THE RELATIONSHIP BETWEEN OCCUPATIONAL PARTICIPATION, MEANINGFUL ACTIVITY AND QUALITY OF LIFE OF COLORECTAL CANCER SURVIVORS

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FACULTY OF MEDICINE
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ABSTRACT

BACKGROUND: Globally, colorectal cancer is the third most common type of cancer, constituting about ten percent of all cases and affecting mostly older adults. Previous studies on the Quality of life (QoL) of colorectal cancer survivors have not focused on the area of participation in daily living activities. Occupational participation is an essential concept and a key significant outcome in the field of occupational therapy. This study aim is to explore the relationships between colorectal cancer (CRC) survivors' occupational participation, meaningful activity and their QoL. **METHOD**: This is 2-phase study using structural equation modelling, and a theoretical model based on an occupational perspective to examine potential mechanisms of the mediation effect of meaningful activity on QoL. Upon ethical approval from University Malaya Medical Centre Ethic Committee, data were collected from two public hospitals. Face to face interview were conducted using the Malay version of Occupational Participation Questionnaire (OPQ-M), Engagement in Meaningful Activities Survey (EMAS-M) and the European Organization for Research and Treatment of Cancer Quality of Life Questionnaire version 3.0 (EORTC QLQ-C30). Data analyses for testing the proposed research hypotheses were done using Partial least square structural equation modelling (PLS-SEM) techniques. **RESULTS:** 113 participants were completed the questionnaires from a total of 152 consented participants. The mean age of the survivors was 64.7 (SD=10.4) years and range from 18 to 75 years. A significant weak positive association was found between overall score of occupational participation and QoL ($r=0.35$; $p<0.05$). Significant positive association were found between i) total score of

meaningful activity and QoL (r=0.62; p<0.0 5) and ii) total score of meaningful activity and occupational participation (r=0.45; p<0.05).The five most significant restrictions to occupational participation were in activities of working full or part time (70%), performing voluntary work (51.3%), participating in sport activities (40.7%), travelling for pleasure (34.5%) and activities helping and support others (22.1%).The predictors of QoL for CRC survivors were occupational participation and meaningful activity, which comprises a variance of 43.7 percent. The model of occupational participation, meaningful activity and QoL (OP-MA-QoL) has sufficient predictive relevance (Q^2) with values between, 0.471 to 0.612 (Q^2>0). Mediation analyses confirmed that meaningful activity served as a significant mediator between occupational participation and QoL (β=0.284(a*b), ρ<0.01, SE=0.05, z=5.040, ρ<0.01). **CONCLUSION**: This study found a positive, preliminary hypothesised OP-MA-QoL model, where meaningful activity mediates the fulfilment of occupational participation, which in turn positively influence QoL of the CRC survivors. Findings can inform the planning of occupational therapists in their Occupational-based intervention. Further research using longitudinal data and all stakeholders such as caregivers report are needed to re-examine this preliminary model.

ABSTRAK

LATARBELAKANG: Kanser kolorektal merupakan kanser yang ke tiga paling lazim, iaitu sepuluh peratus dari semua jenis kanser dan kebanyakkannya di kalangan orang dewasa yang berumur. Penyelidikan terdahulu, mengenai kualiti kehidupan di kalangan survival kolorektal tidak memberi tumpuan kepada aspek penyertaan dalam aktiviti kehidupan harian. Konsep penyertaan pekerjaan penting dan kunci utama keberhasilan dalam bidang Pemulihan Carakerja. Tujuan kajian ini adalah memeriksa hubungan di antara penyertaan pekerjaan, penglibatan dalam aktiviti bermakna dan kualiti kehidupan di kalangan survival kolorektal. **KAEDAH** Ini adalah kajian dua fasa menggunakan Permodelan Persamaan Berstruktur melibatkan model teoritikal dari perspektif pekerjaan untuk meneroka potensi kesan perantaraan aktiviti bermakna ke atas kualiti kehidupan. Data kajian dikutip sebaik mendapat kelulusan daripada Jawatankuasa Etika Perubatan, Pusat Perubatan Universiti Malaya di dua hospital awam. Temuduga bersemuka dikendalikan menggunakan soal selidik versi Bahasa Melayu, iaitu Penyertaan Pekerjaan (OPQ-M), Penglibatan dalam Aktiviti yang Bermakna (EMAS-M).) dan *European Organization for Research and Treatment of Cancer Quality of Life Questionnaire* (EORTC QLQ C30). Data dianalisa untuk menguji hipotesis kajian menggunakan kaedah Permodelan Persamaan Berstruktur Berasaskan Varians. (PLS-SEM) **KEPUTUSAN:** 113 peserta telah melengkapkan soal-selidik daripada 152 peserta yang membuat persetujuan penyertaan. Purata umur peserta ialah 64.7(SD=10.4) tahun dan julat umur dari 18 hingga

75 tahun. Terdapat perhubungan positif yang signifikan di antara jumlah skor penyertaan kerja dan kualiti kehidupan ($r=0.35$; $p<0.05$). Perhubungan positif yang signifikan diperolehi di antara i) jumlah skor aktiviti bermakna dan kualiti kehidupan ($r=0.62$; $p<0.05$). dan ii) jumlah skor aktiviti bermakna dan penyertaan kerja ($r=0.45$; $p<0.05$). Terdapat lima "limitasi penyertaan" yang signifikan di kalangan survival kolorektal iaitu kerja (70%), kerja sukarela (51.3%), aktiviti bersukan (40.7%) melancong (34.5%) dan aktiviti membantu dan memberi sokongan (22.1%). Peramal kualiti kehidupan di kalangan survival kolorektal ialah penyertaan pekerjaan dan aktiviti bermakna yang menyumbang sebanyak 43.7 peratus varian. Model Penyertaan kerja-Aktiviti bermakna-Kualiti kehidupan (OP-MA-QoL) mempunyai peramal relevan (Q^2) yang memadai iaitu di antara 0.471 hingga 0.612 ($Q2 >0$). Dapatan analisis pengantara menunjukkan konstruk aktiviti bermakna mempunyai kesan pengantara yang signifikan ke atas konstruk penyertaan pekerjaan dan kualiti kehidupan ($\beta=0.284(a*b)$, $\rho<0.01$, $SE=0.05$, $z=5.040$, $\rho<0.01$). **KESIMPULAN**: Kajian ini memperolehi model awal OP-MA-QoL yang positif, di mana aktiviti bermakna merupakan pengantara memenuhi penyertaan pekerjaan,yang seterusnya mempengaruhi kualiti kehidupan yang positif ke atas survival. Dapatan kajian ini dapat menjadi panduan kepada Jurupulih Carakerja semasa merancang intervensi berasaskan pekerjaan. Kajian rekabentuk longitudinal dan data dari pelbagai sumber seperti dari penjaga diperlukan untuk memeriksa semula model awal ini pada masa hadapan.

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DEDICATION

In loving memories to

Haji Sapihis bin Haji Ghazali

And

Hajjah Rumisah binti Kamin

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LIST OF SYMBOLS AND ABBREVIATIONS

ADL	Activity of Daily Living
α	Alpha
AVE	Average Variance Estimation
CRC	CRC survivors
EMAS-M	Malay version of Engagement in Meaningful Activity Survey
EORTC-QLQ	European Organisation for Research and Treatment of Cancer Quality of Life Questionnaire
CVR	Content Validity Ratio
f^2	Effect size/Cohen *f* ratio
IADL	Instrumental Activity of Daily Living
ICF	International Classification of Functioning
ICC	Interrater Item Correlation
IIC	Intra class Correlation Coefficient
MA	Meaningful activity/Perceived engagement in Meaningful activity
OP	Occupational participation/Perceived Occupational participation
OPQ-M	Malay version of Occupational participation Questionnaire

OTPF	Occupational Therapy Practise FrameWork
PLS	Partial Least Square
PLS-SEM	Partial least square structural equation modelling
ρ	Probability
β	Path coefficients/Regression coefficients
QoL	Quality of life/Perceived Quality of life
Q^2	Predictive accuracy
q^2	Effect size
r	Estimate of Pearson product-moment correlation coefficient
R^2	Explained variances/Coefficients of determinations/Measure of strength association
SE	Standard error
SEM	Structural Equation Modeling
t	Sample value of the t statistic
TNM	Staging system based on the extent of the tumor (T), the extent of spread to the lymph nodes (N), and the presence of metastasis (M
VIF	Variance Inflation Factors
z	Standardized score

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CHAPTER 1: INTRODUCTION

1.1 Background

Globally, colorectal cancer (CRC) is the third most common type of cancer making up about 10% of all cases worldwide (World Health Organization, 2014) . It is the third most common cancer in the United Kingdom (Cancer Research, UK, 2010) and the fourth in the United States of America (American Cancer Society, 2012). In Asia, the incidence of CRC is increasing rapidly and the overall prevalence in this region is comparable with other developed countries (Al-Jashamy, Murad, Zeehaida, Rohaini, & Hasnan, 2010; Moghimi-dehkordi & Safaee, 2012).

The 5-year survival rate in United State of America for CRC is 64 percent and increases to 90 percent if the disease is detected early (American Cancer Society, 2012). However in Asia, the cure rate of CRC is only at about 60 percent because of late detection. Survivors of CRC form the largest group affecting men and women (Cancer Fact & Figure 2014). The same trend is also experienced in Malaysia, where CRC is identified as the primary type of cancer among men (16.2%) and secondary type cancer among women (10.6%). The National Cancer Registry, 2006 published data that showed incidence increase parallel with age.

Some type of cancer is taking a form of the chronic diseases, whereby the increase in life expectancy have risen to more than ten years due to the advanced treatment and effective screening programs (American Cancer Society, 2014; WHO, 2011) especially in develop countries. The need to live with cancer and the fear of recurrences affects the quality of life (QoL) amongst these individuals. Malaysian

government is undertaken the huge task of managing above issue and has consequently developed policies to deal with this illnesses (Ministry of Health Malaysia, 2010).In line with the Ministry of Health's (MOH) vision statement, which is to inculcate the nation to collaborate to achieve better health, there is a need for rehabilitation to enhance QoL of cancer survivors (Ezat, Noraziani, & Sabrizan, 2012; Halpin, Morales-Suarez-Varela, & Martin-moreno, 2010; Loh, Packer, Chinna, & Quek, 2013).

In oncology rehabilitation, an emergent approach towards health promotion, illness prevention and diseases management for cancer survivors have been promoted to ensure the outcome with improved QoL (Denlinger & Engstrom, 2011; Lynch, Cerin, Owen, Hawkes, & Aitken, 2008; Salz, Oeffinger, McCabe, Layne, & Bach, 2012; Taylor, 2013; van der Mei, Dijkers, & Heerkens, 2011). There is also evidences of occupational therapists' contribution in prevention and management of long term chronic diseases (Berg & Hayashi, 2013; Hand, Law, & McColl, 2011; Loh et al., 2013; Rao, 2014). Given that, there are limited studies done on rehabilitation needs of cancer survivors; this study address the gap and issues highlighted above in the Malaysian setting. Furthermore, cancer survivors among the adults often experience disabilities, but little is known on how the disabilities disrupt their daily performance. So far, there has been little reporting and discussion about how occupational participation relates to the quality of life among the CRC survivors' in the Malaysian setting.

Recently, the concept of "participation" has become significant in the field of occupational therapy and rehabilitation. Three categories of participation i.e. i) client-centeredness, ii) involvement in the environmental and iii) meaningfulness, were seen

as emerging elements in recent reviewed literatures. Therefore, more research is required to determine how these elements interrelate and/or influence occupational therapy (Vessby & Kjellberg, 2010). "Participation", is defined as - the nature and extent of a person's involvement in life situations such as work, play and learning and can be assessed by the daily living activities and social roles they undertake (World Health Organization, 2001). According to Van der Mei, Dijkers and Heerkens, (2011); the International Classification of Functioning, Disability and Health (ICF) can be used as a guide for assessment and intervention programs for patients with cancer, where "participation" is highlighted as the primary outcome measure in rehabilitation.

Occupational perspective, stresses the subjective experience of meaning, autonomy and self-determination in life participation (Hemmingsson & Jonsson, 2005). In addition, occupation engagement in work, play and daily living activities in the social cultural context are essential in individual's health and well-being, which has the potential to empower people who suffer from ongoing health conditions (Kielhofner, 2009; White, Lentin, & Farnworth, 2013a).

Hence, in this dissertation, the concept "participation" as generally used by the occupational therapists, has also been adopted by the WHO in their definition in the International Classification of Functioning, Disability and Health (ICF) (WHO, 2001) model. In more specific term, the concept 'occupational participation' is based on occupational perspective, and are reflective of occupational therapy's perspective.

Occupational participation Questionnaire (OPQ), was developed to assess the participation restriction in performing daily life activities, while the Engagement in Meaningful Activities Survey (EMAS) (Goldberg, Brintnell, & Goldberg, 2002) was developed to measure the indicator level of meaningful activity. Since both of these tools have never been psychometrically tested in Southeast Asian population before, they were psychometrically evaluated in the Malaysian context before it can be utilised as the main tool in this study.

Existing knowledge of 'occupational participations' and 'meaningful activity' was applied to other chronic diseases (such as traumatic brain injury, stroke, dementia and schizophrenia) was predominantly tested among western population (Eriksson & Tham, 2010; Fallahpour, Tham, Joghataei, Eriksson, & Jonsson, 2011; Goldberg et al., 2002; Guidetti, Asaba, & Tham, 2009; Hammel et al., 2008; Harmer & Orrell, 2008). It is crucial to understand how the role of occupational participation and meaningful activity, relates to QoL of CRC - a primary cancer amongst older men and women in Malaysia.

1.2 Statement of Problem

I am an occupational therapy educator at the Training Division, of the Ministry of Health (MOH), Malaysia. One of the challenges I faced in delivering occupational therapy, is that the philosophies and theories are mostly developed according to the western traditions. Experts in the profession are well aware that there is a gap between the philosophy of occupational therapy and its implementation in everyday practice (Hasselkus, 2002; Kielhofner, 2005; Pierce, Munier, & Myers, 2001; Towns & Ashby,

2014). In particular, literature which captures the occupational perspective - participation and meaningful activity in non-western countries is scarce and there are currently no valid tools in Malay language. Whilst most theories have been developed in the western population, this research argues the need to investigate how well this theory on occupational participation can be applied in other non-western countries. Thus, as an attempt to bridge the gap in the literature, this study investigates the concept of occupation-participation and their meaningfulness of activities as perceived by colorectal cancer survivors in Malaysia. Malaysia is an Asian country that differs substantially from its western counterparts in various aspects such as socially, culturally, politically and economically. Therefore, the proposed study provides a unique perspective that may not have not yet been explored and may help to shed a light in the gap between the theory and practice.

Previous studies were mostly on breast cancer survivors, focusing on women and younger group of the population, thus providing little information among CRC survivors who are older. Moreover, most of these studies examined the QoL among CRC survivors from a multifactorial perspective and reveal inconsistent findings (Braun, Gupta, Grutsch, & Staren, 2011; Campbell, Patel, Newton, Jacobs, & Gapstur, 2013; Lee et al., 2015; Milbury, Cohen, Jenkins, Skibber, & Schover, 2013; Peddle,Au,& Courneya, 2008; Schmid & Leitzmann, 2014). In addition, evidence about how does occupational participation in meaningful activity affect the QoL quality of life among CRC survivors is scarce.

Previous studies captured participation in daily life activities, QoL and wellbeing of people with disabilities (Bergstrom, von Koch, Andersson, Tham, & Eriksson, 2015; Desrosiers et al., 2009) however, the literature within this domain appears to be lacking among cancer survivors, specifically among CRC group which include a significant proportion of older and equally distributed gender.

In the methodology and analysis aspect, limited studies constructed a conceptual model and empirically test the model that predict QoL using structural equation model (SEM). Many studies have utilised regression analysis which restricted the relationship examined, compare than SEM, which can test complex model sets of relationships among a large number of theoretically related variables (Tabachnick & Fidell, 2007).

The SEM analysis is flexible in determining the relationships among variables and the direct and indirect relationships among variable can be specified and estimated. Therefore, the conceptual model from ICF health model is developed and a test of the pathways through which occupational participation and meaningful activity influences CRC QoL is warranted.

Schnoll, Fang, & Manne (2004), reviewed the progress made in the application of SEM towards behavioural oncology research, highlighting two central uses: 1) theory development and evaluation, and 2) scale construction. The advantages of using SEM include the ability to easily examine direct and indirect effects; the capacity to evaluate sophisticated theoretical assumptions (e.g., directional relations among constructs), the ability to formally assess the veracity of competing theoretical models, the ability to

include multiple predictors, mediators, and outcomes. All of which can either be noticeable or hidden, and the ability to assess the validity of prediction models across various subgroups such as moderators for prediction models (Schnoll et al., 2004)

Mulligan (1998), strongly suggested the field in occupational therapy to move forward using SEM to evaluate the conceptual framework and complex models developed within the field. With this, the way of thinking and analysis will be enhanced by forcing explicit statements in relationships reflecting occupational therapy theories and encouraging good measurement.

Based on the rationales posed above, Partial Least Squared (PLS) -SEM is applied in the current study as it matches the exploratory research purpose that aims investigate the ICF health model with data of from occupation participation in meaningful activity obtained from CRC survivors that can predict their health QoL. The researcher believes that there is a need to develop a tentative causal model which relates to the construct of 1) perceived occupational participation, 2) perceived engagement in meaningful activity, and 3) perceived QoL. Consistent with the model, hypotheses was derived from the constructs of OPQ and EMAS.

This study was divided into two phases. Phase 1 examines cultural adaptation and psychometric evaluation of both measurement tools (OPQ and EMAS). Phase 2 involves three steps: 1) assessment of Measurement Model that aims to validate the formative and reflective construct within the model. This is to demonstrats whether there is sufficient robustness to test the relationship among the latent variables (OP and

MA) and dependent variables (QoL); 2) assessment of Structural Model to determine the explanatory power of the model and to test the research hypotheses; 3) testing the mediation effect via bootstrapping, which is a non-parametric resampling procedure (Hair, Hult, Ringle & Sarstedt, 2014).

1.3 Research Questions

This study was guided by the following research questions:

What is the relationship between occupational participation, meaningful activity and QoL among CRC survivors**?**

What is the percentage of restriction on occupational participation of survivors?

What is the associations between perceived occupational participation and perceived QoL among CRC survivors?

What is the associations between perceived occupational participation and perceived QoL among CRC survivors?

What is the associations between perceived engagement in meaningful activity and perceived QoL among CRC survivors**?**

What is the mediator role of perceived engagement in meaningful activity between occupational participation and QoL**?**

1.4 Research Aims and Objectives

Based on the above research question, the study is designed to accomplish the following aim through specific objectives:

This is an exploratory study that aims to examine the association between perceived occupational participation (OP), perceived engagement in meaningful activities (MA) and perceived Quality of Life (QoL) in a small cohort of CRC survivors sample from Malaysia. The specific objectives to answer the research question were:

i. To determine the percentage of restriction on occupational participation of survivors.
ii. To determine the associations between perceived occupational participation and perceived QoL among CRC survivors.
iii. To determine the association between perceived occupational participation and perceived engagement in meaningful activity among CRC survivors
iv. To determine the association between perceived engagement in meaningful activity and perceived QoL among CRC survivors.
v. To examine the mediator role of perceived engagement in meaningful activity between occupational participation and QoL.

1.5 Theoretical and Conceptual Framework of the Study

The World Health Organization's International Classification of Functioning, Disability and Health (ICF) (WHO, 2001) is a dominant theoretical health model, which determines health outcomes or the consequences of diseases. The ICF emphasises on a bio- psychosocial model, which integrates both biomedical and psychosocial aspects of health and functioning, as well as contextual factors that influencing functioning. The ICF defines participation "as involvement in a life situation", and participation

restriction as "problems experienced in this involvement during the period of survivorship". The concept of participation is applicable for measuring outcomes in the field of occupational therapy and rehabilitation medicine which influences overall health QoL (Gilchrist et al., 2009; Seekins et al., 2012; Vessby & Kjellberg, 2010). Recently the applicability of the ICF for studying relevant aspects of health QoL in CRC survivors was also reported (van Roekel et al., 2014).

