malaysian medical school: A cross-sectional study. [Journal article]. *Nutrition Journal, 11*(1), 48. doi:10.1186/1475-2891-11-48

Ganz, P. A., Kwan, L., Stanton, A. L., Bower, J. E., & Belin, T. R. (2011). Physical and Psychosocial Recovery in the Year After Primary Treatment of Breast Cancer. *Journal of Clinical Oncology, 29*(9), 1101-1109. doi:10.1200/jco.2010.28.8043

Gao, C.-M., Ding, J.-H., Li, S.-P., Liu, Y.-T., Qian, Y., Chang, J., . . . & Tajima, K. (2013). Active and passive smoking, and alcohol drinking and breast cancer risk in chinese women. *Asian Pacific Journal Of Cancer Prevention: APJCP, 14*(2), 993-996.

Gase, L. N., Glenn, B., & Kuo, T. (2016). Self-Efficacy as a mediator of the relationship between the perceived food environment and healthy eating in a low income population in Los Angeles County. *Journal of Immigrant and Minority Health, 18*(2), 345-352. doi:10.1007/s10903-015-0186-0

Gill, T., Chittleborough, C., Taylor, A., Ruffin, R., Wilson, D., & Phillips, P. (2003). Body mass index, waist hip ratio, and waist circumference: Which measure to classify obesity? *Soz Praventivmed, 48*(3), 191-200.

Glanz, K., Rimer, B. K., & Viswanath, K. (2011). *Health behavior and health education: Theory, research, and practice*. John Wiley & Sons. Retrieved from http://QUT.eblib.com.au/patron/FullRecord.aspx?p=353367

Gotay, C. C., Farley, J. H., Kawamoto, C. T., & Mearig, A. (2008). Adaptation and quality of life among long-term cervical cancer survivors in the military health care system. *Military Medicine, 173*(10), 1035-1041.

Gotay, C. C., Korn, E. L., McCabe, M. S., Moore, T. D., & Cheson, B. D. (1992). Quality-of-life assessment in cancer treatment protocols: Research issues in protocol development. *JNCI Journal of the National Cancer Institute, 84*(8), 575-579.

Grandner, M. A., Schopfer, E. A., Sands-Lincoln, M., Jackson, N., & Malhotra, A. (2015). The Relationship between Sleep Duration and Body Mass Index Depends on Age. *Obesity (Silver Spring, Md.), 23*(12), 2491-2498. doi:10.1002/oby.21247

Grimmett, C., Bridgewater, J., Steptoe, A., & Wardle, J. (2011). Lifestyle and quality of life in colorectal cancer survivors. *Quality of Life Research, 20*(8), 1237-1245. doi:10.1007/s11136-011-9855-1

Gupta, D., Braun, D. P., Staren, E. D., & Markman, M. (2013). Longitudinal health-related quality of life assessment: Implications for prognosis in ovarian cancer. *Journal of Ovarian Research 6*(17).

Gupta, P., Sturdee, D. W., Palin, S. L., Majumder, K., Fear, R., Marshall, T., & Paterson, I.. (2006). Menopausal symptoms in women treated for breast cancer: The prevalence and severity of symptoms and their perceived effects on quality of life. *Climacteric, 9*(1), 49-58.

Haas, B. K. (2011). Fatigue, self-efficacy, physical activity, and quality of life in women with breast cancer. *Cancer Nursing, 34*(4), 322-334. doi:10.1097/NCC.0b013e3181f9a300

Hair, J. H., Black, W. C., Babin, B. J., & Anderson, R. E. (2010). *Multivariate data analysis. A global perspective* (7th ed.). Upper Saddle River: Person.

Hastert, T. A., Beresford, S. A. A., Patterson, R. E., Kristal, A. R., & White, E. (2013). Adherence to WCRF/AICR cancer prevention recommendations and risk of post-menopausal breast cancer. *Cancer Epidemiol Biomarkers Prev, 22*(9), 1498–1508.

Haugland, T., Wahl, A. K., Hofoss, D., & DeVon, H. A. (2016). Association between general self-efficacy, social support, cancer-related stress and physical health-related quality of life: A path model study in patients with neuroendocrine tumors. *Health and Quality of Life Outcomes, 14*. doi:10.1186/s12955-016-0413-y

Hirooka, N., Takedai, T., & D'Amico, F. (2012). Lifestyle characteristics assessment of Japanese in Pittsburgh, USA. *Journal of Community Health, 37*(2), 480-486. doi:10.1007/s10900-011-9467-2

Holick, C. N., Newcomb, P. A., Trentham-Dietz, A., Titus-Ernstoff, L., Bersch, A. J., Stampfer, M. J., . . . & Willett, W. C. (2008). Physical activity and survival after diagnosis of invasive breast cancer. *Cancer Epidemiology, Biomarkers & Prevention, 17*(2), 379-386. doi:10.1158/1055-9965.epi-07-0771

Holmes, M. D., Chen, W. Y., Feskanich, D., Kroenke, C. H., & Colditz, G. A. (2005). Physical activity and survival after breast cancer diagnosis. *JAMA, 293*(20), 2479-2486.

Holmes, M. D., Murin, S., Chen, W. Y., Kroenke, C. H., Spiegelman, D., & Colditz, G. A. (2007). Smoking and survival after breast cancer diagnosis. *International Journal of Cancer, 120*(12), 2672–2677.

Houston, L., Probst, Y., & Martin, A. (2015). Measuring data quality through a source data verification audit in a clinical research setting. *Studies in Health Technology and Informatics, 214*, 107-113.

Hsu, H.-T., Dodd, M. J., Guo, S.-E., Lee, K. A., Hwang, S.-L., & Lai, Y.-H. (2011). Predictors of exercise frequency in breast cancer survivors in Taiwan. *Journal of Clinical Nursing, 20*(13/14), 1923-1935. doi:10.1111/j.1365-2702.2010.03690.x

Hsu, H.-T., Huang, C.-S., Liu, Y., Dodd, M. J., Juan, C.-H., Lai, Y.-H., & Guo, S.-E. (2012). Exercise behaviors in breast cancer survivors in Taiwan. *Cancer Nursing, 35*(6), E48-E56. doi:10.1097/NCC.0b013e3182479984

Hsu, T., Ennis, M., Hood, N., Graham, M., & Goodwin, P. J. (2013). Quality of life in long-term breast cancer survivors. *Journal of Clinical Oncology, 31*(28), 3540-3548. doi:10.1200/jco.2012.48.1903

Huang, H.-Y., Tsai, W.-C., Chou, W.-Y., Hung, Y.-C., Liu, L.-C., Huang, K.-F., . . . & Kung, P.-T. (2017). Quality of life of breast and cervical cancer survivors. *BMC Women's Health, 17*(30).

Hui, S. S., Woo, J., & Kwok, T. (2009). Evaluation of energy expenditure and cardiovascular health effects from Tai Chi and walking exercise. *Hong Kong Medical Journal, 15 Suppl 2*, 4-7.

International Agency for Research on Cancer (IARC). (2008). *Cancer incidence and mortality worldwide.* GLOBOCAN. Retrieved from http://www.iarc.fr/en/media-centre/iarcnews/2010/globocan2008.php

International Agency for Research on Cancer (IARC). (2012a). *Estimated cancer incidence, mortality and prevalence worldwide in 2012.* GLOBOCAN. Retrieved from http://globocan.iarc.fr/old/pie_pop.asp?selection=213704&title=Viet+Nam&sex=2&type=1&window=1&join=1&submit=%C2%A0Execute%C2%A0

International Agency for Research on Cancer (IARC). (2012b). *Estimated number of cancer cases.* GLOBOCAN. Retrieved from http://globocan.iarc.fr/old/pie_pop.asp?selection=213704&title=Viet+Nam&sex=2&type=0&window=1&join=1&submit=%C2%A0Execute%C2%A0

Irwin, M. L., Smith, A. W., McTiernan, A., Ballard-Barbash, R., Cronin, K., Gilliland, F. D., . . . & Bernstein, L. (2008). Influence of pre- and postdiagnosis physical activity on mortality in breast cancer survivors: The health, eating, activity, and lifestyle study. *Journal of Clinical Oncology, 26*(24), 3958-3964. doi:10.1200/jco.2007.15.9822

Janda, M., DiSipio, T., Hurst, C., Cella, D., & Newman, B. (2009). The Queensland Cancer Risk Study: General population norms for the Functional Assessment of Cancer Therapy-General (FACT-G). *Psychooncology, 18*(6), 606-614. doi:10.1002/pon.1428

Janz, N. K., & Becker, M. H. (1984). The Health Belief Model: A decade later. *Health Education Quarterly, 11*(1), 1-47.

Jepson, R. G., Harris, F. M., Platt, S., & Tannahill, C. (2010). The effectiveness of interventions to change six health behaviours: a review of reviews. *BMC Public Health, 10*(1), 538. doi:10.1186/1471-2458-10-538

Kagawa-Singer, M., Dadia, A. V., Yu, M. C., & Surbone, A. (2010). Cancer, culture, and health disparities: Time to chart a new course? *CA: A Cancer Journal for Clinicians, 60*(1), 12-39. doi:10.3322/caac.20051

Kahn, S. E., Hull, R. L., & Utzschneider, K. M. (2006). Mechanisms linking obesity to insulin resistance and type 2 diabetes. *Nature, 444*(7121), 840-846. doi:10.1038/nature05482

Kang, H.-B., Zhang, Y.-F., Yang, J.-D., & Lu, K.-L. (2012). Study on soy isoflavone consumption and risk of breast cancer and survival. *Asian Pacific Journal Of Cancer Prevention: APJCP, 13*(3), 995-998.

Kikuchi, H., Mifune, N., Niino, M., Kira, J.-i., Kohriyama, T., Ota, K., . . . & Kikuchi, S. (2013). Structural equation modeling of factors contributing to quality of life in Japanese patients with multiple sclerosis. *BMC Neurology 13*(10), 1-9.

Kim, K., & Kim, J. S. (2015). The association between alcohol consumption patterns and health-related quality of life in a nationally representative sample of South Korean adults. *PLoS One, 10*(3), e0119245. doi:10.1371/journal.pone.0119245

Kim, Y. W., Lee, C. H., Park, Y. S., Kim, Y. I., Ahn, C. M., Kim, J. O., . . . & Yoo, K. H. (2015). Effect of exposure to second-hand smoke on the quality of life: A nationwide population-based study from South Korea. *PLoS One, 10*(9), e0138731. doi:10.1371/journal.pone.0138731

King, K. A., Mohl, K., Bernard, A. L., & Vidourek, R. A. (2007). Does involvement in healthy eating among university students differ based on exercise status and reasons for exercise? *Californian Journal of Health Promotion, 5*.

Kline, R. B. (2010). *Principles and practice of structural equation modeling* (3rd ed.). New York: The Guilford Press.

Korfage, I. J., Essink-Bot, M. L., Mols, F., van de Poll-Franse, L., Kruitwagen, R., & van Ballegooijen, M. (2009). Health-related quality of life in cervical cancer survivors: A population-based survey. *International Journal of Radiation Oncology, Bioliogy Physics, 73*(5), 1501-1509. doi:10.1016/j.ijrobp.2008.06.1905

Kreitler, S., Peleg, D., & Ehrenfeld, M. (2007). Stress, self-efficacy and quality of life in cancer patients. *Psychooncology, 16*(4), 329-341. doi:10.1002/pon.1063

Kushida, O., Iriyama, Y., Murayama, N., Saito, T., & Yoshita, K. (2017). Associations of self-efficacy, social support, and knowledge with fruit and vegetable consumption in Japanese workers. *Asia Pacific Journal of Clinical Nutrition, 26*(4).