Occupational perspective emphasises the subjective experience of meaning, autonomy and self-determination in life participation (Hemmingsson & Jonsson, 2005). The focus is on purposeful and meaningful participation of the individual and as well as occupational engagement in work, play and activity of daily living in a social cultural context which are both essential for increasing the individual's health and wellbeing (American Occupational Therapy Association, 2014; Kielhofner, 2009; Law, 2002; White et al., 2013a). In this dissertation, occupational participation and meaningful activity are the variables that describe "participation" or "involvement in life situation" which may have positive influence on health QoL of CRC survivors.

Conceptual framework illustrates the independent variables within the occupational participation and meaningful activity, which might influence the health QoL among CRC survivors (see Figure 1-1).We hypothesised that data from CRC survivors' perceived occupational participation and meaningful activities satisfies the ICF model, thus predicting their perceived health QoL.

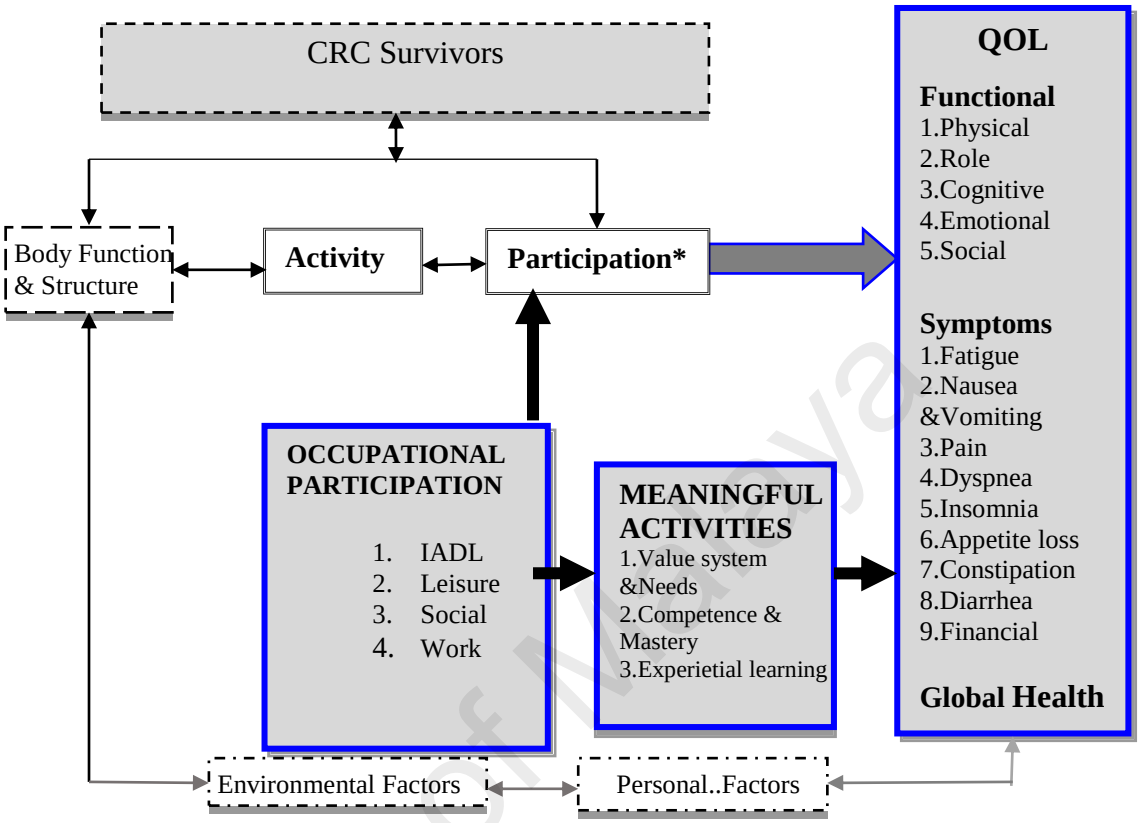


Figure 1-1: Theoretical framework of the study focusing on *participation* from WHO's ICF (2001) health model

1.6 Significance of the Study

This research is the first to explore the relationship between occupational participation, meaningful activity and QoL involving a cohort of CRC survivors from Malaysia. The outcomes of this study has potential contribution in enhancing knowledge and practices in the field of occupational therapy, rehabilitation medicine and overall health care system within the country in the following ways.

Firstly, to get a better understanding of occupational perspective on the incomplete involve participation and health QoL, which underlying principles from WHO's ICF health model. Secondly, to provide a unique perspective which has not been explored in Malaysia, where occupational participation among cancer survivor are neglected, however, interventions need more evidence based research in future. It is also equally important among occupational therapy practitioners, as our unique skills and responsibilities in the current health care systems is to facilitate clients to participate and engage in meaningful daily life occupations, where occupation-based interventions may be a possible focus for survivors in home-based and community setting. This is in line with the current health care challenges and issues in managing long-term chronic diseases in Malaysia (Health Strategic Plan 2010). Therefore the necessary preventive measures, guide and support care systems will be taken considerably among survivors. Finally, the study outcome may be used as input in the development of Occupational therapy curriculum and training module for healthcare professional in Malaysian.

1.7 Scope of the Study

The scope of the study was limited to CRC survivors at the University of Malaya Medical Centre (UMMC) and Selayang Hospital, Kuala Lumpur, Malaysia. The study focused on the occupational participation, meaningful activity and QoL of these survivors, which was using the Malay version of OPQ, EMAS and EORTC QLQ-C30 version 3.0.

1.8 Operational Definition

The definitions of terminologies used in this research are presented below to avoid any potential confusion in interpretation of the concepts employed in this study. These definitions are used as guidelines in discussing the findings of the tested hypotheses.

Occupation Participation - Occupational participation is the engagement in work, play or activities of daily living that are part of one's sociocultural context and that are desired and or necessary to one's wellbeing. Engagement involves not only performance but subjective experience of individual which may influence from personal and environmental factors (Kielhofner, 2008).

Engagement in Meaningful activity - Meaningful activity is aspects of activity meaning with a particular emphasis on, "the activity's congruity with one's value system and needs, its ability to provide evidence of competence and mastery and its value in one's social and cultural group" (Goldberg et al., 2002). In this study, the term occupational participation and meaningful activity have been used as the main constructs of independent variables.

Cancer survivor - National Cancer Institute, (2011b) define cancer survivor as an individual survivor from the time of diagnosis, to the remaining period of his or her life. In this study, the researcher recruited survivors who have been diagnosed for at least

one year or more with colon, rectal and both sites of cancer. The rationale is to target a greater number of survivors provided attend follow up at clinics or medical facilities.

Colorectal cancer (CRC) - CRC is a term used for cancer that starts in the colon or the rectum. These cancers can also be referred to separately as colon cancer or rectal cancer, depending on where they began. Most CRCs are adenocarcinomas (cancers that begin in cells that make and release mucus and other fluids). CRC often begins as a growth called a polyp, which may form on the inner wall of the colon or rectum (American Cancer Society, 2015).

Quality of Life (QoL) -National Cancer Institute 2011 defines QoL as an individual's perception of his or her overall well-being and enjoyment, as well as the ability to carry out various activities. In this study, QoL was measured using the European Organization for Research and Treatment of Cancer (EORTC) QLQ-C30 Version 3.0, which consist of functional, symptomatic and global health.

Partial Least Squared (PLS) – PLS is variance-based structural equation model which is the second generation of statistical analysis that combines a number of statistical techniques including correlation, redundancy analysis, multiple regression, principal component analysis and multivariate analysis of variance. Predictive models can be constructed when the factors (variables) are many and highly collinear. A series of interrelated dependence relationships can be estimated simultaneously using a

multivariate technique combining aspects of multiple regression and factor analysis (Gefen, Straub, & Boudreau, 2000).

In this study, occupational participation and meaningful activity are the factors that yield the result for the QoL outcome in the model. These variables would be identified as independent variables, which are not influence by other variables in a model. The results of QoL would be identified as dependent variable in the model.

1.9 Summary of Chapter

This chapter briefly describes the current scenario with cancer. The background of the problem relates to the many problems faced by cancer survivors. Furthermore, the statement of problem was given to support the reasons for conducting the study. Research question of the study was spelt out to lead the formulation of the objectives. ICF health model and occupational perspective are identified as the theoretical models to conceptualise the research model for this study. The hypotheses model were formulated based on the conceptualization of the study. The significance of the study was also discussed. In addition, to help readers have a better understanding of the study, definition of terms in the study was also given. In the next chapter, the researcher discusses and presents the literature review of the study.

CHAPTER 2: LITERATURE REVIEW

2.1 Overview

The chapter highlights the theories, concepts and measurement strategies pertaining to occupational participation, meaningful activity and the influence on health related QoL. Relevant literature concerning colorectal epidemiology, rising survivors and the need to examine the important key constructs (such as MA, OP) related to daily living of these survivors in relation to the influence on their QoL are discussed. The following section then presents the research hypotheses of this study.

2.2 Theories Underpinning Participation and QoL

2.2.1 International Classification of Functioning, Disability and Health (ICF)

World Health Organization (WHO) presented ICF in 2001, which comprises a set of terminology containing descriptions of health and health-related conditions for researchers and practitioners. Briefly, ICF is organized into: a) Functioning and Disability - (i) body function (or physiological aspects) and body structure (anatomical) and (ii) activity-participation, and b) Contextual factors.

The subsets, 'activity and participation' in ICF represents the societal perspective of functioning. Activity is defined as the execution of a task or action by an individual while participation is defined as the 'involvement in a life situation' (World Health Organization, 2001, p. 10). Participation in occupations of everyday life naturally occurs when clients are actively involved in carrying out occupations or daily life activities that they find purposeful and meaningful; it provides individuals the

opportunities to acquire skills and competencies, to connect with others (World Health Organization, 2001).

The concept of participation includes involvement or "taking part, being included or engaged in an area of life, being accepted or having access to needed resources" (World Health Organization, 2001, p. 15). Activity and participation are classified within a common list but are coded with two qualifiers – i) capacity and ii) performance. Although widely used, there are major shortcomings regarding the subjective experience of meaning and autonomy, as reported by Hemmingsson and Jonsson (2005). Even though ICF's definition of participation emphasises individuals' subjective life experience using two qualifiers of capacity and performance, the only way of coding participation within the ICF's notion is through the observed performance. This limitation pertaining to the provision of information on the subjective experience of participation in daily life should be taken into account.

The contextual factors in ICF are divided into the two components, namely environmental factors (i.e. physical, social and attitudinal environment) and personals factors (i.e. factors which influence how individuals live and conduct their lives). They can either facilitate or hinder impact on all the components of functioning and disability. Unfortunately, these personal factors are not further classified by ICF (Lozano-Lozano et al., 2016) which is another limitation that the researcher needs to consider.

In this dissertation, ICF's terminology was used to categorise the variables and the definitions for possible comparison or reference with studies from other countries.

Hence, in the present study, participation is based on two aspects. The first is derived from WHO's definition registered in ICF (WHO, 2001), as explained above. The second is based on the definition of occupational participation drawn from the perspective of occupational therapy, which is elaborated in the next section.

2.2.2 Occupational Therapy Perspective

Occupation

The typical assumptions on occupation are highlighted to give its historical perspectives and understanding. Meyer (1922), stated that occupational therapy's basic assumption about occupation is - to be engaged in occupation as an integral part of human nature, and the basic need and drive for an individual to be occupied. These two main assumptions – *basic human need* and *therapeutic occupation* formed the basis for the occupational perspective, as stressed by Polatajko et al. (2007).

The first assumption mentioned above perceives occupation as a basic need for the human who is known as an occupational being. Therefore, the engagement to any sort of occupation is an important requirement for health and well-being, and any possible reason that reduces an individual's participation in occupation would negatively influence the individual's health and well-being. The second assumption links occupation with potential therapeutic values which contributes to the individual's social and self-identity, whereby it connects the individual to others and to their past, present and future. Therefore, occupation organises their time and bring structure to individual's life, forms rhythm to theirs days by organising their time and as well leads

to the formation of habits and routines. In brief, occupations are idiosyncratic – to be viewed as a concept of personal experience (Polatajko et al., 2007).

The term 'occupational' relates to human doing activities of self-care, productivity, and leisure which carry personal meaning and value in their everyday life (Hammell (2004). Other scholars refers to it as 'groups of activities and tasks of everyday life, named, organised, and given value and meaning by individuals and a culture, or everything people do to occupy themselves, or looking after themselves (self-care), enjoying life (leisure), and contributing to the social and economic fabric of their communities (productivity)' (Law, 2002, p. 34). It does not stand alone; instead, aspects of cultural and environmental attributes contribute to form the important features in occupation (Kielhofner, 2008). A recent 'enriched' definition of occupation describes it as "all the things that people want, need or have to do whether of a physical, mental, social, sexual, political, or spiritual nature and is inclusive of sleep and rest" (Wilcock & Townsend, 2014).

The American Occupational Therapy Association (2014) categorised occupation into Activities of Daily Living (ADLs), Instrumental Activities of Daily Living (IADLs), work, education, rest and sleep, leisure and social participation. It incorporates "therapeutic use of everyday life activities with individuals or groups for the purpose of enhancing on enabling participation in roles, habits, routines and rituals in home, school, workplace, community and other settings" (AOTA, 2014).

These definitions suggest that the measurement for any engagement in 'occupation'/activities must consider its meaningfulness and relevance to the individual's culture and context (of past, present, and future). Therefore, any study on occupation must encompass the perspective of being client-centred (Townsend, 2002) and relate activity participation with its cultural and environment relatedness (Hammingsson & Jonsson 2005).

Model of Human Occupation

One theoretical model that is used to study occupation which incorporates the term *participation* (from ICF) is the Model of Human Occupation (MOHO) (Kielhofner, 2008). The model expands these terms into *occupational participation.* MOHO is widely used as an occupation-focused model internationally (Lee, Taylor, & Kielhofner, 2009; (Lee, Taylor, & Kielhofner, 2009; Wikeby, Lundgren Pierre, & Archenholtz, 2006) and has been reported to form the conceptual connection between ICF and occupational therapy models by Stamm, Cieza, Machold, Smolen, and Stucki (2005). Within MOHO's definition, *occupational participation* refers to the "engagement in work, play or activities of daily living which are part of one's sociocultural context and its necessary to one's well-being" (Kielhofner, 2008, p.115).

MOHO emphasizes participation as involving not only performance but also the subjective experience of engagement and doing significant things, whether within the personal or social context (Kielhofner, 2008). This model implies that occupation participation results from an interaction of the inner characteristics of the individual (volition, habituation, and performance capacity) and is influenced by the environment

(Kielhofner, 2008). It encompasses the physical, social, cultural, economic, and political features and they all have an impact on the motivation, organisation, and performance of the occupation (Hunter, Gibson, Arbesman, & D'Amico, 2017; Polatajko et al. 2007; Kielhofner, 2009).

Thus, occupation and environment have a reciprocal relationship, in which each of them influences each other (Jonsson, 2008) and with consequences on health QoL. As a result these underlying cultural-environmental variables and the factors of meaningfulness (client-centred) must be considered in linking occupation participation to QoL.

Wilcock (2006) argued that people influence their health and well-being positively or negatively through their occupations. However, occupation is a broader construct than behaviour and encompasses not only what people do, but also the meaning and context of people's actions (Hasselkus, 2002; Kiefhofner, 2008). This is also in parallel with a number of researchers' corresponding view regarding the complexity in the operationalisation of participation in daily life and is dependent on the *subjective experience and individual perspective* (Häggström & Lund, 2008; Whiteneck & Dijkers, 2009).

Previous scholars agreed that engagement in personally valued and meaningful activity contributes to an individual's sense of meaning and purpose in life, eventually influencing health and well-being (Clark et al., 1997; Jackson, Carlson, Mandel, Zemke, & Clark, 1998; Yerxa et al., 1989). Empirical evidence also show meaningful activity as

a variable associated with fulfilling basic psychological needs and contributing towards creating meaning in life in older adults with and without disabilities and also among undergraduate and graduate college students (Eakman, Carlson, & Clark, 2010; Eakman & Eklund, 2012). These variables relate to the individual's occupation-centred perspectives and they are well recognised in occupational therapy for successful rehabilitation (Canadian Association of Occupational & Townsend, 2002; Fisher, 2013; Wilcock, 2006)

Due to a dearth of evidence on this subject in the non-western countries, specifically Asian countries such in Malaysia which represents a different socio-cultural context, there is an obvious lack of knowledge regarding participation/occupation in daily life. Secondly, from an occupational therapy's unique perspective, there is a need to explore and specifically focus on occupational participation, meaningful activity and health QoL to fulfil important goals in rehabilitation. Therefore, it is essential to further understand the meaning of occupation as experienced by CRC survivors in the context of their daily lives.

In short, this dissertation aims at advancing the knowledge regarding the concept definition of *occupational participation* in daily life after experiencing cancer. The ICF's general definition of participation is applied as it is the most common definition in use worldwide, together with the theoretical model based on the occupational perspective (as depicted in Figure 1-1).

2.3 Colorectal Cancer Incidence and Epidemiology

Colorectal cancer (CRC) is the most common cancer worldwide. It is the third most common for both male and female in the USA (American Cancer Society, 2014) as well as in United Kingdom (Cancer Research, UK, 2014). In Asian countries including China, Japan, South Korea, and Singapore, the incidence of CRC is rising rapidly, between 40.0 to 60.0 per 100,000 people in the population (Sankaranarayanan et al., 2010).The report published by National Cancer Registry (NCR) in 2007 showed that the top five leading cancers among the general population in Malaysia at the time were breast (18.1%), colorectal (12.3%) trachea, bronchus, and lung (10.2%) as well as cervical (4.6%). Meanwhile, the five most frequent cancers among Malaysian males in 2007 were lung, colorectal, nasopharynx, prostate and lymphoma while among females, the five most common cancers were breast, colorectal, cervix, ovary and lung (Zainal & Nor Saleha, 2011).

In the USA, the 5-year survival rate for CRC is between 83 percent and 65 percent and it has increased to 90 percent if the disease is detected at an early stage (American Cancer Society, 2014). However, the overall cure rate in Asia is about 60 percent, except in countries such as Japan, Taiwan and Korea which have a much higher survival rate as they implement screening as their national policy (Moghimi-Dehkordi & Safaee, 2012). In Malaysia, an estimated 2000 or more cases have been reported among its population of 32 million and the number is expected to rise every year. Men accounted for 60 percent and women 40 percent of the cases reported. Age distribution showed that cases increased sharply after 50 years. The overall 5-year survival rate was 40 percent and recurrence was 9.7 percent for early detection and 19.6 percent for late

cancer detection (Rashid, Aziz, Ahmad, Shah, & Sagap, 2009). Meanwhile, a more recent study (2000-2006) demonstrated an improved overall 5-year survival rate of 53 percent (Kong, Roslani, Law, Law, & Arumugam, 2010). The Chinese was the best to comply with screening and recorded the highest survival rate compared to other ethnic groups. The primary cancer types for CRC were: rectum (33.07%), sigmoid colon (20.11%), recto-sigmoid (17.47%), ascending colon (5.46%), caecum (5.16%), and descending colon (3.96%) (Rashid et al., 2009) .

The second report of NCR (Muhammad Radzi et al., 2014) for CRC cancer from 2008 until 2013 had reported recent findings which involved 34 participating centres and a total of 4501 patients in Malaysia. The registry allows data collection systematically on prevention, management and treatment evaluation in Malaysia, contributing to the formulation of policies to improve CRC management (Muhammad Radzi et al., 2014).

The key findings in the report included:

- In Malaysia, the incidence rate was 21.3 cases per 100,000 populations from 2008 to 2013. The mortality rate was 9.8 cases per 100,000 populations.
- The age-adjusted incidence rate of CRC was 1.42 times higher among men than women. The mean age was 61.6 year old with a standard deviation of 12.7.
- The Chinese have shown a significant association with CRC with a reported incidence of 27.4 per 100,000 populations. The lowest incidence per 100,000 population was observed among Indians (11.3 cases) and Malays (9.5 cases).

- In terms of risk factors and clinical presentation, 22.3 percent of CRC patient were diagnosed with diabetes mellitus. The trend of diabetes mellitus was persistent between 19.3 percent and 25.6 percent. In this six-year duration, 9.6 percent of the patients were active smokers, 13.2 percent were former smokers and 38.4 percent were non-smokers. Even though family history is a known risk factor for CRC, merely 6.4 percent of the patients had a positive family history. The most common presentation of CRC was altered bowel habits (41.7%).
- The most common histologic tumour type seen in CRC patients in Malaysia was adenocarcinoma of the usual-type (95.5%), most of which were moderately differentiated. The majority the patients were presented with locally advanced tumour (pT3 and pT4). In addition, more than half had nodal metastasis.
- The most common site of CRC among patients as reported for the period of 2008 until 2013 was in the colon, according to International Statistical Classification of Diseases and Related Health Problems – 10th Revision (ICD-10). However, rectum and recto sigmoid were among the most common sites of CRC when the colon is specifically divided into small segments. Left-sided tumour constituted more than three quarter of the CRC (Muhammad Radzi et al., 2014) which was not the case for various western populations (Goh et al., 2005). Over the past six-year period, majority of the patients were diagnosed at stage III according to the final TNM staging.
- 70.8 percent of CRC cancer patients had surgery performed and 35.9 percent of colorectal patients had chemotherapy, whereas for rectal cancer, 26.3 percent received radiotherapy. As for complimentary or alternative treatment, 5.5 percent of patients received the care while only 1.6 percent of CRC patients received

palliative care in this registry. The data on chemotherapy and radiotherapy are still insufficient for analysis.

Most CRC studies in Malaysia examined general screening, awareness of symptom, and social demographic profiling in relation to QoL (Loh, Majid, Dahlui, Roslani, & Su, 2013; Natrah, Ezat, Syed, Rizal, & Saperi, 2012). A study by Wan Puteh et al. (2013) which utilized EORTC QLQ C-30 to determine QoL among 160 CRC patients revealed that emotional, cognitive and social functions deteriorate with the advances of the stage of the disease. Pain, dyspnoea, diarrhoea and financial implication were significantly higher in patients who are at the advanced stage of the disease – all of which will affect occupational participation.

In Malaysia, there is neglect in comprehensive interventions due to insufficient information, inability to access services and support and as well as issues related to socioeconomic and cultural issues (Loh et al., 2013). Furthermore, there is limited knowledge in occupational participation and meaningful activity in relation to health QoL among cancer survivors in Malaysia. As suggested by Natrah, et. al (2012) , further studies on QoL among cancer patient are needed to refine the strategy to manage cancer in Malaysia in regards of lifestyle practices, diagnostic tests, interventions in cancer prevention, treatment, palliation and rehabilitation.

Colorectal cancer treatment is multidimensional, consisting of surgery, radiotherapy, chemotherapy, hormonal therapy, or combined treatment modalities. Consequently, treatment-related side effects and symptoms are often the results of toxicities in multiple systems. Side effects include physical and psychological problems

such as fatigue, lymphedema, decreased oxygen uptake, pain, body image problems, sleep disturbances, anxiety and depression, all of which can negatively impact the general health and QoL (Deimling, Bowman, Sterns, Wagner, & Kahana, 2006; Krouse et al., 2009; Shi et al., 2011; Wu & Harden, 2015).

Pre-existing medical conditions or comorbidities (such as cardio vascular problems, musculoskeletal problems, lung or breathing problems, and depression) may also lower participation and decrease their functional/physical/psychological states and the overall QoL (Soerjomataram et al., 2012; Thong et al., 2011). Furthermore, CRC survivors may experience restriction in social and role functioning, particularly in their ability to participate in community activities, perform work and engage in social networks (Deimling et al., 2006; Thraen-Borowski, Trentham-Dietz, Edwards, Koltyn, & Colbert, 2013).These problems can potentially affect occupational participation due to the debilitating functional abilities of cancer patients during the illness trajectories. An understanding on how occupational participation and meaningful activity may positively influence QoL of CRC survivors was also not clear especially in non-western countries, like Malaysia.

2.4 Occupational Therapy and Cancer Rehabilitation

2.4.1 Outcomes – Occupation, Participation and QoL

The role of occupational therapy in cancer is to facilitate and enable an individual patient to achieve maximum functional performance, both physically and psychologically with everyday living skills regardless of his or her life expectancy (Penfold, 1996). The goal of occupational therapy is to support health through

occupational engagement and participation (AOTA, 2008, 2011). Although occupational therapy is well known and effective in other endeavours such as neurologic and orthopaedic services, the knowledge of access to and effectiveness of occupational therapy is lacking in cancer care (Bass-Haugen, 2009).

Research that examines occupational therapy's effects on adults with cancer is limited (Hindley & Johnston, 1999; Lyons, Lambert, Balan, Hegel, & Bartels, 2013; Pergolotti et al., 2015; Purcell et al., 2010). Specifically, research on the relationship between the use of occupational therapy and improved outcomes has mostly been limited to the following: a certain type of cancer treatment (e.g. a stem-cell transplant, chemotherapy or craniotomy, a specific type of impairment (e.g. lymphedema), a particular side effect of treatment (e.g. cancer related fatigue), or a subsection of the continuum of care (e.g. end-of-life care) (Campbell, Pergolotti & Blaskowitz, 2009, Cooper & Littlechild, 2004, Unruh & Elvin, 2004). These studies used mostly qualitative methods with small sample sizes.

However, a randomised control trial (RCT) among rural breast cancer survivors undergoing chemotherapy conducted by Hegel, Lyon et al. (2011) found that telephone based problem-solving occupational therapy intervention program is feasible and has a positive effect of patients' function, QoL and emotional state. In another study, Lozano-Lozano et al. (2016) designed a RCT study to compare the clinical efficacy of m-health lifestyle intervention system versus an integral strategy to improve QoL in breast cancer survivors. However, the study results have not being publish yet.

Despite being one of the leading cancers word wide, occupational therapy research on CRC survivors is limited compare to breast cancer. A narrative study by Shipp, McKinstry, and Pearson (2015) support leisure participation to improve QoL for men with CRC and the need to participate in meaningful leisure occupation.

Due to the uniqueness and complexity of human occupation, each individual diagnosed with cancer will experience different limitations in his or her various occupations/roles and restriction in participation throughout the course of the disease based on lifestyle choices. In light of this, occupational therapy interventions target participation in meaningful activities (i.e. occupation). For example, White, Lentin, and Farnworth (2013b) conducted mixed method study to investigate the role and meaning of occupational from a client-centred perspective. Results indicates that engaging in occupation can reveal, explain, manage and reflects the meaning for people with on-going health conditions.

A systematic review by Stav, Hallenen, Lane, and Arbesman (2012) addressed the health effects of participation in occupation and activities of the growing older adult population, found evidence that links occupational participation to improve health and well-being. Pergolotti, Cutchin, Weinberger, and Meyer (2014) found that occupational participation is strongly associated with meaningful activity, in contrast to physical limitations, in older adults with cancer. Other studies have provided evidence on the important relationships between meaningful-activity and meaning in life (Eakman, 2012a; Eakman, 2014).

More research targeting on the associations between occupational-participation, meaningfulness of activity on quality of life is needed in oncology for enhance quality of care and quality of life of cancer survivors.

2.4.2 Measurement of Occupational Participation and Meaningful Activity

Participation is a complex construct and requires it to be measured beyond an adult's ability score. This is because ability is just one aspect of the multifaceted relationship between participation and QoL. In rehabilitation, occupational therapy consensus has not been made, namely on how to measure participation due to its complex nature (Heinemann, 2010; Heinemann et al., 2010; Whiteneck & Dijkers, 2009) .

A systematic review search of the literature revealed that 103 instruments had been previously used to determine participation. However, most of the instruments used had limitations. Instruments differ in terms of their content and operationalisation of the concept participation. Domains that are mostly measured are work/study, social life, general participation, and home while domains that are less measured are family life and financial participation. Mostly, items refer to participation problems accomplishment whereas satisfaction with participation is the domain least referred to (Eyssen, Steultjens, Dekker, & Terwee, 2011).

Future research should focus on empirically assessed consensus on the operationalisation for measuring participation, participation domains and participation aspects (Eyssen et al., 2011). Lack of social influence on participation should also be

highlighted, through which psychosocial is identified as the outcome measure (van der Mei et al., 2011).

Two studies by Aziz (2007) and Pergolotti, Williams, Campbell, Munoz, and Muss (2016) reported a lack of measurement in the personal meaning of activity participation. In addition, Nicklasson and Jonsson (2012) revealed that the understanding of subjective experience of participation is dependent upon the interaction between function, personal factors and social attitudes. Ability compensation or independence in performance does not always lead to the experience of participation. Because of the above limitation, this dissertation employs both the ICF definition and an occupational perspective, which are specifically applied in occupational therapy to define participation.

2.5 Research Hypotheses

The theories and literatures reviewed above provide the rationale for the hypotheses model, as depicted in Figure 2-1. The hypotheses model presents the structural relationship between occupational participation, meaningful activity and health QoL. The study's general hypothesis is that the proposed model will fit the data. In viewing from left to right of the proposed model, the hypotheses are: (1) occupational participation and meaningful activity have a positive direct effect on health QoL, and (2) meaningful activity serves as a mediator between occupational participation and health QoL.

The variables were:

(1) Perceived occupational participation within four domains, - i. Instrumental activity of daily living activities (IADL) (6 items), ii. Social activities (4 items), iii. Leisure activities (6 items), and iv. Work activities (3 items)

(2) Perceived engagement in meaningful activity, and

(3) Perceived quality of life with three domains: Functional, Symptoms and Global Health.

In deciding whether the measurement model is reflective or formative – it is the direction of causality between the construct and the indicators. Reflective models assume that causality flows from the construct to the indicators. In formative models, the reverse is the case, causality flows from the indicators to the construct. Figure 2-1, despict the formative constructs are IADL, Social, Leisure and Work domain. Reflective contructs are six items in IADL domain, four items in Social domain, six items in Leisure domain and three items in Work domain.

The measurement tool used to determine perceived occupational participation construct and its indicators (IADL, Social, Leisure and Work) are Occupational Participation Questionnaire (OPQ-M) (Sapihis, Loh, Roslani, & Chinna, 2015). It consists of nineteen items which are intended to tap the performance of daily life activities.

The Engagement in Meaningful Activity Survey (EMAS) (Goldberg et al., 2002) is the second measure intended to tap the domain of meaningful activity participation. EMAS is a twelve-item measure proposed to reflect the extent to which persons ascribe

meaningfulness to their overall activity routine. In general, the scale reflects an individual's perception on his or her daily activities, namely: i) to provide congruence with one's value system and needs, ii) to provide evidence of competence and mastery, and iii) those which are valued in one's social/cultural group.

Version 3 of the European Organization for Research and Treatment of Cancer (EORTC) Quality of Life Questionnaire QLQ-C30 (EORTC-QLQ C30) (Yusof, Law & Yip, 2010) was used. The QLQ-C30 is composed of both multi-item scales and single-item measures. These include five functional scales, three symptom scales, a global health status/QoL scale, and six single items. All questionnaires are in Bahasa Malaysia version and have been tested for validity and reliability.

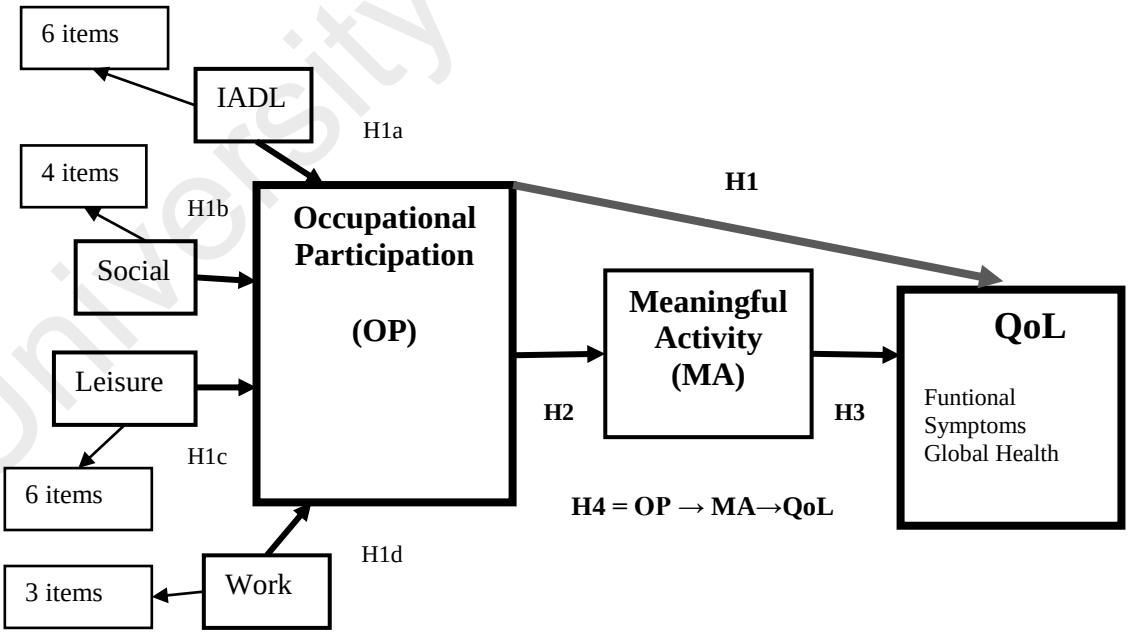


Figure 2-1: The Hypotheses Model

Below are the hypothesis statements of the study:

Hypothesis 1 : OP has a positive influence on CRC survivors' QoL

Hypothesis 1a : IADL has a positive influence on CRC survivors' OP

Hypothesis 1b : Social activities has a positive influence on CRC survivors' OP

Hypothesis 1c : Leisure activities have a positive influence on CRC survivors' OP

Hypothesis 1d : Work activities have a positive influence on CRC survivors' OP

Hypothesis 2 : OP has a positive influence on MA

Hypothesis 3 : MA has a positive influence on QoL of survivors

Hypothesis 4 : MA mediates the relationship between OP and QoL positively

2.6 Summary of the Chapter

In this chapter, the ICF health model and the occupational therapy perspective were reviewed to help inform the important variables and provide guidance in conceptualising the research model for this study. The theoretical underpinning of this study could provide insights into the importance of exploring the relationship between occupational participations, meaningful activity and QoL.

CHAPTER 3: METHODOLOGY

3.1 Overview

This chapter describe the methodology used in this two-phase study. Phase 1 was a cross-cultural adaptation and examination on the psychometric properties of the Malay versions of Occupational participations Questionnaire (OPQ) and Engagement in Meaningful activity Survey (EMAS). Phase 2 was the main study – examining the main objectives of the study. The research design, sampling design, ethical considerations, setting and sample and research instruments will be reported followed by data collection procedure, explanation of Phase 1(a + b) study and the main study in Phase 2. PLS-SEM procedure is also explained. The flowchart of the research methodology is shown in Figure 3-1.

3.2 Research Design

This quantitative study is the first study in Malaysia, to examine the relationships between occupational participations and meaningful activities in everyday life in relation to health QoL among adult CRC after post active treatment. As this is the first study looking at these variables, a cross sectional design was chosen to generate preliminary research evidence. Secondly, it allows a quick and inexpensive means to study many outcome and risk factors (Martin & Bridgmon, 2012), thus making it useful for future research planning and generation of hypotheses (Bowers, 2008; Pacific, 2001)). This study design allows for systematic collection of information from a sample of people to generate an understanding about respondents' opinions, feelings, beliefs, attitudes and motives about these new research focus on participation (Forsyth, 2006).

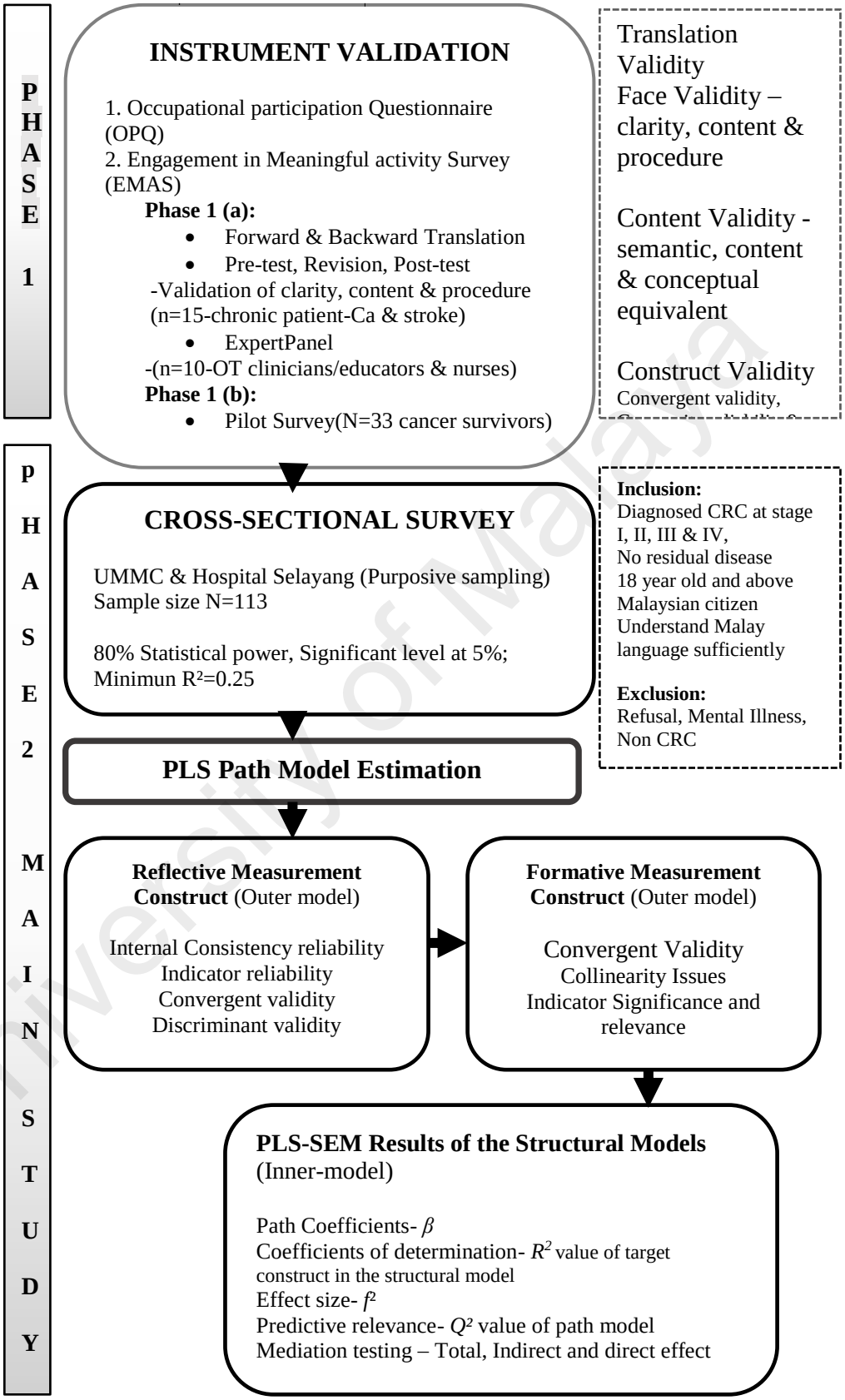


Figure 3-1 Flowchart of the Cross Sectional Study Design

3.3 Sampling Design – Setting and Sampling Technique

The main study was conducted at two outpatient surgery clinics at the two main referral hospitals. The potential eligible patients were approached and were given explanation on the purpose of this study. From those who consented to participate, data were collected mainly using face-to-face interviews via a structured survey to ensure higher participation rates. Follow up data based cross-checking and telephone communication was carried out to minimise missing data.