Kwan, M. L., Chen, W. Y., Flatt, S. W., Weltzien, E. K., Sarah J. Nechuta, Elizabeth M. Poole, . . . Caan1, B. J. (2013). Postdiagnosis alcohol consumption and breast cancer prognosis in the after breast cancer pooling project. *Cancer Epidemiology, Biomarkers & Prevention, 22*(1), 32-41.

Kwan, M. L., Kushi, L. H., Weltzien, E., Tam, E. K., Castillo, A., Sweeney, C., & Caan, B. J. (2010). Alcohol consumption and breast cancer recurrence and survival among women with early-stage breast cancer: The life after cancer epidemiology study. *Journal of Clinical Oncology, 28*(29), 4410-4416. doi:10.1200/jco.2010.29.2730

Kyu, H. H., Bachman, V. F., Alexander, L. T., Mumford, J. E., Afshin, A., Estep, K., . . . & Forouzanfar, M. H. (2016). Physical activity and risk of breast cancer, colon cancer, diabetes, ischemic heart disease, and ischemic stroke events: Systematic review and dose-response meta-analysis for the Global Burden of Disease Study 2013. *BMJ, 354*. doi:10.1136/bmj.i3857

Lai, B. P., Tang, C. S., & Chung, T. K. (2009). Age-specific correlates of quality of life in Chinese women with cervical cancer. *Support Care Cancer, 17*(3), 271-278. doi:10.1007/s00520-008-0473-6

Lan, N. H., Laohasiriwong, W., & Stewart, J. F. (2012). Survival probability and prognostic factors for breast cancer patients in Vietnam. *Global Health Action, 6*. doi:10.3402/gha.v6i0.18860

Le, G. M., Gomez, S. L., Clarke, C. A., Glaser, S. L., & West, D. W. (2002). Cancer incidence patterns among Vietnamese in the United States and Ha Noi, Vietnam. *International Journal of Cancer, 102*(4), 412-417. doi:10.1002/ijc.10725

Lee, E. S., Lee, M. K., Kim, S. H., Ro, J. S., Kang, H. S., Kim, S. W., . . . & Yun, Y. H. (2011). Health-related quality of life in survivors with breast cancer 1 year after diagnosis compared with the general population: A prospective cohort study. *Annals Of Surgery, 253*(1), 101-108.

Lee, J. E., & Loh, S. Y. (2013). Physical activity and quality of life of cancer survivors: A lack of focus for lifestyle redesign. *Asian Pacific Journal of Cancer Prevention, 14*(4), 2551-2555.

Lee, P. W., Kwan, T. T., Tam, K. F., Chan, K. K., Young, P. M., Lo, S. S., . . . & Ngan, H. Y. (2007). Beliefs about cervical cancer and human papillomavirus (HPV) and acceptability of HPV vaccination among Chinese women in Hong Kong. *Preventative Medicine, 45*(2-3), 130-134. doi:10.1016/j.ypmed.2007.07.013

Lenz, E. R., & Shortridge-Baggett, L. M. (2002). *Self-efficacy in nursing: Research and measurement perspective*. New York: Springer Publishing Company.

Leong, S. P., Shen, Z. Z., Liu, T. J., Agarwal, G., Tajima, T., Paik, N. S., . . . & Foulkes, W. D. (2010a). Is breast cancer the same disease in Asian and Western countries? *World Journal of Surgery, 34*(10), 2308-2324. doi:10.1007/s00268-010-0683-1

Leong, S. P. L., Shen, Z. Z., Liu, T. J., Agarwal, G., Tajima, T., Paik, N. S., . . . & Foulkes, W. D. (2010b). Is Breast Cancer the Same Disease in Asian and Western Countries? *World Journal of Surgery, 34*(10), 2308-2324. doi:10.1007/s00268-010-0683-1

Lev, E. L., & Owen, S. V. (2000). Counseling women with breast cancer using principles developed by Albert Bandura. *Perspectives in Psychiatric Care, 36*(4), 131-138.

Li, C. (2000). Confucianism and feminist concerns: Overcoming the confucian "Gender complex". *Journal of Chinese Philosophy, 27*(2), 187-199.

Liao, Y. C., Shun, S. C., Liao, W. Y., Yu, C. J., Yang, P. C., & Lai, Y. H. (2014). Quality of life and related factors in patients with newly diagnosed advanced lung cancer: A longitudinal study. *Oncology Nursing Forum, 41*(2), E44-55. doi:10.1188/14.onf.e44-e55

Ligibel, J. (2011). Obesity and breast cancer. *Oncology (Williston Park), 25*(11), 994-1000.

Lim, J.-W., Gonzalez, P., Wang-Letzkus, M. F., & Ashing-Giwa, K. T. (2009). Understanding the cultural health belief model influencing health behaviors and health-related quality of life between Latina and Asian-American breast cancer survivors. *Supportive Care In Cancer: Official Journal Of The Multinational Association Of Supportive Care In Cancer, 17*(9), 1137-1147. doi:10.1007/s00520-008-0547-5

Linh, T. (2014). *7.3% of Vietnamese population holding graduate or posgraduate qualifications.* Lao Dong. Retrieved from http://laodong.com.vn/viec-lam/73-dan-so-co-trinh-do-dai-hoc-va-tren-dai-hoc-281187.bld

Liu, L., Fiorentino, L., Rissling, M., Natarajan, L., Parker, B. A., Dimsdale, J. E., . . . & Ancoli-Israel, S. (2013). Decreased health-related quality of life in women with breast cancer is associated with poor sleep. *Behavioral Sleep Medicine, 11*(3), 189-206. doi:10.1080/15402002.2012.660589

Little, T. D., Cunningham, W. A., Shahar, G., & Widaman, K. F. (2002). To parcel or not to parcel: exploring the question, weighing the merits. *Structural Equation Modeling: A Multidisciplinary Journal, 9*(2), 151-173.

Lorig, K. R., Ritter, P. L., Laurent, D. D., & Plant, K. (2006). Internet-based chronic disease self-management: A randomized trial. *Medical Care, 44*(11), 964-971.

Lorig, K. R., Ritter, P. L., Laurent, D. D., Plant, K., Green, M., Jernigan, V. B. B., & Case, S. (2010). Online diabetes self management program. A radomized study. *Diabetes Care, 33*(6), 1275-1281. doi:10.2337/dc09-2153

Lorig, K. R., Ritter, P. L., Villa, F. J., & Armas, J. (2009). Community-based peer-led diabetes self-management: A randomized trial. *The Diabetes Educator, 4*, 1-11.

Lowe, T., Ferrell, B., & Leong, L. (2007). Quality-of-life issues in the management of epithelial ovarian cancer. *Current Treatment Options in Oncology, 8*(6), 402-416. doi:10.1007/s11864-007-0049-6

Marcoulides, G. A., & Schumacker, R. E. (2001). *New developments and techniques in structural equation modeling* New Jersey: Lawrence Erlbaum Associates.

Makarem, N., Chandran, U., Bandera, E. V., & Parekh, N. (2013). Dietary fat in breast cancer survival. *Annual Review of Nutriton, 33*, 319-348. doi:10.1146/annurev-nutr-112912-095300

Maxine. (2015). Sleep quality, pain and self-efficacy among community-dwelling adults with sickle cell disease. *The Journal of the Nation Black Nurses Association, 26*(1), 15-21.

McCaskill-Stevens, W., & Abrams, J. S. (2011). Comorbidities in the aging breast cancer population: Are current assessments leading to improved outcomes? *JNCI: Journal of the National Cancer Institute, 103*(14), 1072-1073. doi:10.1093/jnci/djr239

McDonald, P. A., Williams, R., Dawkins, F., & Adams-Campbell, L. L. (2002). Breast cancer survival in African American women: Is alcohol consumption a prognostic indicator? *Cancer Causes & Control, 13*(6), 543-549.

McGuire, A. (2015). *Benefits and barriers to exercise in midlife women undertaking a web-based multi-modal lifestyle intervention for the primary preventio of chronic disease* PhD. Queensland University of Technology.

McNaughton, S. A., Crawford, D., Ball, K., & Salmon, J. (2012). Understanding determinants of nutrition, physical activity and quality of life among older adults: The Wellbeing, Eating and Exercise for a Long Life (WELL) study. *Health and Quality of Life Outcomes 10*(109). doi:10.1186/1477-7525-10-109

Mohammadi, S., Sulaiman, S., Koon, P. B., Amani, R., & Hosseini, S. M. (2013). Impact of healthy eating practices and physical activity on quality of life among breast cancer survivors. *Asian Pacific Journal Of Cancer Prevention: APJCP, 14*(1), 481-487.

Mols, F., Vingerhoets, A. J., Coebergh, J. W., & van de Poll-Franse, L. V. (2005). Quality of life among long-term breast cancer survivors: A systematic review.

European Journal of Cancer, 41(17), 2613-2619. doi:10.1016/j.ejca.2005.05.017

Montazeri, A. (2010). Quality of life in breast cancer patients: an overview of the literature In V. R. Preedy & R. R. Watson (Eds.), *Handbook of disease burdens and quality of life measure* (pp. 2829-2855). New York: Springer

Morgan, E. H., Vatucawaqa, P., Snowdon, W., Worsley, A., Dangour, A. D., & Lock, K. (2016). Factors influencing fruit and vegetable intake among urban Fijians: A qualitative study. *Appetite, 101*, 114-118. doi: 10.1016/j.appet.2016.03.003

Mostafai, A., Mostafai, M., & Mostafai, M. A. (2012). The relationship between self-eficacy and its subscales with mental health in university students. *Annals of Biological Research 3*(5), 2433-2438.

Muller, J., Amberger, T., Berg, A., Goeder, D., Remmele, J., Oberhoffer, R., . . . & Hager, A. (2017). Physical activity in adults with congenital heart disease and associations with functional outcomes. *Heart*. doi:10.1136/heartjnl-2016-310828

Müller, J., Amberger, T., Berg, A., Goeder, D., Remmele, J., Oberhoffer, R., . . . & Hager, A. (2017). Physical activity in adults with congenital heart disease and associations with functional outcomes. *Heart*. doi:10.1136/heartjnl-2016-310828

Mwaka, A. D., Garimoi, C. O., Were, E. M., Roland, M., Wabinga, H., & Lyratzopoulos, G. (2016). Social, demographic and healthcare factors associated with stage at diagnosis of cervical cancer: Cross-sectional study in a tertiary hospital in Northern Uganda *BMJ, 6*(e007690), 1-10.

Nakamura, H., Watanabe, N., & Matsushima, E. (2014). Structural equation model of factors related to quality of life for community-dwelling schizophrenic patients in Japan. *International Journal of Mental Health Systems 8*(32), 1-12.

Nelissen, S., Beullens, K., Lemal, M., & Van den Bulck, J. (2015). Media use, cancer knowledge and lifestyle choices: A cross-sectional analysis. *European Journal of Public Health, 25*(5), 885-890. doi:10.1093/eurpub/ckv018

Nelson, S. H., Marinac, C. R., Patterson, R. E., Nechuta, S. J., Flatt, S. W., Caan, B. J., . . . & Pierce, J. P. (2016). Impact of very low physical activity, BMI, and comorbidities on mortality among breast cancer survivors. *Breast Cancer Research & Treatment, 155*(3), 551-557. doi:10.1007/s10549-016-3694-2

Newcomb, P. A., Kampman, E., Trentham-Dietz, A., Egan, K. M., Titus, L. J., Baron, J. A., . . . & Willett, W. C. (2013). Alcohol consumption before and after breast cancer diagnosis: Associations with survival from breast cancer, cardiovascular disease, and other causes. *Journal of Clinical Oncology, 31*(16), 1939-1946. doi:10.1200/JCO.2012.46.5765

Nguyen, T.-H.-H. (2009). *Health promoting behaviours among Vietnamese people with type 2 diabetes.* Master of Nursing Science. Burapha University

Norat, T., Aune, D., Rosenblatt, D. N., Vingeliene, S., Abar, L., Vieira, R., . . . & Greenwood, D. R. C. (2013). *The associations between food, nutrition and physical activity and the risk of ovarian cancer*. From World Cancer Research Fund International: Continuous Update Project Report. Retrieved from http://www.wcrf.org/sites/default/files/SLR_endometrial_cancer_2012.pdf

Norat, T., Chan, D., Vieira, A. R., Aune, D., Rosenblatt, D. N., Vingeliene, S., . . . & Greenwood, D. C. (2014). *Systematic review on diet, nutrition, physical activity and survival and second cancers in breast cancer survivors*. From World Cancer Research Fund International: Continuous Update Project Report. Retrieved from http://www.wcrf.org/sites/default/files/Breast-Cancer-Survivors-SLR-2014-Report.pdf

Overcash, J., Extermann, M., Parr, J., Perry, J., & Balducci, L. (2001). Validity and reliability of the FACT-G scale for use in the older person with cancer. *American Journal of Clinical Oncology, 24*(6), 591-596.

PDQ Cancer Genetics Editorial Board. (2017). *Genetics of Breast and Gynecologic Cancers*. Retrieved from https://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0032757/

Pei, L., Wang, Y., Sun, C. Y., & Zhang, Q. (2016). Individual, social and environmental predictors of regular exercise among adults with type 2 diabetes and peripheral neuropathy in China. *International Journal of Nursing Practice, 22*(5), 451-460. doi:10.1111/ijn.12474

Pekmezi, D. W., & Demark-Wahnefried, W. (2011). Updated evidence in support of diet and exercise interventions in cancer survivors. *Acta Oncologica, 50*(2), 167-178. doi:10.3109/0284186x.2010.529822

Phillipson, L., Larsen-Truong, K., Jones, S., & Pitts, L. (2012). *Improving cancer outcomes among culturally and linguistically diverse communities: A rapid review*. Australia: The Sax Institue.

Pierce, J. P., Stefanick, M. L., Flatt, S. W., Natarajan, L., Sternfeld, B., Madlensky, L., . . . & Rock, C. L. (2007). Greater survival after breast cancer in physically active women with high vegetable-fruit intake regardless of obesity. *Journal of Clinical Oncology, 25*(17), 2345-2351. doi:10.1200/jco.2006.08.6819

Pinto, A. C., & de Azambuja, E. (2011). Improving quality of life after breast cancer: Dealing with symptoms. *Maturitas, 70*(4), 343-348. doi:http://dx.doi.org/10.1016/j.maturitas.2011.09.008

Pollard, A., Eakin, E., Vardy, J., & Hawkes, A. (2009). Health behaviour interventions for cancer survivors: An overview of the evidence and contemporary Australian trials *Cancer Forum, 33*(3), 184-187.

Pollard, J., Greenwood, D., Kirk, S., & Cade, J. (2001). Lifestyle factors affecting fruit and vegetable consumption in the UK Women's Cohort Study. *Appetite, 37*(1), 71-79. doi:10.1006/appe.2001.0415

Prabhu, P., Srinivas, R., Vishwanathan, K., & Raavi, A. (2014). Factors influencing alcohol and tobacco addiction among patients attending a de-addiction Centre, South India. *Journal of International Society Preventive Community Dentistry, 4*(2), 103-107. doi:10.4103/2231-0762.137645

Prochaska, J. O., & Velicer, W. F. (1988). Measuring processes of change: Applications to the cessation of smoking. *Journal of Consulting and Clinical Psychology, 56*(4), 520-528.

Protani, M. M., Nagle, C. M., & Webb, P. M. (2012). Obesity and ovarian cancer survival: A systematic review and meta-analysis. *Cancer Prevention Research (Phila), 5*(7), 901-910. doi:10.1158/1940-6207.capr-12-0048

Pruitt, S. L., McQueen, A., Deshpande, A. D., Jeffe, D. B., & Schootman, M. (2012). Mediators of the effect of neighborhood poverty on physical functioning among breast cancer survivors: A longitudinal study. *Cancer Causes Control, 23*(9), 1529-1540. doi:10.1007/s10552-012-0030-y

Ptomey, L. T., Gibson, C. A., Willis, E. A., Taylor, J. M., Goetz, J. R., Sullivan, D. K., & Donnelly, J. E. (2016). Parents' perspective on weight management interventions for adolescents with intellectual and developmental disabilities. *Disability and Health Journal, 9*(1), 162-166. doi:https://doi.org/10.1016/j.dhjo.2015.07.003

Quyen, T. C., Angkatavanich, J., Thuan, T. V., Xuan, V. V., Tuyen, L. D., & Tu, D. A. (2017). Nutrition assessment and its relationship with performance and Glasgow prognostic scores in Vietnamese patients with esophageal cancer. *Asia Pac J Clin Nutr, 26*(1), 49-58. doi:10.6133/apjcn.122015.02

Rose, D. P., & Vona-Davis, L. (2010). Interaction between menopausal status and obesity in affecting breast cancer risk. *Maturitas, 66*(1), 33-38. doi:10.1016/j.maturitas.2010.01.019

Rosenstock, I. M., Strecher, V. J., & Becker, M. H. (1988). Social learning theory and the Health Belief Model. *Health Education Quarterly, 15*(2), 175-183.

Rozenberg, S., Antoine, C., Carly, B., Pastijn, A., & Liebens, F. (2007). Improving quality of life after breast cancer: Prevention of other diseases. *Menopause International, 13*(2), 71-74. doi:10.1258/175404507780796398

Ruiz-Casado, A., Alejo, L. B., Santos-Lozano, A., Soria, A., Ortega, M. J., Pagola, I., . . . & Lucia, A. (2016). Validity of the physical activity questionnaires IPAQ-SF and GPAQ for cancer survivors: Insights from a Spanish cohort. *International Journal of Sports Medicine, 37*(12), 979-985. doi:10.1055/s-0042-103967

Rutledge, C. M., La Guardia, A. C., & Bluestein, D. (2013). Predictors of self-efficacy for sleep in primary care. [Article]. *Journal of Clinical Nursing, 22*(9-10), 1254-1261.

Sanford, S. D., Wagner, L. I., Beaumont, J. L., Butt, Z., Sweet, J. J., & Cella, D. (2013). Longitudinal prospective assessment of sleep quality: Before, during, and after adjuvant chemotherapy for breast cancer. *Supportive Care in Cancer*, *21*(4), 959-967.

Sarfati, D., Gurney, J., Lim, B. T., Bagheri, N., Simpson, A., Koea, J., & Dennett, E. (2013). Identifying important comorbidity among cancer populations using administrative data: Prevalence and impact on survival. *Asia Pacific Journal of Clinical Oncology*. doi:10.1111/ajco.12130

Schlesinger, S., Walter, J., Hampe, J., von Schonfels, W., Hinz, S., Kuchler, T., . . . & Nothlings, U. (2014). Lifestyle factors and health-related quality of life in colorectal cancer survivors. *Cancer Causes Control, 25*(1), 99-110. doi:10.1007/s10552-013-0313-y

Schmitz, K. H., Neuhouser, M. L., Agurs-Collins, T., Zanetti, K. A., Cadmus-Bertram, L., Dean, L. T., & Drake, B. F. (2013). Impact of obesity on cancer survivorship and the potential relevance of race and ethnicity. *JNCI: Journal of the National Cancer Institute*, *105*(18), 1344-1354. doi:10.1093/jnci/djt223

Schumacker, R. E., & Lomax, R. G. (2010). *A beginner's guide to structural equation modelling* (3rd edition ed.). New York: Routledge Taylor & Francis Group.

Shaver, J. L., & Woods, N. F. (2015). Sleep and menopause: a narrative review. *Menopause*, *22*(8), 899-915. doi:10.1097/gme.0000000000000499

Shih, T.-H., & Fan, X. (2009). Comparing response rates in e-mail and paper surveys: A meta-analysis. *Educational Research Review, 4*(1), 26-40. doi: 10.1016/j.edurev.2008.01.003

Shin, D. W., Nam, J. H., Kwon, Y. C., Park, S. Y., Bae, D. S., Park, C. T., . . . & Yun, Y. H. (2008). Comorbidity in disease-free survivors of cervical cancer compared with the general female population. *Oncology*, *74*(3-4), 207-215. doi:10.1159/000151368

Shin, Y., Jang, H., & Pender, N. J. (2001). Psychometric evaluation of the exercise self-efficacy scale among Korean adults with chronic diseases. *Research in Nursing & Health, 24*(1), 68-76.

Short, C. E., James, E. L., Stacey, F., & Plotnikoff, R. C. (2013). A qualitative synthesis of trials promoting physical activity behaviour change among post-treatment breast cancer survivors. *Journal of Cancer Survivalship, 7*(4), 570–581.

Singh, A. K., Pandey, A., Tewari, M., Pratyush, D. D., Singh, H. K., Pandey, H. P., & Shukla, H. S. (2011). Obesity augmented breast cancer risk: Apotential risk factor for Indian women. *Journal Of Surgical Oncology, 103*(3), 217-222. doi:10.1002/jso.21768

Smith-DiJulio, K., & Anderson, D. (2009). Sustainability of a multimodal intervention to promote lifestyle factors associated with the prevention of cardiovascular disease in midlife Australian women: A 5-year follow-up. *Health Care for Women International*, *30*(12), 1111-1130. doi:10.1080/07399330903104524

Sternfeld, B., Weltzien, E., Quesenberry, C. P., Jr., Castillo, A. L., Kwan, M., Slattery, M. L., & Caan, B. J. (2009). Physical activity and risk of recurrence and mortality in breast cancer survivors: Findings from the LACE study. *Cancer Epidemiol Biomarkers Prev, 18*(1), 87-95. doi:10.1158/1055-9965.epi-08-0595

Surakasula, A., Nagarjunapu, G. C., & Raghavaiah, K. V. (2014). A comparative study of pre- and post-menopausal breast cancer: Risk factors, presentation, characteristics and management. *Journal of Research in Pharmacy Practice, 3*(1), 12-18. doi:10.4103/2279-042x.132704

Swerissen, H., Belfrage, J., Weeks, A., Jordan, L., Walker, C., Furler, J., . . . & Peterson, C. (2006). A randomised control trial of a self-management program for people with a chronic illness from Vietnamese, Chinese, Italian and Greek backgrounds. *Patient Education and Counseling, 64*(1–3), 360-368. doi:http://dx.doi.org/10.1016/j.pec.2006.04.003

Tabachnick, B. G., & Fidell, L. S. (2007). *Using multivariate statistics* Boston: Person Education, Inc.