Three instruments were used in this study to assess the perceived occupational participation, perceived engagement in Meaningful activity and perceived QoL, namely: 1. the Occupational participations Questionnaire (OPQ), 2. the Engagement in Meaningful activity (EMAS), and 3. the European Organization for Research and Treatment of Cancer Quality of Life Questionnaire (EORTC-QLQ C30) version 3.0. The demographic and clinical data included questions concerning aspects relating contextual factors and health conditions.

3.4 Ethical Consideration

Ethical application for approval for the study was approved by the Medical Ethics Committee of University of Malaya Medical Centre (MEC 201311-0508) and National Medical Research Register, Ministry of Health, Malaysia (NMRR 13-1525-18789). This is in accordance with the Declaration of Helsinki involving humans subjects (see Appendix A). All data were stored on the researcher's protected and secured personal computer.

3.5 Setting and Sample

The main study was conducted at two outpatient surgery clinics at the two main referral hospitals: 1) University Malaya Medical Centre (UMMC), Kuala Lumpur, and 2) Hospital Selayang, Selangor. Both hospitals are situated in Klang Valley, Malaysia. These two hospitals were selected purposefully as they provide specialised in CRC surgery and provide oncology services. The main study was conducted from April to December 2014.

3.5.1 Sample

For the pilot study, 33 cancer survivors were selected from the Keep Able Cancer Community Centre, Kuala Lumpur. As suggested by Johanson & Brooks (2010) for an initial scale development, a pilot study requires a minimum of 30 participants from the population. The inclusion criteria were; (i) aged of 18 years and above, (ii) had been diagnosed with breast, colorectal or other cancers with no metastasis for the past one year, and (iii) able to read and write in Malay language. This study was conducted from February through March 2014.

The sample population in this study was CRC survivors who had completed treatment (surgery and or radiotherapy/ chemotherapy). The rationale for selecting them was that these survivors had experienced the impact of cancer diagnosis, had been treated with surgery, chemotherapy and/or radiotherapy, and were faced with the situation of integrating the experience of cancer into their identity (Andrykowski & Cordova, 1998). The inclusion criteria were; (i) aged of 18 years and above, (ii) had

been diagnosed with colorectal with no metastasis for the past one year, and (iii) able to understand and read in Malay language.

Demographic and clinical information captured include ethnicity, age, gender, income, marital status, education level, cancer type, stage and treatment. As women are more likely to complete questionnaires, it was anticipated that in this study they would be more women respondents compared to men. In addition, as most cancers are diagnosed in people over the age of 50, it was expected that the distribution of the respondents' age would be skewed to the left.

3.6 Sample Size Calculation

Sample size calculation was performed using G*Power 3.1.9, which is commonly used in social, behavioural and biomedical research (Faul, Erdfelder, Buchner, & Lang, 2009). In the analysis, an alpha level of 0.05, power of 0.80 and medium effect size of 0.15 were used. A moderate effect size (Cohen, 1995) was used since there were no previous studies, which examined the specific association in CRC. With four predictor variables in the model, (most arrow pointing through/in the constructs) the minimum required sample size was 80. Taking into account a nonresponse rate of 70 percent as suggested by (Czaja & Blair, 2005), a final sample size of 152 was targeted. Finally, a total of n=113 participants was achieved with the response rate of 74.3 percent from 152 participants.

3.7 Instruments

Three instruments were used in this study to assess the perceived occupational participation, perceived engagement in meaningful activity and perceived QoL, namely: 1. the Occupational participations Questionnaire (OPQ), 2. the Engagement in Meaningful activity (EMAS), and 3. the European Organization for Research and Treatment of Cancer Quality of Life Questionnaire (EORTC-QLQ C30) version 3.0. The demographic and clinical data included questions concerning aspects relating contextual factors and health conditions. Table 3-1 lists the instrument constructs used in this study.

3-1 Table of Instrument Construct and Definition

Construct	Definition	**Reference**
Perceived Occupational participations	The gaps that might occur when an individual cannot participate in a desired occupation	(Eriksson,Tham, & Borg, 2006)
Instrumental Activity of Daily Living (IADL)	Activities to support daily life within the home and community that often require more complex interactions than those used in ADLs.	(Bänholm & Fugl-Meyer, 1994b)
Leisure Activities	Non obligatory activity that is intrinsically motivated and engaged in during discretionary time, that is, time not committed to obligatory occupations such as Work, self-care, or sleep" (Parham & Fazio, 1997, p. 250).	(Törnquist & Sonn, 1994a)
Social Activities	"The interweaving of occupations to support desired engagement in community and family activities as well as those involving peers and friends" (Gillen & Boyt Schell, 2014, p. 607); involvement in a subset of activities that involve Social situations with others (Bedell, 2012) and that support Social interdependence (Magasi & Hammel, 2004). Social participation can occur in person or through remote technologies such as telephone calls, computer interaction, and video conferencing.	Baum (1993) (American Occupational Therapy Association, 2014)
Work or Work related activities	"Labor or exertion; to make, construct, manufacture, form, fashion, or shape objects; to organize, plan, or evaluate services or processes of living on governing; committed occupations that are performed with or without financial reward" (Christiansen & Townsend, 2010, p. 423).	(American Occupational Therapy Association, 2014)
Perceived Engagement in Meaningful Activities	Aspects of activity meaning with a particular emphasis on, "the activity's congruity with one's value system and needs, its ability to provide evidence of competence and mastery and its value in one's social and cultural group	Goldberg, Brintell & Goldberg, pg 19, (2002) Kielhofner (1985); Christiansen & Baum (1997); Persson, Erlandsson, Eklund & Iwarsson, (2001)
Quality of life	Quality of life (QOL) is a broard multidimensional concept that	

3.7.1 Occupational participations Questionnaire (OPQ)

The OPQ was adopted which to collect data on individuals to identify that either perform or not perform a range of activities. The list of indicators and items/activities were adapted from Interest checklist and the Role checklist (Bränholm & Fugl-Meyer, 1994a), a Swedish activity profile based on work by Baum and Edwards (1993) and the ADL taxonomy (Törnquist & Sonn, 1994b). Four indicators of OPQ, namely Instrumental Activity of Daily Living (IADL), Social, Leisure and Work activities with 30 items/activities. The final Malay translation of OPQ-M questionnaire has 19 items with two questions posed to each activity: "Do you perform the activity?", and followed by a likert scale rating of one to five, if the answered is yes (See Appendix E).

3.7.2 Engagement in Meaningful Activity Survey (EMAS)

The Engagement in Meaningful activity Survey is a tool to collect data on aspects of activity meaning with a particular emphasis on "the activity's congruity with one's value system and needs, its ability to provide evidence of competence and mastery and its value in one's Social and cultural group"(Goldberg et al., 2002) pg. 19). The items comprised EMAS which reflects the multiple propositions of occupational therapy and occupational science that address the constituents of meaningful engagement (Kielhofner, 1983; Trombly, 1995, Yerxa, 1990).

EMAS is a twelve-item scale, purported to reflect the construct of meaningful activity participation (Goldberg et al., 2002). Items in the scale are worded to address twelve types of meanings attributable to participation in daily activities. In general, the

scale reflects individuals' beliefs that their daily activities: a) provide congruence with their value system and needs, b) provide evidence of competence and mastery, and c) are valued in one's social / cultural group. EMAS items are scaled 1 (never) through 5 (always). For example, the respondent may be asked to indicate the extent to which a given statement is true for them (e.g., "The activities I do give me a sense of satisfaction," and "The activities I do help other people.") (See Appendix F.) The score in EMAS is computed from the average of the 12 items. The usage of EMAS can be found within the public domain (Goldberg et al., 2002).

EMAS has been reported to have good measures in psychometric properties with a test-retest reliability of 0.69 and a Cronbach alpha value of 0.84. The scale has demonstrated positive relationships with measures of life satisfaction and health QoL, as well as negative relationships with measures of boredom, depression and negative influences in community and institutional dwelling of older adults, persons with persistent mental illness, and university students (Eakman, 2011; Eakman, Carlson, & Clark, 2010a; Eakman, Carlson, & Clark, 2010b; Goldberg et al., 2002).

Therefore, EMAS was selected for this study because it is valid for collecting data processes an outcomes central to occupational therapy practice, where concept of *activity meaning* is essential in therapeutic occupations (Eakman, 2012).

3.7.3 The European Organization for Research and Treatment of Cancer Quality of Life Questionnaire (EORTC-QLQ C30) version 3.0

The EORTC QLQ-C30 is a widely used instrument to measure cancer-specific health-related QoL (Aaronson et al., 1993; Aaronson, Cull, Kaasa, & Sprangers, 1996; Fayers et al., 2001; Osoba, Aaronson, Zee, Sprangers, & Te Velde, 1997). The EORTC QLQ-C30 was the most frequently used tool for patient report outcome from 2009 through 2010 (McNair et al., 2015).

The EORTC QLQ-C30 version 3.0 include 30 items comprising five multi-item functional scales covering physical (PF), role (RF), cognitive (CF), emotional (EF) and Social (SF), three multi-item symptom scales consisting of fatigue (FA), nausea and vomiting (NV) and pain (PA), six single-item symptom scales consist of dyspnea (DY), insomnia (I), appetite loss (AP), constipation (CO), diarrhea (DI) and financial difficulties (FI) and lastly, two item covering the global quality of life scale (QL). The questionnaire uses a 1-week time frame and 4-point Likert-type response scales (“not at all,” “a little,” “quite a bit,” and “very much”), with the exception of the two items of the overall global QoL scale which use a 7-point response scale. Scale scores range from 0 to 100 with higher scores representing a better health state for the functional scores and lower scores representing a better health state for the symptom scores.

The EORTC QLQ-C30 has been shown to be reliable and valid in a range of patient populations and treatment settings. Internal consistency (Cronbach’s coefficient α) for scores of the multi-item scales exceeded 0.7 (Aaronson et al., 1996). Test-retest reliability coefficients ranged between 080 and 0.90 for most multi-item scales and

single items (Hjermstad, Fossa, Bjordal, & Kaasa, 1995). Aaronson et al., confirmed that the EORTC QLQ-C30 is valid in terms of its response to meaningful between group differences (e.g. local vs. metastatic diseases, active treatment vs. follow-up) and changes in clinical status over time.

In this study, a translated and validated version of EORTC-QLQ C30 in the Malay language was used (Yusoff, Low, & Yip, 2010). The reported internal consistency were acceptable (Cronbach's alpha value of 0.5 to 0.99 for all subscales). Test-retest evaluation (i.e. three weeks and ten weeks following surgery) showed acceptable Intraclass Correlation Coefficient (ICC) which ranged from 0.05 to 0.99 for Global Health Status and Functional domains, and ranged from 0.13 to 1.00 for symptomatology domains. Sensitivity of the scale was observed in nearly all of the domains. However, with discriminant validity, insignificant differences were observed between women who had mastectomy and women who had lumpectomy.

3.8 Data Collection

The main study was conducted at two outpatient specialist surgery clinics from two main referral hospitals. The eligible patients were approached potential and were given explanation on the purpose of this study. From those who consented to participate, data were collected mainly using face-to-face interviews via a structured survey to ensure higher participation rates. Follow up data based cross-checking and telephone communication was carried out to minimise missing data. Demographic and clinical information captured include ethnicity, age, gender, income, marital status, education level, cancer type, stage and treatment. As women are more likely to

complete questionnaires, it was anticipated that in this study they would be more women respondents compared to men. In addition, a most cancers are diagnosed in people over the age of 50, it was expected that the distribution of the respondents' age would be skewed to the left.

3.9 Phase 1(a) – Validation of the OPQ-M and EMAS-M

The process of cross-cultural adaptation involved translating and replacing items or scaling (if necessary) to make it relevant and valid in the prospect culture. This study used guidelines from Beaton, Bombardier, Guillemin, & Ferraz (2000), Sousa & Rojjanasrirat (2011) and MacKenzie, Podsakoff, & Podsakoff (2011) which were based on a review of cross-cultural adaptation in the medical, sociological and psychological literature.

Initially, forward and backward translation of the OPQ and EMAS was performed by two bilingual translators. The instruments was forward translated from English to Malay, followed by a back translation into English. The first translator was an occupational therapist consultant and second was an independent individual with no clinical background. The translation included the instruction required for answering the questionnaire and every items in the questionnaire.

A panel of four bilingual health professionals (i.e. occupational therapist and nurses with clinical and education backgrounds) who were familiar with the terminologies used was invited. A meeting was conducted involving the translators and the panel met to review, reconcile and harmonise the forward translation version of the

OPQ and EMAS. Next, another two independent bilingual translators translated the questionnaire back to English. Then the researchers and an occupational therapist who are Malay speakers evaluated both the versions of Malay OPQ and EMAS. The original version of both instruments was referred and a consensus decision was made to produce a single conceptually equivalent translation in easily understood Malay language. Next, the first Malay version of the OPQ and EMAS underwent the process of translation validity, construct validity and stability validity.

3.9.1 Translation Validity of the OPQ-M and the EMAS-M

In this study, the first Malay version of the OPQ and EMAS were tested for translation validity that involved face validity and content validity.

3.9.2 Face Validity of OPQ-M and EMAS-M

Face validity is a subjective assessment to provides insight of how potential participants interpret the items, however this subjective assessment is the weakest form of validity (Trochim & Donnelly, 2001). The newly translated instruments were reviewed for grammar, syntax, organization, appropriateness and confirmation to ensure that they flow logically.

Investigators seek for expert and lay people to review for face validity from various stakeholders (Netemeyer, Bearden, & Sharma, 2003; Waltz, Strickland, & Lenz, 2005) In this study, both instruments were pretested on three cancer survivors, five caregivers and two occupational therapists who are experienced in the field of cancer rehabilitation. Participants were asked to rate the items on the scale according to a

dichotomous scale (clear and unclear) and they were asked to make suggestions if any items was rated unclear. After receiving feedback from the pre-test, the items were reworded to improve the interpretation and suggestions to add a scale and to discuss further.

3.9.3 Content Validity of OPQ-M and EMAS-M

Establishing content validity is important as it represents the appropriateness of the items in the instrument for measuring constructs. The content validity involves the development of the instrument and the analysis and judgement of specialist (Polit & Beck, 2006). To be able to rate the quality of questionnaire, a researcher should provide a clear description of the following aspects regarding the development of a questionnaire:

i. *Measurement aim of the questionnaire*, i.e. discriminative, evaluative or predictive. The measurement aim is important, because different items may be valid for different aims. For example, the aim of the OPQ is to measure perceived Occupational participation. A question on instrumental activity of daily living such as meal preparation could be a valid item of discriminative questionnaire used.
ii. *Target population*, i.e., the population for which the questionnaire was developed. This is important to judge the relevance and comprehensiveness of the items.
iii. *Concepts* that the questionnaire intended to measure: To judge the suitability of a questionnaire for specific purpose, it is important that authors provide a

clear framework of what that overall concept is measuring. Relevant concepts can be defined in terms of symptoms, functioning (physical, psychological and social) and general health perceptions. In this study, concept occupational participation (IADL, Leisure, Social and Work), and it subjective meaning of meaningful activity were measured.

iv. *Item selection and item reduction.* Items in the questionnaire must reflect areas that are important to the target population that are being studied. Thus, the target population should be involved during item selection, reduction and the execution of the pilot study to examine their readability and comprehension (Terwee et al., 2007).

v. *Interpretability of the items*: Items should be short and simple, readable, avoid jargon terms and double-barrelled questions (Streiner & Norman, 2008).

A six expert panel consisting of Malaysian occupational therapists who were proficient in the Malay language, with five to ten years of working experience in the field of Medical or Geriatric was recruited to further support the conceptual equivalence (clarity) and content validity of the OPQ-M. They were asked to rate the instructions, items and the response format of the instruments as "clear" or "unclear" and provide suggestions to improve the clarity of statements that were rated as "unclear". Cohen (1989) kappa was used to test inter-rater reliability. The values range from 0 to 1, where values close to 1 indicate high level of agreement between the observers. The interpretation for the kappa values are: 0.00 to 0.20=slight; 0.21 to 0.40=Fair; 0.41 to 0.60 Moderate; 0.61 to 0.80 =Substantial; 0.81 to 0.99=Almost perfect; 1.000=Perfect.

After the instruments evaluation, the content validation was performed. The content validity index for items (I-CVI) and for scales (S-CVI) were calculated with the method suggested by Polit and Beck (2006).To calculate ab I-CVI, the same six experts were asked to rate the relevance of each item of the OPQ-M, using the 4 ordinal scale; 1= nor relevant, 2 = somewhat relevant, 3 =quite relevant, 4 = highly relevant (Davis, 1992). Item content validity index (I-CVI) was computed as a ratio of the number of reviewers giving the rating of either three or four and the total number in the panel. For a 6 to 10 panel membership, I-CVI values of 0.78 and higher and SCVI/AVE value of 0.90 and higher indicate excellent validity (Polit & Beck, 2006). However, realising the subjective nature of content validity other validity assessment (construct and criterion) are also applied to validate the constructs in this research (Messick, 1995).

3.9.4 Construct Validity and Reliability of OPQ-M and EMAS-M

Construct validity is the degree to which an instrument measure the construct it is intended to measure using the instrument's items by linking it to related theories and concepts (Streiner & Norman, 2008).

Reliability coefficients (ICC) involve the variation in the population (inter-individual variation) divided by the total variation, namely the inter-individual variation plus the intra-individual variation (measurement error), expressed as a ratio between 0 and 1. In Phase 1(b) of the study, a pilot survey was conducted to examine the construct reliability of the OPQ-M and EMAS-M.

3.10 Phase 1(b) - Pilot Study

A cross sectional pilot study was conducted from February to April 2014 on a group of cancers survivors at the Keep Able Cancer Community Centre, Kuala Lumpur. The centre is a non-profit organization providing community supportive-rehabilitative care to cancer survivors. Thirty three (33) participants were recruited into the study. Johanson & Brooks (2010), suggested a minimum of 30 respondents for an initial scale development survey. The minimum sample size of 33 respondents was calculated based on the recommendation of Hair, Ringle, & Sarstedt (2013).

3.10.1 Profile of the Respondents in Pilot Survey

Their mean age of the respondents was 52.0±9.9 years and duration after surgery was 2.0 ±0.84 years. Majority (69.7%) of the respondents were women, 51.5 percent were Malays, followed by 39.4 percent Chinese and 9.1 percent Indians. The sample were made up of breast cancer (51.5%), CRC (36.5%) and other types of cancer (12.1%) survivors.

3.10.2 Internal Consistency and Test-retest Reliability of the OPQ-M and EMAS-M

The internal consistency for each construct was tested using inter- item correlation (IIC), corrected item-total correlation (CITC) and Cronbach's Alpha. An IIC correlation values more than 0.3 and CITC values of more than 0.2 indicate the corresponding item correlates very well in the scale (Field, 2005). George & Mallery (2003), stated that Cronbach's Alpha values of ≥ 0.90 is considered excellent, while values of ≥ 0.70 are moderate and values of ≥ 0.5 are low. Cronbach's alpha coefficients

of at least 0.70 are generally regarded as acceptable for a psychometric scale, with values between 0.81 and 0.90, inclusive, considered good, and >0.90 considered excellent.