Thuy, P. T., Van Geluwe, S., Nguyen, V.-A., & Van der Bruggen, B. (2012). Current pesticide practices and environmental issues in Vietnam: management challenges for sustainable use of pesticides for tropical crops in (South-East) Asia to avoid environmental pollution *Journal of Material Cycles and Waste Management, 14*(4), 379-387. doi:10.1007/s10163-012-0081-x

Topiwala, A., Allan, C. L., Valkanova, V., Zsoldos, E., Filippini, N., Sexton, C., . . . & Ebmeier, K. P. (2017). Moderate alcohol consumption as risk factor for adverse brain outcomes and cognitive decline: Longitudinal cohort study. *BMJ, 357*. doi:10.1136/bmj.j2353

Tran, D. V., Lee, A. H., Au, T. B., Nguyen, C. T., & Hoang, D. V. (2013). Reliability and validity of the International Physical activity questionnaire - Short form for older adults in Vietnam. *Health Promotion Journal of Australia, 24*, 126-131.

Trieu, P. D., Mello-Thoms, C., & Brennan, P. C. (2015). Female breast cancer in Vietnam: A comparison across Asian specific regions. *Cancer Biology & Medicine, 12*(3), 238-245. doi:10.7497/j.issn.2095-3941.2015.0034

Trill, M. D. (2013). Anxiety and sleep disorders in cancer patients. *EJC Supplements, 11*(2), 216-224. doi:10.1016/j.ejcsup.2013.07.009

United Nations Population Division. (2008). *World Marriage Data 2008*. Retrieved from http://www.un.org/esa/population/publications/WMD2008/Main.html

van der Heijden, M. M., Pouwer, F., Romeijnders, A. C., & Pop, V. J. (2012). Testing the effectiveness of a self-efficacy based exercise intervention for inactive people with type 2 diabetes mellitus: Design of a controlled clinical trial. [Journal article]. *BMC Public Health, 12*(1), 331. doi:10.1186/1471-2458-12-331 van der Heijden, M. M. P., Pouwer, F., & Pop, V. J. M. (2014). Psychometric Properties of the Exercise Self-efficacy Scale in Dutch Primary Care Patients with Type 2 Diabetes Mellitus. *International Journal of Behavioral Medicine, 21*(2), 394-401. doi:10.1007/s12529-013-9308-z

Vietnam National Cancer Prevention Project. (2002). *Incidence of Cancer in Hanoi and Hochiminh City, Vietnam*. Retrieved from http://benhvienk.com/pcut/du-an-quoc-gia-ve-pcut?limitstart=0

Vietnam Ministry of Health. (2006). *Vietnam National Health Report*. Retrieved from http://jahr.org.vn/downloads/Nghien%20cuu/Khac/Vietnam%20National%20Health%20Report%202006.pdf

Vietnam Ministry of Health. (2013). *Decision - cancer diagnosis and treatment procedure.* Hanoi, Vietnam.

Vietnam Ministry of Health. (2016). *Joint annual health review 2015*. Retrieved from http://jahr.org.vn/downloads/JAHR2015/JAHR2015_full_EN.pdf

Vissers, P. A., Thong, M. S., Pouwer, F., Zanders, M. M., Coebergh, J. W., & van de Poll-Franse, L. V. (2013). The impact of comorbidity on Health-Related Quality of Life among cancer survivors: Analyses of data from the PROFILES registry. *Journal of Cancer Survivorship, 7*(4), 602-613. doi:10.1007/s11764-013-0299-1

Wada, K., Kawachi, T., Hori, A., Takeyama, N., Tanabashi, S., Matsushita, S., . . . & Nagata, C. (2015). Husband's smoking status and breast cancer risk in Japan: From the Takayama study. *Cancer Sci, 106*(4), 455-460. doi:10.1111/cas.12619

Wang, D.-H., Kogashiwa, M., Mori, N., Yamashita, S., Fujii, W., Ueda, N., . . . & Masuoka, N. (2016). Psychosocial determinants of fruit and vegetable consumption in a Japanese population. *International Journal of Environmental Research and Public Health, 13*(786). doi:10.3390/ijerph13080786

Wang, P. C., Yip, P. K., & Chang, Y. (2016). Self-efficacy and sleep quality as mediators of perceived stress and memory and behavior problems in the link to dementia caregivers' depression in Taiwan. *Clinical Gerontologist, 39*(3), 222-239.

Ware, J., & Sherbourne, C. (1992). The MOS 36-Item Short-Form Health Survey (SF-36®): Conceptual framework and item selection. *Medical Care, 30*. doi:10.1097/00005650-199206000-00002

Wattana, C., Srisuphan, W., Pothiban, L., & Upchurch, S. L. (2007). Effects of a diabetes self management program on glycemic control, coronary heart disease risk, and quality of life among Thai patients with type 2 diabetes. *Nursing and Health Sciences, 9*, 135-141.

Weaver, A. M., McCann, S. E., Nie, J., Stephen B. Edge, Nochajski, T. H., Marcia Russell, . . . & Freudenheim1, J. L. (2013). Alcohol intake over the life course and breast cancer survival in Western New York exposures and breast cancer (WEB) study: Quantity and intensity of intake. *Breast Cancer Research and Treatment, 139*(1), 245-253

Wee, C. C., Davis, R. B., & Hamel, M. B. (2008). Comparing the SF-12 and SF-36 health status questionnaires in patients with and without obesity. *Health & Quality of Life Outcomes, 6*. doi:10.1186/1477-7525-6-11

Weeks, S. G., Glantz, S. A., De Marco, T., Rosen, A. B., & Fleischmann, K. E. (2011). Secondhand smoke exposure and quality of life in patients with heart failure. *Archives of Internal Medicine, 171*(21), 1887-1893. doi:10.1001/archinternmed.2011.518

Westby, R. P., Berg, C. J., & Leach, C. (2016). Gender, race, BMI, and social support in relation to the health-related quality of life of cancer survivors: A report from the American Cancer Society's Study of Cancer Survivors II (SCS-II). *Quality of Life Research, 25*(2), 409-421. doi:10.1007/s11136-015-1084-6

White, S. M., Wójcicki, T. R., & McAuley, E. (2012). Social cognitive influences on physical activity behavior in middle-aged and older adults. *Journals of Gerontology, Series B, Psychological Sciences & Social Sciences, 67B*(1), 18-21. doi:10.1093/geronb/gbr064

Wong, S. S., Beth Dixon, L., Gilbride, J. A., Chin, W. W., & Kwan, T. W. (2011). Diet, physical ativity, and cardiovascular disease risk factors among older Chinese Americans living in New York City. *Journal of Community Health, 36*(3), 446-455. doi:http://dx.doi.org/10.1007/s10900-010-9326-6

World Cancer Research Fund International. (2010). *Continuous update project. Keeping the science current. Breast cancer report: Food, nutrition, physical activity, and the prevention of breast cancer*. Retrieved from http://www.dietandcancerreport.org/cancer_resource_center/downloads/cu/Breast-Cancer-2010-Report.pdf

World Cancer Research Fund International. (2013). *Recommendations for cancer prevenetions and cancer survivors.* Retrieved from http://www.dietandcancerreport.org/expert_report/recommendations/recommendation_cancer_survivors.php

World Cancer Research Fund International. (2017). *Continuous update project report: Diet, nutrition, physical activity and breast cancer*. Retrieved from http://www.wcrf.org/sites/default/files/CUP_BREAST_REPORT_2017_WEB.pdf

World Health Organization (WHO). (2004). Appropriate body-mass index for Asian populations and its implications for policy and intervention strategies. *Lancet, 363*(157–63). Retrieved from http://www.who.int/nutrition/publications/bmi_asia_strategies.pdf

World Health Organization (WHO). (2008). The Global burden of disease: 2004 Update. Retrieved from http://www.who.int/healthinfo/global_burden_disease/GBD_report_2004update_full.pdf

World Health Organization (WHO). (2010). *Global adult tobacco survey (GATS). Vietnam 2010*. Retrieved from http://www.who.int/tobacco/surveillance/en_tfi_gats_vietnam_report.pdf

World Health Organization (WHO). (2015a). *Breast cancer: prevention and control.* Retrieved from http://www.who.int/cancer/detection/breastcancer/en/index1.html

World Health Organization (WHO). (2015b). *Global health estimate.* Retrieved from http://www.who.int/healthinfo/global_burden_disease/estimates/en/index1.html

World Health Organization (WHO). (2014a). *Alcohol fact sheet.* Retrieved from http://www.who.int/mediacentre/factsheets/fs349/en/

World Health Organization (WHO). (2014b). *Global strategy on diet, physical activity and health.* Retrieved from http://www.who.int/dietphysicalactivity/en/

World Health Organization (WHO). (2014c). *Obesity and overweight. Fact sheet N^{o}311.* Retrieved from http://www.who.int/mediacentre/factsheets/fs311/en/

World Health Organization (WHO). (2014d). *Physical activity - Fact sheet No 385.* Retrieved from http://www.who.int/mediacentre/factsheets/fs385/en/

World Health Organization (WHO). (2014e). *World cancer report 2014*. Retrieved from http://www.who.int/cancer/publications/WRC_2014/en/

World Health Organization (WHO). (2016). *Prevalance of insufficient physical activity on Global Health Observatory (GHO) data.* Retrieved from: http://www.who.int/gho/ncd/risk_factors/physical_activity_text/en/

Xiao, C., Miller, A. H., Felger, J., Mister, D., Liu, T., & Torres, M. A. (2016). A prospective study of quality of life in breast cancer patients undergoing radiation therapy. *Advances in Radiation Oncology, 1*(1), 10-16. doi:10.1016/j.adro.2016.01.003

Xu, Y., Toobert, D., Savage, C., Pan, W., & Whitmer, K. (2008). Factors influencing diabetes self-management in Chinese people with type 2 diabetes. *Research in Nursing & Health, 28*, 613-632. Retrieved from http://onlinelibrary.wiley.com/doi/10.1002/nur.20293/pdf.

Xuan, L. T. T., Van Minh, H., Giang, K. B., Nga, P. T. Q., Hai, P. T., & Minh, N. T. (2013). Prevalence of Waterpipe Tobacco Smoking Among Population Aged 15 Years or Older, Vietnam, 2010. *Preventing Chronic Disease, 10,* E57. Retrieved from http://dx.doi.org/10.5888/pcd10.120100.

Yan, B., Yang, L.-M., Hao, L.-P., Yang, C., Quan, L., Wang, L.-H., . . . & Yuan, J.-M. (2016). Determinants of quality of life for breast cancer patients in Shanghai, China. *PLOS One, 11*(4), e0153714.

Yang, Y. J., Nam, S.-J., Kong, G., & Kim, M. K. (2010). A case-control study on seaweed consumption and the risk of breast cancer. *The British Journal Of Nutrition, 103*(9), 1345-1353. Retrieved from cmedm. doi:10.1017/S0007114509993242

Zeng, Y. C., Ching, S. S. Y., & Loke, A. Y. (2011). Quality of life in cervical cancer survivors: A review of the literature and directions for future research. *Oncology Nursing Forum, 38*(2), E107-117. doi:10.1188/11.ONF.E107-E117

Zhang, L., Li-Qiang, Q., Ai-Ping, L., & Pei-Yu, W. (2010). Prevalence of risk factors for cardiovascular disease and their associations with diet and physical activity in suburban Beijing, China. *Journal of Epidemiology, 20*(3), 237-243.

Appendices

Appendix A: Participant Information and Consent Form

Queensland University of Technology Brisbane Australia	**PARTICIPANT INFORMATION FOR QUT RESEARCH PROJECT – Survey –**

Cross cultural comparison of lifestyle factors and health related quality of life in Australian and Vietnamese women after breast and gynaecological cancer
QUT Ethics Approval Number 1600000528

RESEARCH TEAM

Principal Researcher:	**Thi Hoa Huyen Nguyen**	– PhD Student
Associate Researchers:	**Dr Charrlotte Seib**	– Principal supervisor
	Prof Patsy Yates	– Associate Supervisor
	Queensland University of Technology (QUT), Australia	
	Prof Debra Anderson	– External Supervisor
		Griffith University (GU), Australia

DESCRIPTION

This study is one phase of a three-phase-project being undertaken as part of PhD study at QUT, Australia.