To examine test-retest reliability, the participants were retested again after a two to four week interval. The time interval is acceptable. This is to ensure no differences that occur were due to changes that are due to environment or situational changes, participants were clinically stable in health and did not memorise the questionnaires. ICC was computed to examine test-retest reliability. An ICC value greater than 0.80 indicate good test-retest reliability (Weir, 2005).

The internal consistency in this research was also assessed using confirmatory factor analysis (CFA). This is important to ensure that all measures used in this study are reliable and at the same time provides greater confidence to the researcher that the individual items are consistent in their measurements (Hair, 2014). The two methods used are construct reliability (CR) and average variance extracted (AVE) as suggested by Fornell & Larcker (1981). Construct reliability equal to or greater than 0.70 and average variance extracted (AVE) equal to or greater than 0.50 is considered acceptable (Hair, 2014).

3.11 Phase 2 – The Main Study

The data collection process was conducted for nine months, starting April 2, 2014 to December 1, 2014. Data were collected at two surgery clinics, one in UMMC and the other at Selayang Hospital. These two hospitals were chosen purposefully as

these two hospitals are the major referral centres in the Klang Valley. Data were collected mainly using face-to-face interviews via a structured survey, after patient consent had been obtained to ensure higher participation rates. Follow up telephone communication was performed to minimise missing values.

3.11.1 Data Analysis

All the data were in in Statistical Package for Social Science (SPSS), version 22 software. The data preparation process involved coding, data filtering and checking for missing response. SPSS version 22 software was applied in data description. Internal consistency of items was evaluated with Cronbach's alpha coefficients and test retest reliability was examined using ICC. Correlations were used to analyse the construct validity of OPQ-M and EMAS-M. Confirmatory factor analysis (CFA) was used to determine if the items in the four construct of OPQ-M were appropriate (content and discriminant validity) as well as to improve the instrument. Factor loadings, factor inter-correlations and goodness of fit indices were examined. Composite reliability and average extracted values (AVE) were calculated from factor loadings for sufficient discriminant validity (Fornell & Larcker, 1981).

Partial Least Square Structural Equation Modeling (PLS-SEM) was applied for data analysis using the Smart PLS version 3.2 software. The data was transformed into an Excel CVS file to generate raw input for the PLS application.

3.11.2 Structural Model Validity and Hypotheses Testing - PLS-SEM Analysis

PLS-SEM is causal modelling method aimed at maximising the explained variance of the endogenous variables, which characterize real world processes better than simple correlation based model (Tenenhaus, Vinzi, Chatelin, & Lauro, 2005). Therefore, SEM is more suited for the mathematical modelling of complex process to serve both theory and practice. In PLS, causal models such as the tentative research model presented in Chapter 1 are evaluated based on estimates of the standardized regression weights of each path in the inner model. This produces an index of the variance in an endogenous (dependent) variable that is explain by that specific path.

Even though PLS is a non-parametric statistical analysis, scholars are now accepting this method as a more robust estimation of the structural model (Hair, Sarstedt, Hopkins, & Kuppelwieser, 2014; Henseler & Chin, 2010) and it should be viewed as a complementary method to the standardised regression method, instead of a competitive method (Cassel, Hackl, & Westlund, 1999).

PLS path modelling is a mixture of a priori knowledge and data analysis (Tenenhaus et al., 2005). This implies that PLS is appropriate for testing theoretical models using empirical data. A structural model is develop to represent the theory with

a set of structural equations and is usually illustrated with visual diagram. The structural model is use to illustrate one or more dependence relationship linking the hypotheses model's construct. It is also useful in representing the interrelationship between exogenous and endogenous variables.

The main focus of structural model evaluation are: i) assessing collinearity of the inner model, ii) assessing the path-coefficient (hypotheses testing), iii) assessing direct and indirect effect of exogenous variables on endogenous variable, iv) assessing the squared correlation (R^2) and its effect size (f^2), and finally, v) assessing the predictive relevance of the model (Q^2). Hair et al (2013), illustrates the indices for evaluating structural model in PLS-SEM analysis (see Table 3-2). The guideline of evaluating structural model is explained below:

Table 3-2: Indices for Structural Model Analysis Using PLS-SEM

Assessment Test		Name of Index	Level of Acceptance	Literature Support
1.	Collinearity	Variance Inflation Factor (VIF)	VIF< 3.3/VIF<5.0	Diamantopoulos & Sigouw (2006), Hair et al.,(2014)
2.	Path Co –efficient	Path Co-efficient	P value<0.05, t value >1.96	Hair et al.,(2014)
3.	R^2	Co-efficient of determination	0.75-Substantial 0.50-Moderate 0.25-Weak	Hair et al.,(2014)
4.	f^2	Effect size to R2	0.35-Large to effect size 0.15-Medium effect size 0.02-Small effect size	Hair et al.,(2014)
5.	Q^2	Stone-Geisser Q^2 Predictive Relevance	Value larger than 0 indicate that exogeneous constructs have predictive relevance over endogenous construct	Stone (1974), Geisser (1974), Hair et al.,(2014)

1. Multicollinearity - a phenomenon in which one predictor variable in a multiple regression model can be linearly predicted from the others with a substantial degree of accuracy.

2. Assessing the Inner Model – Direct Path & Indirect Path & Sobel test

3. Assessing Outer Model – H1a-H1d

4. The Predictive relevance (Q^2)

The predictive relevance of the model is assessed by using the blindfolding procedure. Blindfolding is a sample reuse technique that omits every *d* data point in the endogenous construct's indicators and estimates the parameters with remaining data

points (Henseler et al., 2009; Tenenhaus et al., 2005). Blindfolding calculates a cross-validated predictive relevance criterion, the Stone-Geisser's Q^2 value (Geisser, 1974; Stone, 1974).

The blindfolding procedure should only be applied to endogenous constructs that have a reflective measure (Hair et al., 2014). If the Q^2 value is larger than zero, the model has the predictive relevance for a certain endogenous constructs, and otherwise if values is less than zero (Hair et al., 2014).

5. The Effect size f^2 and q^2

The change in the R^2 value when a specified exogenous construct is omitted from the model can be used to evaluate whether the omitted construct has a basic impact on the endogenous constructs. This measure is referred to as the f^2 effect size. The effect size can be calculated as:

$$f^2 = \frac{R^2_{\text{included}} - R^2_{\text{excluded}}}{1 - R^2_{\text{included}}}$$

Where $R^2_{included}$ and $R^2_{excluded}$ are the R^2 values of the endogenous latent variable (QoL) when a selected exogenous latent variable (OP or MA) is included in or excluded from the model. Guidelines for assessing effect size (f^2) are that values of 0.02, 0.15, and 0.35, respectively, representing small, medium, and large effects (Cohen, 1988) of the exogenous latent variable.

Next, the results of effect size (q^2) of independent variables (OP and MA) on dependent variables (QoL) are discussed. The effect (q^2) is calculated as below:

$$q^2 = \frac{Q^2 \text{ included} - Q^2 \text{ excluded}}{1 - Q^2 \text{ included}}$$

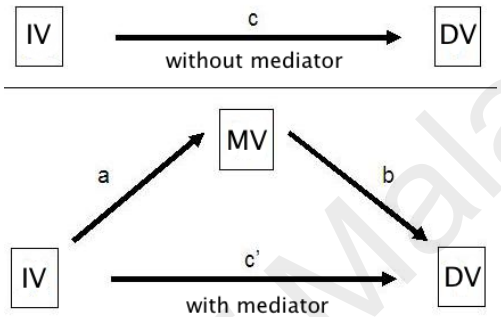
3.11.3 Mediating Analysis

In the health and social science literature, mediation analysis is increasingly being used to study causal mechanisms. Mediation addresses how an independent variables causes a change in dependent variables. In this section, two analytic methods generally used to conduct mediation analysis, including both traditional structural equation modelling (SEM) methods popularised by Baron and Kenny (1986) and recently approaches based on the potential outcomes framework originally proposed by Rubin (1978).

According to Baron and Kenny (1986), a mediating factor refers to a third variable that accounts for the relations between the independent (predictor) and dependent (outcome) variables. Traditionally, Baron and Kenny's guideline for testing a mediation relationship follows the below steps:

1. To show that there is a significant relationship between the predictor (independent variable) and the outcome (dependent variable) (path c),
2. To show that the predictor is related to the mediator (path *a*)
3. To show that the mediator is related to the outcome variable (path *b*)

4. To show that the strength of the relations between the predictor and the outcome is reduced significantly when the mediator is added to the model (path *c'*). If it is a complete mediation, the value of path c' will not differ from zero. If it is a partial mediation, the path *c'* value will be significantly smaller compared to path *c*.



The product of *a* and *b*, *ab*, is the mediated effect which is also known as the indirect effect. The indirect effect is also equal to the difference between *c* and *c'*. As a result, the total effect is the sum of a direct effect and an indirect effect. The assessment of mediation in path models can be done by examining the relationship of the direct link between two latent variables (path *c*) and the indirect link via the potential mediator variable (path *a*), from the predictor to the mediator and path b from the mediator to the endogenous variable.

Mediation can be assumed if H0: $a \times b = 0$ can be rejected. The asymptotical normally distributed ***Z*** (Sobel, 1982) can be used as a test statistic.

$$z = \frac{ab}{\sqrt{(b^2\mathrm{SE}_a^2) + (a^2\mathrm{SE}_b^2)}}$$

Where a is the regression weight **(a)** for the relationship between the independent variable and the mediator and **(b)** is the regression weight between the mediator and the dependent variable; $\boldsymbol{SE_a}$, and $\boldsymbol{SE_b}$ are the standard error regression weight of **(a)** and **(b)** respectively.

Sobel test method is often used to test null hypothesis whereby the mediated effect is equal to zero in the population. This test assumes that the mediated effect has a normal sampling distribution which is not always true (MacKinnon, Lockwood, & Williams, 2004). Thus, the Sobel test can produce inaccurate probabilities, especially in small and moderate-sized samples (MacKinnon et al., 2004).

3.12 Summary of the Chapter

This chapter covered the research processes and survey method used in this study. The measurement issues were identified and PLS-SEM was introduced as a data analysis technique. The approached used to develop the research instrument was explained in this chapter. It involved the process of cross-cultural adaptation of OPQ and EMAS instruments, a pre-test followed by pilot survey. Discussions on participants' recruitment, data collection and interviews, data analyses was reported in this chapter as well.

CHAPTER 4: DATA ANALYSIS AND RESULTS

4.1 Overview

This chapter presents the empirical findings of this study. The analyses are conducted using the statistical technique discussed in Chapter 3. First, the validation of the research instruments is assessed. Second, the path hypotheses and structural model are tested and validated. Since this involves assessing the mediation effect of occupational participation on health quality of life, a post-hoc is conducted to examine this effect. This chapter ends with a summary of this chapter.

4.2 Phase 1 (a + b) - The Study Results

Translation, construct validity, internal consistency and reliability of Malay version of Occupational participation Questionnaire (OPQ-M) and Engagement in Meaningful activity Survey (EMAS-M) are discussed in this section.

4.2.1 Forward and Backward Translation of OPQ-M

Translation validity of both instruments involved face and content validity. Face validity is a subjective assessment to assess the items, which it supposed to measure, and which is relevant to the participants (Trochim & Donnelly, 2001).

A panel consisting two occupational therapists, three cancer survivors and five caregivers examined the items and wording in the tool. The panel reported that the concept of "gaps" or the discrepancies between what you want to do and what you actually do, needs higher order thinking, which may pose a difficulty to survivors. Therefore, the first questions was reworded to simplify it: i.e. *Do you perform this*

activity? Yes/No and at what level. A likert scale of 1 to 5 added to rate 'low performance/participation' to 'higher performance/participation'. The second questions: *Do you want to perform this activity?* Was mostly not answered by respondents. Therefore, this questions was dropped from the questionnaire (OPQ-M), which means the tool will only assess participation and at what level of the participation, instead of measuring "gap".

4.2.2 Content Validity of OPQ-M

The panel of six members checked the content (conceptual equivalence and clarity) of OPQ-M. The expert panel consisted of Malaysian occupational therapists who were proficient in both the English and Malay language, with five to ten years of working experience in the field of Medical/Geriatric. The initial results of this checking are summarised in Table 4-1 . The item-Content Validity Index (I-CVI) – the 30 items in OPQ-M ranged between 83.3 percent and 100 percent, except for two items, item 16(50%) and item 18 (50%). Items 16 and 18 were evaluated and revised. By consensus from all experts, the phrase "*reading literature and periodical"* was changed to *"reading book and magazine"* and the phase *"Playing lottery, mobile phones games"* was changed to *"Playing computer/mobile"*. After correcting, both items 16 and 18 had I-CVI value of 1.

Table 4-1: Content Validity of OPQ-M

Item	Number Agreed	I-CVI
Q1.Grocery shopping	6	1.00
Q2.Cooking	6	1.00
Q3.Doing laundry	6	1.00
Q4.Cleaning	6	1.00
Q5.Doing light maintenance of home, garden, car	6	1.00
Q6. Doing heavy-duty maintenance of home, garden, car	6	1.00
Q7.Managing personal finances	6	1.00
Q8. Transportation one-self	6	1.00
Q9. Shopping	6	1.00
Q10.Participating/taking interest in sports	5	1.00
Q11. Participating in outdoors activities	5	1.00
Q12.Participating in hobbies	6	1.00
Q13.Participating in cultural activities	5	1.00
Q14.Listening to radio/watching TV/videos	6	1.00
Q15.Reading newspaper/news/magazines	6	1.00
Q16.Reading literature/periodicals	3	0.50
Q17.Writing	5	1.00
Q18.Playing the lottery, mobile phones games, solving crossword puzzles games	3	0.50
Q19.Playing computer games/surfing the internet	4	0.67
Q20.Visiting/having contact with partner and/or children	6	1.00
Q21.Visiting.having contact with relatives/friends/neighbors	6	1.00
Q22. Helping and supporting others	6	1.00
Q23. Involvement in activities societies/clubs/unions	5	0.83
Q24. Practicing in religious activities	5	0.83
Q25. Visiting restaurants and cafes	5	0.83
Q26.Travelling for pleasure	6	1.00
Q27. Working (full or part time)	6	1.00
Q28.Studying (full or part time)	6	1.00
Q29.Taking care and raising children	6	1.00
Q30.Performing voluntary Work	5	0.83

4.2.3 Internal Consistency and Test-retest Reliability for domains in OPQ-M

There are four domains in OPQ-M; Activity of Daily Living (IADL)-8 items, Leisure-11 items, Social-7 items, Work-4 items. The OPQ-M was pilot tested among 33 respondents. For sufficient internal consistency, the pair-wise correlation between the

items must be between 0.3 and 0.9 (DeVon et al., 2007) the minimum corrected item total correlation (CIT-C) must be more than 0.2 (De Vellis & Dancer, 1991) and the Cronbach's alpha value must be more than 0.7 (Cronbach, 1951). For test-retest reliability, the intra-Class Correlation (ICC) value must be at least 0.7 (Clark & Watson, 1995; Cronbach, 1951).

The results from the pilot test are summarised in Table 4-2 within the IADL construct, the highest correlation for each item with at least one other item in the construct was between 0.3 and 0.9. Hence, all the 8 items in IADL construct correlated adequately. The minimum CIT-C was 0.367 and the Cronbach's Alpha value was 0.777.

For leisure construct, the highest correlation for item on shopping was less than 0.3.The minimum CIT-C for this item was 0.027 (<0.2). Hence the item on shopping was dropped. The Cronbach's Alpha value for the remaining 10 items was 0.657.

For social construct, the highest correlation for each item with at least one other item in the construct was between 0.3 and 0.9. Hence the 7 items in social construct correlated adequately. The minimum CIT-C was 0.342 was 0.342 and the Cronbach's Alpha value was 0.855.

For work construct, the highest correlation for each item with at least one other item in the construct was between 0.3 and 0.9. Hence the 4 items in work construct were moderately correlated. The minimum CIT-C was 0.254 and the Cronbach's Alpha value was 0.71.

In test-retest reliability analysis, the ICC values for all the 29 items were more than 0.7.

Table 4-2: Internal Consistency and Test-retest Reliability of OPQ-M

Domain	Items	Highest pairwise correlation 0.3< r <0.9	Corrected Item-Total Correlation (CIT-C) **r>0.2**	Cronbach's Alpha (α>0.7)	Intra-Correlation Coefficient (ICC)
IADL	Grocery shopping	0.639	0.367	0.777	0.842
	Cooking	0.654	0.489		0.959
	Cleaning	0.833	0.774		0.940
	Laundry	0.643	0.717		0.911
	Light maintenance	0.670	0.456		0.916
	Heavy maintenance	0.670	0.456		0.835
	Managing personal finance	0.450	0.448		0.719
	Transportation one self	0.340	0.392		0.881
Leisure	Shopping	0.440	0.027	0.675	0.442
	Sports	0.693	0.221		0.930
	Outdoors activities	0.693	0.264		0.944
	Hobbies	0.526	0.280		0.944
	Cultural activities	0.617	0.275		0.849
	Listening to radio	0.706	0.102		0.971
	Reading newspaper	0.706	0.481		1.000
	Reading books	0.792	0.255		0.896
	Writing	0.792	0.345		0.739
	Outdoor games	0.869	0.537		0.820
	Playing computer	0.869	0.604		0.941
Social	Visiting with partner/children	0.863	0.840	0.855	0.877
	Visiting relatives/friends/neighbor	0.863	0.770		0.977
	Helping & support others	0.841	0.813		0.903
	Engaging in societies	0.449	0.342		0.786
	Participating in religious activities	0.600	0.565		0.784
	Visiting restaurants	0.756	0.561	0.714	1.000
	Travelling for pleasure	0.637	0.683		0.994
Work	Working full/part time	0.745	0.747		0.973
	Studying	0.413	0.254		0.764
	Taking care and raising children	0.541	0.403		0.978
	Voluntary Work	0.745	0.722		0.975

IADL= Instrumental Activity of Daily Living

4.2.4 Results from Confirmatory Factor Analysis (CFA) of OPQ-M

Confirmatory factor analysis (CFA) was used to assess content convergence and discriminant validity of the 29 items in OPQ-M. The AMOS version 20 software was used in the analysis. In CFA, model fit indices; Chi-square/df, Comparative of Fit Index (CFI), Tucker Lewis Index (TLI) and Root Mean Square Error Approximation (RMSEA) were used to test for model fit. Chi-square/df<3, CFI>0.9, TLI>0.9 and RMSEA<0.08 indicate acceptable model fit (Browne, Cudeck, Bollen, & Long, 1993). For a good factor model, the factor loading (L) values must be at least 0.5, composite reliability (CR) must be more than 0.7, the average variance extracted (AVE) value must be more than 0.5 and the CR values must be more than AVE values (Hair, 2010). For sufficient discriminant validity between constructs, when compared pairwise the R-squared values must be lesser than the AVE values (Fornell & Larcker, 1981).

In CFA, out of the 29 items, 10 items were dropped due to low (all<0.4) factor loading values; 2 items in IADL, 6 items in leisure, 1 item in social and 1 item in work construct. The summary for the remaining 18 items is presented in Table 4-3. For all constructs, the CR values are more than 0.7, the AVE values are more than 0.5 and CR values are more than the AVE values.