The purpose of this study is to: explore and understand the lifestyle factors, HRQoL and their relationships in Vietnamese women after BGC.

You are invited to participate in this project because you are Vietnamese resident aged 18 year and older, have completed active treatment for breast and/or gynaecological cancer, are able to read and converse in Vietnamese, and have no metastatic disease (advanced cancer).

PARTICIPATION

Participation will involve completing an anonymous survey about your health status, lifestyles, and health related quality of life. This will take approximately 60-80 of your time and you can choose either online based or paper based method to complete survey.

Your participation in this project is entirely voluntary. If you agree to participate you do not have to complete any question(s) you are uncomfortable answering. Your decision to participate or not participate will in no way impact upon your current or future relationship with QUT, GU or either Breast Cancer Network Vietnam or Cancer Discussion Forum or the hospitals. If you do agree to participate you can withdraw from the project without comment or penalty. However as the survey is anonymous once it has been submitted it will not be possible to withdraw.

EXPECTED BENEFITS

It is expected that this project will not directly benefit you. However, the results of the project will benefit health professional in the future to provide better care and consultations for women after breast and/or gynecological cancer in Vietnam. It is also expected that the project will provide significant information for future culturally adapted behavioral intervention program which will benefit Vietnamese women after breast and/or gynecological in the future.

To recognise your contribution should you choose to participate, the research team is offering you *a VND 80,000 voucher upon the completion of the survey. You will be asked at the end of survey if you would like to receive an incentive. If yes, you will receive it in person or you will be asked to provide your postal or email addresses where a voucher* can *be sent.*

RISKS

There are minimal risks associated with your participation in this project. You might feel tired or experience anxiety while completing the surveys. If your anxiety is ongoing, you will be offered counselling: Out-patient and ER Department, Hanoi Medical University. No 1 Ton That Tung Str, Dong

Da, Hanoi, Vietnam, telephone +84 4. 3852 3798 (ext 483). This is free for participants of this project.

PRIVACY AND CONFIDENTIALITY

All comments and responses are anonymous and will be treated confidentially unless required by law. Your personal details such as your name on the written consent form, your email or postal address collected for providing the incentive will be stored securely and separately from your survey responses. There will be no link between your information and your survey responses.

Any data collected as part of this project will be stored securely as per QUT's Management of research data policy. Please note that non-identifiable data collected in this project may be used as comparative data in future projects or stored on an open access database for secondary analysis.

CONSENT TO PARTICIPATE

Submitting the online consent or the return of the consent paper are accepted as an indication of your consent to participate in this project.

QUESTIONS / FURTHER INFORMATION ABOUT THE PROJECT

If you have any questions or require further information please contact one of the researchers listed below.

Thi Hoa Huyen Nguyen	+61 7 3138 0553	thihoahuyen.nguyen@hdr.qut.edu.au
Charrlotte Seib	+ 61 7 3138 8209	c.seib@qut.edu.au

CONCERNS / COMPLAINTS REGARDING THE CONDUCT OF THE PROJECT

QUT is committed to research integrity and the ethical conduct of research projects. However, if you do have any concerns or complaints about the ethical conduct of the project you may contact the QUT Research Ethics Advisory Team on +61 7 3138 5123 or email ethicscontact@qut.edu.au. The QUT Research Ethics Advisory Team is not connected with the research project and can facilitate a resolution to your concern in an impartial manner.

THANK YOU FOR HELPING WITH THIS RESEARCH PROJECT. PLEASE PRINT THIS SHEET FOR YOUR INFORMATION

Appendix B: Questionnaire _ English version

PART 1: SOCIO-DEMOGRAPHIC INFORMATION

The following questions are about your socio-demographic information. Please answer by providing answer in the space provided, or circling the number next to the answer that is ***the most correct for you.***

1. What is best description of your residence?

Rural	1
Urban	2

2. What is your year of birth? 19………………….
3. What is best description of your current religion?

None	1
Buddhism	2
Catholics	3
Others, specify please…………………………………	4

4. What is your current marital status?

Married	1
De facto	2
Separated	3
Divorced	4
Widowed	5
Single/Never married	6

5. How many people are there in your household? …………………..
6. What is the best description of your household structure?

Alone	1
Couple only	2
Couple and children (nuclear family)	3
Extend family	4
Others, please specify: …..	5

7. What is your highest qualification?

No schooling	1
Completed primary school	2
Completed junior school	3
Completed senior school	4
Trade, technical certificate or diploma	5
University or college degrees and post-graduate	6

8. What is best description of your occupation?.............................
9. *Being employed is having job or business, or working without pay in a family business for a minimum of one hour per week*
   What is your current employment status?

Employed full-time	1
Employed part-time	2
Employed casual	3
Retired	4
Home duties	5
Unemployed	6
Permanently ill/unable to work	7

10. What category does your total gross monthly income fall into?

Less than 1,600.000 VND	1
1,600,000 - <9,000,000VND	2
9,000,000 VND -<20,000,000 VND	3
≥ 20,000,000 VND	4
Don’t know	5

PART 2: YOUR HEALTH STATUS

*The following questions are about your current health status. Please answer by providing answer in the space provided, or circling the number next to the answer that is **the most correct for you.***

11. What is your weight? ……………………..kg

12. What is your height? …………………cm
13. What is your current waist?.....................................cm
14. What is your hip?............................cm
15. Do you think that your current weight is

Acceptable	1
Too high	2
Too low	3

16. What month and year were you diagnosed with cancer? ………………………
17. What type of cancer have you been treated for ?

Breast	1
Ovary	2
Uterus	3
Cervix	4
Vulva	5
Other (please specify)…………………………..	6

18. Which of the following treatments have you received?

(Tick Yes or No for every treatment listed below)

		Yes	No
a	Surgery – please specify: …………………………….		
b	Chemotherapy		
c	Radiotherapy - localised		
d	Radiotherapy – to whole body		
e	Stem cell transplant		
f	Other therapies? (e.g. Femarra, Trastuzumab - Herceptin®, Tamoxifen, Anastrozole - Arimidex®, Goserelin - Zoladex®)		
	If you answered 'yes', please specify ___________________________		

Now some questions about other health problems you may have experienced.

19. Have YOU been diagnosed with any of the following health problems?
If yes, in which year were you diagnosed?

(Tick Yes or No for every diagnosis listed below)

		Yes	No	Year diagnosed
a	Headaches/ migraine			
b	Stroke			
c	High blood pressure			
d	Leaking urine when coughing or sneezing (stress incontinence)			
e	Back problem			

f	Coronary heart disease (angina, heart attack, bypass surgery, angioplasty)			
g	Other heart disease (irregular beat, heart failure)			
h	Irritable bowel problem			
i	Thyroid disorder			
j	Diabetes			
m	Cancer (any other type)			
n	Arthritis or rheumatism			
o	Osteoporosis			
p	Bone or joint problem other than arthritis or osteoporosis			
q	Clinical depression			
r	Anxiety disorder			
s	Alzheimer’s disease			
t	Other mental health problem (please specify): ____________			

Now, some questions regarding your reproductive health:

20. Have you had a hysterectomy, an operation to remove your uterus or womb?

Yes	1
No	0

21. Have you had both ovaries removed?

Yes	1
No	0

22. Have you had a menstrual period in the past 12 months?

Yes	1
No	0

23. Have you had a menstrual period in the past 3 months?

Yes	1
No	0

24. Compared to a year ago, has the number of days between the start of one menstrual period and the start of your next menstrual period become less predictable?

Yes	1

No | 0

25. Have you *ever* taken any form of oestrogen or hormone replacement therapy (HRT) for menopause?

Yes	1
No	0

26. Were you at menopause prior to your cancer treatment?

Yes	1
No	0

Please answer each of the following questions. Some questions may look like others, but each one is different. Please take the time to read and answer each question carefully, and mark an ☒ in the one box that best describes your answer. ***(SF36)***

27. In general, would you say your health is:

Excellent	Very good	Good	Fair	Poor
▼	▼	▼	▼	▼
☐1	☐2	☐3	☐4	☐5

28. Compared to one year ago, how would you rate your health in general now?

Much better now than one year ago	1
Somewhat better now than one year ago	2
About the same	3
Somewhat worse now than one year ago	4
Much worse than one year ago	5

The following two items are about activities you might do during a typical day.

29. Does your health now limit you in these activities? If so, how much?

		Yes, limited a lot ▼	Yes, limited a little ▼	No, not limited at all ▼
a	Vigorous activities, such as running, lifting heavy objects, participating in strenuous sports	☐1	☐2	☐3
b	Moderate activities, such as moving a table, pushing a vacuum cleaner, bowling, or playing golf	☐1	☐2	☐3
c	Lifting or carrying groceries	☐1	☐2	☐3
d	Climbing several flights of stairs	☐1	☐2	☐3
e	Climbing one flight of stairs	☐1	☐2	☐3
f	Bending, kneeling, stooping	☐1	☐2	☐3
g	Walking more than a mile	☐1	☐2	☐3
h	Walking several blocks	☐1	☐2	☐3
i	Walking one block	☐1	☐2	☐3
j	Bathing or dressing yourself	☐1	☐2	☐3

30. During the past 4 weeks, have you had any of the following problems with your work or other regular daily activities as a result of your physical health?

		Yes	No
		▼	▼
a	Cut down the amount of time you spent on work or other activities	☐1	☐2
b	Accomplished less than you would like	☐1	☐2
c	Were limited in the kind of work or other activities	☐1	☐2
d	Had difficulty performing the work or other activities (for example extra effort)	☐1	☐2

31. During the past 4 weeks, have you had any of the following problems with your work or other regular daily activities as a result of any emotional problems (such as feeling depressed or anxious)?

		Yes	No
		▼	▼
a	Cut down on the amount of time you spent on work or other activities	☐1	☐2
b	Accomplished less than you would like	☐1	☐2
c	Did work or other activities less carefully than usual	☐1	☐2

32. During the past 4 weeks, to what extent has your physical health or emotional problems interfered with your normal social activities with family, friends, neighbours, or groups?

Not at all	Slightly	Moderately	Quite a bit	Extremely
▼	▼	▼	▼	▼
☐1	☐2	☐3	☐4	☐5

33. How much bodily pain have you had during the past 4 weeks?

None	Very Mild	Mild	Moderate	Severe	Very severe
▼	▼	▼	▼	▼	▼
☐1	☐2	☐3	☐4	☐5	☐5

34. During the past 4 weeks, how much did pain interfere with your normal work (including both work outside the home and housework)?

Not at all	A little bit	Moderately	Quite a bit	Extremely
▼	▼	▼	▼	▼
☐1	☐2	☐3	☐4	☐5

35. These questions are about how you feel and how things have been with you during the past 4 weeks. For each question, please give the one answer that comes closest to the way you have been feeling. How much of the time during the past 4 weeks?