Table 4-3: Results from Confirmatory Factor Analysis

Latent variables	Item	Factor Loading (L)	Composite Reliability (CR)	Average Variance Extracted (AVE)
Instrumental Activity of Daily Living (IADL) (6 items)	IADL1-Grocery shopping	0.827	0.905	0.659
	IADL2-Cooking/Preparing meal	0.787		
	IADL3-Doing laundry	0.886		
	IADL4-House cleaning	0.587		
	IADL7- Managing personal finances	0.687		
	IADL8-Transportation one self	0.553		
Leisure Activities (4 items)	LEIS3-Outdoors activities	0.757	0.892	0.674
	LEIS5-Cultural activities	0.837		
	LEIS6-Listening to radio	0.837		
	LEIS7-Reading newspaper	0.891		
Social Activities (6 items)	SOC1-Visiting with partner/children	0.792	0.941	0.801
	SOC2- Visiting relatives/friends/neighbour	0.946		
	SOC3-Helping & support others	0.926		
	SOC5-Participating in religious activities	0.593		
	SOC6-Visiting restaurants	0.806		
	SOC7-Travelling for pleasure	0.687		
Work Activities (3 items)	WORK1-Working full/part time	0.842	0.883	0.715
	WORK3- Taking care and raising children	0.826		
	WORK4-Performing voluntary Work	0.874		

Note:IADL5,IADL6,LEIS2,LEIS4,LEIS8,LEIS9,LEIS10,LEIS11,SOC4,and WORK2 were deleted due to low loadings

The values for discriminant validity are presented in Table 4-4. In this table, the diagonal values are the AVEs and the off-diagonal values are the R-squares. When compared pairwise, the AVE values are more than the respective R-square values. Hence, there is sufficient discriminant validity between the 4 constructs.

Table 4-4: Discriminant Validity of OPQ-M Constructs

	IADL	Leisure	Social	Work
IADL	0.744			
Leisure	0.627	0.819		
Social	0.575	0.684	0.815	
Work	0.496	0.724	0.700	0.755

4.2.5 Final OPQ-M Instrument

The final model in CFA provided support for the reliability and validity of the OPQ-M. Table 4-5: Initial and Final OPQ-M shows the indicators of OPQ-M's which is much shorter (19 indicators) than the original OPQ (30 indicators).

Table 4-5: Initial and Final OPQ-M

OPQ –M	Modified OPQ-M
Activity of Daily Living	
Grocery shopping	Grocery shopping
Cooking	Cooking
Cleaning	Cleaning
Laundry	Laundry
Light maintenance	Managing personal finance
Heavy maintenance	Transporting oneself
Managing personal finance	
Transporting oneself	
Leisure Activities	
Participating in sports	Participating in sports
Participating outdoors activities	Participating in cultural activities
Participating hobbies	Listening to radio/watching TV/videos
Participating in cultural activities	Reading newspaper/magazines
Listening to radio/watching TV/videos	
Reading newspaper/magazines	
Reading books/ periodicals	
Writing letter, poetry, or books	
Playing carom, chess, crossword puzzle	
Playing/ Surfing Internet	
Social Activities	
Visiting with partner/children	Visiting with partner/children
Visiting relatives/friends/neighbor	Visiting relatives/friends/neighbor
Helping and supporting others	Helping and supporting others
Engaging in societies/clubs/unions	Participating in religious activities
Participating in religious activities	Visiting restaurants or food stalls
Visiting restaurants or food stalls	
Travelling for pleasure	
Work or Work related Activities	
Working, full or part time	Working, full or part time
Studying	Taking care and raising children
Taking care and raising children	Performing voluntary Work
Performing voluntary work	

4.2.6 Translation of Engagement in Meaningful activity Survey (EMAS-M)

4.2.6.1 Content Validity of EMAS-M

Table 4-6 shows the results of content validation of the items in EMAS-M. The I-CVI values for all the 12 items are 0.83 and above. Hence, the 12 items in EMAS-M have sufficient content validity.

Table 4-6: Content Validity of EMAS-M

Item	Number of agreement	I-CVI
Take care of myself	5	0.83
Reflect the kind of person I am	6	1.00
Express my creativity	5	0.83
Help me to achieve something which gives me sense of accomplishment	5	0.83
Contribute to the feeling of being competent	6	1.00
Are valued by other people	6	1.00
Do can help other people	6	1.00
Give me pleasure	6	1.00
Give me feeling control	6	1.00
Help me express my personal values	5	0.83
Give me sense of satisfaction	5	0.83
Give me challenges	6	1.00

4.2.6.2 Internal Consistency of Items in EMAS-M

The results from reliability analyses of the items in EMAS-M are shown in Table 4-7. The highest correlation for each item with at least one other item in the EMAS construct is between 0.3 and 0.9. Hence, all the 12 items in EMAS-M correlate adequately. The minimum CIT-C was 0.278 and Cronbach's alpha value was 0.900. In test-retest analysis the intra-correlation coefficients values (ICC) were all more than .0700.

Table 4-7: Internal consistency and Test-retest Reliability of EMAS-M

Items	Highest Correlation for items	Corrected Item-Total Correlation (CIT-C)	Cronbach's Alpha	Intra-class Correlation (ICC)
Take care of myself	0.346	0.560	0.900	0.958
Reflect the kind of person I am	0.843	0.681		1.000
Express my creativity	0.843	0.619		0.984
Achieve something-sense of accomplishment	0.672	0.278		0.975
Contribute to the feeling of being competent	0.779	0.683		0.981
Evaluate by other people	0.769	0.514		0.709
Help other people	0.895	0.829		0.963
Give me pleasure	0.871	0.863		0.963
Give me feeling control	0.861	0.753		0.944
Express my personal value	0.895	0.774		1.000
Give sense of satisfaction	0.724	0.740		0.974
Give me challenges	0.871	0.757		0.983

4.3 The Main Study Results - Phase Two

From the 1,145 records that were screened from the database at the two centres, 348 patients were eligible to be recruited this study. Of the 348, only 152 consented to participate while 196 patients refused to participate in this study. Out of the 152 patients who consented, only 113 gave near complete responses (>85%). For the 113 cases, missing values were replaced with group means as this is a conservative approach that does not change the mean of the distribution of scores (Chua, 2013; Field, 2009; Ho, 2006; Tabachnick & Fidell, 2001) .The flow chart for participant recruitment is depicted in Figure 4-1.

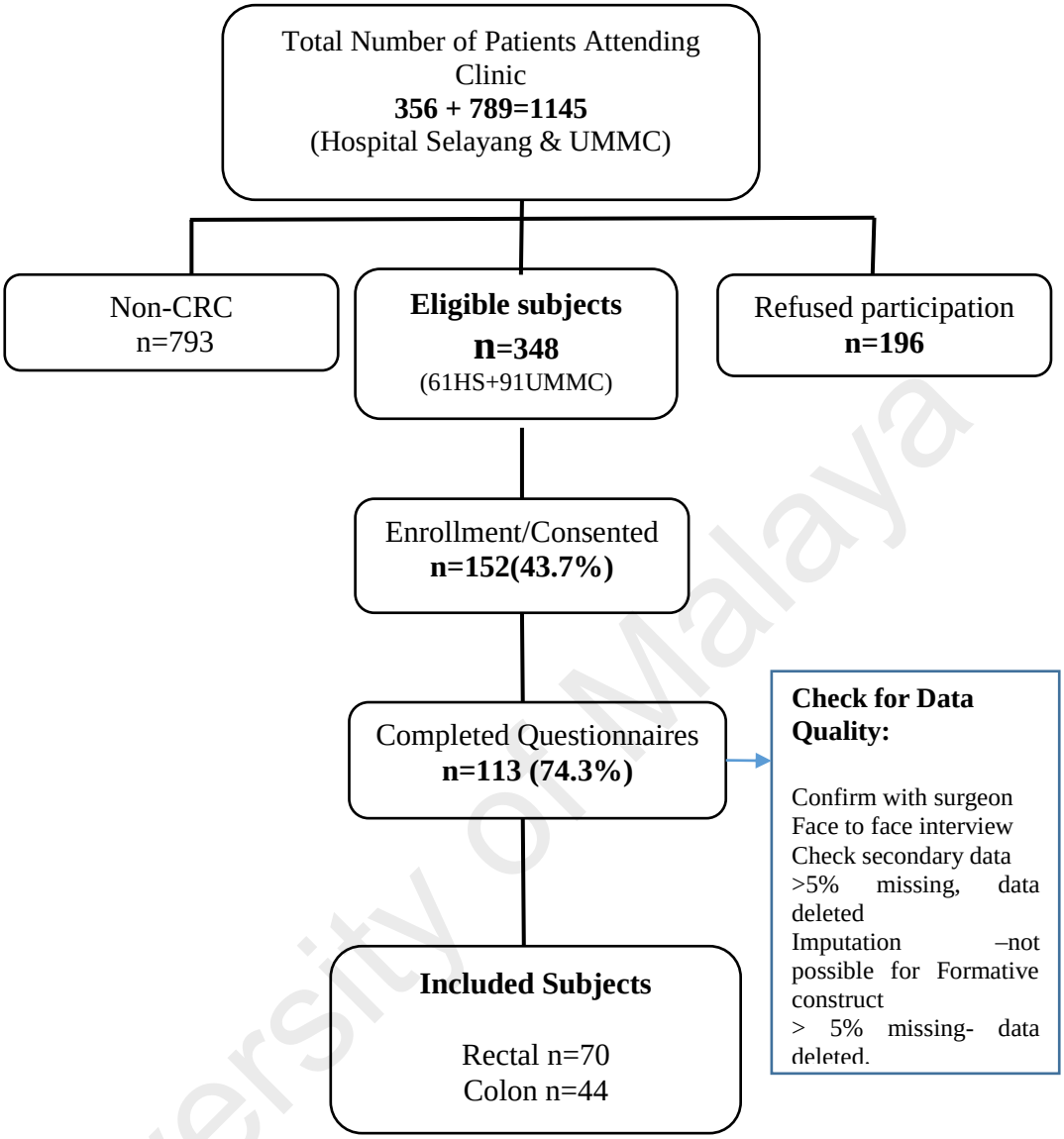


Figure 4-1: Flow-chart of the Recruitment Process

In this section, phase two study results are discussed. The synthesized results are presented separately below in four section; (1) description on different aspect of health conditions, functioning, contextual factors and health QoL among CRC survivors, (2) description on restriction to occupational participation activities, (3) association

between occupational participation, meaningful activity and QoL and (4) testing the measurement and structural model of OP-MA-QoL.

4.3.1 Demographic Characteristics of the Participants in this Study

A total of n=113 participants was achieved with the response rate of 74.3 % from 152 participants. The characteristics of participants in terms of different aspects of health conditions, functioning, contextual factors and health quality of life in this study are presented in Table 4-8.

Table 4-8: Demographic Characteristics of the Participants in the Study (N=113)

Variable	Total N (%)
Age (year)	
Median	65.00
Mean(SD)	64.67 (10.40)
Range	50
75 and more	21(18.6)
65 - 74	37(32.7)
55 - 64	31(27.4)
45 - 54	20(17.7)
18 - 44	4(3.5)
Gender	
Male	53(46.9)
Female	60(53.1)
Ethnicity	
Malay	22(20.4)
Chinese	77(68.1)
Indians	11(9.7)
Others	2(1.8)
Marital status	
Single	10(8.8)
Married	98(86.7)
Widow/Divorced/Separated	5(4.4)
Religion	
Muslim	24(21.2)
Buddhist	63(55.8)
Hindus	10(8.8)
Christian	15(13.3)
Others	1(.9)
Educational level	
Not schooling	3(2.7)
Primary	49(43.4)
Secondary	48(42.5)
Tertiary	13(11.5)
Employment Status	
Working	26(23.0)
Pensioner	19(16.8)
Not Working	27(23.9)
Housewife	41(36.3)
Household income	
<RM1000	27(23.9)
RM1001-3000	65(57.5)
RM3001-5000	18.(15.9)
>RM5000	3(2.7)

The values for categorical variables are given in frequency and percentage in -parenthesis: n(%)

In terms of clinical characteristics (Table 4-9), six (5.3%) patients were diagnosed with stage I, 33 (29.2%) at stage II, 60 (53.1%) at stage III, 12(10.6%) at stage IV cancer. For two (1.8%) patients at the stage was not known. The mean (SD) time of after treatment was 4.27 (3.49) years with range of 19 years. Out of the 113 respondents, 91 (80.5%) had survived between one to five years after treatment. In terms of type of cancer, 68(60.2%) have been diagnosed with colon cancer and 45(39.8%) with rectal cancer. Out of the 113 participants, 55.8% have completed radiotherapy treatment, 67.3% have completed chemotherapy, 63.7% did not have stoma at the time of assessment and 61.1% had at least one comorbidities.

Table 4-9: Clinical Characteristics of the Participants in the Study (N=113)

Clinical Characteristics	**Total (N) (%)**
Disease duration post diagnosis (year)	
Median	3.00
Range	19
1 to 5 year	91(80.5)
5 to 8 year	16(14.2)
10 year and more	5(4.4)
Not known	1 (0.9)
Stage of Cancer	
Stage I	6(5.3)
Stage II	33(29.2)
Stage III	60(53.1)
Stage IV	33(29.2)
Not known	2(1.8)
Cancer cite	
Colon	68(60.2)
Rectal	45(39.8)
Radiotherapy	
Yes	63(55.8)
No	50(44.2)
Chemotherapy	
Yes	83(73.5)
No	27(23.9)

Clinical Characteristics	Total (N) (%)
Not known	3(2.7)
Stoma	
Yes	41(36.3)
No	72(63.7)
Comorbidities	
No	31(27.4)
1 to 2	69(61.1)
3 and more	13(11.5)

The values of categorical variables are given in frequency and percentage in parentheses (%)

4.3.2 Restriction to Occupational participation

Restriction for Occupational participation was assessed using 19 activities in OPQ-M are summarised in Table 4-10. The five most restrictions were in activities of working full or part time (70%), performing voluntary work (51.3%), participating in sports (40.7%), travelling for pleasure (34.5%) and activities helping and support others (22.1%). The most common restrictions were in work and work related domain, leisure domain and social domain. Females showed slightly more restriction in working full or part time and performing voluntary work compared to the males. On the other hand male showed higher level of restriction in cooking/preparing meal compared to the females.

Table 4-10: Restriction to Occupational participation

Activities	Overall n (%)	Gender	
		Male 53(46.9)	Female 60(53.1)
Instrumental Activity of Daily Living			
Grocery shopping	4(3.5)	3(5.7)	1(1.7)
Cooking/Preparing meal	26(23.0).	20(37.7)	6(10.0)
Doing laundry	23(20.4)	14(20.6)	9(20.0)
House cleaning	3(2.7)	2(3.8)	1(1.7)
Managing personal finances	0(0.0)	0(0.0)	0(0.0)
Transporting oneself	9(8)	3(5.7)	6(10.0)

Activities	Overall n (%)	Male 53(46.9)	Female 60(53.1)
Leisure Activities			
Participating in sports	46(40.7)	21(39.6)	25(41.7)
Participating in cultural activities	27(23.9)	12(22.6)	15(25.0)
Listening to radio/watching TV/videos	0(0.0)	0(0.0)	0(0.0)
Reading newspapers/news /magazines	2(1.8)	1(1.9)	1(1.7)
Social Activities			
Visiting with partner/children	15(13.3)	6(11.3)	9(15.0)
Visiting relatives/friends/neighbors	14(12.4)	10(18.9)	4(6.7)
Helping and supporting others	25(22.1)	14(26.4)	11(18.3)
Participating in religious activities	6(5.3)	2(3.8)	4(6.7)
Visiting restaurants and café	11(9.7)	4(7.5)	7(11.7)
Travelling for pleasure	39(34.5)	26(38.2)	13(28.9)
Work or Work related activities			
Working full or part time	79(70.0)	34(64.2)	45(75.0)
Taking care and raising children	28(24.8)	15(28.3)	13(21.7)
Performing voluntary Work	58(51.3)	23(43.4)	35(58.3)

4.3.3 Association between Overall Score of Occupational participation, Meaningful activity and Quality of Life

The total scores for the Occupational participation (OP) based on the 19-items OPQ-M, Meaningful activity (MA) based on the 12 items of EMAS-M and quality of life based on EORTC QLQ-C-30 items were obtained and the association between the three scores were tested. The results are as follows:

There are significant inter-correlations between OP, MA and QoL total indexes among CRC survivors. Result from Pearson inter-correlation test indicates:

i. A weak, significant positive association between Occupational participation and QoL ($r=0.35$; $p<0.05$),

ii. A moderate, significant positive association between Meaningful activity and QoL ($r=0.62$; $p<0.05$), and

iii. A moderate, significant association between Meaningful activity and Occupational participation ($r=0.45$; $p<0.05$).

4.4 The Structural Model of OP-MA-QoL (Inner Model)

The criteria for assessing the validity of the structural model in PLS-SEM are the significant of the path coefficient (β), the level of the coefficients of determination (R^2 values) and the corresponding t-values (Hair et al., 2014). A boot strapping procedure with 5,000 resamples was applied to obtain the t-values. In addition to these basic measures, the effect size (f^2), and the predictive relevance (Q^2) of the model were also reported via the blindfolding procedure as discussed in Chapter 3.

Initially, the structural model for collinearity issues was examined. The reason was because PLS-SEM fits the model of the sample data to obtain the best parameter estimates by maximizing the explained variance of the dependent variables.

Each set of predictor constructs separately for each of the sub-part of Structural Model (Redundancy analysis was run to assess Formative Measurement Model). Variance Inflation Factor values of less than five (VIF < 5) indicates multicollinearity is not exist. The following sets of (predictors) constructs are run to assess collinearity:

a. IADL(instrumental activity of daily living), leisure social,work as predictors of OP (occupational performance)
b. IADL, leisure, social, work and MA (meaningful activity) as predictors of QoL

Results in Table 4-11 shows that the VIF values are uniformly below threshold value of 0.50. Therefore, in conclusion, collinearity does not reach critical levels in any of the constructs.

Table 4-11: Collinearity Assessment Results for Structural Model

First Set		**Second Set**	
Construct	**VIF**	**Construct**	**VIF**
IADL	1.885	MA	1.000
Leisure	1.784	IADL	1.793
Social	2.025	Leisure	1.686
Work	1.597	Social	2.054
		Work	1.559

Next, the results of the inner model and outer model are discussed. Followed with R^2 values of coefficient determination, predictive relevance (Q^2) of OP construct on QoL. Finally the effect size (f^2) on R2 and effect size (q^2) of occupational on QoL and MA on QoL.

4.4.1 The Path Model of Occupational participation to QoL - The Inner Model Results

First step analyses of the structural model involved the assessment of the significant of direct effect (path c) of Occupational participation on QoL without including the mediator variable in the path model (Figure 4-2). The significant test is

conducting by carrying the bootstrapping procedure as explained in Chapter 3. Results in Table 4-12 shows positive influence on QoL (β=0.417, t=4.72, p<0.001). As a result, hypothesis H1 of the study is supported.

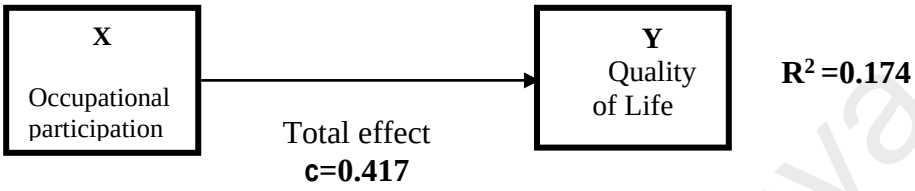


Figure 4-2 : The Result of Direct Path Model of OP→QoL

Table 4-12: The Results of Significance of Path Model of OP→ QoL (Direct Effect)

	Path Coefficient (β)	Standard Error	T- value >3.291	p value	Confident Interval at 95%
OP →QoL	0.417	0.092	4.720	0.001	[0.284,0.632]

OP –occupational participation

4.4.2 The Path Model with Mediation (Indirect Effect) - The Inner Model Results

A subsequent analyse of the structural model involved the assessment of significant path of indirect effect (path c') of between occupational participation and QoL, with meaningful activity as the mediator variable (Figure 4-3). Table 4-13 shows results of indirect effect is not significant (β=0.118, t=1.406, ρ<0.160). These results suggest a full mediation scenario according to Baron and Kenny (1986).

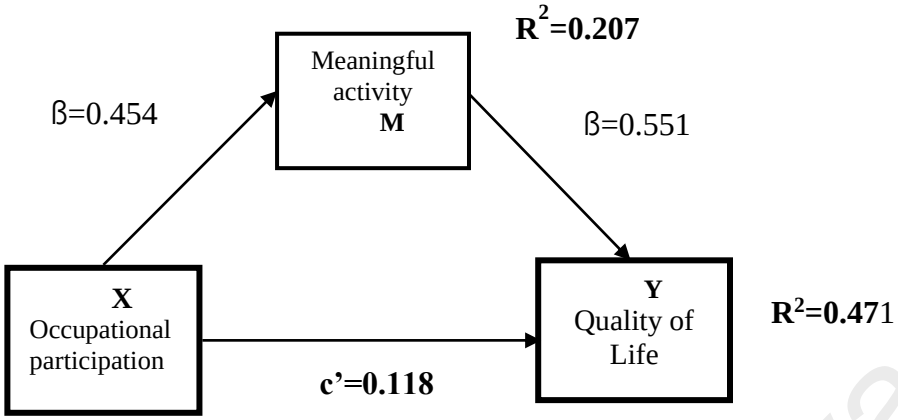


Figure 4-3: The Results of Path Model OP-MA-QoL with Mediating Variable

Table 4-13: The Results of Significant Path Model of OP-MA-QoL

Path	Path Coefficient β	Standard Error	t- value >1.96	p value
Path a OP→MA	0.455	0.073	6.204	0.001
Path b MA→QoL	0.551	0.073	8.511	0.001
Path c' OP→QoL	0.118	0.084	1.406	0.160

OP-occupational participation; MA- meaningful activity

Sobel's test is then used to test the significance of the mediating relationships hypotheses in this study. Table 4-14: Sobel's Test Results (Z value) shows the relationship between occupational participation and QoL is mediated significantly by engagement in meaningful activity. The *z* value that was greater than 1.96 explains meaningful activity ($Z=5.040$, $p<0.01$) as a significant mediator. Meaningful activity mediates the strength of the relationship between occupational participation and QoL positively. Therefore, hypotheses H3 of the study is supported.

Table 4-14: Sobel's Test Results (Z value)

Path	Path Coefficient (a*b)	Standard Error	Z-value (>1.96)	p-value
OP→MA→QoL	0.284	0.050	5.040	0.001

OP-occupational participation; MA- meaningful activity

The above results support hypotheses H1 and H3 of the inner model of the Structural Model of OP-MA-QoL. Next, is the results of the outer model.

4.4.3 The Hypotheses Testing Results- The Outer Model

Table 4-15 displays the results of the outer model the study. The hypotheses of H1a, H1b, H1c, H1d and H2 are all supported. All four indicators in the occupational participation construct has positive significant influence on QoL constructs which are IADL (β=0.316, $p < 0.01$), Leisure (β=0.207, $p < 0.01$), Social (β=0.394, $p<0.01$) and Work (β=0.142, $p < 0.01$).Results of hypotheses H2 is also supported, which is occupational participation has a positive influence on Meaningful activity (β=0.456, ρ<0.000,t=5.37).

Table 4-15: Significance Testing Results of the Structural Model Path Coefficients (Outer Model)

Hypotheses	Path Coefficients (β)	t-Value 1.65	ρ values	90% Confidence Intervals	Inference
H1a:IADL→ OP	0.316	10.55	0.001	[0.26;0.37]	Supported
H1b:Leisure→ OP	0.207	9.49	0.001	[0.17;0.25]	Supported
H1c:Social→ OP	0.394	14.83	0.001	[0.34;0.44]	Supported
H1d:Work→OP	0.319	11.50	0.001	[0.26;0.37]	Supported
H2 :OP → MA	0.456	5.37	0.001	[0.26;0.57]	Supported

4.4.3.1 Significance Testing Results of the Total Effects

The four driving constructs for OP are the exogenous constructs which are formative and also the primary concern for the total effects analysis. Table 4-16 shows the results for the total effects of exogenous constructs: IADL, leisure, social and work, on the target construct QoL in the bootstrapping output. The findings indicated that social activities (SOC=0.154) has the strongest total effect on QoL, followed by Work activities (WORK=0.125), IADL activities (IADL=0.124) and Leisure activities (LEIS=0.081). The results shown that all total effects were significant at 10% level. These outcomes are crucial need to be given due consideration by therapists/health care providers during managing CRC patients in terms of treatment, preventive measures and rehabilitation.

Table 4-16: Significance of Testing Results of the Total Effects

	Total Effect	t values	Significance Levels	p values	90% Confidence Intervals
IADL→ QOL	0.124	3.395	***	0.001	[0.052;0.195]
LEIS→ QOL	0.081	3.703	***	0.001	[0.037;0.123]
SOC→ QOL	0.154	3.857	***	0.001	[0.070;0.226]
WORK→ QOL	0.125	4.091	***	0.001	[0.050;0.178]

***p<0.001; IADL- instrumental of daily living; LEIS-leisure; SOC-social; Work -work

4.4.3.2 The Level of Coefficient of Determination (R^2 values)

Coefficient of determination (R^2) values indicates the amount of variance in dependent variables, which is explained in the independent variables. Therefore, a

larger R^2 value increase the predictive ability of a structural model. In this study, SmartPLS 3.0 algorithm function is used to generate the R^2 value. The bootstrapping function in SmartPLS 3.0 with 5000 resample from 113 data is used to generate the t-statistics value. The results of the structural model is presented in Figure 4-4.

Referring to Figure 4-4, occupational participations, meaningful activity are able to explain 43.7% of the variance in QoL. Meanwhile, occupational participations justified 18.0% of the variance in meaningful activity. In the other hand, IADL, Leisure, Social and Work explained 97.1% of the variance in perceived occupational participations.

The R^2 value of 0.437 was considered higher than the 0.25 (weak) value but less than 0.50 (moderate) as suggested by Cohen (1988). Meanwhile, the value of R^2 =0.971 indicated a very large amount of variance in IADL, Leisure, Social and Work that can be attributes to occupational participation.

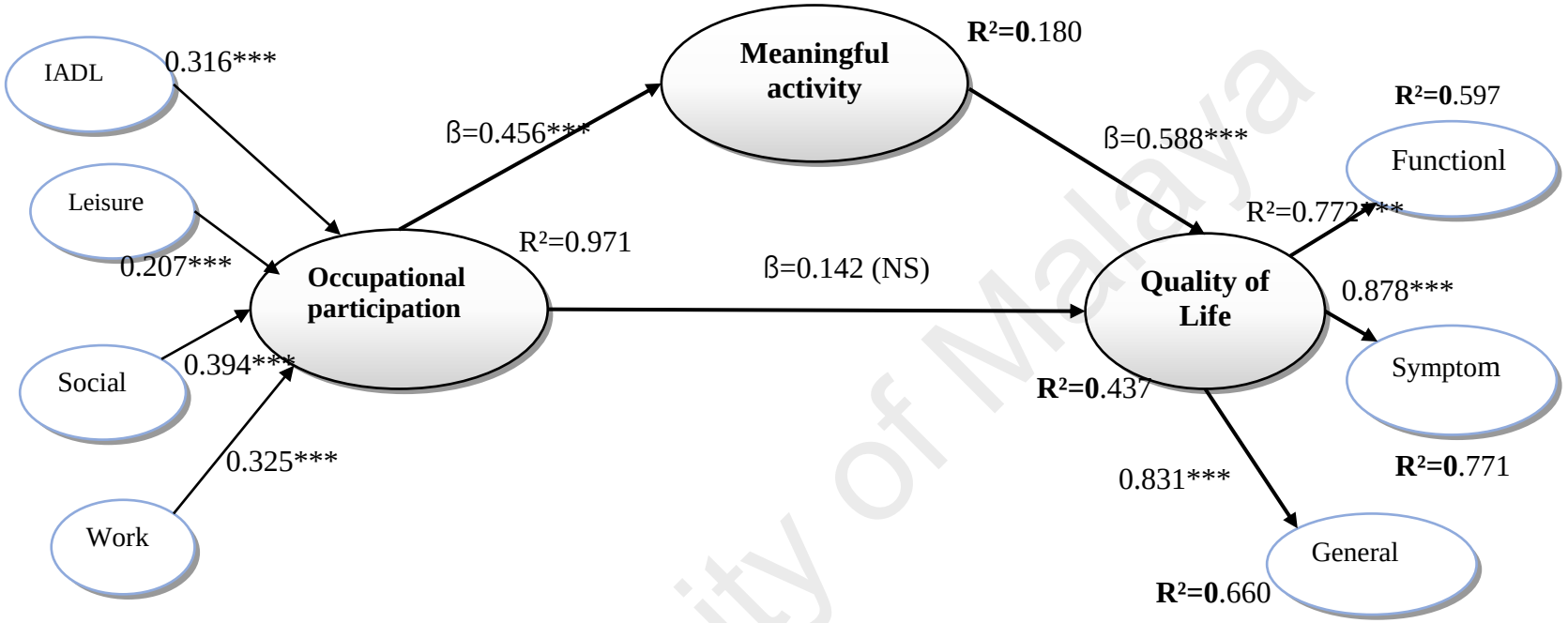
4.4.3.3 The Predictive relevance (Q^2)

Table 4-17 depicts that the all the Q^2 values were more than zero, ranging from 0.118 to 0.317, suggesting that the model of OP-MA-QoL has sufficient predictive relevance.

4.4.3.4 Effect size f^2 and q^2

Results depicted in Table 4-17 reveal that the effect size (f^2) on R^2 values of QoL on occupational participation is small, however large (f^2=0.506) on R^2 values of QoL on

meaningful activity. Next the results of effect size (q^2) of independent variables (OP and MA) on dependent variables (QoL) show the effect size (q^2 =0.010) of occupational participation on the QoL is small however, effect size of meaningful activity on QoL (q^2 =0.286) is medium to large effect.



R^2values of 0.25,0.50 and .75 for target construct are interpreted as weak, medium & substantial

** p < 0.01; ***p<0.001; NS-not significant

Figure 4-4: Results of the Structural Model OP-MA-QoL

Table 4-17: Results of Effect size f^2 and q^2 Analysis

Dependent Construct	Independent Construct	R^2 Included	R^2 Excluded	Q^2 Included	Q^2 Excluded	Effect Size f^2	Effect Size q^2	Inference
QoL R^2 =0.437	Occupational participation	0.437	0.424	0.307	0.300	0.023	0.010	Small
QoL Q^2=0.307	IADL	0.437	0.431	0.307	0.302	0.019		Small
	Leisure	0.437	0.449	0.307	0.317	0.012		Small
	Social	0.437	0.426	0.307	0.229	0.020		Small
	Work	0.437	0.440	0.307	0.309	0.005		Small
QoL R^2 =0.437	Meaningful activity	0.437	0.152	0.307	0.109	0.506	0.286	Medium to large

Q^2 = Stone-Geisser Predictive Relevance, Q^2 >0 indicate independent construct have predictive relevance over dependent construct
f^2 = Effect size to R^2 ; q^2 =Effect size OP on QoL and MA on QoL
Values of 0.02, 0.15 and 0.32 are to be considered as small, medium and large effect sizes respectively.
IADL- instrumental activity of daily living

4.5 Summary of Chapter 4

Analysis is applied using SmartPLS to explore the relationship between occupational participations, meaningful activity and QoL among a cohort of CRC survivors. A number of observations can be made from the analysis conducted on the measurement and structural model.

First, in Phase One study results demonstrated satisfactory reliability and validity of the instruments. The internal consistency was satisfactory, all constructs have composite reliability values of more than 0.700. In addition, all items loadings were greater than 0.700 and were significant at the level of 0.001, demonstrating indicator reliability. The measurement model has also demonstrated satisfactory convergent and discriminant validity by having AVE value greater than 0.500, all manifest variables loaded on their respective latent variable and the square roots of AVE for each construct greater than its inter-correlation. The formative constructs have shown sufficient degrees of convergent validity, and the measurement for collinearity, did not reach critical levels in any of the formative construct.

Second, the validation of the structural model demonstrated satisfactory results. The R^2 were substantial, with value of 43.70%.This demonstrate substantial explanatory power. In addition, all the proposed path/hypotheses within the structural model are supported. Based on path coefficient assessment, seven proposed relationships have β value greater than 0.1 and are significant at least at the level of 0.001. The model of OP-MA-QoL has

sufficient predictive relevance, with significant relationship. The effect size (f^2) to R^2 values of QoL was small on occupational participation, nevertheless moderate to strong effect size on meaningful activity. The effect size (q^2) of occupational participation and meaningful activity as independent variables on dependent variable of QoL have shown to be small and moderate.

Finally, the structural model exhibited one significant mediating relationship between occupational participation and QoL. The next chapter provides a summary of the main findings and the discussion of the theoretical constructs used in this dissertation in connection with the results obtained.

CHAPTER 5: DISCUSSION

5.1 Overview

This is the first study to our best knowledge that explores the relationship between occupational participation, meaningful activity and QoL of CRC survivors in Malaysia. PLS-SEM analysis was applied to test the path hypotheses and the structural model of OP-MA-QoL. This chapter brings together the key findings. To begin with, the findings from instruments validation of OPQ-M and EMAS-M is briefly discuss. This is followed by the discussion on the five main objectives of the study including the tested hypotheses and structural model outlined in Chapter 1 and Chapter 2. This chapter also analyses the findings of this study in light of the existing literature. The strength and limitations of this study are then discussed. Finally, future studies are suggested.

5.1.1 Phase 1 -Validation of OPQ-M and EMAS-M [Development and Cross-cultural Adaptation]

The results from phase one showed that OPQ-M and EMAS-M performed well in the psychometric testing. These tools were specifically developed to assess performance ability and subjective experience of participation in daily life. Although the main aim of this study was not to develop an instrument nor perform psychometric evaluation, this step was performed as a preparatory measure before the exploratory analysis. The outcome revealed a lack of validated instruments for screening occupational participations and meaningful activity for the application in the clinical practice in Malaysia. Further studies of the OPQ-M and EMAS-M in healthy persons and in patients with CRC is necessary to further evaluate the reliability of the scale.

5.2 Phase 2 of the Study

A cross sectional study on occupational participation, meaningful activity and QoL among 113 CRC.

5.2.1 Restriction in Occupational Participation

Results of the main study revealed that the restriction most experienced in occupational participation among CRC survivors who participated in this study was work domain, followed by leisure and social domain. The five most significant restriction to occupational participation were in activities of working full or part time (70%), performing voluntary work (51.3%), participating sport activities (40.7%), travelling for pleasure (34.5%) and activities helping and support others (22.1%).

In work domain, working full time caused the most restriction, followed by working part time. Participants were mostly homemaker (n=41), not working (n=27) and pensioners (n=19). Mohler et al. (2008), in a cross sectional mail survey of involving 679 CRC survivors found an association of not working with lower QoL of survivors. Contrarily, Wong, Lam, Poon, and Kwong (2013) in a cross sectional interview of 545 CRC survivors revealed no significant association between QoL and work status. This finding which only showed that socio-demographic data of work status is congruent with restriction in work, cannot conclude any association between QoL and work status of CRC survivors in both settings.

CRC survivors' restrictions in leisure and social domain were the second and third most significant found in this study. Thraen-Borowski et al. (2013) survey involving 1,768 of older and long term CRC survivors revealed that less participation in social activities (e.g. visiting family/friends) is associated with lower QoL of CRC

survivors. Campbell et al. (2013) on the other hand reported that patients with CRC have lower risk of death if they actively participate in physical and recreational leisure, while engaging in socially oriented leisure in low intensity for older people with CRC improved mental and physical health (Thraen-Borowksi et al., 2013).

Fatigue and other cancer symptoms may hinder the ability of CRC survivors to engage in community-based leisure (Bakitas, 2007), while managing a stoma has been described as affecting men and women's confidence in socialising and can cause significant humiliation (Rozmovits & Ziebland, 2004). A recent qualitative narrative study conducted by Shipp, Mc Kinsty, and Pearson (2015) enhanced the understanding of leisure participation in men with CRC as it associated the disruption to usual leisure participation to their choice of passive leisure instead of active or community leisure due to recurrent fatigue and colostomy bag caused by cancer.

CRC survivors who are aware of the benefit of actively participating in leisure and social activities during their survivorship may encourage them to take more responsibility for their health. Occupational therapists are uniquely suited to promote leisure and social activities to enable survivors to participate in meaningful activities as a means of promoting health and prevent later-life decline.

5.2.2 Association between Occupational Participation, Meaningful Activity, and Quality of Life among CRC Survivors

Associations were found between the OPQ-M, EMAS-M and QoL total scores. Occupational participation showed a weak positive significant association with QoL. This implies that the higher the score in occupational participation, the better is the QoL

among CRC survivors. There was a moderate and significant association between meaningful activity and QoL. This implies that the higher the score in meaningful activity, the better is the QoL among CRC survivors.

The association between occupational participation and meaningful activity was significant and in moderate strength. This implies that the higher the score in occupational participation and meaningful activity, the better is the QoL among CRC survivors. Above findings suggest that CRC survivors who have higher scores in occupational participation, and meaningful activity have a higher score in QoL, which infers good functioning, less complaint in symptoms and better global health. Literature on occupational perspective (Kielhofner, 2008, Townsend & Palajako 2007; Law, 2002) offers compelling explanation for participation and engaging in meaningful activity, namely that they are significantly associated with health quality of life in general. Thus, the above findings provide further insights into the association between occupational participation, meaningful activity, and QoL among CRC survivors in non-western countries, particularly Malaysia.

5.3 Phase 2 – Structural Model and Study Hypotheses

This study had proposed and tested a theoretical model for explaining occupational participation and QoL via a sample of CRC survivors living in Malaysia. The results of the analysis and statistical modelling illustrate that occupational participation and meaningful activity have a positive influence on QoL in CRC survivors, either in a direct or indirect manner.

Table 5-1 Summary of the Objectives/Hypotheses and Results

Research Questions/Specific Objectives and Hypotheses		Results
Is there any significant association between occupational participation, meaningful activity and QoL among CRC survivors?		
H1	Occupational participation has a positive influence on CRC survivors' QoL.	Supported β=0.417,t=4.72,ρ<0.001
H1a	Instrumental Activity of Daily Living has a positive influence on CRC survivors' occupational participation.	Supported β=0.316,t=10.55,ρ<0.001
H1b	Leisure activities have a positive influence on CRC survivors' occupational participation.	Supported β=0.207,t=9.49,ρ<0.001
H1c	Social activities have a positive influence on CRC survivors' occupational participation.	Supported β=0.394,t=14.83,ρ<0.001
H1d	Work activities have a positive influence on CRC survivors' occupational participation.	Supported β=0.319,t=11.50,ρ<0.001
H2	Occupational participation has a positive influence on CRC survivors' engagement in meaningful activity.	Supported β=0.456,t=5.37,ρ<0.001
H3	Meaningful activity has a positive influence on CRC survivors' QoL.	Supported β=0.551,t=8.511,ρ<0.001
Does meaningful activity have mediating effect on the relationship between occupational participation and QoL in CRC survivors?		
H4	Meaningful activity mediates the relationship between occupational participation and QoL.	Supported β=0.2.84, SE=0.050, z=5.040
Is structural model of the OP-MA-QoL valid?		
H4	The OP-MA-QoL model has a significant level of coefficient determination (R^2 value) of QoL explained in OP and MA.	Supported OP and MA are explained as 43.7% of the variance in QoL.
	The OP-MA-QoL model has sufficient predictive relevance (Q^2).	Q^2 values ranging from 0.109 to 0.317 (Q^2>0) suggest that the model has sufficient predictive relevance.
	The OP-MA-QoL model has a significant effect size (f^2) to R^2 value of QoL.	OP has a small effect size (f^2=0.023). MA has a moderate to strong effect size (f^2=0.506).
	The OP-MA-QoL model has an effect size (q^2) of OP and MA (independent variables) on QoL (dependent variable).	OP has a small effect size (q^2=0.01). MA has a moderate effect size (q^2=0.286).