		All of the time ▼	Most of the time ▼	A good bit of the time ▼	Some of the time ▼	A little of the time ▼	None of the time ▼
a	Did you feel full of life?	☐1	☐2	☐3	☐4	☐5	☐6
b	Have you been very nervous?	☐1	☐2	☐3	☐4	☐5	☐6
c	Have you felt so down in the dumps that nothing could cheer you up?	☐1	☐2	☐3	☐4	☐5	☐6
d	Have you felt calm and peaceful?	☐1	☐2	☐3	☐4	☐5	☐6
e	Did you have a lot of energy?	☐1	☐2	☐3	☐4	☐5	☐6
f	Have you felt downhearted and blue?	☐1	☐2	☐3	☐4	☐5	☐6
g	Did you feel worn out?	☐1	☐2	☐3	☐4	☐5	☐6
h	Have you been happy?	☐1	☐2	☐3	☐4	☐5	☐6
i	Did you feel tired?	☐1	☐2	☐3	☐4	☐5	☐6

36. During the past 4 weeks, how much of the time has your physical health or emotional problems interfered with your social activities (like visiting friends, relatives, etc.)?

All of the time ▼	Most of the time ▼	Some of the time ▼	A little of the time ▼	None of the time ▼
☐1	☐2	☐3	☐4	☐5

37. How TRUE or FALSE is each of the following statements for you?

		Definitely true ▼	Mostly true ▼	Don’t know ▼	Mostly false ▼	Definitely false ▼
a	I seem to get sick a little easier than other people	☐1	☐2	☐3	☐4	☐5
b	I am as healthy as anybody I know	☐1	☐2	☐3	☐4	☐5
c	I expect my health to get worse	☐1	☐2	☐3	☐4	☐5
d	My health is excellent	☐1	☐2	☐3	☐4	☐5

38. Below is a list of statements that other people with your illness have said are important. **By circling one (1) number per line to indicate your response as it applies to the <u>past 7 days</u>? (FACT _G)**

	<u>Physical well-being</u>	**Not at all**	**A little bit**	**Some-what**	**Q a**
GP1	I have a lack of energy	0	1	2	3
GP2	I have nausea	0	1	2	3
GP3	Because of my physical condition, I have trouble meeting the needs of my family	0	1	2	3
GP4	I have pain	0	1	2	3
GP5	I am bothered by the side effects of treatment	0	1	2	3
GP6	I feel ill	0	1	2	3
GP7	I am forced to spend time in bed	0	1	2	3

	<u>Social/family well-being</u>	**Not at all**	**A little bit**	**Some-what**	**Q a**
GS1	I feel close to my friends	0	1	2	3
GS2	I get emotional support from my family	0	1	2	3
GS3	I get support from my friends	0	1	2	3
GS4	My family has accepted my illness	0	1	2	3
GS5	I am satisfied with family communication about my illness	0	1	2	3
GS6	I feel close to my partner (or the person who is my main support)	0	1	2	3
Q1	*Regardless of your current level of sexual activity, please answer the following question. If you prefer not to answer it, please check this box* □ *and go to the next section.*				
GS7	I am satisfied with my sex life	0	1	2	3

	<u>Emotional well-being</u>	**Not at all**	**A little bit**	**Some-what**	**Q a**
GE1	I feel sad	0	1	2	3
GE2	I am satisfied with how I am coping with my illness	0	1	2	3
GE3	I am losing hope in the fight against my illness	0	1	2	3
GE4	I feel nervous	0	1	2	3
GE5	I worry about dying	0	1	2	3
GE6	I worry that my condition will get worse	0	1	2	3

	<u>Functional well-being</u>	**Not at all**	**A little bit**	**Some-what**	**Q a**
GF1	I am able to work (include work at home)	0	1	2	3
GF2	My work (including work at home) is fulfilling	0	1	2	3
GF3	I am able to enjoy life	0	1	2	3

GF4	I have accepted my illness	0	1	2	3	4
GF5	I am sleeping well	0	1	2	3	4
GF6	I am enjoying the things I usually do for fun	0	1	2	3	4
GF7	I am content with the quality of my life right now	0	1	2	3	4

PART 3: LIFESTYLE
***The following questions are about your physical activity*.**
Exercise includes activities that increase the heart rate and breathing, such as brisk walking, jogging, swimming, aerobic dancing, cycling, rowing etc. Activities that have a very light exertion level such as bowling, or playing golf using a golf cart are not considered exercise for these questions.
The following Table describes different exercise levels on a scale - please look at the scale and description, and then answer the question that follows.

6		
7	Very, very light exertion	
8		
9	Very light exertion	*Very light exercise, like walking slowly at your own pace*
10		
11	Light exertion	
12		
13	Somewhat hard exertion	*Moderately hard exercise, increased heart rate and breathing*
14		
15	Hard exertion	*Strenuous or vigorous exercise*
16		
17	Very hard exertion	*Very strenuous exercise*
18		
19	Very, very hard exertion	*Extremely strenuous exercise – can only maintain 10 mins*
20	Maximal exertion	

39. During the past month, how many times did you exercise for at least 30 minutes at a time at a somewhat hard exertion level (or a higher level)?

Daily	1
5-6 times a week	2
3-4 times a week	3
1-2 times a week	4
None	5

40. Do you exercise for 150 minutes each week at a somewhat hard to hard exertion level?

Yes, I have been exercising for **more than 6 months**	1
Yes, I have been exercising for **less than 6 months**	2
No, but I am planning to start exercising in the next 30 days	3
No, but I am planning to start exercising in the next 6 months	4
No, and I **don't plan to start** exercising in the next 6 months	5

41. Overall, how do you rate your current level of physical activity (general daily activity plus exercise)? Circle a number from 00 (not at all active) to 10 (extremely active).

00	01	02	03	04	05	06	07	08	09	10
Not at all active									Extremely active	

Number of situations are described below that can make it hard to stick to an exercise routine. For each item, please rate how confident you are that you can stick to an exercise routine on a regular basis (3 or more times a week).

42. Rate your degree of confidence by recording a number from 0 to 100 using the scale given below:

0	10	20	30	40	50	60	70	80	90	100
Cannot do at all					Moderately certain can do				Highly certain can do	

*(Score each item between **0 - 100**)*	**Confidence (0-100)**
When I am feeling tired	
When I am feeling under pressure from work	
During bad weather	
After recovering from an injury that caused me to stop exercising	
During or after experiencing personal problems	
When I am feeling depressed	
When I am feeling anxious	
After recovering from an illness that caused me to stop exercising	
When I feel physical discomfort when I exercise	
After a vacation	
When I have too much work to do at home	
When visitors are present	
When there are other interesting things to do	
If I don’t reach my exercise goals	
Without support from my family or friends	
During a vacation	
When I have other time commitments	
After experiencing family problems	

The next questions are about your diet, smoking, and alcohol consumption

01 serve vegetable (approximately 75grams)= 1 medium potato; ½ cup cabbage/spinach/ broccoli/cauliflower etc.; or 1 cup of lettuce or salad vegetables

43. How many serves of vegetables do you have at least a day? …………………….

44. Do you currently eat at least 5 serves of vegetables every day?

Yes	1
No	0

45. **If yes,** how long have you had at least 5 serves of vegetables every day?…….years…….months

1 serve fruit (approximately 150 grams of fresh fruit or 50 grams of dried fruit) =1 apple; 1 mandarin; 2 plums; 2 apricots; 8 strawberries; 1 cup diced or canned fruit; 20 grapes or cherries.

46. How many serves of fruits do you have at least a day? ………………
47. Do you currently eat at least 2 serves of fruit every day?

Yes	1
No	0

48. **If yes,** how long have you had at least 2 serves of fruit every day? …….years…….months
49. Have you ever drunk alcohol-containing beverages?

Never	1
Drank in the past	2
Rarely	3
Occasionally	4
Regularly	5
Always	6

50. **If regularly or always,** how many years have you been a regular alcohol drinker? …years…….months

1 drink of alcohol = 12 oz beer, 5 oz wine, or 2 oz spirits.

51. **If regularly or always,** in average, how many drinks of alcohol do you have a day? ....drinks/ day
52. **During the past week (7 days**), how many standard size drinks on average did you have per day? ....drinks/ day

53. Have you ever smoked?

Never	1
Smoked in the past	2
Rarely	3
Occasionally	4
Regularly	5
Always	6

54. **If yes,** how many years have you been a cigarette smoker?…….years…….months
55. **If yes,** in average, how many cigarettes do you smoke a day? ………..cigarettes/ day
56. **During the past week (7 days**), how many cigarettes did you smoke in the past 7 days? ……. cigarettes/ day
57. How many family members tobacco smoke inside your home? ……………………………
58. If you live with a smoker, how many years have you lived with them?

    Husband…….years…….months
    Father…….years…….months
    Mother…….years…….months
    Sibling(s)…….years…….months
    Others……….years……..months

59. Are you exposed to smoking at work place?

Yes	1
No	2

60. If Yes, in average, how many people tobacco smoke at your work place? …………………………..
61. If yes, how many hours per day are you exposed to tobacco smoke at work?..................................

A number of situations are described below that can make it hard to stick to a healthy diet. For each item please rate how confident you are that you can stick to a healthy diet on a regular basis.

62. Rate your degree of confidence by recording a number from *0 to 100 using the scale given below*:

0	10	20	30	40	50	60	70	80	90	100
Cannot do at all				**Moderately certain can do**					**Highly certain can do**	

(Score each item between ***0 - 100****)* **Confidence0-100**

	While watching television	
b	Feeling restless or bored	
c	During holiday times	
d	Feeling upset or tense over job-related matters	
e	Eating at a friend's house for dinner	
f	Preparing meals for others	
g	Eating at a restaurant alone	
h	When angry or annoyed	
i	When very hungry	
j	When depressed	
k	When you want to sit back and enjoy food	
l	When lots of unhealthy food is available in the house	
m	Feel like celebrating with others	
n	Someone offers you unhealthy foods	
o	Feel a strong urge to eat unhealthy foods that you like	
p	When you are entertaining visitors	
q	During vacations	
r	Eating out with others when they are ordering unhealthy foods	
s	Parties where a lot of appetising unhealthy food is served	
t	At recreational and sport events where unhealthy fast foods are served	
u	When visiting a city and needing a quick meal	
v	Airplane meals with unhealthy items	
w	When visiting a city & wanting to experience the local food & restaurants	
x	Holidays and celebrations where unhealthy foods are served	
y	When upset over family matters	
z	When eating breakfast in a restaurant	
aa	Others bring or serve unhealthy foods	
ab	When you have to prepare your own meals	
ac	When faced with appealing unhealthy foods in the supermarket	

<u>The next questions are about your sleep</u>

The following questions relate to your usual sleep habits during the past month only. Your answers should indicate the most accurate reply for the majority of days and nights in the past month. Please answer all questions.

63. During the past month, what time have you usually gone to bed at night?
    Usual bed time……………………………
64. During the past month, how long (in minutes) has it usually taken you to fall asleep each night?
    Number of minutes………………………………
65. During the past month, what time have you usually gotten up in the morning?
    Usual getting up time…………
66. During the past month, how many hours of actual sleep did you get at night? (This may be different than the number of hours you spent in bed)
    Hours of sleep per night ………………………………

67. For each of the remaining questions, check the one best response. Please answer all questions
During the past month, how often have you had trouble sleeping because you.....

		Not during the past month	Less than once a week	Once or twice a week	Three or more times a week
a	Cannot get to sleep within 30 minutes	☐	☐	☐	☐
b	Wake up in the middle of the night or early morning	☐	☐	☐	☐
c	Have to get up to use the bathroom	☐	☐	☐	☐
d	Cannot breathe comfortably	☐	☐	☐	☐
e	Cough or snore loudly	☐	☐	☐	☐
f	Feel too cold	☐	☐	☐	☐
g	Feel too hot	☐	☐	☐	☐
h	Had bad dreams	☐	☐	☐	☐
i	Have pain	☐	☐	☐	☐
j	Other reasons, please specify……………………………	☐	☐	☐	☐

68. During the past month, how would you rate your sleep quality overall?

Very good	1
Fairly good	2
Fairly bad	3
Very bad	4

69. During the past month, how often have you taken medicine to help you sleep (prescribed or 'over the counter)?

Not during the past month	1
Less than once a week	2
Once or twice a week	3
Three or more times a week	4

70. During the past month, how often have you had trouble staying awake while driving, eating meals, or engaging in social activity?

Not during the past month	1
Less than once a week	2
Once or twice a week	3
Three or more times a week	4

71. During the past month, how much of a problem has it been for you to keep up enough enthusiasm to get things done?

No problem at all	1
Only a very slight problem	2
Somewhat of a problem	3
A very big problem	4

72. Do you have a bed partner or roommate?

No bed partner or roommate	1
Partner/roommate in other room	2
Partner in same room, but not same bed	3
Partner in same bed	4

73. If you have a roommate or bed partner, ask him/her how often in the past month you have had....

		Not during the past month	Less than once a week	Once or twice a week	Three or more times a week
a	Loud snoring	☐	☐	☐	☐
b	Long pauses between breaths while asleep	☐	☐	☐	☐
c	Legs twitching or jerking while asleep	☐	☐	☐	☐
d	Episodes of disorientation or confusion during sleep	☐	☐	☐	☐
e	Other restlessness while you sleep, please specify………… ……………………………………………………………...	☐	☐	☐	☐

<u>Next questions will ask you about your specific physical activity and food consumption</u>

IPAQ – short form

We are interested in finding out about the kinds of physical activities that people do as part of their everyday lives. The questions will ask you about the time you spent being physically active in the **<u>last 7 days</u>**. Please answer each question even if you do not consider yourself to be an active person.

Please think about the activities you do at work, as part of your house and yard work, to get from place to place, and in your spare time for recreation, exercise or sport.
Think about all the **vigorous** activities that you did in the **last 7 days**. **Vigorous** physical activities refer to activities that take hard physical effort and make you breathe much harder than normal. Think *only* about those physical activities that you did for at least 10 minutes at a time.

74. During the **last 7 days**, on how many days did you do **vigorous** physical activities like heavy lifting, digging, aerobics, or fast bicycling?

_____ **days per week**
☐ No vigorous physical activities → ***Skip to question 76***

75. How much time did you usually spend doing **vigorous** physical activities on one of those days?

_____ **hours per day**
_____ **minutes per day**
Don’t know/Not sure ☐

Think about all the **moderate** activities that you did in the **last 7 days**. **Moderate** activities refer to activities that take moderate physical effort and make you breathe somewhat harder than normal. Think only about those physical activities that you did for at least 10 minutes at a time.

76. During the **last 7 days**, on how many days did you do **moderate** physical activities like carrying light loads, bicycling at a regular pace, or doubles tennis? Do not include walking.

_____ **days per week**
☐ No moderate physical activities → ***Skip to question 78***

77. How much time did you usually spend doing **moderate** physical activities on one of those days?

_____ **hours per day**
_____ **minutes per day**
Don’t know/Not sure ☐

Think about the time you spent **walking** in the **last 7 days**. This includes at work and at home, walking to travel from place to place, and any other walking that you might do solely for recreation, sport, exercise, or leisure.

78. During the **last 7 days**, on how many days did you **walk** for at least 10 minutes at a time?

_____ **days per week**
☐ No walking → ***Skip to question 80***

79. How much time did you usually spend **walking** on one of those days?

_____ **hours per day**
_____ **minutes per day**
Don’t know/Not sure ☐

The last question is about the time you spent **sitting** on weekdays during the **last 7 days**. Include time spent at work, at home, while doing course work and during leisure time. This may include time spent sitting at a desk, visiting friends, reading, or sitting or lying down to watch television.

80. During the **last 7 days**, how much time did you spend **sitting** on a **week day**?
    _____ **hours per day**
    _____ **minutes per day**
    Don’t know/Not sure ☐

Appendix C: Questionnaire – Vietnamese version

Appendix D: Ethics approvals and Letters of acceptance

QUT Ethics approval

Dear Dr Charrlotte Seib and Mrs Thi Hoa Huyen Nguyen
Project Title: Cross cultural comparison of lifestyle factors and health-related quality of life in Australian and Vietnamese women after breast and gynaecological cancer
Ethics Category: Human - Low Risk
Approval Number: 1600000528
Approved Until: 21/06/2019
(subject to receipt of satisfactory progress reports)
We are pleased to advise that your application has been reviewed and confirmed as meeting the requirements of the National Statement on Ethical Conduct in Human Research.
I can therefore confirm that your application is APPROVED.
If you require a formal approval certificate please advise via reply email.
CONDITIONS OF APPROVAL
Please ensure you and all other team members read through and understand all UHREC conditions of approval prior to commencing any data collection:
> Standard: Please see attached or go to http://www.orei.qut.edu.au/human/stdconditions.jsp
> Specific: None apply
Decisions related to low risk ethical review are subject to ratification at the next available UHREC meeting. You will only be contacted again in relation to this matter if UHREC raises any additional questions or concerns.
Whilst the data collection of your project has received QUT ethical clearance, the decision to commence and authority to commence may be dependent on factors beyond the remit of the QUT ethics review process. For example, your research may need ethics clearance from other organisations or permissions from other organisations to access staff. Therefore the proposed data collection should not commence until you have satisfied these requirements.
Please don't hesitate to contact us if you have any queries.
We wish you all the best with your research.
Kind regards
Janette Lamb / Debbie Smith
on behalf of Chair UHREC
Office of Research Ethics & Integrity
Level 4 | 88 Musk Avenue | Kelvin Grove
+61 7 3138 5123 / 3138 4673
ethicscontact@qut.edu.au
http://www.orei.qut.edu.au

Ethics approval granted by Hanoi School of Public Health, Vietnam

MINISTRY OF HEALTH
HANOI SCHOOL OF PUBLIC HEALTH

No.: 158/2016/YTCC-HD3
Subject: Ethical Approval

SOCIALIST REPUBLIC OF VIETNAM
Independence – Freedom - Happiness

Ha Noi, March 24, 2016

DECISION

On Ethical approval for research involving human subject participation

THE CHAIR OF THE ETHICAL REVIEW BOARD FOR BIOMEDICAL RESEARCH
HANOI SCHOOL OF PUBLIC HEALTH

- Based on Decision No. 116/QD-YTCC by the Dean of Hanoi School of Public Health on Establishment of The Institutional Ethical Review Board of Hanoi School of Public Health; 02 February 2015 ;
- Based on decision No. 651/QĐ-YTCC by the Dean of Hanoi School of Public Health on the Issuing Regulation of the Institutional Ethical Review Board of Hanoi School of Public Health; 26 June 2015;
- After reviewing research ethics application No. **016-158/DD-YTCC**;

DECIDED

Article 1. Grant ethical approval for ethnographic study project:

- Project Title**: *CROSS-CULTURAL COMPARISON OF LIFESTYLE FACTORSAND HEALTH RELATED QUALITY OF LIFE IN AUSTRALIAN AND VIETNAMESE WOMEN AFTER BREAST AND GYNAECOLOGICAL CANCER.***
- Principal Investigator: **Nguyen Thi Hoa Huyen-** PhD student, School of Nursing, Queensland University of Technology, Australia
- Supervisor: Dr. Charrlotte Seib- School of Nursing, Queensland University of Technology, Australia
- Research site: Hanoi, Vietnam
- Project time: from 30/09/2015 to 30/09/2016
- Pilot and data collection time: from 01/04/2016 to 30/09/2016
- Review type: Expedited review

Article 2. This decision is effective from **01/04/2016** to **30/09/2016**

Article 3. Principal Investigator has to send progress report once each year and a final report upon the study completion to the Institutional Ethical Review Board of Hanoi School of Public Health (IRB of HSPH).

Article 4. Principle Investigator should notify (IRB of HSPH) immediately of any adverse effects arising from this study (e.g. unexpected adverse outcomes, unexpected community/subject risk factors or complaints, etc.). Active research projects are subject to random audit by the IRB of HSPH.

CHAIR OF INSTITUTIONAL ETHICAL REVIEW BOARD
(Signature and full name)

Ha Van Nhu

SECRETARY
(Signature and full name)

Nguyen Thi Minh Thanh

Letter of support provided by Breast Cancer Network Vietnam

Re: Connect with VNese women after Breast and/or Gynaecological Cancer through... People

Dear Ms. Hoa

I would like to confirm support your research project from our organization by BCNV's social channel (FB, website, forum).

I want to clear to you that BCNV's beneficiaries are breast cancer patients includes their family members and people concern breast cancer issues. We don't focus on gynaecological caner, so do not have any activities to gynaecological cancer/ gynaecological patients.

But I hope that through BCNV's social media channels can help spread widely, and I hope that the research will be done successfully.

Kind regards,
Tien Nguyen

--
Ms. Nguyen Thuy Tien
Project Co-ordinator

BCNV - Breast Cancer Network Vietnam

A member of Union for International Cancer Control (UICC)
Head Office : 114 Ham Tu Quan, Chuong Duong, Hoan Kiem, Ha Noi
Working office: 180/47 Nguyen Huu Canh, Binh Thanh Dist., Ho Chi Minh
Tel : (84) 8 35120092
Cell : (84) 912 534 948

Letter of support provided by Cancer Discussion Forum Vietnam

Re: Connect with VNese women after Breast and/or Gynaecological Cancer through... People

Le Quang Vu <quangchep01@yahoo.com> 12/17/15 at 11:49 PM
To Thi Hoa Huyen Nguyen
CC nhatminh.hmu@gmail.com nguyenhoahuyen1981@yahoo.com

Hi Huyen,

It's our pleasure to help. As Dien dan ung thu is an non profit fanpage created to help cancer patients and their relatives, we are happy to give hands to anybody, who share the same vision and serve the same mission.

This letter is to confirm that we agree to support you ar our best.

To post and advertise on the fanpage, please send us your project's infomation in Vietnamese to avoid any misunderstanding in translation.

And also please let us know the time you plan to have your information posted.

Bests regards.