Eight hypotheses developed to test the independent variables and outcomes of health QoL. These hypotheses and the summary of the results are depicted in Table 5.1. Findings from this study successfully support the hypothesised relationship between occupational participation, meaningful activity, and health QoL in CRC survivors.

5.3.1 Predictor of QoL

H1: Occupational participation has a positive influence on CRC survivors' QoL.

H1a: Instrumental Activity of Daily Living has a positive influence on CRC survivors' occupational participation.

H1b: Leisure activities have a positive influence on CRC survivors' occupational participation.

H1c: Social activities have a positive influence on CRC survivors' occupational participation.

H1d: Work activities have a positive influence on CRC survivors' occupational participation.

As indicated in Table 5.1, occupational participation was found to be positive and significantly influenced CRC survivors' QoL. In this study, occupational participation concerns survivors' perception of participating in daily life activities covering four indicators which are IADL, leisure, social and work. All the four indicators in the occupational participation construct showed positive and significant influence on QoL constructs. Social indicators showed the strongest path (β=0.394, p<0.01), followed by IADL (β=0.316, p < 0.01), leisure (β=0.207, p <0.01) and work (β=0.142, p <0.01). These findings indicate that occupational participation is an empirically distinct construct from IADL, leisure, social, work and health QoL outcome.

Consistent with the claim that fostering a positive occupational participation in relation on health QoL (Stav, Hallenen, Lane, & Arbesman, 2012; Lyon, Lambet, Balan, Hegel, & Bartels, 2013; Loh & Musa, 2015; Silver & Gilchrist, 2011), Hypothesis 1 is confirmed. Findings support participation as a broad international concept and provide opportunities to understand whether this concept developed in the west is congruent to non-western countries such as Malaysia, indicating the need for it to be further explored.

H2: Occupational participation has a positive influence on CRC survivors' engagement in meaningful activity.

Hypothesis 2 is confirmed as the findings revealed that occupational participation is associated with meaningful activity. The positive relationship between meaningful activity and occupational participation shown in the results of this study indicated that meaningful activity facilitates survivors in participating in daily life activities. The findings were found to be consistent with ICF and occupational perspective (WHO, 2002; Hammell, 2004; Polatajko et al., 2007; Kielhofner, 2008) as discussed earlier (see Chapter Two).

H3: Meaningful activity has a positive influence on CRC survivors' QoL.

Meaningful activity has a significant positive influence on CRC survivors' QoL, which supports Hypothesis 3 of this study. Meaningful activity was found to be the strongest predictor (β=0.551, t=8.511, $p < 0.001$) of CRC survivors' QoL compared to occupational participation (β=0.417, t=4.72, $p < 0.001$). This implies that perceived health QoL of survivors in participating in daily life activities is driven primarily by the

perceived engagement in meaningful activity. These findings are in line with previous studies regarding *subjective experience and individual perspective* (Haggstrom & Lund, 2008; Whiteneck & Dijkers, 2009).

In this study, EMAS was chosen as an instrument that assesses activity meaning and conceptual congruent with occupational perspective theories. Substantial literature has demonstrated the positive relationships of EMAS scale with health QoL instruments (Eakman, 2011; Eakman, Carlson, & Clark, 2010a, 2010b; Goldberg et al., 2002). Thus, EMAS-M, which has been validated by testing it among cancer survivors, has a substantial content validity.

Recently, Pergolloti, Cutchin, and Muss (2015) conducted a study that measured participation in activities considered to be personally meaningful involving 71 older adults with cancer and the findings reported that perceived activity possibilities was an important predictor (β=0.56, $p < 0.001$) of meaningful activity participation. This finding suggests that perceptions regarding possibilities for activity – the 'should' and 'could' in performing daily activities are related to participation in meaningful activity, which in turn enriches the understanding of the meaningfulness of an activity.

5.3.2 Mediation of Meaningful Activity

H4: Meaningful activity mediates the relationship between occupational participation and QoL.

A major finding of this study is that Hypothesis 4 is confirmed. The findings showed that the relationship between occupational participation and QoL seems to be

fully mediated by 'engaging in meaningful activity' as perceived by the survivors. This shows that the construct of occupational participation may have a positive influence to QoL if only the survivors perceive that the participation in activities are meaningful to them, as indicated in EMAS-M's measurement. This implies that occupational participation results from an interaction of the inner characteristics of the individual (Kielhofner, 2008), which in EMAS construct, has been employed to measure activity meaning, meaning and purpose in life as well as basic psychological needs (e.g. relatedness, competence, and autonomy) (Eakman, 2012). Thus, increased positive aspects of meaningfulness activities' bring about values, competency, and mastery, as well as experiential meaning to the survivors, which in turns may positively influence health QoL in them, leading to higher functionality, fewer symptoms and higher global quality of life.

This study has thus extended Ekman's previous works (2014, 2015) on a tested model of meaningful activity and meaning in life among non-oncology patients by demonstrating that meaningful activity has a full mediation effect to health QoL among CRC survivors in a non-western country.

This study has also provided significant evidence in predicting the key constructs of occupational participation and meaningful activity as direct and indirect effects. Findings showed that the EMAS-M scales completely mediated the relationship between CRC survivors. Occupational participation was measured with OPQ-M, EMAS-M and EORCT- QLQ-C30 for quality of life. Thus, the present study's hypothesis that meaningful activity would mediate the relationship between occupational participation and QoL is confirmed.

5.3.3 Validity of the Structural Model/Testing Model

The resulting structural model explained 43.7% of the variance influencing health QoL of the CRC survivors, which was from occupational participation and meaningful activity. This implies that survivors who engage in meaningful occupational participation have significantly contributed about 43.7 of their QoL. However, other variance/variables which made up about 66.3% were not tested in this study. On the other hand, IADL, Leisure, Social and Work which are all indicators of occupational participation construct explained 97.1% of the variance in occupational participation. This implies that the four indicators have formed a very strong path to occupational participation which confirmed that the measurement model is valid and reliable. The study's findings have also provided evidence that the model's predictive relevance ($Q^{2)}$ is adequate to measure QoL construct, albeit having a small effect size.

Consistent with ICF and occupational perspective (Hemmingsson & Jonsson, 2005; Law, 2002; Wilcock, 2006), occupational participation in daily life occurs naturally, but when survivors find an activity meaningful, the result of choice, motivation, and meaning within a supportive context and environment becomes critical and therapeutic.

This study has extended the existing literature (Kielfhofner, 2008; Law et al., 2002; Polatjako, 2007) on a general basis as participation and engagement in meaningful activity has been found to contribute to QoL among non-oncology patients. Overall, the results appeared to support the concept of participation in ICF and occupational perspective in relation on QoL of CRC survivors.

The findings also showed that occupational participation is an empirically distinct construct from IADL, leisure, social, and work and QoL outcomes. This suggests that when meaningful activity are included in the investigation, occupational participation may be better explained as 'participation in meaningful activity' which expands the subjectivity of participation. Occupational participation that facilitates subjective meaning was particularly adaptive in this population of CRC survivors.

The findings also offered the evidence that occupational participation and QoL is a timely concept in cancer survivorship period, where the meaningfulness or values of the activities exert a positive role in this relationship. Therefore, in engaging patients in their daily life occupation, health care professionals/occupational therapists need to advice patients on activities that are meaningful as per their subjective evaluation.

5.4 Strengths and Limitations

5.4.1 Strengths

The strengths of this study include sampling, response rate and multicentre. The method of participant inclusion, whereby all CRC patients were those who had been referred to UMMC and Selayang Hospital colorectal clinics made them eligible to participate. The sampling was performed in Klang Valley, the capital of the country, which made it possible to attain the ethnic background distribution of the country. Additionally, the two hospitals selected for sampling were the main referral hospitals for CRC patients from almost all the regions of peninsular Malaysia. This increased the generalisation of the findings in both settings, but limited it to CRC survivors in Malaysia. Performing a personal face-to-face interview on each patient and caregiver in a conducive room was one of the efforts taken to maximize the response rate (74.3%).

Moreover, the use of the outcome measure in Malay version which has been proven as valid and reliable was another advantage of this study.

Finally, structural equation modeling (SEM) which offers robust statistical tools for assessing relationships among variables and provided initial evidence of causal assumptions suggested by theory (Bollen & Long, 1992). Specifically, the PLS-SEM analysis showed the presence and magnitude of direct relationship simultaneously, with the only minimal of demands on the data distributions, sample size and measurement scale. Thus, this structural model served as an initial empirical evidence of path model significance effect and predictive relevance variables on QoL of survivors.

5.4.2 Limitations

Several study limitations need to be considered when evaluating the meaning of the findings. First, participants were non-randomly sampled and recruited from two public hospitals in Kuala Lumpur, Klang Valley. Thus, the findings from the sample may not be used to infer the general population of CRC survivors. However, as the models fit the data well, the SEM allows us to conclude the dependency between the variables.

Additionally, data was derived cross-sectionally; thereby, the findings are limit to imply temporal association and conclude causal evidence. Future studies (i.e. longitudinal and pre/post semi-experimental design) are needed to confirm this study's proposal of the structural relation between the variables.

A selection bias may have occurred where more active and fitter individuals with impairments could have had higher interest in participation. In addition, the data

obtained were solely based on patient report outcome, which could cause same-source bias or general method variance (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). Multi-informant data such as from caregiver or spouse and clinical observation or measurement (e.g. Karnofsky and ECOG performance scale) can procedurally remedy such method biases.

The amount of variance explained by the final model (i.e. 43.7%) suggests that there may be other variables that should be added for better understanding of the determinants of QoL. The findings of this study therefore, should be thought of as providing only indicative evidence.

5.5 Recommendation for Future Studies

Since this was a cross sectional designed study which the shared the variance from reliance solely in patients' report, it critically needs further research using longitudinal research design and multi-informant data source to confirm these findings. A longitudinal research design is needed to investigate further any causal relationships among factors included in this study. Multi-informant data source such as caregiver feedback and functional performance status tools such as the Karnofsky Performance Scale Index (Karnofsky, Abelmann, Craver, & Burchenal, 1948) and the Eastern Cooperative Oncology Group (ECOG) score (Oken et al., 1982) should be utilised in future studies.

Mixed method studies such as qualitative and quantitative studies are required to identify individuals' needs in relation to their occupational participation for the

provision of appropriate social support services for cancer survivors at a national level and within the health care system of the country. Qualitative studies, which provide opportunities for cancer survivors to express and explain their view on participation in meaningful activity, and to understand better the concept meaningfulness and QoL.

CHAPTER 6: CONCLUSION

6.1 Overview

This chapter presents the conclusion and the research and clinical implications for the field of occupational therapy and cancer rehabilitation.

6.2 Summary

This cross-sectional study examined the association between occupational participation, meaningful activity and QoL among CRC survivors. This theory-led study was designed and guided by ICF health model and occupational perspective, with occupational participation and QoL as the key element of the model. Using PLS-SEM analysis, the model was tested and the mediation effects were identified.

The current study found that occupational participation and meaningful activity predicted 43.7% of variance in QoL among CRC survivors. The study implies that positive influence in occupational participation (i.e. IADL, Leisure, Social and Work) predicted the positive influences in meaningful activity (in terms of i.e. values, competency, mastery, and also experiential meaning) and positive change in QoL (i.e. high in functional outcome, less in symptoms and high in global QoL) among CRC survivors.

Furthermore, occupational participation was associated with change in QoL via two pathways: a direct path from occupational participation to QoL and an indirect path through change in meaningful activity. This study concludes that meaningful activity fully mediates occupational participation and consequently leads to positive influence in QoL among survivors. This study contributes to the literature on participation of cancer survivors, implicating meaningful activity as a subjective evaluation of daily life activities.

6.3 Implications

Based on the distinctive findings of this dissertation, some noteworthy implications are generated for clinical practise, education and future research. These implications are presented below.

The findings of study generated new knowledge regarding the concept of participation that applies to CRC survivors. Both ICF model and occupational perspective were applied when analysing the data, which asserted the role of subjective appraisal of engagement in meaningful activity in occupational participation to health QoL. Findings of the study have identified the relevance of meaningful activity as being central in occupation participation which includes self-mastery and experiential leaning. This contributes to a positive health QoL outcome including better health functioning, less symptoms and good general health well-being. These will enable survivors, caregivers, occupational therapists and other health professionals to be informed of the elements of occupational participations and meaningful activity linked to QoL after a patient survives cancer. Occupational perspective (Kielhofner, 2008; Law et al., 2002) and empirical literature (Fallahpour & Jonsson, 2013; Hammel, 2008; Hagsstrom, Lund, 2008) defined participation as a complex and multidimensional concept, including the observed performance of activities and also the subjective experience of individuals concerning their participation. Previous studies (Hammel, 2009, 2004; Jonsson, 2008) have suggested considering individuals' 'personal aspect and subjective experiences' when operationalising participation. Thus, the understanding of concept participation as an essential and comprehensive classification in ICF health model has been explained and expended in non- western country such as Malaysia.

These findings established the growing evidence that supports the links between occupational participation, meaningful activity and health QoL, regardless can be implemented in the field of occupational therapy and oncology rehabilitation in Malaysian setting.

The present study's findings also suggest that occupational therapists should emphasise the significance of engaging meaningful activity or the content of meaningful activity engagement when assessing patients with CRC and their intervention outcomes, especially in survivors with occupational participation restriction. This implies paying attention to self-reporting in participation performance in IADL, social, leisure, and work activities. Furthermore, the present study's findings may also assist and guide occupational therapists in planning occupational interventions. This may lead to the initiation of occupational based interventions that aim to reduce the restriction in participation in complex daily life activities.

Strategies to consider subjective appraisal of engagement in meaningful activity during assessment and focus on occupational based interventions has to be initiated. As highlighted in a study done by Che Daud, Yau, & Barnett (2015), Malaysian occupational therapists perceive occupational based interventions as means and as an end which characterised by the use of occupation as a therapeutic medium (means) and as goal of therapy (end). An intervention on occupational performance that matches the client's goal, is identified as meaningful and is done within the client's context (Che Daud et al., 2015). This hence indicates that Malaysian occupational therapists have the

knowledge and understanding of occupational based interventions which can be applied to cancer survivors.

Additionally, this may provide a comprehensive patient care and establish occupational therapists' unique role in the field of oncology care which focuses on physical, psychological and spiritual interventions. Follow-up by knowledgeable healthcare providers is critical for the ongoing management of chronic health conditions that threaten participation and quality of life of survivors. Hwang, Lokietz, Lozano, and Parke (2015) asserted that a wide-ranging of approaches can be integrated into the survivor's holistic treatment plan to improve various symptom-specific problems and occupation-based issues. Some of the strategies are energy conservation and coping techniques, relaxation techniques for managing pain, fatigue, and sleep difficulty, exercise or leisure programs to improve strength and mobility, cognitive strategies, activity and work adaptation, and assistive technology to optimise performance in activities of daily-living, education, and employment, support and volunteer groups for preventing social isolation and promoting psychosocial well-being, and lifestyle consultation for enhancing health and QoL (Hwang et al., 2015). It's become imperative for occupational therapists to familiarize themselves with above strategies and to look at community models for educating survivors about risk prevention and health promotion of well-being through self-management (Keegan et al., 2012; Loh & Musa, 2015; Loh et al., 2013). Occupational therapist role is to serve these cancer survivors through consultation or program development that support active engagement in activities and participation in a full community life.

Finally, the findings lead to an implication to occupational therapy education and training, specifically in Training Division, Ministry of Health Malaysia. Educators must be informed of the results from empirical studies such as this and present the multifaceted information to students, whom current curricula and interventions with supporting evidence are limited (American Occupational Therapy Association, 2008). Findings of study may guide educators in developing appropriate curricula or training module for oncology rehabilitation for therapists. The need of specialised training for occupational therapists in oncology as part of their professional curriculum was in line with (Gillette & Kielhofner, 1979) who identified occupational therapists as those trained to be generalists practicing shall specialising in one area of practice. In line with MOH's policies (2010) and Ezat, Noraziani & Sabrizan's (2012) suggestion, the study's outcome may provide an insight in the long term strategic planning for prevention and preparation of chronic conditions as the growing aging population in Malaysia is inevitable.

6.4 Concluding Remarks

The present study provided substantial support for the notion that occupational participation has a significant positive influence on QoL among CRC survivors. This study established the hypothesis that positive change in occupational participation may influence positive change in QoL through two pathways: a direct path of influence from OP to QoL and an indirect path through change in meaningful activity. The research model was found as significant in that it explained 43.7% of variance in CRC survivors' QoL, namely through occupational participation and meaningful activity. Given sufficient predictive relevance (Q^2) of the model (0.471 to

0.612;(Q^2>0), the thesis contributes to a growing literature implicating subjective evaluation of meaningful activity as a fruitful means for exploring relationship between participation and QoL.

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LIST OF PUBLICATIONS AND PAPER PRESENTED

Publication

1. Sapihis, M., Loh, S. Y., Roslani, A. C., & Chinna, K. (2015). Participation restriction in cancer survivors: A cross-cultural adaptation and psychometric evaluation of occupational gap questionnaire. *Jurnal Teknologi (Science and Engineering)*.(77:33),49-57.4ISSN2180-3722.Open Access (SCOPUS-Cited Publication)

2. Sapihis, M., Loh, S. Y., Roslani, A. C., & Chinna, K. (2016). Occupational participation, Meaningful activity and Quality of life in CRC survivors: A Path Modeling. Disability and Rehabilitation (ISI Cited- Publication; IF: 1.191) (Proceeding- Under Peer Review) Manuscript ID: TIDS-11-2016-129.

3. Sapihis, M., Loh, S. Y., Roslani, A. C., & Chinna, K. (2017). The role of Occupational participation and meaningful activity on the Quality-of-life in Colorectal cancer survivors: Findings from path-modeling. *Disability and Rehabilitation (ISI Cited- Publication; IF: 1.191)* (Proceeding- Under Peer Review) Manuscript ID: TIDS-07-2017-042.

Conference Presentation (Oral)

1. Sapihis, M., Loh, S. Y., Roslani, A. C., & Chinna, K. (2018). Occupational participation, Meaningful activity and Quality of Life of Colorectal cancer. Oral presented at the World Federation of Occupational Therapist (WFOT) Congress, 21-25 May 2018, Cape Town, South Africa.
2. Sapihis, M., Loh, S. Y., Roslani, A. C., & Chinna, K. (2016). The Relationship between Occupational participation, Meaningful activity and Quality of Life on CRC survivors. Oral presented at the Selangor Research Day, 7-8 September 2016, Hospital Sungai Buloh, Jalan Hospital, Sungai Buloh, Selangor (Appendix B1 & B2)- 2nd Runner up winner

Conference Presentation (Poster Presentation)

1. Sapihis, M., Loh, S. Y., Roslani, A. C., & Chinna, K. (2014). A Review of Occupational Gaps and QoL in Chronic Diseases: Implication to Occupational Therapy. Poster presented at the Malaysian Occupational Therapist Conference. 22-23 May 2014, Allied Health Science College, Ministry of Health, Jalan Hospital, Sg. Buloh (Appendix D).
2. Sapihis, M., Loh, S. Y., Roslani, A. C., & Chinna, K. (2014). Assessing Activity Participation Restriction in Chronic Diseases: Validity and Reliability of Occupational Gap Questionnaire (OGQ).Poster presented at The 6th International Conference on Postgraduate Education (ICPE06 2014), 17-18 December 2014, University Technical Malacca, Malaysia(UTEM) (Appendix D)