Lê Quang Vũ

Letter of support provided by Hanoi Oncology Hospital

CỘNG HÒA XÃ HỘI CHỦ NGHĨA VIỆT NAM
Độc lập – Tự do – Hạnh phúc

SOCIALIST REPUBLIC OF VIETNAM
Independence – Freedom – Happiness

Hà Nội, ngày 26 tháng 5 năm 2016

LETTER OF ACCEPTANCE

Thay mặt Bệnh Viện/ On behalf of hospital:

Bệnh viện Ung bướu Hà Nội / Hà Nội Cancer Hospital

Tôi (tên)/ I (name): Ts. Tran Dang Khoa

Chức danh/ Title: **Giám đốc/** director

CHO PHÉP/ GIVE PERMISSION FOR

Ths. Nguyễn Thị Hoa Huyền, Nghiên cứu sinh Đại học Công nghệ Queensland, Úc

Nguyen Thi Hoa Huyen, MSc, PhD student at Queensland University of Technology, Australia

Thực hiện đề tài nghiên cứu/ To conduct the research project entitled:

"So sánh cắt ngang về lối sống và chất lượng cuộc sống liên quan đến sức khỏe ở phụ nữ Úc và Việt Nam sau điều trị ung thư vú và/hoặc ung thư sinh dục"

"Cross-culture comparison of lifestyle factors and health related quality of life in Australian and Vietnamese women after breast and/or gynaecological cancer"

Tại bệnh viện trong thời gian từ 25/5/2016 đến 30/8/2016

At the hospital, from 25/5/2016 to 30/8/2016

Ký tên và đóng dấu/ Signature and Official Stamp

GIÁM ĐỐC

BỆNH VIỆN UNG BƯỚU HÀ NỘI

TS. BS Trần Đăng Khoa

Letter of support provided by Hanoi Medical University Hospital

CỘNG HÒA XÃ HỘI CHỦ NGHĨA VIỆT NAM
Độc lập – Tự do – Hạnh phúc

SOCIALIST REPUBLIC OF VIETNAM
Independence – Freedom – Happiness

Hà Nội, ngày 26 tháng 5... năm 2016

LETTER OF ACCEPTANCE

Thay mặt Bệnh Viện/ On behalf of hospital:

Bệnh viện Đại học Y Hà Nội/Hanoi Medical University Hospital

Tôi (tên)/ I (name): **A.Prof. Lưu Ngọc Hoạt MD., PhD**

Chức danh/ Title: **Phó Giám đốc**/Vice director

CHO PHÉP/ GIVE PERMISSION FOR

Ths. Nguyễn Thị Hoa Huyền, Nghiên cứu sinh Đại học Công nghệ Queensland, Úc

Nguyen Thi Hoa Huyen, MSc, PhD student at Queensland University of Technology, Australia

Thực hiện đề tài nghiên cứu/ To conduct the research project entitled:

"So sánh cắt ngang về lối sống và chất lượng cuộc sống liên quan đến sức khỏe ở phụ nữ Úc và Việt Nam sau điều trị ung thư vú và/hoặc ung thư sinh dục"

"Cross-culture comparison of lifestyle factors and health related quality of life in Australian and Vietnamese women after breast and/or gynaecological cancer"

Tại bệnh viện trong thời gian từ 15/5/2016 đến 30/8/2016

At the hospital, from 15/5/2016 to 30/8/2016

Ký tên và đóng dấu
Signature and Official Stamp

BỆNH VIỆN
ĐẠI HỌC Y
HÀ NỘI

A.Prof Dr Lưu Ngọc Hoạt

Letter of support provided by National Oncology Hospital, Vietnam

CỘNG HÒA XÃ HỘI CHỦ NGHĨA VIỆT NAM
Độc lập – Tự do – Hạnh phúc

SOCIALIST REPUBLIC OF VIETNAM
Independence – Freedom – Happiness

Hà Nội, ngày 11.. tháng 5.. năm 2016

LETTER OF ACCEPTANCE

Thay mặt Bệnh Viện/ On behalf of hospital:

Bệnh viện K Hà Nội/National Cancer Hospital, Hanoi Vietnam

Tôi (tên)/ I (name): **Prof Dr Trần Văn Thuấn**

Chức danh/ Title: **Giám đốc/** director

CHO PHÉP/ GIVE PERMISSION FOR

Ths. Nguyễn Thị Hoa Huyền, Nghiên cứu sinh Đại học Công nghệ Queensland, Úc

Nguyen Thi Hoa Huyen, MSc, PhD student at Queensland University of Technology, Australia

Thực hiện đề tài nghiên cứu/ To conduct the research project entitled:

"So sánh cắt ngang về lối sống và chất lượng cuộc sống liên quan đến sức khỏe ở phụ nữ Úc và Việt Nam sau điều trị ung thư vú và/hoặc ung thư sinh dục"

"Cross-culture comparison of lifestyle factors and health related quality of life in Australian and Vietnamese women after breast and/or gynaecological cancer"

Tại bệnh viện trong thời gian từ 25/5/2016 đến 30/8/2016

At the hospital, from 25/5/2016 to 30/8/2016

Ký tên và đóng dấu/ Signature and Official Stamp

BỆNH VIỆN K
KT GIÁM ĐỐC
PHÓ GIÁM ĐỐC

Prof Dr Trần Văn Thuấn

Appendix E: Permissions of using scales for the study

Permissions of using self-efficacy scales

Re: permission of using scales

Albert Bandura <albertob@stanford.edu>

You replied to this message on 12/02/2016 11:19 AM.

Sent: Thu 21/01/2016 11:59 AM

To: Thi Hoa Huyen Nguyen

permission granted!

Albert Bandura

website: http://web.stanford.edu/dept/psychology/bandura/

Check out my new book, ***Moral Disengagement: How People Do Harm and Live with Themselves*** available on pre-order Barnes & Noble and Amazon here.

From: Thi Hoa Huyen Nguyen <thihoahuyen.nguyen@hdr.qut.edu.au>
Sent: Sunday, January 17, 2016 4:14 PM
To: bandura@psych.stanford.edu
Subject: permission of using scales

Dear Prof Bandura,

I am Huyen Nguyen – a PhD student at Queensland University of Technology, Australia.
As my PhD project focuses on a comparison of lifestyle behaviours and health related quality of life between Australian and Vietnamese women after cancer. The project also examines the influences of different factors on performing lifestyle behaviours, including self-efficacy.
I have found your articles and questionnaires relating Self-efficacy to Regulate Exercise and Self-efficacy to Regulate Eating Habits which I believe are suitable scales to measure self-efficacy exercise and diet in my study. Would I please ask for your permission of using these scales? In addition, have these scale been translated into Vietnamese? If yes, can I have permission of using these Vietnamese version? If not, can I translate these scale to use for my research purpose?

Thank you so much and I am looking forward to hearing from you soon,
Kind regards,
Huyen

Permissions of using Pittsburgh Sleep Quality Index

RE: 42855_Vietnamese version of PSQI_attached

Lyra Lavazais <llavazais@mapigroup.com>

Sent: Thu 21/01/2016 5:27 AM

To: Thi Hoa Huyen Nguyen

Message | PSQI_2012 10 14 final version_Vietnamese.pdf (303 KB)

Dear Huyen,

Thank you for your interest in the PSQI.

As per your request, please find attached the Vietnamese version. Please note that this is an academic translation. We at Mapi cannot be held liable for any consequence this may cause as we cannot guarantee the quality.

Your study being unfunded, this service is provided to you at no charge.

Wishing you all the best,

Lyra Lavazais (US Contact)
Information Resources Specialist
Information Support Service Unit

Mapi Research Trust
27 rue de la Villette | 69003 LYON | FRANCE
Tel: +33 (0) 4 72 13 65 75 | Fax: +33 (0)4 72 13 66 82 | US direct line : +1 859.948.3776 |
E-mail: llavazais@mapigroup.com

Register now to attend Mapi Group's Fall/Winter 2015 Research Assessment Developer Webinars: http://webinars.mapigroup.com/author-webinars-2015 >> ***Please Spread the Word to Relevant Colleagues!***

Please visit our websites | www.mapigroup.com | www.mapi-trust.org | www.proqolid.org | www.mapi-prolabels.org | www.mapi-store.com

Think environmentally, please only print if necessary.

Permissions of using Australian Health Survey – Vietnamese version

Re: permission of using AHS - Vietnamese version

Tiet Hanh Dao Tran <tiethanh.daotran@hdr.qut.edu.au>

You replied to this message on 17/12/2015 10:06 AM.

Sent: Thu 17/12/2015 10:03 AM

To: Thi Hoa Huyen Nguyen

Cc: daohanh2001@gmail.com; Charrlotte Seib

Message | Cau hoi ve loi song - Lifestyle.docx (32 KB)

Here you are. Good luck.

Hanh

From: Thi Hoa Huyen Nguyen
Sent: Thursday, 17 December 2015 9:27 AM
To: Tiet Dao Tran; daohanh2001@yahoo.com
Cc: Tiet Hanh Dao Tran
Subject: permission of using AHS - Vietnamese version

Dear Hanh,

As my PhD project focuses on lifestyle factors of both Australian and Vietnamese women after breast and gynaecological cancer, I am using Australian Health Survey Questionnaire (AHSQ) to access demographic, health status, and lifestyles data of this population. I have found that you have translated the AHSQ into Vietnamese and also validated this Vietnamese version. I am writing to ask for your permission of using this Vietnamese questionnaire.
Would you require any further document please inform via my email, I will response to you as soon as possible.

Thank you very much,
Kind regards,
Huyen

Permissions of using International Physical Activity Questionnaire – Short Form

Re: Asking for permission of using Vietnamese FFQ

Chung Nguyen <bsnguyenthanhchung@gmail.com>

You replied to this message on 6/10/2015 3:30 PM.
Click here to download pictures. To help protect your privacy, Outlook prevented automatic download of some pictures in this message.

Sent: Tue 6/10/2015 2:55 PM

To: Thi Hoa Huyen Nguyen

Message | IPAQ-SHORT FORM.doc (53 KB)

Dear Huyen,
Sorry for late response
Please see IPAQ-SF Vietnamese version.

Best wishes

On Fri, Oct 2, 2015 at 10:09 AM, Thi Hoa Huyen Nguyen <thihoahuyen.nguyen@hdr.qut.edu.au> wrote:

Permissions of using SF36 version 2

RE: OPTUM OGSR License Application CT171536

Dana Kopec <dkopec@qualitymetric.com>

You replied to this message on 6/10/2015 3:46 PM.

Sent: Tue 6/10/2015 2:48 AM

To: Thi Hoa Huyen Nguyen

Message | Queensland University of Technology-QM031968.pdf (55 KB)

Dear Huyen,

LICENSE AGREEMENT FOR USE OF OPTUM'S COPYRIGHTED MATERIAL. Please ready carefully!

You have been classified as a student and will receive the materials free of charge.

Instructions:

1. Sign the first page of the license agreement.
2. Return the signed license agreement by email (a scanned copy) to me at dkopec@qualitymetric.com.

How our Scoring Software Works:

The desktop scoring software that you will receive is a two part product. The first part is the actual software download. The second part is the key to activate the software.

The download can be used an infinite number of times. The activation key can be used only ***one time.***
Ex: If you would like to use 3 computers to score your survey data you will need 3 activation keys and just the one software download.

Installation Notes:

- Optum is unable to provide technical support for any software downloaded to Windows 8 or MAC computers, or MAC computers with Windows compatibility software.
- For installation help or system/software requirements, please consult the Installation Guide: http://www.qualitymetric.com/download/InstallationGuide_ScoringSoftwareV4.pdf

Permissions of using FACT-G

FACT-G Vietnamese

Shannon Romo <sromo@facit.org>

You forwarded this message on 14/12/2016 6:08 PM.

Sent: Mon 20/07/2015 11:09 PM

To: Thi Hoa Huyen Nguyen

Message | FACT-G_VIE_Final_Ver4_NI_08Aug14.docx (37 KB) | FACT-G_VIE_Final_Ver4_NI_08Aug14.pdf (162 KB) | doc01_Administration Guidelines_Manual_082505.doc (43 KB) | doc03_ScoringFACT-G v4-REVISED.doc (24 KB) | License for Thi Hoa Huyen Nguyen.docx (180 KB)

Hello Thi Hoa Huyen Nguyen,

Thank you for your enquiry. I have attached the FACT-G questionnaire in Vietnamese along with scoring materials and a license. Please let me know if I may assist you further.

Kind Regards,

Shannon C Romo
sromo@facit.org

FACIT.org FACITtrans

PROVIDING A VOICE FOR PATIENTS WORLDWIDE
FACIT.org FACITtrans | 381 S Cottage Hill Avenue | Elmhurst, IL 60126 | USA
www.FACIT.org